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CONTENTS

F. HAVASI: The Sixth Five-Year Plan of the Hungarian National Economy (1981—1985) 1
I. T. BEREND: Reflections on the Sixth Hungarian Five-Year Plan (1981—1985) 17
M. TARDOS: Options in Hungary's Foreign Trade 29
A. KÖVES: Turning Inward or Turning Outward: Reflections on the Foreign Economic Strategy of CMEA Countries 51
E. HUSZTI: Main Trends in the Development of Socialist Banking Systems and Organizations 71
É. PALÓCZ-NÉMETH: Exports of Manufactures of CMEA and Developing Countries to Developed Industrial Countries 93
GY. ERŐS: Some Problems of the International Monetary System 107
I. NYIRI: Gold — Gold Price — Currency Reserves 123
F. MOLNÁR: Consumers' Investment Versus Capital Investment 133
U. KIVIKARI: Problems and Prospects of an Open Economy: Finland's Case 157

REVIEWS

J. KORNAI: On the Difficulties and Deficiencies of Mathematical-Economic Research in Hungary 175
I. DOBOZI: The Fifth Hungarian—US Economic Roundtable 186
News about the Hungarian Economic Science. The 140th General Assembly of the Hungarian Academy of Sciences 195
Jenő Rácz (1907—1981) 198

BOOK REVIEWS

J. KORNAI: Economics of Shortage (R. ANDORKA) 199
A. KÖVES: Opening to World Economy: Challenge and Necessity (A. INOTAI) 201
GY. POGÁNY: On the System and Development of the Division of Labour (SZ. BABANÁSZISZ) 206
L. LAVALLÉE: Growth of a Socialist Economy: Romania (M. FÜLÖP) 208
H. LEIPOLD: Wirtschafts- und Gesellschaftssysteme im Vergleich (A. INOTAI) 210
W. BEITEL — J. NÖTZOLD: Deutch-sowjetische Wirtschaftsbeziehungen in der Zeit der Weimarer Republik (A. INOTAI) 212

BOOKS RECEIVED

ACTA OECONOMICA

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M. SIMAI (Chairman) E. CSIZMADIA, P. ERDŐS, T. ERDŐS,
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CONTENTS

F. HAVASI: The Sixth Five-Year Plan of the Hungarian National Economy (1981–1985) ... 1
I. T. BEREND: Reflections on the Sixth Hungarian Five-Year Plan (1981–1985) 17
M. TARDOS: Options in Hungary's Foreign Trade 29
A. KÖVES: Turning Inward or Turning Outward: Reflections on the Foreign Economic Strategy of CMEA Countries 51
E. HUSZTI: Main Trends in the Development of Socialist Banking Systems and Organizations . 71
É. PALÓCZ-NÉMETH: Exports of Manufactures of CMEA and Developing Countries to Developed Industrial Countries 93
GY. ERŐS: Some Problems of the International Monetary System 107
I. NYIRI: Gold – Gold Price – Currency Reserves 123
F. MOLNÁR: Consumers' Investment Versus Capital Investment 133
U. KIVIKARI: Problems and Prospects of an Open Economy: Finland's Case 157
Editor's Preface 221
M. AUGUSZTINOVICS: The Rate of Economic Growth in Hungary 1950–2000 223
R. ANDORKA – B. FALUSSY: The Way of Life of the Hungarian Society as Reflected by the Time Budget Survey of 1976–1977 243
É. KIGYÓSSY-SCHMIDT: Sectoral Interrelations between Material and Non-Material Spheres of the National Economy in a Dynamic System 275
L. FÜSTÖS – GY. MESZÉNA – N. MOSOLYGÓ-SIMON: Cluster Analysis 291
T. FÉNYES – J. SÁRI: On the Difference Equation System of the Composition of the Amount of Money 335
F. SZIDAROVSZKY: On the Generalization of Nash's Cooperative Solution Concept 361
G. KORNAI: Has the Hog Cycle Ceased to Exist? (An Econometric Model of the Hungarian Pig Farming) 369

INTERVIEW

Economics and Psychology – An Interview with János Kornai about his Book "Economics of Shortage" 389

REVIEWS

J. KORNAI: On the Difficulties and Deficiencies of Mathematical–Economic Research in Hungary 175
I. DOBOZI: The Fifth Hungarian–US Economic Roundtable 186
News about the Hungarian Economic Science. The 140th General Assembly of the Hungarian Academy of Sciences 195
Jenő Rácz (1907–1981) 197
GY. BÁNKÖVI – J. VELICZKY – M. ZIERMANN: New Ways and Means in Econometrics .. 403

BOOK REVIEWS

J. KORNAI: Economics of Shortage (R. ANDORKA) 199
A. KÖVES: Opening to World Economy: Challenge and Necessity (A. INOTAI) 201
GY. POGÁNY: On the System and Development of the Division of Labour (SZ. BABANÁSZISZ) 206
L. LAVALLÉE: Growth of a Socialist Economy: Romania (M. FÜLÖP) 208
H. LEIPOLD: Wirtschafts- und Gesellschaftssysteme im Vergleich (A. INOTAI) 210
W. BEITEL – J: NÖTZOLD: Deutsch-sowjetische Wirtschaftsbeziehungen in der Zeit der Weimarer Republik (A. INOTAI) 212
A. BRÓDY: Cycle and Control – An Attempt at Constructing the Mathematical Model of the Classical Market and Business Cycle Theory (J. KORNAI–A. SIMONOVITS) 409
M. AUGUSZTINOVICS (ed.): Macroeconomic Models in Long-Term Planning (R. ANDORKA) 414
M. HEGEDÜS – E. ZALAI: Fixed Point and Equilibrium in Economic Models (L. LÖVEI) ... 417
G. PÁRNICZKY: Foundations of Statistical Informatics (J. UJVÁRI) 418

BOOKS RECEIVED

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F. HAVASI

THE SIXTH FIVE-YEAR PLAN OF THE HUNGARIAN NATIONAL ECONOMY (1981–1985)*

The main objective of the new Hungarian five-year plan is to restore the equilibrium of the national economy through intensive development. The plan provides for a much more moderate growth rate than in earlier periods but for a higher one than in 1979–80. The living standards policy envisages preservation of the standards attained so far. The author analyses the plan targets from the following three aspects: 1. whether the plan is suited for giving positive response to international economic and political changes; 2. whether it corresponds to the requirements of the intensive phase of development; 3. whether it secures the preservation of a balanced internal political situation and atmosphere.

The performance of the last five years (1976–1980)

On the last five years, under more difficult conditions than expected, through many efforts and sacrifices considerable achievements have been made in the development of the Hungarian national economy and in consolidating the material-technical foundations of socialism. Some of the targets of the 5th five-year plan for 1976–1980 were overfulfilled. For example, the investments accomplished in five years was above the target in spite of curtailments carried out in recent years; nursery and kindergarten accomodation was created for more children than planned and 445.000 to 450.000 flats were built instead of 435.000. The number of hospital beds and of primary school classrooms increased. In other fields, especially in agricultural production, the objectives were met. At the same time a number of important objectives – such as the growth of national income, of industrial production and construction, of personal consumption and a rise in real incomes and real wages – have not been implemented.

The assessment of the resulting situation has to set out from the fact that the 5th five-year plan reckoned with changes in the external and internal conditions of the economy. Therefore it denoted as main objectives a powerful enhancing of efficiency in production and a better controlled growth of the domestic uses of the national income, improving thereby the equilibrium of the national economy. All that had to be implemented along with a relatively dynamic increase of production and of the standard of living.

In the first three years of the plan period the growth of production was almost in conformity with the plan but it was not accompanied by meeting the qualitative

*On the basis of the author's speech at the Central Committee Session of the Hungarian Socialist Workers' Party on November 13, 1980, and the speech delivered in the National Assembly on December 18, 1980.

requirements of economic development. Instead of the planned improvement, the external and internal equilibrium deteriorated. Domestic uses increased at a higher rate than did the national income. Disequilibrium between investment and executing (building) capacities increased, the volume of stockpiling exceeded the planned figure and, especially in 1978, a marked increase of imports ensued.

In this stage, numerous achievements nothwithstanding, development of the economy did not completely follow the economic-political guideline formulated in the 5th five-year plan, and in a number of important fields it fell short of the requirements deriving from changing external and internal conditions. This was so basically for two main reasons. Firstly, the external economic conditions evolved more unfavourably than expected, the terms of trade were worse than presumed in both relations (i.e. both in trade settled in convertible currencies and in that settled in rouble). It thus became more difficult to boost exports to western markets and also imports from socialist countries. The second reason was that – while the task of restoring equilibrium proved to be more difficult than presumed – central control and the system of regulators failed to stimulate the economy to the extent expected, to comply with changing world market conditions, Consequently the improvement of efficiency, the modernization of the production pattern and the enhancing of marketability did not come up to the necessary standards either. Enterprise management was preoccupied with stabilization efforts.

After the first three years (1976–1978) of the 5th five-year plan it became clear that the vain pursuit of quantitative plan targets would inevitably make the equilibrium problems still worse. Therefore it had to be decided whether to carry on with the practice of earlier years or to abandon it, accepting that, with respect to economic development, we really start on the road to restoring equilibrium through accelerating the qualitative changes, though several targets of the five-year plan would not be numerically fulfilled.

Upon such reflections the Central Committee of the HSWP resolved in December 1978 that *the main task of economic work must be restoration of the external equilibrium of the national economy as well as preservation and consolidation of the attained standard of living.* It also specified that production should develop along this line, that investment and distribution be adjusted to these goals. Towards these ends substantial changes were carried out in economic control and in the organization of implementation in 1979, and in 1980 a new system of prices and regulators was introduced.

As a result, processes meeting the requirements stated in the said resolution began to evolve. In 1980 trade settled in convertible-currency areas was nearly balanced. As to internal equilibrium, harmony between purchasing power and commodity funds could be maintained in the last two years and also investment and employment were more balanced. In these years the main factor in the restoration of equilibrium was the curbing of domestic uses rather than the improvement of the international competitivity and efficiency of production.

But the achievements of recent years are remarkable also because in 1979–1980 steep price increases took place again in the world market and recession became dominating in the capitalist world economy. Marketing and credit-raising conditions became

tougher and – in spite of considerable price rises – conditions of expanding exports and increasing purchases dwindled also in the turnover between CMEA countries.

Achievements in the last two years of the plan period testify that the objectives contained in the Central Committee resolution of December 1978 were correct. Thereby good grounds were provided for drawing up the 6th five-year plan and for starting its implementation.

Main objectives of the sixth five-year plan and its nature

The 6th five-year plan sets out from the fact that the strategy of economic policy and control pursued in 1979–80 must be consistently carried on. In the planning work the new five-year plan targets were defined in consideration of the situation that had taken shape by the end of the previous plan period, as well as of the expectable external and internal conditions of economic development in the coming years.

Under the impact of the unfavourable processes in the world economy, the Hungarian economy suffered a large price loss in the last five years. Credits had to be raised to provide for the steady development of the economy. The external conditions of economic development are not going to be any more favourable in the next plan period either. Competition is getting sharper in the world market, marketing will be expectably more difficult and so will the staying in markets already acquired and the mitigation of losses suffered because of deteriorating terms of trade. There are limits to the expansion of import from socialist countries, and the quality requirements towards Hungarian export are rising. The new price proportions of the world market gradually assert themselves also in the relations between socialist countries. Owing to the pattern of our exports and imports we have to reckon with worsening terms of trade also in these relations. All in all, the new five-year plan cannot ignore further 6 to 7 per cent deterioration in the terms of trade, even if the high-quality requirements are met.

Consequently, about two-thirds of the increment of the national income will have to be allocated to restoring the balance of trade. Exports must be increased at a substantially higher rate than imports and in trade with convertible-currency areas an export surplus must be attained.

While the above task will be harder to deal with because in the last two years the external equilibrium position has in most cases been improved by curbing domestic uses and by exploring reserves more easily and rapidly accessible, *in the 6th five-year plan the basic source for improving equilibrium cannot be anything else but the raising of the efficiency and international competitivity of production,* that, is, factors that provide a lasting solution.

For a long while economic development was identified with quantitative growth and, at a certain stage, this was correct and necessary. It took time to realize that quality and a corresponding rate of development are the only possible way of future socio-economic progress. In this age progress is characterized by such quality criteria as up-to-

dateness, profitability and competitivity. An economy is really dynamic if it is capable of robust transformations and of flexible adaptation to circumstances.

The main line of economic-policy action in Hungary today is the promotion of intensive development in each sphere of the economy. This provides foundation for the restoration of equilibrium of the economy, for preserving the attained standard of living, and for improving living circumstances in adjustment to real possibilities.

In view of the opportunities for improving international competitivity and for expanding imports, *the rate of growth to be set as a target is relatively modest but higher than in the years 1979–80. The national income may be increased by 14 to 17 per cent in five years.* Because of the requirements related to the restoration of equilibrium domestic uses may increase by 3–5 percent, i.e. by much less than the national income.

Under the known and expectable circumstances of economic development the economic-political guideline of the plan and its targets are *the only realistic way* that may give grounds for more advantageous growth and may consolidate the economic bases of social progress.

A consistent implementation of this economic-political guideline demands flexible adaptivity and mature response in practical action. That is, the *implementation of the economic-political strategy implies the improvement and expansion of manoeuvring ability on every level of management.*

Considering the above and for the sake of an unequivocal assertion of the paramount economic-political requirements and objectives, the plan is *unusually flexible, in some respects it is more open, and, occasionally, it is of an orienting kind where decisions are concerned.* This allows to adjust work to changing circumstances both in management and in implementation.

As the medium-term plan is a kind of an economic-political programme and comprises a relatively narrow range of commitments, this allows and also calls for concrete measures to be taken continually and to be adjusted to the given situation. In the context of comprehensive objectives, alternatives for implementation arise mostly in the field of developments and investments. The study and elaboration of possible alternatives are further tasks of planning work. It also follows from the nature of the plan that concrete decisions on investment can be taken at present only for the first years of the plan period while investment projects to be started later on may be decided upon in the annual plans depending on circumstances and on the achievements of economic construction.

Programmes adjoining the plan

For the purpose of backing up the line of economic policy, of shaping social action, and of exploring and exploiting reserves, govermental programmes are drawn up simultaneously with the plan to solve a number of important tasks.

It appears to be necessary that the *industry,* relying on Hungarian conditions and utilizing our endowments more rationally should satisfy domestic and foreign trade requirements in a better quality and pattern. Its contribution to the national income should increase at a higher rate than production and it should increasingly help improve the balance of foreign trade.

In alignment with these tasks the central development projects of petrochemistry, computation techniques and of the aluminium industry approved earlier will be carried on. The implementation of new central development programmes will start also in the production of medicines and plant protectives and in the electronic industry. Programmes covering several sectors have been drafted such as energy saving and rationalization, the recycling of wastes and secondary raw materials, and the economical utilization of domestic forest stocks.

The central development programme for the production of pharmaceutical, plant-protective and intermediary products provides in the production of medicines for maintaining competitivity in the world market and for increasing export mainly through a growing share of original products; and in the production of plant protectives, beside satisfying a higher amount of domestic demand, the programme prescribes a powerful expansion of exports to the Soviet Union. Development of research activities is a basic precondition of implementating the programme.

The main objective of the central development programme for the *electronic* industry is to manufacture electronic and therein microelectronic parts. The creation of this new line of production requires broad international cooperation as well as coordination and improvement of research, development and trading activities.

The programme for a better utilization of the domestic *forest stock* aims at bringing about harmony between the live forest stock and exploitation, as well as processing, by increasing the use of the existing less valuable stock and by improving the quality of processing.

Through the programme for the utilization of *wastes and secondary raw materials* the collection and recycling of various valuable materials – mainly paper, dead oil, non-ferrous metals and man-made materials – will be increased by about 25 percent.

The *energy programme sets an extremely stepped-up task to the national economy. Practically it demands that the growth* of energy consumption in five years should not exceed *10 percent* and that the 1980 level should be maintained in the use of traditional primary energy. It is intended to stress the use of relatively cheaper primary energy, to spread energy-saving technologies, and to let a prudent consumer's attitude prevail.

In *agriculture* the main task is a better assertion of the quality, profitability and saving requirements. We have significant reserves in raising yields, beside better business management. The biological capacities of the major plants are not fully exploited. The large-scale farms can economically and substantially increase their present average yields even without changing the species under appropriate conditions of production. Interests are attached to a better exploitation of reserves inherent in genetical and biological factors both in plant growing and in livestock breeding for the purpose of – economically – increasing yields.

In the context of agricultural development reference must be made to the tasks entailed in this sector by a better utilization of domestic protein resources, by an enhanced preservation of the arable land and of soil quality, and by a more intensive utilization of meadows and grazing land.

The requirements deriving from changes in the conditions of agricultural development must be asserted in every field of social and economic life. It will be therefore an equally important political and economic tasks in the years ahead that *rational and parsimonious management should dominate production and public and individual consumption.*

The programme of economizing on social public expenditure is aimed at moderating the running costs of institutions. According to the plan the increase in social public expenses will amount to about two-thirds of that in the past five years.

In certain cultural, administrative and infrastructural fields only a more moderate rate of development can be implemented than what had been hoped for.

Assessment of the economico-political strategy

In connection with the assessment of the five-year programme of economic development, i.e. with the economic-political strategy, three questions have to be answered:

– Is the plan suitable for giving positive response to tasks arising from the international economic and political changes?

– Are the requirements of the intensive phase of development expressed in, and met by, the plan?

– Do the plan and its implementation guarantee the economic and material conditions required for the maintenance of a balanced home-political situation and climate?

Consideration of the world economic situation

As far as the first question is concerned, the world economy has gone through significant and lasting transformations in recent years. These are expressed in powerfully changing prices and price proportions, in increasingly difficult selling and purchasing opportunities in the world market; in a slackening growth of the world economy and in strengthening discriminatory and protectionistic tendencies; in some of the developing countries' entering the market as competitors; in troubles CMEA economies face because of their transition to intensive development and in a temporary slackening of development in their mutual relations; as well as in uncertainties of the capitalist international economic and monetary system.

Simultaneously with the changes in world economic processes we also witness such political events as will impede, owing to the halt of the process of détente, the improvement of international economic relations.

Owing to its international openness, originating from its conditions, its economic structure and the requirements of higher efficiency, the Hungarian economy participates of necessity in the international division of labour, enjoying its advantages and sharing its problems. Thus, our economic progress is heavily dependent upon our ability to develop international economic and commercial relations, on how we can exploit the benefits offered by it and overcome the unfavourable impacts.

Bearing the experiences of past years as well as our economic conditions in mind, the 6th five-year plan has been drafted in such a manner that

– its response to the world-economic crisis is not seclusion but provides for basically export-oriented and reasonable import-substituting development lines;

– it provides for a structural transformation expected to result in enhanced international competitivity and flexible adaptation to external conditions;

– in order to improve the equilibrium and to lay the foundations for steady and balanced advancement it reckons with a much faster increase of exports than of imports.

These requirements are expressed in a producer price system corresponding to the new international price proportions and following export prices; in financial regulations stressing profitability and encourageing exports; in selective investment and credit policies serving the promotion of competitivity; and in the rationalization programmes aimed at a moderation of material and energy intensities.

Beside expanding the traditional foreign trade relations priority will be given to long-term cooperation in production and in technico-scientific fields; to purchasing and economically exploiting licences and production technologies; to the expansion of participation in joint ventures; greater attention will be paid to the system of relations between production and foreign trade; to improving foreign trade organization and marketing; to the expansion of cooperation based on mutual advantages in so-called third markets; as well as to using up-to-date methods of enterprise management satisfying these requirements. Thereby we hope to achieve a safe expansion of market relations and in certain priority fields a gradual closing up to the technical and technological level of the internationally pioneering countries which we regard as our standard.

Along with the development of international economic relations it is also our duty to strengthen our alliance and co-operation with the Soviet Union and the socialist community – in harmony with the changes taking place in the international political state of affairs – and to contribute to the further strengthening of the defensive power of the Warsaw Treaty.

The path of intensive development

As far as the second question is concerned – the one about transition to intensive development – it is no easy task in itself to cope with the changing international circumstances. At the same time in Hungary also the internal conditions of development have changed. The extensive reserves of growth have become depleted.

The evolution of *intensive development based on quality factors* has become pressing. The fulfilment of this requirement is, as stated in the 6th five-year plan, a key task in the coming years, a primary condition of consolidating equilibrium. Accordingly, it is assumed that, in the given circumstances, this task must be solved *along* with a more moderate quantitative growth *than before*. This is also reflected by the numerical plan targets.

In the phase of intensive development, and especially during the transition to it, the growth rate will necessarily be more moderate than in the phase of extensive development. In the coming years the rate of development will have to be in keeping with the requirements of equilibrium and with increasing efficiency based on structural changes in production.

The plan contains low targets for quantity and high ones for efficiency. Their implementation will be no smaller task than that of the previous ones, moreover, *advancement* based on quality factors requires better work in every field of social and economic life.

The forecast 3 percent annual average growth rate corresponds to the average rate of CMEA countries according to international forecasts. For the majority of the advanced capitalist countries a lower rate of growth is envisaged. The forcing of a faster growth rate would entail deterioration in the equilibrium for it would need such a volume of imports as could not be balanced by economical exports.

If our work is more successful than presumed in the plan, and if the external economic conditions also take a more favourable turn than calculated, then the rate of growth may also be somewhat higher. Indeed, this ought to be an endeavour in the course of implementing the plan. The resulting additional resources should be reasonably used for a safer foundation of the economico-political line stated in the plan, i.e. for enhancing the competitivity of production; this would have favourable impacts in every field of economic life including the improvement of living circumstances.

For the purpose of promoting intensive development based on quality factors the plan emphasizes the following:

– Productivity will increase at a higher rate than production, the efficiency of live labour will significantly improve; in the sectors of material production, employment will decrease by about 25 per cent, and the per capita production will increase by approximately 20 per cent.

– Through modernization and more economical exploitation of the existing stock of fixed assets (possibilities for expansion becoming more modest) and through making the entire development activity more rational and efficient, the combined efficiency of live and embodied labour will increase by 12 per cent as against the 8 per cent attained in the last five years.

– Material inputs will evolve more advantageously, production and marketing will require smaller stock and the management of inventories will improve. A unit increase of the national income will require a 0.6–0.7 per cent rise in energy consumption and a 0.7–0.8 per cent one of stocks as against the previous period when energy consumption

and the national income increased practically at the same rate, while the increase of inventories was markedly faster.

By accelerating technological development the improvement of quality and the raising of profitability will be enhanced. Under the 6th five-year plan 100.000 million forints will be spent on scientific research and technological development.

The foundation for an economic development showing the planned qualitative changes cannot be laid but by increasing production in a way adjusted to efficiency requirements and differentiated by sectors and enterprises. It is therefore absolutely important to produce only what is demanded. Expansion of efficient exports, reasonable substitution of imports and profitable satisfaction of effective domestic demand are the only viable ways of increasing production. All these require drastic rearrangements in production, development and employment. Nearly one-third of industrial production in this country is not up-to-date and profitable enough and needs subventions. It is imperative to change this state of affairs as quickly as possible.

Moderate growth rate stands not against but rather for a dynamic development of certain sectors, enterprises and activities. Enterprises capable of efficient expansion of export, of substituting import and of satisfying domestic effective demand may increase their production at a faster than average rate.

The most important duty of enterprises that do not meet the above requirements is to update their production and to make it more economical and, where this is not feasible, to maintain or gradually reduce or eventually discontinue production.

For this purpose the system of regulators should encourage a faster development of enterprises with efficient business activities and, at the same time, force the winding-up of uneconomical production, especially in the manufacturing industry. Quick adaptation to changing conditions and cost reduction can be accomplished only through increasing the autonomy and initiative of the enterprises and by strongly improving the standards of management. Therefore enterprise management has to meet very exacting requirements imposed by central control, and no exemption is made to the economic units.

The realization of the production objectives is profoundly conditional on *improving the standards of development activity.* Accordingly, the share of allocations to the creation of new capacities has to be reduced within investment; while the shares of modernizing, reconstruction and complementing of existing machines and equipment have to grow. This will also help reduce the share of construction within productive investment. However, even updating and reconstruction will only be possible in fields where they effectively enhance competitivity and the improvement of equilibrium.

While the volume of investment in the state and co-operative sectors will be similar to that in the preceding five years, the production of basic materials and energy will claim greater shares. Thus the development possibilities in manufacturing are rather scarce, and this makes the criteria of efficiency stricter and harder to comply with.

Regarding the judgement of the investment level it should also be borne in mind that the amount of 1020.000 to 1040.000 million forints allocated by the plan is very much money. If this sum is economically used throughout implementation then substan-

tial progress might be achieved in updating production, technological development, in the foundation of long-range development and in the improvement of living circumstances.

In the field of industrial construction and agricultural investments *the share of the enterprises' own funds and the importance of credits granted on basis of tenders will increase.* The role of state support in enterprise developments will decrease.

The raising of labour productivity is a basic condition of implementing the economic policy. This requires substantial improvement in labour management. Consequently, the maintenance of full employment and a powerful improvement of the efficiency of live labour must be achieved simultaneously.

A more rational labour management is required than has hitherto been the case. Transformation of the product pattern and of the structure of activities will necessitate improved work organization and discipline, the acceleration of the regrouping of economically not employable labour to efficient fields inside the enterprise or between enterprises; and through recycling as required by structural transformation.

In case production and productivity grow at the planned rate it will be possible to reduce employment in industry and construction by about 120.000. In agriculture the basic activity will be less able to dispense with further people while employment in the complementary and auxiliary activities will keep expanding. *Employment in the infrastructural sectors may increase by about 100.000 people in five years.* Most of them may be employed in the health and educational sectors.

The efficiency of employment can only be enhanced through a more consistent insistence on the socialist principle of distribution according to performance, that is, by adjusting wages to the quantity, quality and results of the work done and differentiating them accordingly. The real wage per capita of the economically active population will remain unchanged in the coming years. However, the financial situation of those who perform excellently will improve while for those who do not or only slightly improve their performance the continuation of their real wages cannot be guaranteed.

It is a momentous step towards improving the conditions of work and living that from 1982 on, the five-day working week will be introduced.

Balanced internal political conditions

In this stage of economic development it is particularly important for the building of socialism to guarantee a quiet and balanced home political climate. The living standard policy plays a basic role in this.

In Hungary the standing objective of the living-standard policy has remained the same. We continue to strive to attain that the building of socialism should be accompanied by a steady improvement of public welfare. The five-year plan is intended to preserve and consolidate the achievements in the standard of living and further improve

living circumstances. If we assess the situation realistically, this is the biggest task we can set for ourselves for the time being.

The standard of living cannot be preserved and the planned increase of personal and public consumption cannot be achieved unless the share of consumption increases to 81–83 percent and the rate of accumulation accordingly within the domestic uses, which have to increase much more moderately than the national income created.

Total personal consumption cannot but slightly increase in the coming years. However, the standard of living is not equal to incomes and consumption. It includes the living and working circumstances, the infrastructural as well as other factors, the non-economic elements of the way of life. The improvement of the living circumstances may affect the general atmosphere favourably.

The main point is the security of existence: the safeguarding of a state of affairs in this country where for social reasons there are no starving and poorly dressed people; the full employment of people in the working age; the right by citizenship to free health service, to schooling and education.

Our pension system stands up to international tests. Hardly two decades ago we decreed that the peasantry were entitled to pension after ten years of employment and from this January 1981 their age of retirement is the same as of workers and other employees (60 years for males and 55 years for females). Twenty years ago the amount paid out on pension was equal to 3 per cent of the national income, now it is 9 to 10 per cent. In 1960 the average pension of workers and other employees was 45 per cent of their earnings, now it is 61 per cent. Our aim is to preserve the real income which has almost doubled in 20 years. We also wish to continue building 7–8 flats per 1000 inhabitants each year, to provide the opportunity for the running of nearly one million passenger cars and for buying new ones; to create conditions for about 5 million people (out of the 10.7 million inhabitants) to make annual journeys abroad.

The preservation of the standard of living naturally does not mean that the income of each family and each citizen will remain on the present level. It is namely a primary interest that the quality and quantity of the work done and differences in performance should be better reflected by the incomes originating from work.

At the same time we intend more powerfully to assert the other side of our socialist policy of distribution, namely, to *reduce* the differences due to family size and to other social reasons, irrespective of work, through furthering the system of social benefits. That is, improvement of the terms of distribution and the levelling of social inequalities will entail slight modifications in relative income proportions.

The share of social benefits will increase in personal incomes, moreover, the increment of real income will derive almost entirely from social benefits.

It remains an important objective to decrease differences in per capita income resulting from different family sizes. For this purpose the real values of the family allowance paid to families with three and more children as well as of lower than average pensions will be preserved while the real value of the lowest pensions will be increased. For the sake of maintaining the level of benefits in kind, the real value of the norms of

nutrition in health, social and educational institutions will be preserved. The family allowance after two children, the maternity allowance, scholarships and social aids will also be somewhat increased.

The funds available for social purposes will be allocated in the first place to the improvement of living conditions of strata living under difficult circumstances and suffering disadavantages. The sense of social justice also demands that mainly the situation of large families and the old in need should be alleviated by increasing social care.

The standard of living attained may not be regarded as preserved, and financial incentives may not be considered effective unless public supply does not deteriorate but possibly improve, unless people can buy good-quality and up-to-date products satisfying their demands, needs and tastes for their money in civilized circumstances and unless they get better service. It is therefore important to consistently maintain the long-standing order of economic life, i.e., to have firm commodity coverage behind any outflow of income and purchasing power. For this purpose the production-influencing and organizing function of the commercial network must be increased, research to explore demand has to be improved, and the different forms of importing consumer goods must be expanded. For the purpose of steady and expanding supply the manufacturing and service activities of small and medium factories and of private small-scale industry will have to be more relied upon.

The operation of the complementary (or so-called secondary) economy may also give its modest contribution to the shaping of living conditions. This activity has expanded lately. It largely consists of legal activities organized or controlled by society but it also has its invisible, hidden forms. Since its existence occasionally shows negative symptoms, such as abuse of monopoly position or cunning, the public judgement of its role in Hungary is ambivalent. Necessary and useful activity is an essential and determinative factor of complementary economy and this we support because both society and the individual benefit from it.

It was not necessary to set up the complementary economy; it has evolved spontaneously and exists because it was brought into being by unsatisfied demands and objective needs. When socialist industrialization was started in Hungary it was naturally not expected that 30 years later personal property would assume such dimensions and that the preservation, maintenance and repair of durable goods in possession of the population would need such an amount of qualified labour. The new enterprises were not designed for personal "odds and ends" or for services. Such work was not rewarded adequately by either prices or wages for a long time, and the organization of a big enterprise adapts itself with difficulty to the rational and profitable performance of such services. This is why the concealed forms of work spread and monopoly positions and "black" rates could evolve.

These problems cannot be solved either by moralizing or with administrative instruments. The task is to rid the necessary and useful activities of unreasonable restrictions and to make them visible and legal in order to fit them into the scope of

activities organized and controlled by society. At the same time severe action will have to be taken against cases violating law and order and the norms of society.

We know that the great tasks of socialist construction and thus the objectives of the 6th five-year plan will be carried out invariably by the socialist big enterprises and by the socialist large-scale farms but, in addition, we will sponsor and support the spontaneous work of the people as this can contribute to the expansion and variety of the assortment of goods and services as well as to creating additional incomes. The public recognition of additional income originating from here and proportional to work must be helped also by political and legal instruments.

Development of the control and incentive system

The realization of the targets formulated in the plan lays heavy but manageable duties on Hungarian society. Conditions of fulfilling the tasks are to make use of experiences of past years and to possess a concerted set of control instruments coordinated with the economic objectives, providing sufficient incentive and exercising coercive force toward implementation. It may be regarded an advantage that the amendments required in economic control and in the entire system of conditions and instruments of business management have been largely drafted lately parallel to formulating the main line of economic development.

Measures aimed at enhancing the efficiency of economic control on the highest governmental level and on the levels of functional and sectoral control alike have been taken in this basis. Our main aspiration is to enable the government agencies of economic control to make prompt and competent decisions on the basis of the national economic plan and to take coordinated and united actions in their implementation.

This requires a *stronger role of central planning.* When coordinating the economic processes it should clearly be stated who is responsible for what aspect of implementation. The instruments and methods of instant and flexible adaptation to the changing external and internal conditions should be developed in the framework of national economic planning. Opportunities for an operative control and for appropriately rechannelling the disadvantageous deviations from the plan given are an indispensable condition.

Central control must state definite and clearcut guidelines developing enterprise management *so that the responsibility of management and the initiative and inventiveness of enterprise staff* might evolve to the fullest, while simultaneously providing for coordinated activity. Control and supervision of enterprises must be carried out without minute and bureaucratic interference with daily business issues.

The systems of prices and financial control introduced in 1980 are suitable for implementing the economico-polical objectives and for solving the tasks in the sphere of production. The improved system of economic regulators stimulates business managers, restricts the conditions of management and is more expressive of the central will. On this

assumption it sets conditions of price, cost, income and business terms under which the efficiency of enterprise work can be assessed by international standards.

It is important that the principles of the system should be observed consistently and the subsidies and preferences granted provisionally should be gradually abolished. Reasonable corrections should consistently be carried out by the economic control agencies and, at the same time, any aspiration at individual discrimination and thereby at a loosening of efficiency requirements must be resisted. The system will thus have a great power of orientation, moreover, it will stimulate toward higher efficiency.

These steps might entail more frequent and stronger clashes of interests and conflicts than accustomed to and will accompany the enforcement of efficiency and equilibrium requirements. These implications should be reckoned with consciously and resolved in a progressive way.

The updating of the enterprise organization, a partial lifting of restrictions on enterprise profiles and scopes of activity, and the development of new forms of enterprise must become integral parts of the development of control.

Furthermore it will be necessary to draft measures designed to moderate the unreasonable organizational fragmentation of production and marketing, to establish intensive relations between producers and users as well as better cooperation between producing, foreign trading and domestic trading enterprises.

We need an internal system of control and incentives of the economic organizations that will make staffs more interested in profitable business. The simultaneous assertion of social and enterprise objectives and the mobilization of staffs and individuals must be promoted also by improved factory democracy.

In order to make the enterprises more willing to take initiatives and risks, higher moral and financial acknowledgement must be given to managers who are successful and run risks with responsibility.

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The solution of our economic problems requires tenacity, diligence, discipline, greater intellectual effort, ingenuity and greater initiative. We cannot escape the challenge of the international economy. If we want to participate in competition – and this is imperatively vital for us – we must not make comparisons with the past or ourselves only. The scale must be adjusted to international economic requirements. What we have not done out of our own accord, we shall have to do under the pressure of life, of the hard realities of management, or under more difficult internal and external conditions of development.

The accomplishment of the targets of the 6th five-year plan will enable Hungary to create favourable conditions for social and economic advancement in the eighties.

VI. ПЯТИЛЕТНИЙ ПЛАН РАЗВИТИЯ ВЕНГЕРСКОГО НАРОДНОГО ХОЗЯЙСТВА (НА 1981—1985 гг.)

Ф. ХАВАШИ

Во вступительной части статьи, написанной на основе выступлений на заседании Центрального Комитета ВСРП и в Государственном собрании ВНР, секретарь Центрального Комитета Венгерской социалистической рабочей партии указывает на постановление ЦК ВСРП, принятое в декабре 1978 г., которое выдвинуло в качестве основной задачи улучшение внешнего равновесия народного хозяйства и сохранение достигнутого уровня жизни, подчинив этим задачам динамику производства, развития и распределения. В 1979—1980 гг. были проведены значительные изменения в управлении экономикой, в системе экономических регуляторов и цен. В результате этого в более трудных внешнеэкономических условиях было достигнуто улучшение равновесия, а также начали развертываться положительные процессы в других областях народного хозяйства, хотя рост национального дохода замедлился.

VI. пятилетний план предполагает, что внешнеэкономические условия не станут более благоприятными, чем они были в 1979—1980 гг., и поэтому две трети прироста национального дохода должны быть затрачены на улучшение внешнеэкономического равновесия. План предусматривает относительно умеренный — 14—17% за пять лет — рост национального дохода и гораздо меньший — 3—5% — рост внутреннего потребления. В соответствии с интересами и целями экономической политики план является более гибким, более открытым в отдельных вопросах и в ряде случаев имеет ориентирующий характер.

Во второй части статьи автор ставит три вопроса, связанных со стратегией экономической политики пятилетнего плана. Первый вопрос: способен ли план дать положительный ответ в связи с задачами, вытекающими из международных экономических и политических изменений? Автор указывает на то, что новый пятилетний план отвечает на мирохозяйственные изменения не отгораживанием от мирового хозяйства, а ориентацией прежде всего на развертывание экспорта и рациональную замену импорта, предусматривает структурные преобразования, направленные на улучшение международной конкурентоспособности и гибкого приспособления к внешним условиям, значительно более быстрый рост экспорта по сравнению с импортом.

Второй вопрос: нашли ли выражение в плане требования интенсивного этапа развития и отвечает ли план этим требованиям? Развертывание основанного на качественных факторах интенсивного развития отражается в таких наметках плана, как повышение производительности труда на 20% и повышение совокупной эффективности живого и овеществленного труда на 12%. Следует снизить удельное потребление энергии и рост запасов. Более рационально должны использоваться фонды капитальных вложений (планом предусматриваются капиталовложения на пять лет в размере 1020—1040 миллиардов форинтов), повысив долю кредитов на капитальные вложения, предоставляемых на конкурсных основах. Необходима миграция рабочей силы в более рентабельные отрасли.

Третий вопрос: обеспечивает ли план и его выполнение необходимые экономические и материальные условия для сохранения внутриполитического равновесия? Пятилетний план предусматривает закрепление достижений в области уровня жизни и улучшение жизненных условий. При умеренном росте национального дохода, используемого на накопление и потребление доля потребления в нем повысится до 81—83%. Хотя различия в личных доходах отдельных граждан будут увеличиваться в соответствии с количеством и качеством исполненного ими труда, план ставит целью уменьшение различий, вызванных не связанными с трудом причинами. Рост реальных

доходов почти целиком будет происходить за счет общественных фондов потребления. Планом предусматривается сохранение реальной стоимости выплат семьям, имеющим трое и более детей, и пенсионерам с низкими пенсиями. Будет и далее обеспечено соответствующее покупательной способности товарное снабжение. В 1982 г. начнется введение пятидневной 42-часовой рабочей недели.

Для осуществления наченных планом целей, указывает автор в заключительной части своей статьи, необходимо усилить роль централизованного планирования, способствовать развертыванию самостоятельной и ответственной хозяйственной деятельности предприятий и творческой инициативы коллективов предприятий. Необходимо обеспечить воздействие системы экономических регуляторов на повышение эффективности, способствуя быстрому развитию экономически эффективных предприятий и ликвидации неэкономичных производств. Следует усовершенствовать организационную структуру предприятий, повысив тем самым адаптационную способность предприятий и улучшив сотрудничество между предприятиями. Необходимо повысить материальную заинтересованность внутри предприятий и развертывать производственную демократию, моральное и материальное стимулирование ответственных, предприимчивых и успешных хозяйственных руководителей.

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I. T. BEREND

REFLECTIONS ON THE SIXTH HUNGARIAN FIVE-YEAR PLAN (1981–1985)*

Though the new five-year plan prescribes a moderate growth rate only, it envisages most important qualitative changes. This will be the source of many difficulties, contradictions, and new problems in the immediate future. The author discusses a number of the problems in turn: the switch to export-directed development demands the systematic transformation of the whole system of economic management; foreign trade equilibrium will have to be established in a manner that does not endanger the modernisation of the structure of the economy; infrastructural development continues to be crucial, though investment funds will diminish; ways of improving the way of life will have to be found which do not rely principally on added investments or on higher consumption, since available resources ensure no more than the preservation of what has already been achieved. Conflicts are likely to spring from these difficulties and contradictions which can, at this stage, be only predicted to some degree. Anticipating them, and coping with them will demand much flexibility and circumspection.

The sixth five-year plan can be described as open and flexible. New decisions and reorientations will be possible during its term. It therefore makes sense to go on thinking about the options open to the country, and possible alternative decisions, not in order to doubt the road covered as part of this plan, or along which we are progressing, but to show ourselves ready for new reactions that may become necessary later, and which the plan itself envisages, including taking one's bearings once again. It is in this context that I formulated my comments on the plan.

Planning methods and further opportunities to plan the economic mechanism itself

The exigencies of a situation have their advantages. It is hard indeed to plan five years ahead in the present highly changeable international situation. In bridging these difficulties, however, the planners were able to discover much of lasting value. The point was that they simply had to keep the options open, thinking in terms of alternatives, be they favourable or unfavourable. Decisions which simply could not be taken five years ahead will have to be made in terms of annual plans, when

*Based on an address to the Hungarian Academy of Sciences delivered in November 1980.

certain changes will have occurred, and the time will be ripe for them. We cannot predict oil or raw-material prices two or three years ahead, nor can one tell what outside resources we can reckon with – to mention only two factors – it would therefore be a mistake to base planning decisions on such foundations. Making provisions for flexible decisions and keeping the options open for changing course therefore seems the most rational way of planning.

Fitting the tools of direction and regulation into the plan, that is, making the means a part of the ends is equally important in this connection. If the method used is not that of plan directives, and if the possibility of changes and amendments is allowed for, then it becomes particularly important that not only the aims and objectives of the plan be surveyed, but also those methods of control and influencing which will make the central aim attainable also by the use of indirect measures.

These questions are far from being merely formal and more is involved than planning methods as such. Speaking in general terms, the first steps were taken as part of the present plan along that highly important road which essentially widens the scope of the plan. The endeavour is not merely to realize an appropriate proportion of the long-term objectives of economic development, but also to cover some of the strategic targets of the development of the socio-economic institutions. These are, of course, only the first steps, and much remains to be done in the interests of continuing the process in a manner that shows itself aware of what is involved. The problem is not merely what regulators have to be linked to this or that medium-term objective of economic policy, what is much more important is that the planning and control mechanism, and the socio-economic institutions, have to be planned strategically in exactly the same way as economic policy itself. Long term objectives must be established, and these must be approached in the context of medium-term plans.

It should not be forgotten that the system of planning, control and management has been caught up in a process of transformation since as far back as the mid-fifties. The changes were all aimed at improvement, and were all designed to eliminate recognised weaknesses. And yet, or precisely for that reason, the economic system could really be last described as consistent, and logically built-up in all its elements, in the early fifties. There were good reasons why that system was not considered to be satisfactory, that is why a start was made on its transformation. The changes, however, did not produce a new systematic and consistent system. The new elements – regulators instead of planning directives, market incentives etc. – are present in conjunction with the old, and they often oppose each other, and the new aims of economic policy, weakening each other as well.

By the end of the seventies, for the first time in the 20th century, Hungary reached a stage where economic policy no longer aimed to develop import-substitution, striving for autarky, but wished to achive an export orientation. This change in policy was not, however, unfailingly accompanied by the appropriate transformation of the institutional system. Let me mention one example: many hundreds of exchange-rates were

reduced in the last decades to two (commercial and tourist) but it is perhaps no exaggeration to say that this was a briefer and easier step than the next leading on to a uniform exchange rate. Export-orientation demands a closer link with world markets, though certainly not an uncontrolled one, right off the leash, the more direct presence of market-effects, in other words at least external convertibility. If the medium-term plan prescribes major export oriented developments then the appropriate steps in the development of the mechanism which further the realisation of the economic targets must also be planned. The development of the operational mechanism is bound to liberate enormous reserves. Much waste could be put an end to e.g. by the transformation of the long-criticised basis-minded ("incrementalist") financial arrangements that weigh heavily on budgetary institutions. And there are many other examples that demand a systematic improvement of the operational system.

I could list similar examples aplenty. Much has been changed in a price system that served forced accumulation and industrialisation, and prices have gradually been brought into harmony with costs in most fields, what is more, much is done to bring them close to world market prices. This cannot, however, be said about incomes. True, much has been done in this field as well but it can nevertheless not be said that income differentials accord with the present aims of economic policy, since, in many ways, they provide incentives which serve the earlier forced industrialisation, that is, aims that must be considered obsolete by now.

The system of planning, control and management does not as yet provide proper incentives for high performance and outstanding quality, international competitiveness and a careful husbanding of resources, which are particularly important in the present world economic context, now that the country has been industrialised. The systems of prices and incomes, taxation and credits, institutionalisation and personnel selection should all act in the same direction, in an integrated way, and yet, at present, they still frequently oppose each other.

It is not up to me to describe what a consistent and integrated system of planning control and management, that accords with present requirements, might look like. What is needed is a thoroughgoing analysis which would clarify the long-term objectives of the further development of relations of production, and the feasible tasks of a particular planning period, always bearing in mind the necessity to adapt to the realities of commodity and monetary relations as was already recognized in 1968 when changes in the operative mechanism of the economy were initiated.

Medium-term plans permit us to get closer to a gradual arrangement of elements within the mechanism that still here and there contradict each other, and the aims of economic policy, finally leading to a mechanism that is internally consistent and which serves recognized objectives of economic policy.

I mentioned novelties enforced by the situation. True, that is what is involved on the one hand, on the other, however, a new and lasting planning methodology is being born the importance of which far transcends the need to bridge the complexities of a particular period. The way is being opened up towards a planning methodology and

strategy that will make planning more flexible, permitting a closer coordination between the central plan and market effects.

The clash of short and long term objectives: equilibrium and structural change

The proper coordination of long-term strategic objectives with short and medium term decisions is amongst the tougher nuts with which economic policy is faced. Much that demands a decision that cannot be put off in the short run may well delay the solution of long term problems.

Many fields can be listed in which the sixth five year plan serves recognised and sound long-term objectives.

What I consider to be one of the economic basic dilemmas, however, is the establishment of proper priorities between what the restoration of equilibrium demands, and the needs of efficiency and competitiveness – including structural change and the proper technological standards – which clash on many points. To put it in extreme terms, if an end were put to the importation of machines or equipment, or if this were radically limited, that would certainly – like every other limitation of imports – improve internal economic equilibrium. In the long run, however, such measures oppose equilibrium, since they hinder and slow down the achievement of modern, competitive technical standards and of the desired structural change. Much the same could be said about investments in general. Fewer investments naturally improve equilibrium in the short run, structural changes on the other hand generally demand that investments be made.

Economic policy obviously cannot make a choice and leave it at that, since it is essential that both problems be solved. That can be done in a variety of ways. Long-term structural changes and technological development could be given priority, which would handicap the restoration of equilibrium, or vice-versa: the latter being given preference, structural change, and the connected investments, being postponed until after equilibrium is restored.

Present attitudes, and therefore the current plan as well, appear to subject all other interests and aims to the restoration of equilibrium in an exaggerated way. The central importance of the latter cannot, of course, be disputed, and yet further computations and analyses searching for optimum if more complex, and yet harmonious, solutions appear justified. Though equilibrium has to be restored in any event, the duration and the rate of the process is a matter for present decision. The present plumping for the shorter term, and the severe restrictions on imports and investments this involves, not only threatens desired structural change – including the speedy development of new export-industries and of the food-processing industry, the importance of which has long been recognised – as well as slowing down improvements of efficiency, but also the maintenance of achieved technological standards in certain areas, such as agriculture.

The flexibility of current planning makes possible further decisions to correct the course. It might pay to give a bit more thought on the severity of investment and import limitations, on greater purchases of needed agricultural machinery, and higher investments serving the modernization of the technological structure, in other words to the better coordination of clashing short and long-term objectives that serve short-run equilibrium and further progress.

Another example: equilibrium and the infrastructure

Another sensitive area where short and long-term interest find themselves in conflict is the development of the infrastructure. The sixth five year plan, like the fifth before it, gives a secondary role to the infrastructure – the share being much the same as in the earlier plan period – declaring that major developments can only take place following the achievement of priority equilibrium objective. I consider it a major step forwards that infrastructural projects are nevertheless included amongst priority targets, such as the construction of primary school class-rooms, housing, and health services.

The clash of short and long-term objectives in this field is given. Long term development projects involving a strategy of catching up with advanced standards were last asserted undisturbed as part of the fourth five year plan, world economic tempests have since then enforced a striking of sails. And yet I should like to ask once again to what degree such circumstances enforce a course of action, and to what extent the character of the Hungarian attitude to economics determines things. A great many still look on the infrastructure as something to which more or less can be devoted depending on the size of the national product. Something like that is obviously present as well, but a causality in the reverse direction is also there. An increasing number recognise these days that, given a higher stage of infrastructural development the performance of the economy grows better, that the net increment will be higher. The better-founded in the infrastructure they are, the more flexible the ability to react and efficiency as such will be. It should be stressed, however, that this factor cannot be absolutized, and that its effect can only be judged in the context of other, not purely economic, factors. It is obvious, e.g. that numerous social and political requirements must also be satisfied in order to achieve such progress in job-attitudes and efficiency. The latter factors influence morale just as much as financial aspects. It ought to be noted that, in this context, improved job-attitudes are in part the conditions and in part the consequences of such progress.

A higher development level of infrastructure is, nevertheless, of invariably decisive importance and in the long run it is a factor of equilibrium at least to the extent that it is a natural source of savings in the short run to restore equilibrium. It is not easy to resolve this contradiction in the medium of grave difficulties. Still, the urging necessity of change in approach and practice must be stressed repeatedly.

A new stage in standard of living policy

In my view the inclusion of social policy aspects is a magnificent novelty about the plan. The principle is particularly important which was succinctly formulated as follows in a statement on the sixth five year plan: "The conditions for the progress of health services and for general (primary) education must be developed faster than average" and also that a comprehensive policy of housing construction, maintenance and management must ensure that ". . in the next five years the housing conditions of a million and a half citizens will be improved." There is real need for such programmes, since following the successful decades of standard of living policy and of dynamic economic growth one cannot grind to a halt with no more in view than the restoration of economic equilibrium and the stabilization of achieved standards of living, major objectives indeed, given the circumstances, but not too inspiring or sufficient targets, looked at from the angle of social policy. After all there are options between which one can choose, decisions have to be taken, even when one's hand is forced by necessity.

What I consider particularly important about the new five year plan is precisely this new decision, signalling the revaluation of the standard of living policy of the past twenty years.

It is clear that given the present world economic situation the fast growth in incomes and consumption of recent decades is no longer on. The original plan targets of the fifth five year plan were not in fact fulfilled in this area and, according to available figures, in 1980 consumer prices grew somewhat faster than incomes. The targets for the next five years are realistically modest: a 6–7 per cent growth in incomes, and 7–9 per cent total growth in consumption. Around 1970 this much was achieved in a year or two, now one can be well satisfied if modest targets are not put beyond reach by further unexpected deterioration. The plan therefore quite rightly prescribes "the preservation and consolidation of achieved standards" as the major aim of standards of living policy.

In my own view what is particularly important, being as it were a new option open to standards of living policy, and the achievement of the new plan is the fact, once again using the language of the statement on the principles of the plan, that there is scope for "an improvement in the conditions of living that takes its cue from what is realistically possible." One such factor which is an important improvement, and which is realizable even in the circumstances given, is the introduction of a five-day working week. In an entirely different way the same broad aim is served by improvements in housing management, facilitating mobility of flats and houses and providing incentive for them, thus improving housing conditions in a way that goes far beyond the scope of new housing construction.

Special attention must thus be given to ways that are not primarily dependent on investments or on increasing the consumption of commodities. In spite of initiatives of outstanding importance it cannot be said that the directives of the new plan exhaust what can be done.

The importance of improvements in the infrastructure of consumption is equally great, or perhaps greater still. Investments will naturally have to be made. But the share of various areas highly important to conditions of life is so small in the context of the total investments made that certain readjustments that correspond to one per cent of consumption may produce a great leap forward. 1–2 per cent of total investments may produce what amounts to real breakthroughs in certain fields. The health services programme of the sixth five year plan e.g. wishes to implement this recognition by a 40 per cent growth in the budget, which should be welcomed not only because a particularly important and long-neglected area is given priority but also because, at a time when the brakes are unavoidably applied to consumption, progress is being initiated in an essential field which affects the whole population.

Are there no other similar opportunities? These days when the cracks are beginning to show in the hundred year old buildings housing cultural and educational institutions, would it not be a good thing to take up one or two national causes, perhaps also relying on the contributions of voluntary associations – and what I have in mind there are things like the proctracted replacement of the National Theatre, or a large, modern concert-hall in keeping with Budapest's rank as a major world centre of music – thus advancing in improvements in the conditions of life, since spiritual and intellectual morale are, of course, part and parcel of the category.

Let me, in this connection, make special mention of the school system. The new five year plan specially stresses the construction of classrooms for general (primary) schools, and the new notion put forward by the government directing the better exploitation of educational and cultural facilities, aiming to solve the problems of both fields by joint "multi-purpose use" ought to be given a special welcome. The same building can carry out the functions of school, house of culture, and sports establishment if this is borne in mind when designing and equipping it.

The scope of educational development, however, far exceeds the class-room needs of the population bulge that is fast approaching the age-group at school. It is to say that this objective will only get its share. But what determines how much that should be? Is there an automatism involved, or do preferences show when decisions are taken? Obviously a bit of both. The role of education within our attitudes obviously matters. Do we consider the achievement of higher standards of education and culture to be one of the most burning issues, one of the most important "investments", being the basis of all further progress, or do we think of it as a "luxury" on which more is spent if more is available.

I have discussed all this at greater length on another occasion. I have no wish to repeat what I have said and will confine myself to pointing out that it might help if one makes it quite clear that education is in itself one of the most important "industries". Looking at the figures, that are available in all statistics and nevertheless surprising since no one looks at them in this context, it becomes clear that equal with a fifth of the working population is so engaged, roughly twice as many as in agriculture, twice as many

as that employed in what is called the non-productive sector, and more than are employed by manufacturing industry.

In other words education is the biggest 'employer' in Hungary!

The proportion is bound to grow in years to come. The percentages in themselves cannot determine things, that is true, but when the socio-economic and human aspects which are often mentioned these days are taken into account, the position alters.

It should also be mentioned that in this age of transition higher education also has a central, strategic if you like, importance considering the economy the future, and future performance and education. It would be a great mistake to forget this in the context of the urgent issues of the day.

The prospects of future conflicts

Planning means looking ahead. The targets towards which we are making headway are planned, and so are the instruments needed to implement these objectives. It is, however, equally essential that predictable conflicts be surveyed, conflicts which, in part at least, spring from the very realization of the planned aims. It cannot be stressed too much that progress itself may unavoidably produce conflicts.

The plan obviously reckons with future conflicts and formulates certain things that have to be done to blunt them. Let me emphasize just one: the plan directives consider it fundamental that "full employment remains assured throughout the country. Jobs must be found for all school-leavers."

This is an extraordinarily important objective, the more so since many look to some sort of limited unemployment as a way of improving job-attitudes and performance.

I do not here wish to join this debate, allow me to note merely that no one has ever been able to show that a wage-system which truly rewards performance is any the less effective in this respect than a certain degree of unemployment. Nor can it be doubted that, in certain countries, at certain periods, what amounted to full employment in practice, did not lead to a decline in either job-attitudes or performance.

As far as I am concerned it follows from what I have said that I consider country-wide guaranteed full employment to be of central importance when it comes to avoiding future conflicts, and especially, and as part of it, jobs for all those young people who have successfully completed courses of secondary or higher training. Unemployment cannot become socially tolerable, nor any kind of professional unemployment as part of it. Looking at this question with a one-sided economic bias, which is the way some judge the issue, could be the source of serious social tension and conflicts. Since Hungarian society has in the past undertaken burdens and showed itself ready to make sacrifices in the interests of full employment, paying no small price to guarantee it, I feel justified in saying out loud that jobs for young people that make sense in terms of the training they underwent, is the ort of social demand that requires further sacrifices. If that were not done, much of great value would be put at risk.

I have pointed to a field where the plan reckons with possible future conflicts, and includes a clear programme to ward them off, let me then, by way of example point to another one where the plan does not sufficiently count on the possibility of conflicts and therefore does not make any provision for warding them off.

The plan unambiguously prescribes, in a manner showing awareness that a vital question is involved that "the principle of distribution according to work and incomes as a function of performance must be more systematically applied." This endeavour follows from the essence of the plan, and from the necessities of the present level of development and the state of the world economy. This does not, however, do anything about the conflict situations which are present *in nuce* in a genuine attempt to implement such requirements. One must face up to the real possibilities of income-differentiation and bear in mind the social ability to bear burdens when judging how far one can go at a time when there are limited opportunities only for a growth in real wages and consumption. Differentiation, the need for which has long been talked about, while little was achieved in practice did not prove successful even at a time when real wages went up by an annual 5–6 per cent, when differentiation could have been carried out by allowing the real wages of some to grow by 2–3 per cent, and of others by 8–10 per cent. If real incomes stagnate or grow by 1–2 per cent then differentiation implies that the real wages of certain groups or persons may decline. Such a situation must be faced up to, as one ought to face up to the possibility that this may lead to social conflicts. There will thus be a choice between two types of conflict: those due to differentiation, of social nature, and economic conflicts – that indirectly become social conflicts as well – which are due to its absence. The two will have to be weighed up.

In my view what is called the *"second economy"* is particularly important in this context. It has not been comprehensively covered by any plan so far, and the sixth five-year plan is no exception in this respect. And yet it is hardly possible these days to keep this area out of our calculations or thinking. Looking at it only from the incomes aspect – but production and services are of course equally involved – one cannot imagine that the incomes policy of the plan could in itself affect reality if there are no plans, or means, permitting the influencing of "second economy" derived incomes. Some estimates that cannot really be doubted claim that one seventh to one sixth of all working hours are realized in the contest of the "second economy". Bearing in mind that more money can be made there, that hourly rates are at least three times as high as those paid by state enterprises or cooperatives, then incomes derived from the "second economy" must amount to around 40 per cent of officially earned incomes. This, owing to its very nature, is distributed in an extreme way. Certain sections of the population are completely excluded, and others accumulate a large proportion indeed.

Incomes policy must therefore cover this sphere as well, showing foresight, and acting in a planned way. Playing it by ear and hurried decisions due to biassed considerations can be, and have been the source of great mistakes and much damage, for instance when the provisioning of the masses was threatened by burdens placed on household plots with the sole desire of regulating incomes. On the other hand, support and incentives

for much needed supplementary economic activity can be the source of social dissatisfaction and tension if it entails considerable differentiation of incomes without regulation or control.

The plan should therefore envisage the kind of instrumentalities which concurrently ensure incentives and the appropriate institutional framework for much needed supplementary activity in production and services, while, on the other hand, making provision for controls, taxation, and income regulation. It would be particularly damaging if, for a year or two, making production and services objectives one's starting point, limitations were introduced and maintained one-sidedly. A single kind of measure cannot provide an answer to everything in this respect either. Only the concurrent application of many kinds of instruments can allow one to hope for favourable results. Appropriate price-incentives could be linked to lasting, clear and systematic taxation, in the same way as countervailing financial and currency-control measures can be taken to exclude the negative effects and inflationary pressures that derive from external convertibility.

It follows from what has been said, and from the novelties in the plan that there is much more scope for decisions, than one imagines. In spite of the constraints of determination one must search for that field of operation in which advances made impossible along certain sections are balanced by successes elsewhere. True enough the restoration of foreign trade and budgetary equilibrium is given, but there is a certain choice when it comes to "how" and "by when". It is a fact that only what has been produced can be distributed, but preferences and priorities may nevertheless differ considerably. It is clear that the standard of living policy of recent decades cannot be maintained, but it depends on sound decisions whether or not certain important but so far neglected aspects of our living conditions will be improved or not.

The changes in attitudes evident in the sixth five-year plan have looked for and found new answers, though without exhausting possibilities by a long shot. I tried to demonstrate this above, by referring to a number of telling examples.

О ШЕСТОМ ПЯТИЛЕТНЕМ ПЛАНЕ РАЗВИТИЯ ВЕНГЕРСКОГО НАРОДНОГО ХОЗЯЙСТВА НА 1981—1985 гг.

И. Т. БЕРЕНД

При разработке шестого пятилетнего плана развития народного хозяйства Венгрии на 1981—1985 гг. венгерские плановые органы попали в своеобразное положение. В условиях быстрого изменения мирохозяйственной среды трудно предусмотреть развитие целого ряда определяющих факторов на пять лет вперед. Эта вынужденная ситуация определила несколько новых интересных особенностей плана. План стал более открытым. Он содержит направления решений и определяет отправные шаги первых лет, оставляя определение дальнейшей линии и возможность, если необходимо, корректировки направления на период принятия решений по последующим годовым планам, когда условия прояснятся. Еще более важная новая особенность состоит в том, что план

предусматривает не только цели экономической политики, но и впервые равнозначное им значение придает системе планирования и управления. То есть план стремится запланировать долгосрочное развитие производственных отношений и необходимые в этой связи шаги на среднесрочный период так, чтобы различные реформы и осуществляемые постепенно и последовательно преобразования были организованы в цельную систему. Таким образом, вынужденная ситуация привела к новым ценным достижениям. Это же относится и к умеренной программе пониженных темпов роста сохранения достигнутого уровня жизни. Для другого, большего при данных условиях возможностей нет. Это, по-видимому, вызовет конфликты в связи с необходимостью отложить решение отдельных важных вопросов. В то же самое время больше внимания будет обращено на лучшее решение проблем, которые в период быстрого роста производства и потребления отодвигались на задний план. Например, при планируемой стагнации уровня реальной заработной платы наибольший рост капиталовложений предусматривается в отдельных областях сферы услуг (по сравнению с предыдущим плановым периодом, на 40—50%) с целью улушения условий народного образования и медицинского обслуживания. Все это может стать важным моментом улучшения условий жизни.

Шестой пятилетний план дает ответ на новые экономические задачи, применяя новые методы и изменения по существу.

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OPTIONS IN HUNGARY'S FOREIGN TRADE

Disturbances in the course of Hungarian economic development were released by concurring external and internal factors. After the world market price explosion the conditions of Hungarian foreign trade relations clearly deteriorated and the new situation demanded alterations in the economic policy. Measures were taken to restore the balance of foreign trade and the measures did bring some improvement in the years 1979–80. In the quest to overcome the difficulties economic growth was slowed down. The goal was realized mainly through reinvestment and non-socialist imports and stagnating living standards. The author assumes that a slower growth rate of domestic utilization of national income and a sounder export oriented economic policy would be needed, which goes with changes in income regulating methods as well as in price and exchange rate systems and in the investment mechanisms.

Domestic and foreign economic origins of economic tensions

The difficult economic position of the country and the unbalanced Western foreign trade turnover have for some time been important concerns of Hungarian economists and politicians. The symptom giving ground to worry is that ever since the world market price explosion, domestic utilization has been exceeding the value of the GDP produced. The difference was covered from credits. As from 1974 the value of credits raised was ranging from 4 to 9 percent of the GDP. Most credits were raised from the non-socialist market. Thus, the acute ill of the economy is the accumulated debt to the West.

Before indulging in the discussion of the treatment the cause that provokes the symptom needs to be studied. Excessive domestic utilization is generally attributed to the change of the world economy and, more precisely, to the accompanying price explosion. The nature of this price explosion is usually explained by the abrupt price increases of raw materials against the prices of manufactured goods. However, a more thorough study of long-term price trends reveals that the almost eight-fold increase of the crude oil price since 1973 was the only substantial difference in price proportions. The rate of other price changes did not differ much from the about 2.5-fold price increase of manufactured goods over this period.

It follows that the price explosion cannot, or only slightly, be the direct cause of the negative trend in the terms of Western trade and of the country's indebtedness. True, the share of the imported primary energy gradually increased in Hungary, consequently, the rising prices of crude oil and other primary energy put quite a burden on the country. Yet this economic burden does not appear in relations with Western countries and so the exigency to raise credits mostly from Western markets cannot be explained with it.

When analysing the tensions in the country's world market position it must not be forgotten that the problem is not a new one. The balance of payments in convertible currencies was a neuralgic area of the economy throughout the 1950s and 1960s. The cumulation of difficulties cannot be wholly attributed to the single cause of deteriorating terms of trade. It was brought about by a bundle of external and internal factors. Three of the external factors must be identified.

First, a crisis set in for the export of live animals and meat, and especially of slaughter cattle that traditionally used to be a dominant item in Western exports. Cattle export played an important role in economic relations between Hungary and industrialized countries not only in the Middle Ages but also during the flourishing of East-West relations beginning with the late 1950s. Live animal and meat export was at its peak in 1973, amounting to 27,8 percent of non-socialist exports. Along with a 44,5 percent increase in the volume of Western exports between 1973 and 1979, the share of live animal and meat exports declined to 13 to 14 per cent because of the Common Market's discrimination against outsiders. The decrease of turnover was caused not only by quantitative limitations of imports but also by the fact that world market meat prices increased at a rate lagging much behind not only oil prices but also behind prices of manufactured goods.

The second unfavourable phenomenon was that the Hungarian enterprises were not compelled, or able, to efficiently adapt themselves to the prevailing fast inflation and simultaneously sharpening competition in the Western market by suitably raising their export prices and checking the rise in import prices. Owing to the oil crisis every country that pays for her primary energy imports with industrial finished products on the world market was forced to react not only by restraining her domestic utilization and by intensive energy saving but also by increasing the exports of manufactured products. Sharpening competition is a logical outcome of restrained demand and boosted supply. For Hungary it proved to be an additional disadvantage that the tariff facilities offered by the Common Market to its associated members and to developing countries had simultaneous unfavourable impacts on non-member countries. It isn't but a slight relief that in 1978 the USA cancelled its discrimination and granted the most-favoured-nation treatment to Hungary.

Last but not least, simultaneously with the price explosion, an essential change took place in the development of economic relations between Hungary and the CMEA countries in general, and between Hungary and the Soviet Union in particular. It was characteristic of this trade from 1945 to 1972 – with some fluctuations – that it provided Hungary with industrial raw materials under favourable terms and practically smoothly. As a rule, materials at a low degree of processing were purchased in return for industrial finished products. Typically of the opportunities then given, the volume of Hungarian raw material purchases for transferable rouble increased between 1960 and 1972 by 9,2 percent a year, nearly twice the growth rate of the value added. From 1975 on raw material purchases became more expensive within the CMEA, moreover, the rate of increase of deliveries was broken. In spite of significant price increases the purchasing

opportunities of industrial raw materials were still more favourable for transferable rouble than in the world market. However, from 1972 to 1979 the volume of imports increased only by 2 percent yearly. This change necessitated the purchasing of industrial raw materials for convertible currency. Consequently, Hungary was forced to buy much of the raw materials and first of all crude oil for convertible currency also from CMEA partners. Because of the substantial shrinking of raw material purchases for transferable rouble Hungary's export oportunities to the world market became also smaller. As a matter of fact, more than one third of the exports of Hungary, a country short of raw materials, consists of semi-finished products manufactured from raw materials originating directly from the CMEA market.

The unfavourable impacts of the foreign market were amplified by some mistaken steps of the domestic economic policy. In this respect two factors need to be noted in the first place.

1. It is generally recognized that it was a mistake to save the Hungarian enterprises from the impacts of price changes and more precisely from those in price proportions on the world market. But this mistake was not incidental. Its explanation must not fail to recognize that the New Economic Mechanism introduced in Hungary in 1968 was not prepared for changes in external conditions. It was an even more important factor that the social resistance to the system of indirect regulation, i.e., to the differentiation of incomes and to the need to let individual and group interests conflict, persisted till the time of the world market changes. Although this dispute did not discard the resolutions taken earlier for the replacement of the system of plan directives, yet it forced the economic authorities into compromises. Thus they saved the enterprises from income flucturations in consequence of the changing world market situation that would have occurred. It obstructed the assertion of the consequences of the deteriorating economic situation both in investments and in the development of living standards.

In cases when domestic prices remained unchanged the penetration of world market inflation was barred by paying out import price subsidies and by levying taxes to reduce export receipts. This form of disburdening the productive enterprises was typical mainly in 1974. However, the changes of world market prices were kept neutralized even after 1975 when the gradual adjustment of state-controlled prices to world market prices started. Simultaneously with price changes the tax and subsidy schemes were in each case systematically revised. In order to prevent domestic prices and price proportions from changing with the increase of the world market prices, the elements of the control system were continuously amended. This practically resulted in the inaptitude of enterprises of having the buyers acknowledge their costs. The bargaining on prices and regulators between entreprises and control agencies was centred mainly on the measure of state refunds and on the allowed rate of increase of officially controlled domestic prices. This bargaining, besides putting a brake on enterprise efforts to improve efficiency in general, contributed to the deterioration of the terms of trade too. It is, namely, obvious that in the lukewarm medium of state interferences the Hungarian companies were not a match, even doing their best, for the Western partners exposed to merciless competition. Nor did

Table 1
Value added (GDP)
(billion forints)

		1972	1973	1974	1975	1976	1977	1978	1979
Value added, total	(1)	391.0	429.0	448.9	481.5	527.6	577.9	628.3	681.1
at unchanged prices (1970 = 100)	(2)	112.7	120.5	127.5	135.5	140.3	151.0	157.7	161.8
import (–) and export (+) surplus	(3)	+4.8	+19.6	–19.9	–35.6	–22.4	–26.1	–57.3	–23.7
import (–) and export (+), surplus in percentage of the value added	(4)	+1.2	+4.6	–4.4	–7.4	–4.2	–4.5	–9.1	–3.5
loss owing to deteriorating terms of trade	(5)	–2.3	–4.0	–14.3	–26.1	–25.7	–34.9	–36.9	–43.7
difference between import surplus and loss (3)–(5)	(6)	+7.1	+23.6	–5.6	–9.5	+3.3	+8.8	–20.4	+20.0
Actual total domestic utilization: (1)–(3)	(7)	386.2	409.4	468.8	517.1	550.0	604.0	685.6	704.8
Actual domestic utilization at unchanged prices (1970 = 100)	(8)	108.5	111.3	123.3	131.9	134.7	143.0	155.4	148.4
From this: consumption	(9)	109.0	113.2	120.5	126.1	128.7	134.4	140.5	144.6
gross accumulation	(10)	106.9	107.2	101.8	145.3	148.2	162.5	191.6	164.1
of which: investment put into operation	(11)	112.3	119.2	118.8	149.2	142.2	146.7	160.1	165.9

Source: Statisztikai Évkönyvek (Statistical Yearbooks.) A népgazdaság hatékonyságának alakulása 1970–1978. (The development of national economic efficiency 1970–1978), Budapest, 1980. Központi Statisztikai Hivatal.

their efforts at controlling the rising import prices and at increasing the export prices have any stamina.

2. The unfavourable impact of the external shock was made worse by the failure in the regulation of domestic utilization in conformity with the impact of the world market changes. However, in my opinion it is not "overconsumption" to blame, as it is frequently quoted. The only serious mistake in the field of personal consumption was made in 1974 when in the heat of the political discussion about economic control the personal incomes increased at a much faster rate than the value added, especially if the latter is considered net of the loss suffered because of the deterioration in the terms of trade.

In fact the point is rather "overaccumulation" because of unfounded growth ambitions. Unfortunately, up to 1979 most of the over-utilization became manifest not in investment projects put into operation and bringing immediate returns in the near future but in increasing stocks and unfinished investments. It should be also noted that the investments measured at unchanged prices show the magnitude of inputs and not the real value of the implemented projects. Thus it is an unjustifiable assumption that overconsumption developed mainly because personal incomes ran beyond the capacity of this economy. Unfortunately, it cannot be assumed either that investments entering into operation later will result in a significant future relief. A big part of overutilization was, namely, most probably the outcome of declining efficiency caused by the said indetermination of the control agencies.

Nature of the deficit of foreign trade

In the next step of the diagnosis we try to present the indebtedness caused by external and internal factors. We have to make clear whether the difficulties are related to the failure of production to cope with the rise in utilization, that is, the manpower, the capacities, etc. do not permit such a growth of production as to gradually make up for the shortage – or whether this is a particular kind of shortage where the demand for commodities which the domestic production and the transferable rouble markets cannot meet, must be satisfied through imports from Western countries, but the Hungarian economy cannot afford a part of the import bill. Namely, if the case is the first one, then the problem lends itself to easy solution by way of restraining domestic utilization by 5–6 percent for once, provided that even later, the growth rate of utilization will not be higher than that of production. But if the second type is nearer to the truth, then we not only have to reckon with the need of a remarkably drastic restraint of consumption and accumulation for a temporary restoration of equilibrium, but also must be aware that a degree of "austerity" equal to the rate of overutilization will not be sufficient to open the way to further development.

If that is the case, domestic uses should be reduced not only to the point where the balance of foreign trade comes into a temporary equilibrium but farther on: it should be a lasting task to curb import and to increase the volume of exportables as well. But this

would not be enough. Later it should also be achieved that the growth developing after equilibrium has been reached should not run counter to the requirements of the balance. Past experiences showed that the difficulties arising in markets with convertible currency are characteristically different from those met in markets where settlement is made in rouble. In the former market the difficulty arises from the fact that it is very difficult to restrain the demand of the population and of the productive machinery for imports that can be satisfied from there. On the other hand all incentive methods so far used for a lasting acceleration of Western exports have proven to be inadequate. In the latter market where trade is settled in transferable rouble the situation is profoundly different. The commodity supply of partners automatically pegs the boosting of purchases. Of some products Hungary would like to buy more but there is no more supply whereas the products offered by the partners are often not required in the domestic market. Purchases from CMEA partners meet with obstacles sometimes even if the partner could deliver the commodity Hungary wants. The Hungarian buyer prefers Western import even if it is much more expensive because of long terms of delivery by CMEA exporters, lack of security of deliveries and fear from frequent breakdowns of the purchased machinery. In the export settled in transferable rouble the Hungarian party tries to export only the specified volume and not more so that its sales in CMEA markets should not be above the expected volume of import.

These experiences convincingly prove that the export activity and import substitution for convertible currency are bottlenecks in the development of the Hungarian economy. This characteristic feature entailing the country's indebtedness is not a new symptom. We are once again facing a symptom identified in party and government resolutions in 1966–1968. Domestic production keeps failing to adapt itself properly to demand and therefore it is unable of adequate import substitution and especially of satisfying Western market requirements which are much more exigent than domestic ones. The covering of domestic use from domestic resources is frustrated not because of the over-all limits of production and depletion of the factors of production but because there is a higher domestic demand for commodities which cannot be manufactured in the country or the import of which cannot be repaid with enough Hungarian products.

Some relief has been though brought to this problem by the NEM introduced in 1968 but, possibly also because of compromises in the course of implementation, improvement in adaptivity was not enough for Hungary to cope with the world economic conditions that had deteriorated in the meantime.

A proposal for curing the economic disease

There are various approaches to relieving the existing tensions. For example Ferenc *Kozma* recommends to shirnk the Western market relations. [1] He argues that the monopoly organization of Western markets does not give outsiders any chance to promote their trade on the basis of comparative advantages. The leading industrial countries dominating the world market collect such a big share of the benefits accruing

from trade in the form of rents that, in his opinion, outsiders should withdraw from the international division of labour. He exaggerates his point by stating that both the deterioration in the terms of trade, and the indebtedness, are the outcome of overdeveloped trade. On a similar basis he had suggested earlier that the proper response to this said challenge would be closer cooperation with the CMEA countries [2]. Whether the statements of Ferenc Kozma about power relations on the world market and the resulting economic consequences are fully accepted or are taken to be exaggerated, yet it must be admitted that the suggestion is sensible. The opportunity must be exploited to the fullest extent to which the CMEA countries increase the supply of commodities which Hungary demands and can get from them under advantageous terms. Moreover, there are certainly still cases when companies show unjustified preference for Western purchases over the CMEA offer. However, the unfortunate fact is known as well that any substantial change would demand a rapid expansion of trade between CMEA countries but this, in turn, requires such a change in the system of relations between the member countries which is beyond any reasonable anticipation in a medium term. The mechanism of successfully promoting the exchange of manufactured products has not been reached as yet. On the other hand, the system of relations that evolved in past decades and was basically built on Soviet raw material shipments cannot be developed because of the slackening growth rate of raw material extraction in the Soviet Union. Thus, it will be fortunate if the profound structural transformation of the CMEA foreign trade turnover will not have a disintegrating effect on the member countries. It is clear that despite every effort the CMEA intra-trade cannot be expected to successfully substitute for a considerable part of the existing Western relations in a medium term, i.e., in four or five years. It was probably due to the recognition of this connection why in the cited paper Ferenc Kozma did not link his suggestion to shrink Western foreign trade with the promotion of the intra-CMEA trade. He put the emphasis on curbing imports while explaining that this should not imply a return to autarky. However, while stating these correct ideas, he failed to make it clear what he meant by the pressing back of foreign trade. There are namely only two ways imaginable, in part by enhancing the domestic import substituting activity and in part by forcing users to unreasonable substitution in consequence of the shortage of import commodities. Both processes have grave implication. The first one necessitates to renounce the benefits offered by large series production – which are sometimes overemphasized by Kozma. The second one endangers the successful satisfaction of consumer demands.

Measures to restore equilibrium

It is undeniable that when the non-competitive import commodities become more expensive for a country and thereby the terms of trade deteriorate – as has happened to Hungary – then the ways and measure of her participation in the international division of labour need to be reassessed and reformed. This means that the foreign trade turnover has to be rearranged also if it is assumed that the monopoly receipts of Western companies

hinder the effective assertion of Hungarian creativity in the world market and also if the main obstacle to increasing efficient exports is assumed to be the failure of production to adapt itself properly to world market requirements.

In fact after the price explosion the conditions of Hungary's foreign trade relations substantially worsened and this process is not likely to have ended. The relationship between the Western export commodity base and the growth of production was upset by both the crisis of the cattle market and the decelerating growth rate of Soviet raw material deliveries. The already disadvantageous situation continues to worsen because after 1980 the Soviet raw material deliveries will predictably not increase any more and this will not simply retard the growth of Hungary's Western export but will also entail additional demands for imports from convertible currency areas.

The change was a real shock in the field of primary energy or, more precisely, in crude oil consumption. The quick career of crude oil began in Hungary not very long ago, according to contemporary opinions quite tardily. The share of hydrocarbons – mostly crude oil – in primary energy consumption amounted only to a fifth of the total in 1960. Thereafter the use of hydrocarbons increased steeply, especially following the Soviet deliveries of crude oil and then of natural gas to which a 20-fold increase of domestic natural gas production was added.

The trend was broken by the rising world market price of crude oil. The price of primary energy purchased in the form of supplementary import increased in Hungary at a much higher rate than in the world in general. In 1960 energy requirements could be satisfied beside domestic crude oil and natural gas production from Soviet crude oil. In the late sixties the Hungarian import requirement was still satisfied from crude oil that cost 16 roubles (640 forints) a ton. The supplementary amount was bought in 1979 for 138.6 dollars (5088 forints) a ton. This nearly eight fold price increase is 5.5 times the average devaluation rate of the forint. Over this long period the "rocketing" price of crude oil was only 2.9 times faster than the average price increase in the world market. Despite every effort the shock inflicted upon Hungary entailed only slow adjustments. The inertia of attained development showed to be powerful enough to maintain the old 64 percent share of hydrocarbons within the domestic uses of energy even in 1979, although, due to the climbing price of crude oil, the new and most up-to-date power plants were used only at the peak-leads of the electric power network.

The changes that affected the balance of foreign trade adversely showed to be more powerful as far as their import impeding influence was concerned. In the sixties a 1 percent increase in the volume of production used to be accompanied by a 2–3 percent increase in the volume of Hungarian imports. This rate decreased, though with considerable fluctuations, to below 1 percent between 1975 and 1979. The demand of enhanced production for higher imports from the rouble area decreased from the same 2 percent order of magnitude to 1,3 percent. This means that the Hungarian economy already did change its attitude towards foreign markets quite appreciably. The rate at which relations with CMEA countries developed was moderated and the division of labour with the dollar area was downright reduced. But this was not enough to attain equilibrium.

Actual results in restoring equilibrium were not attained before 1979–1980. The 25.4 percent decrease of net investment recorded in 1979 was followed by stagnation on a low level in 1980. Incomplete investment projects and reduction of inventories were typical in both years. After the raising of consumer prices in July 1979, real wages palpably diminished and the total consumption of the population showed only a slight increase. Along with these austerity measures the balance of Western foreign trade substantially improved. In 1979 the deficit was strongly reduced and in 1980 the export and import turnover became practically balanced.

The main factors of the change were the following:

- moderated economic growth;
- drastic restriction of investments;
- stagnation of the standard of living;
- reduction of inventories;
- appropriate regulation of the bilateral balance of socialist export;
- limitation of Western imports through enterprise consensus, (ie., enterprises, having realized the grave position of the economy, and understanding higher intentions, cut back their orders for Western imports.*

The ways of lasting solution

The decreasing role of import in economic growth as proposed by Ferenc *Kozma* really occurred. Yet the problem is unsolved as none of the emerging trends promises but a short-term improvement. The question still demanding an answer is the following: what kind of a new path of economic development gives the chance for balanced imports and exports over the long term; what rate of growth and what combination of import substitution and export promotion should be implemented. The permissible limit to demand restriction and to raising further credits are also points for consideration.

Any lasting change would require an acceleration of Western export activity and import substitution. *An expansive increase of production exceeding the slower than earlier rate of domestic consumption is needed where the surplus helps relieving the tension of the balance of payments.* The emphasis should not be on decreasing the growth rate of production and curbing the import but, on the contrary, on doing everything for increasing efficient production along with an only modest increase of domestic demand.

From this point view it is cardinal to satisfy two requirements parallelly: – demand in the domestic and in the CMEA markets must be durably below production capacities; – enterprises must be continuously forced to efficiently exploit the production capacities. It is obvious that the two requirements must be enforced simultaneously. If only the first one were enforced, then, though the demand for Western imports would be diminished by restraining economic performance and the standard of living, this would

*For the mechanism of import restriction by enterprise consensus see the study of János *Gács* [3]

Table 2
The volume of import

Years	Value added (GDP)	Yearly growth of imports from the		Import elasticity[b]	
		rouble	dollar	rouble	dollar
		area		area	
1960–1972[a]	5.1	8.1	7.9	1.59	1.55
1970–1972[a]	4.0	5.0	5.6	1.25	1.40
1970–1975	5.2	7.8	3.6	1.50	0.72
1971–1976	4.8	5.0	3.0	1.04	0.63
1972–1977	5.0	6.2	5.8	1.24	1.16
1973–1978	4.6	7.1	8.0	1.54	1.74
1974–1979	4.1	5.2	3.3	1.27	0.80
Trend value[c]					
1963–1967				2.02	2.80
1968–1972				1.63	1.53
1975–1979				1.30	0.94

[a]The breakdowns of imports appear as socialist, and non-socialist countries.
[b]Import growth required for one percent growth of the value added, in percent.
[c]Geometrical mean of growth measured over five years.
Source: Statistical Yearbooks, Foreign Trade Yearbooks. Központi Statisztikai Hivatal, Budapest.

not bring about any durable equilibrium in the balance of payments. If only the second requirement were fulfilled we would have to reckon with an outright deterioration of the balance of payments for, owing to difficult sales conditions, the growth of import requirements would be accompanied by a neglect of Western export markets.

A simultaneous performance of the two tasks would not be easy even if the preferences between the two objectives could be defined in a more clearcut way. In the first approach it seems to be safer to concentrate on the first task as its fulfilment certainly improves the situation that has developed. But this statement must be qualified. The strategy of curbing the standard of living contradicts not only to the long-term objectives of economic development but beyond certain limits it might even conflict with the shorter-term requirements of the balance of payments. The substitution of Western imports and the increasing of Western exports are attainable in a lasting way only when higher performances are rewarded by higher real wages. Not mentioning that dissatisfaction with the standard of living and with wages may, as shown by several examples, cause disturbances in production that might irreversibly result in a grave and abrupt deterioration in the balance of payments too.

The question marks of a rational economic policy*

Every item of the Hungarian system of economic control must be put at the service of the established economic policy concept. For solving the above mentioned task we can find a simple answer if we look for a reference in the theory of foreign trade.

The balance of payments deficit derives from overvaluing the domestic currency. It follows that the rate of exchange must be raised, whereby the values of foreign exchange receipts and expenses will increase. Consequently, the enterprises' export incentive will be enhanced and they will be more interested in economizing on import, in substituting import by domestic production.

As shown by experiences of the modern capitalist society, the above recommended measure does not have a direct impact but asserts itself with a rather long time lag and only provided that, and as long as, the limits to domestic demand do not let manufacturers neutralize higher import costs by increased sales prices and as long as the buyers are reluctant to accept a domestic price level that rises more steeply than the export receipts and the import prices [5], [6], [7].

So there is nothing to wonder about the difficulties countries with payment problems face when they accept this apparently simple advice. In the period right after the devaluation of the domestic currency the measure is frequently ineffective. In the long run it happens that by the time when the favourable change would manifest itself the government is no longer able to control demand. It may well be that devaluation is followed not by the recovery of the balance of payments but by increased inflation.

Instead of taking for granted this therapy that seems to be simple at first but has shown to be hard to carry out in several countries, let us make a systematic study of several important elements of economic regulation, as amended in Hungary in 1980, from the aspect of the policy concentrating on export promotion and import substitution: 1. income regulation; 2. the price and exchange rate mechanisms related to foreign trade; 3. allocation of investment funds.

Questions of demand control

It is clear from the analysis that the Hungarian production machinery faces qualitatively different hard tasks when instead of the domestic or the socialist export markets, it wants to sell its products in the world market. It is also obvious that it is not worth while to accept this additional difficulty for a modest extra revenue. Beside direct enterprise experiences it seems to be proved also by empirical econometric analyses that the principle of the price system valid till 1979 that the receipts originating from Western export ought to be higher than those from domestic and socialist marketing did not encourage the promotion of export against convertible currency [8]. Therefore the

*A general analysis of this question is given in our study written together with Rezső *Nyers* [4].

Hungarian industrial enterprises only try to be successful in the world market when they are forced to. What has been the main method of coercion till now resulted in a yearly 13.9 percent and 7.6 percent increase of the non-socialist export volumes of machines and consumer goods, between 1972 and 1976, which implied a 10,1 percent annual increase in the export of manufactures* and was only 0.3 percent below the growth rate that had been attained under more favourable competitive conditions between 1960 and 1972. The compelling force is supposed to lie mainly in two factors: Firstly, the allocation of economic and financial preferences (development funds, purchase of Western machines) was conditional on stipulations of the central organizations concerning Western exports. Secondly, the planning of Western exports and the extent of fulfilling this plan was a generally, and in the last years a particularly, important point in the assessment of the enterprise by supervisory authorities. The results notwithstanding, this method of incentive cannot be accepted as satisfactory not only because the already appreciable growth rate of export needs to be further increased, but mostly because, on the one hand, it can be successful only as long as and where the Western export amounts only to a small part of output and, on the other hand, it does not stimulate the promotion of efficient export. This is because the enterprises consider export to be a means to attain some important goal – from export success they expect acknowledgement by the supervisory authorities or the chance to finish an investment project in an up-to-date manner. As long as the share of Western export in the total activity of an enterprise is low the result expected from export and the cost of export are not commensurable. In such case it is worth exporting even if it is losing and there is no need to save costs entailed by exporting.

However, in the present state of the Hungarian economy such an economic compulsion must be administered which has positive impact where the share of export is no longer insignificant. Not simply export promotion but efficient export promotion should be the objective for enterprises. Furthermore, it should be attained that export efforts be accompanied by economizing on import.

Only the powerful regulation of demand can satisfy this requirement. In Hungary personal and producers' demands are regulated separately. In the planned control of personal incomes the results are rather unambiguous if the side effects of wage control impeding or distorting the economic incentive are not considered. The actual magnitude of money wages and even of real wages keeps in line with the plans with good accuracy. In this respect modifications are necessary because such a method of aggregate income control would be needed that would not put a brake on the differentiation of wages according to individual performances and which would not distract the enterprises from their objectives related to increasing the profit.**

In connection with the control of producers' demand the situation is much worse. It is known that the cyclical unplanned fluctuations of investment have not decreased in

*Covering the group of machines and consumer goods according to CMEA nomenclature.

**For a discussion of wage control methods see Acta Oeconomica, Vol. 20, No. 3.

Hungary in the new economic mechanism either.* The ambitions of planning aimed at satisfying social demands but the aspirations of the central agencies which were not well harmonized with the capacity of the economy have always proved to be stronger than the will to coordinate demand and supply. The investment cycle was accompanied by strong fluctuations in stockpiling, too.

The shortcomings of the control of producers' demand did harm not only because of the high and low tides of incomplete investment projects and inventories but caused even more serious damages: the enterprises were not pressed to economize on inputs. This manifested itself in poor utilization of fixed assets, employment of unnecessary labour, and wasteful material consumption.

The magnitude of producer's demand could and should be regulated in the economy by fiscal and monetary policies coordinated with the money supply. The weakest point of this apparently sensible suggestion is the fact that it does not work quite smoothly even in the capitalist economy.

Not only that the Western governments could not avert the cyclical fluctuations in the economy by a combined regulation of the money supply and of budget expenditures, by the so-called "fine tuning", but unleashed at the same time uncontrollable inflationary processes. In the leading industrial countries, and especially in the USA, the reason of the failure was the regular violation by partial interests of the objectives of counter-cyclical policies started in the sixties. The liquid demand emitted through monetary and fiscal channels affected production only with much delay, but it directly increased inflation. In their combating inflation the governments had to control the growth rate of production which they wished to attain through restraining the money supply and fiscal expenditures. However, this intervention was neither quick nor firm because of the interference of partial interests with the *raison d'état.* Under the influence of the experimentation escaping the power of governments stagflation has developed, a phenomenon of the present-day capitalist world economy meaning unexploited capacities and unemployment accompanied by inflation. From the failure of coordinating monetary with fiscal politicies in Western countries and from the Hungarian failure to keep demand in line with the capacity of the economy whether in periods of directive planning or under NEM it still does not follow that the same would be doomed to failure in the future. The Hungarian control agencies certainly have the necessary power to carry out such a policy. Success depends partly on whether they can give absolute priority to harmony of the aggregate demand and supply over any other given development objective, and partly on whether they can create conditions in economic management that do not hinder the enterprises from taking decisions on production and setting prices in a flexible way.

Demand control planned in line with production opportunities and adequate price and exchange rate policies (which will be discussed hereinafter) that could bring about economizing on import – especially on material and semi-finished import – should not be the result of administrative compulsion nor of such enterprise self-control as has been

*In this respect see [9], [10].

decided upon by enterprise managers bearing in mind the grave situation of the economy and higher intentions. The curbing of imports by not exclusively monetary means, although indispensable when demand is not properly controlled and when the price and exchange rate systems do not sufficiently stimulate parsimony, is namely likely to have most disadvantageous implications. Even with the best control system it strongly inhibits the adaptivity of production to demand.*

The price and exchange rate mechanisms

The old price and exchange rate mechanisms were amended in Hungary in 1980. In this context it was intended to implement two important and progressive principles: the normativity of economic control and the system of flexible competitive prices.

The requirements towards the amended system are a great step forward over the price system introduced in 1968 that followed domestic costs and was not much affected by the value judgement of buyers, and especially over the practice adopted since 1972 under which the regulators were often changed on a firm by firm basis.

The time passed is too short to evaluate the consistency of implementing the new principles, the bureaucratic methods of price control and the achievements of the method. Yet there are *two questions* that seem to be already justified to ask.

The *first* question relates to the magnitude of differentiation of prices and profits, resp., between well marketable and not selling products. We believe that the relevant documents are right in stating that the price of commodities in demand must not be higher than what their import would cost with the prevailing customs duties. The desirable price of products for which supply is greater than demand has not been made that clear as yet. The documents say it is justifiable that such products should not earn profit. According to experience it may be predicted that the declared differentiation of free prices will not come true. But even the declared differentiation is not sufficient. It would be perfectly reasonable if beside not containing profit, the price would not necessarily cover the fixed costs either where the potential supply (that is, capacity) is higher than production. (This is justified when the import price is lower than the total cost.) In order to carry out such economically perfectly justified measure of differentiation in the profitability a comprehensive change of the control system in general would be necessary.

This would require to remove the obstacles from the way of fulfilling two requirements. Firstly, the preconditions for the rational use of big profit should be provided. It is unreasonable that high – and particularly a temporarily high – profit should automatically involve the raising of the wage level. Big profit triggers increased

*For the impacts of self-control-based containment of import demand see [11].

investment, irrespectively of the economic efficiency of enterprise development opportunities too. Secondly, the decreasing profit or loss of enterprises ought not produce, even temporarily, a situation that is inadmissible from the business point of view. Fluctuations in profit and temporary losses of enterprises are, namely, normal concomitants of business. However, owing to the current peculiar features of monetary control, enterprises with diminishing profit and temporary deficit become at once and automatically paralyzed without state assistance. Thus they are prevented not by viewpoints of comfort but by the system of economic management to outmanoeuvre the jeopardy without outside assistance. It is another side of the symptom that the state organizations are forced to subsidize a big part of the enterprises not with the aim of curbing enterprise autonomy when they consider maintaining declining production a lesser evil than to leave capacities completely inutilized.

The recommendable modification of control would naturally provide the grounds also for controlling the force originating from conservative human conduct which manifests itself in the attempts of the state organizations, or some of their officials, to utilize the compelling force of the control system for strengthening their own position against enterprises, or in the reluctance of an enterprise management to run the risk of enterprising.

The other problem is related to the *exchange rate* policy. In Hungary there has been a long debate on the dual task of active *exchange rate policy,* i. e., to bolster the relative stability of the forint and to stimulate for the restoration of the balance of foreign trade.

The definition of the dual task is absolutely rational and necessary. It is justified to defend the country against the import of inflation by regularly revaluing the forint. At the same time, it is not justified to assume that a devaluation of the forint or its slow revaluation against rapidly devaluating foreign currencies – while the other factors remain unchanged – which amounts to a real devaluation of the forint could bring about any improvement of the balance of foreign trade. It is namely clear that when the import demand and export supply of the economy are inelastic then the devaluation of the forint's rate of exchange will only result in a rising price level and will not affect trade. [2]

Admitting the aforesaid does not mean to state that the present exchange rate of the forint is correctly set nor that import demand and export supply are really as inelastic as is assumed by some economists. I do not know the answer to these two very important questions and I believe that others don't know it either for the time being.

However, for being able to answer these questions and to raise realistically the problem of revaluing or devaluing the forint two conditions must be provided in the first place. Firstly, the policy of planned demand control discussed above must be realized. Accordingly, the rate of money supply as well as the level of budget expenditures should be determined in subordination to the requirements of general demand control. The constrained domestic demand should force the productive units to increase Western exports and import substitutions in accordance with the efficiency criteria set by monetary regulations (rate of exchange, rate of interest etc.). Secondly, adequate differ-

entiation of commodity prices according to demand and supply conditions should be facilitated at least in the scope of free prices.*

It is supposed that when these conditions shall have been realized we shall be able to come near to an appropriate forint rate of exchange. It is clear that such an ideal situation should be in mind in which the total planned domestic demand could be satisfied while the balance of exports and imports would keep in line with the plan requirements and the rate of exchange would provide sufficient incentive for this export and for import substitution alike. So the export receipts would be determined exclusively by the product of the price in foreign exchange multiplied by the rate of exchange, and the domestic producer prices would not be higher than the value of the import price plus customs duty.

The present state of affairs cannot be regarded as an acceptable approach to this ideal not only because the export of some products is encouraged through the rate of exchange but also because 1. demand is created according to central plan conceptions and absorption is not limited adequately; 2. state preference is given to export also where the enterprise would have to utilize its production capacity for export purposes anyway; 3. a big part of prices are higher than justifiable by import competition.**

The above noted change would entail significant transformations in the volumes of export and import as well as in their pattern. Today, in lack of experiences, we only have an idea about the directions of the change but we cannot even estimate the measure of the change. Among others we do not know whether, following such a transformation, the ideal commercial rate of exchange would be higher or lower than the present one.

It is nevertheless possible that after the changes the export and import substitution encouraged by the rate of exchange would turn out to be failing to guarantee the planned equilibrium of the balance of payments: exports would not cover the costs to be paid for import in foreign exchange. In such case it would have to be really raised whether it was reasonable to strive after restoration of the balance of payments by a real devaluation of the forint.

It is not impossible that maintaining the equilibrium of the balance of payments could not dispense with administrative intervention in such a case either, for the elasticities of export supply and of import demand with respect to price would be found to be too low. However, it can be answered only after the said transformation of the control and management system whether the elasticities of export supply and import demand with respect to price are too low, or whether there exists any rate of exchange suitable to guarantee the desired equilibrium of the balance of payments.***

*Hereinafter only the rate of exchange of convertible currencies will be treated. Because of CMEA contract price rigidity and because of the bilateral restrictions of turnover the valuation of the transferable rouble raises problems beyond the scope of this paper. For this problem see [13].

**See [14].

***It also needs clarification whether fixed state prices or limited prices or their delayed adjustment to market conditions do not set into motion additional distorting factors which do not allow the assertion of the forint devaluation. See [15] and [16].

Furthermore it remains a question what we are supposed to do in a case when the magnitude of the rate of exchange has been temporarily satisfactorily solved but we have to face the problem arising from the fact that there is steep inflation abroad while we are able to maintain a relatively stable price level at home. In such a case – which is profoundly different from the present one – it may be reasonable to systematically defend the country against the import of inflation by revaluating the forint. But now, as long as the main task is to relieve the chronic strain of the balance of payments, exports and import substitution must be encouraged through the planned control of domestic demand and a more marked differentiation of profits realized in price on basis of efficiency. And if all that proved to be insufficient then we must not refrain from a real devaluation of the forint.*

The enterprise investments

Up to now enterprise decisions on investment projects have set out from the logical assumption that the efficiency of development and the exploitation of up-to-date technology will be determined by the scale of development. The domestic market alone is not able to provide the volume of demand required by an up-to-date development of production. Consequently, the conditions for efficient development must be found in the international division of labour and within that in the framework of CMEA specialization. The importance of the latter has been supported by the enormous and secure market guaranteed for new products by concerted decision of the CMEA countries' planning organizations. The train of thoughts goes on: production developed this way promotes East-West economic relations as well. By virtue of the newly built big and up-to-date capacities the CMEA countries, including Hungary, can realize their domestic labour more efficiently in the world market beyond simply turning out marketable products selling in the advanced industrial countries.

This closed train of thought which is faultless from the viewpoint of the logic of economics and the investment behaviour originating from it are based on two assumptions: firstly, that the products turned out by residual capacities (formed on the basis of CMEA specialization) are in fact marketable and even selling well in the world market and, secondly, that it is possible to import in return for export resulting from the development and directed mostly to the CMEA market such products as are really needed either because they substitute Western imports or because they economically replace products that are expensive to manufacture at home.

*Part of the Hungarian authors treating the problem of an active rate of exchange policy advocate systematical devaluation without assessing whether the stalling of domestic demand is a sufficient incentive to exports or to import substitution. On the other hand, I believe that the advocates of revaluing the forint at a slower rate than foreign inflation, i. e., of its real devaluation, state without any convincing documentation that the predictable increment of the cost of exports and of import substitution will be higher than the valid rate of exchange, and they do not make it clear enough what the preconditions are of a devaluation asserting an incentive impact.

However, these assumptions have been seldom found to be correct. Without trying to go into full details it may be stated that successful implementation of developments based on the above assumptions usually did not come up to expectations because, owing to differences between the sets of requirements of the two markets it frequently cost enormous sacrifices to exploit production capacities suited to CMEA requirements for the purpose of Western export. Exploitation of the new capacities for that purpose was difficult first of all in case when the Western market specified higher requirements as to the basic parameters of a product (performance, wear resistance), but mainly when the manufacturer could not cope with the market requirements concerning terms of delivery, punctuality, finishing, packing, etc. To these shortcomings encountered in the course of marketing were added further ones relating to smooth operation in case of machines and presentation of products in case of consumer goods. Terms of delivery which are required by the world market often as preconditions of sales are either not stipulated in the CMEA market or a lower standard is set than the minimum requirements of the world market. The manufacturer certainly cannot cope easily with such differentiation of requirements. By adjusting to different standards as to the intrinsic or additional properties of his products the majority of advantages to be gained from scale of production is risked. By accepting to satisfy a higher standard also where it is not a primary requirement he runs, as experience has shown, the risk of failing to recover the value of the extra services.

It is another weakness of specialized development of production that it is frequently unable to satisfy even the domestic requirements adequately. Specialized manufacturers often disregard special buyer requirements and specifications, among other things with respect to assortment and timing of delivery. Buyers are therefore sometimes hard to persuade to satisfy their demand from specialized CMEA output.

One could thus argue the past rationality of pursuing the investment strategy here described, but it is sure that as long as the Hungarian economy is set back by the problem of the balance of payments in convertible currency and as long as no sharp and effective turn can be expected towards a more effective observation of buyer's interests, both in the CMEA relations and in the domestic business systems of friendly countries, the investment line relying on CMEA specialization may not be regarded to be the mainstream of development.

The investment policy must be formulated on the basis of the reasoning set forth by Mr. János Kádár at the session of the National Assembly, on September 26 1980: "We cannot change the world economic conditions. We have got to live, work, carry on and thrive under the circumstances presented by the state of affairs."

Under the coercion of circumstances such expansive economic policy must be pursued in the use of the modest available resources which gives preference to promoting direct Western exports and import substitution. We have to endeavour to find widening Western markets with favourable sales prices for the manufactured products. In addition, endeavours have to be also made towards controlling demands for import from the world market.

Unfortunately, it must be admitted that it is about impossible to score smashing success with large-scale operations in developments aimed either at sales on the world market or at domestic import substitution. Step-by-step evolutionary development based on the attained performance and existing production capacities has the best chances for success.

In addition to efficient major investment projects it would be reasonable to emphasize such smaller developments as could prompt the enhanced purposeful activity of participants beside being in a short term. The large-scale industry should be thus convinced to carry out new kinds of efficient development aimed at export and import substitution where the efficient returns of the modest funds are promising even if the risk of development is not diminished by a big sales market provided by intergovernmental agreement. This strategy of enterprise development is unusual in the practice of the Hungarian industry. In the course of implementing it, it will be often necessary to run counter to traditions established in the last three decades. The Hungarian enterprises ought to learn the know-how of developments that serve to improve the balance of trade settled in convertible currency.

Hungary has to reckon with special difficulties in connection with the program initiated for the setting up of small enterprises. This program is intended, among others, to give the green light to founding small cooperative enterprises and at the same time it is meant to give more ground to private initiatives as well. These limited, but considering the inputs most promising, enterprises are likely to be especially successful in the field of Western exports and import substitution. We have to be aware, however, that if we want to enjoy the fruits of the advancing cooperative and private enterprise, then we must accept the implications as well. Small enterpreneurs will not betake themselves to markedly promising business activities unless they can expect higher receipts than the average income. Therefore the consequences for the distribution of income must be reckoned with well ahead when, under economic coercion, we attach great expectations not only to the development of big state companies but also to the achievements of the small firms. The positive workings of the program would be jeopardized if the impact of small enterprise upon income distribution happened to provoke indignant counter-actions afterwards.

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ВНЕШНЕТОРГОВЫЕ АЛЬТЕРНАТИВЫ

М. ТАРДОШ

Напряженное состояние венгерской экономики вызвано несбалансированностью внешнеторгового оборота с несоциалистическими странами. Это может быть объяснено внешними и внутренними причинами. Среди внешних причин наиболее важной является не резкое повышение цен на нефть, а то, что спрос на основную статью венгерского экспорта (живой скот и говядину) понизился, и цены также стали неблагоприятными. Кроме того, венгерская внешняя торговля не сумела поспеть за капиталистической инфляцией. На рынке изделий обрабатывающей промышленности давление развивающихся стран, пользующихся таможенными преференциями, сделало

конкуренцию особенно острой. Венгерские предприятия, субсидируемые из государственного бюджета, не проявили достаточной сопротивляемости повышению импортных цен и не добивались повышения экспортных цен. Ухудшению положения на капиталистических рынках способствовала также стагнация поставок сырья из стран СЭВ. Среди внутренних причин автор указывает на то, что экономика восточноевропейских стран, слабо приспосабливающаяся к потребностям потребителей, традиционно обладает слабыми позициями на капиталистических рынках. После реформы 1968 г. венгерская экономика достигла определенных сдвигов в изменении этого положения, однако после 1972 г. из-за отступления в проведении экономической реформы усилия в этом направлении ослабли, и Венгрия не смогла приспособиться к ухудшению хозяйственной ситуации.

Для преодоления трудностей ориентированная на экспорт экономическая политика является лучшим и более надежным решением, чем ограничение потребления. Экономическая политика, стимулирующая экспортную ориентацию и замену импорта, требует более свободной динамики оптовых цен и усиления регулирующей роли валютных курсов.

В связи с политикой в области капиталовложений в статье говорится об исчерпании возможностей осуществления крупных капиталовложений, ориентированных на рынок СЭВ. Положение требует малых эволюционных акций, которые способствовали бы постепенному достижению успехов на рынке развитых промышленных стран и ограничению импорта без ущерба для потребителей. Ни на одном из этих рынков не имеется возможностей для эффективного сбыта прироста продукции, достигнутого благодаря крупным концентрированным капиталовложениям.

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A. KÖVES

TURNING INWARD OR TURNING OUTWARD: REFLECTIONS ON THE FOREIGN ECONOMIC STRATEGY OF CMEA COUNTRIES

"Unusual things are rarely considered believable"

(János *Székely*)

Arguing with the widely spread concept according to which the integration of CMEA-countries would become stronger in the years to come at the expense of East-West trade because of tensions accumulated there, the author proves that the inward looking economic strategy of CMEA-countries cannot be consistently realized taking present potentialities of their economies into consideration. Endeavours aimed at turning inward would lead to mounting economic tensions. Their lasting dissolution and elimination of structural disequilibria would become possible only by an economic policy trying to expand economic relations with other parts of the world also further on, but more purposefully than previously. Such a policy may create the conditions for further development of CMEA cooperation, too.

The author of the present paper has recently had the possibility – both as researcher and as opponent – to participate in several works aimed at exploring possible trends and ways of world economic development, the expected foreign economic environment of Hungary and other CMEA-countries at a time when they begin with the realization of their next five-year plans.

Difficulties and pitfalls of forecasting are well-known. They result also from the fact that the unavoidable starting point of each concept referring to the future has always been extrapolation of past processes and of the present situation, respectively, to the future. Whether authors are aware of it or not, whether they emphasize or even deny it, each forecast is largely influenced by the economic and political medium prevailing at the time of its elaboration. On the ground of fast and balanced growth optimistic forecasts are made as self-evidently as pessimistic ones under conditions of sharp disequilibria. In the latter situation (characteristic of Hungary at present) there is no realistic basis that would justify to outline concepts making the future seem considerably better than the present.

But, the question arises: what will happen if, precisely because pessimistic forecasts prove to be correct, i.e. slow development, accumulated disequilibria and increasing tensions remain characteristic of the world economic situation or of individual sectors of the world economy also further on, and the growth model whose outlines can be seen at present proves to be untenable after a certain time together with its assumptions and a

situation develops when several – if not all – elements of economic, perhaps also political, strategy and tactics have to be reconsidered and elements of the way of reasoning and action of society previously thought to be valid for ever and incontestable must be queried? Because of the great number of unknown factors – by far surpassing the frameworks of economic analysis – precisely that is usually the most difficult to foresee what might happen at this point. The possibility of such a joint impact of forces and circumstances can by no means be excluded, in consequence of which still no correction would take place when such critical points will have been passed. But, this is only one of several possible alternatives and it is not excluded, either, that alternatives which will radically change the conditions of growth will be realized.

This statement holds for the economy of socialist countries, among others also for the future development of their economic relations with Western countries. Possibilities of choice and forced choices CMEA countries are faced with in this respect are subjects of the present article.

Turning inward as an alternative: causes and consequences

The view has widely spread in East and West as well that, in consequence of tensions accumulated in East-West trade, economic relations between CMEA- and developed capitalist countries will decline in the years to come, while CMEA-countries will turn inward, simultaneously strengthening their integration.

From processes that took place in the mid-1970s the American politologist Andrzej *Korbonski* [8] already draw the conclusion that the integration of CMEA countries would go on unavoidably at the expense of trade with the West, because smaller European CMEA-countries would not be able to finance their imports from the West and thus would have no other choice than to solve their raw material problems within the CMEA.

Richard *Portes* also held the view that "the debt may . . . act as a centripetal force in CMEA. Paradoxically, if the pressures of meeting debt service obligations require East European countries to cut back all but essential Western imports, they may thus motivate greater reliance on each other" . . . because "our lending may have indirectly financed investment by the other countries in Soviet raw material extraction." ([19], p. 777)

A later American analysis also stated that shocks in their relations with the world economy acted as integrating forces concerning relations of CMEA-countries among each other, though "the trade data do not bear out the proposition that in the trading patterns of either East Europe or the USSR since 1973 there has been a substantial turning inward." ([22], p. 429)

Let us just list the arguments most frequently referred to when turning inward of CMEA countries is either made probable or urged for: there is a lasting shortage of export commodity funds in the CMEA countries and this may even increase, especially as regards raw materials and fuels: Western recession – under the circumstances of which politi-

cally motivated discrimination against CMEA countries is aggravated also by strengthening protectionism – and relative world market prices durably unfavourable for CMEA countries exporting manufactured goods raise almost insurmountable obstacles to export efforts of the latter; the risk of dependence on Western imports must not be taken in the sharpened international situation; nor is it worth at all, since the importance of technological imports from the West is anyway limited in socialist countries if only because Western firms will by no means sell most up-to-date technology to them [1] and also because technological import is not a suitable tool to stop and reverse unfavourable processes of economic and technological development caused by internal factors. [5] Last but not least, an inwardlooking strategy is necessary and also possible, because reasons of the rapid growth of imports in the 1970s should not be looked for in the economic potentialities of CMEA countries, but in economic policy mistakes, faults or natural hazards. As regards mistakes the most obvious base of reference is the Polish development policy between 1971 and 1976, but also the Hungarian economic policy prior to December, 1978, neglecting foreign economic limits, could be mentioned here with good reason, while as regards hazards the large import of grain by several socialist countries in years when weather conditions were unfavourable could be quoted.

Let us not discuss the arguments for the time being, all the less since those referring to the contemporary situation are really weighty and we have doubts not so much about statements, but rather about conclusions drawn from or suggested by them. Let us analyse instead whether a policy of turning inward might be realized or carried out at all in the present economic situation of CMEA countries and with prevailing world economic trends in view. What are – or would be – the consequences of such a policy? Could it relieve or – on the contrary – will it unavoidably reproduce economic tensions? Is this policy suitable for the elimination of lasting structural disequilibria accumulated in East-West economic relations, or are these brought about precisely by concomitant phenomena of this policy?

From the line of reasoning of those urging for the self-sufficiency of CMEA-countries in one or another form at present a by no means negligible circumstance is often missing, namely, that the policy suggested by them is the traditional foreign economic strategy of socialist countries. Sometimes they try to make rather the impression as if they proposed some new direction of economic development not tested yet previously and, therefore, there were enormous unexploited reserves available in this field. But, in reality the economic history of CMEA-countries has been characterized up to now precisely by endeavours for national and collective self-sufficiency. Even in the period of international *détente* and rapid development of East-West trade the standpoint remained characteristic according to which "the principal technological – economic independence from the capitalist world" should be ensured, also further on, i.e. "in case of an eventual serious deterioration of the international situation the further many-sided economic and technological-scientific development of socialist countries can be provided for, relying basically upon the internal resources of the socialist community." ([21], p. 34) The participation of CMEA-countries in the world economy considerably strengthened in the

1970s* and a situation has developed that is characterized sometimes as "over-opening" requiring correction because of the growth of import exceeding that of export *amidst and despite* import-substituting objectives to be realized at regional level and endeavours aimed at maintaining and increasing self-sufficiency to a great extent.

This "over-openness" is indicated according to Ferenc *Kozma* by such ill omens as deterioration in the terms of trade, or that "the increase of export may make up for the deterioration in the terms of trade only with very considerable efficiency sacrifices or can not compensate for price losses even with such sacrifices", "the entire national work performance proves to be less by international value judgement than stated in domestic valuation", and finally, "the domestic currency proves to be over-valued". ([9], p. 43) Applying these criteria (except for the last one, being irrelevant from this viewpoint) to smaller CMEA-countries the surprising conclusion should be drawn that they are "over-open" also in their trade within the CMEA (first of all in that with the USSR), since deterioration in the terms of trade is most general and of the greatest extent precisely here for an obvious reason, resulting namely, from the commodity pattern of trade. Hungarian terms of trade with developed capitalist countries were by about 6 per cent and those with socialist countries by 20 per cent worse in 1979 than in 1970.** (In the case of Poland, having the most serious difficulties, terms of trade with the West even improved for years after 1973.) According to the logic of argumentation a "closing" would be thus required also here, and that hardly corresponds to the intentions of F. Kozma. The reality is – and this may be the most important starting point in the analysis of conditions, requirements and tasks of opening towards world economy – that this opening was largely promoted precisely by the inadequate development of trade within the CMEA which became "closed" and thus "opening" elsewhere became unavoidable, quite independently of intensions and resolutions. Therefore, the tool of import from the West had to be resorted to a greater extent than previously with regard to not only up-to-date production equipment, but also other products. This explains the increasing import of raw materials, fuel, basic materials for production, spare parts, semi-finished products and foodstuffs.

In this sense, an inwardlooking strategy striving for regional self-sufficiency had already proved to be unrealizable also in the past. This may be explained basically by the fact that demands reflecting objective needs and requirements of the economic development of CMEA countries could not be satisfied exclusively from CMEA sources. Just for an example, let us refer to the requirements of modernization arising in quite a different way at present than one or two decades ago. Namely, modernization of a diversified and developed economy requires not only the import of "most up-to-date" production equipments selected on the basis of certain criteria, whose compensation through exports can be solved without any special problem, but also most diversified and widest possible

*As regards reasons for growing demands for imports from the West see (10), especially pp. 127–157 and 240–274.

**Computed on the basis of [3], pp. 15 and 17.

relations with the external world including the import of capital goods serving for the development of an increasing number of sectors, the buying of know-how and licence and (first of all, but not exclusively in the case of smaller countries) imports for use in current production in ever growing volume (materials, spare parts and components.)* Perhaps even more important are those *consumer demands* connected with the stabilization and raising of living standards already achieved whose satisfaction has also unavoidably necessitated to increase imports from the West, first of all to maintain the lasting high level of the import of grain. There is a marked change as compared with previous decades also in this respect: at that time, with a much lower level of consumption, satisfaction of these demands could be pushed into the background, yet, while at present – as events in Poland warn us – we cannot do so without risking upsetting the socio-economic equilibrium.

As has been indicated in the foregoing, the circumstances because of which CMEA countries are dependent, both jointly and separately, on the development of intensive relations with the external world continue to exist. What is more, in the mirror of events of recent years the idea of turning inward seems to be even more unrealistic and dangerous.

In these years economic growth in the European CMEA-countries has slowed down, large external and internal disequilibria have accumulated. Serious defence burdens are borne by the economies of CMEA-countries. The increase of raw material production is characterized by growing difficulties – especially in the main supplying country, the USSR – indicated in respect of its most important export item – oil – by the fact that the planned production level for 1985 (620–645 million tons) does not exceed the targets of the tenth five-year plan originally set for 1980. Performance in agriculture is not satisfactory in several countries, though a very considerable part of available resources is spent on the development of this branch. The outdated infrastructure neglected for a long time causes increasingly serious troubles for the continuous running of the economy, among others for mutual trade. Amidst such processes the stock of their debts kept increasing and so did their debt service obligations.

All this resulted in a slower growth of export commodity funds saleable to Western countries, sometimes even in their decrease in several countries and in many fields (first of all concerning fuel, raw materials and foodstuffs), what is more, growing shortages could be alleviated only through from outside the CMEA. In case of a slower growth alone – if it is not accompanied by cumulating shortages and tensions – import demands need not increase at the previous rate, either. With progress made in the saving of materials and energy, in rationalization as well as in the transformation of the product pattern, a slowing down or restraint might have been thus even favourable in several countries for

*In this context it is a question of secondary importance (though a not negligible negative phenomenon) that certain missing up-to-date equipments cannot be purchased in the West, either, first of all because of present *political conditions.*

endeavours aimed at improving the equilibrium situation in certain respects. However, tensions became sharper in other respects.

Therefore, commodity funds for trade within the CMEA could be expanded only at a slower rate because of more moderate growth. The most urging task for the individual countries became to improve their balance of trade settled in convertible currency. That is the reason why efforts were increased to export a growing part of their commodity funds saleable also on Western markets actually to the West and to qualify commodity funds previously included in the trade of CMEA-countries among each other as commodity funds to be exported to the West. This process could only partly be neutralized by the spreading of non-rouble trade within the CMEA [18], [20] and by the sober recognition, that the withdrawal of export commodity funds from the trade with a partner within the CMEA would necessarily entail similar steps on part of the partner-country. Thus the final effects of such action on the balance of payments are dubious.

Not only the necessity to increase exports to the West, but also that of restraining Western imports will harden limits to the growth of trade within the CMEA: the increase of export to socialist countries might have to be limited because of its considerable Western import contents for reasons of saving foreign exchange in certain fields even if the commodity funds in question cannot be directed to the West. Of course, reciprocity is enforced also in this case; therefore, savings realized might be less than planned while the negative impacts on trade within the CMEA are unambiguous. Naturally, all this cannot be separated from the rigid bilateral character of cooperation, the backwardness of commodity and monetary relations and from the fact that, as regards the merits of the matter, no change has been made in the system of cooperation in the last decade, either.

These processes do not concern the various countries within the CMEA to the same extent. They impede the growth of trade of smaller CMEA-countries among each other, since in all of them also a further regrouping of export commodity funds is taking place. Not only the boosting of exports to the West will be necessarily given even greater preference than previously, but also the importance of export to the USSR will be growing in intra-CMEA trade. Namely, with permanently deteriorating terms of trade smaller CMEA-countries are able to compensate their raw material imports from there only if a growing share of commodity funds available for export against rouble will be used for export to the USSR. Thus the "radial" character of relations within the CMEA perceivable from the very beginning will become even more conspicuous and because of the unfavourable trends in the mutual relations of smaller CMEA countries the question may become topical in which way and by what specific methods the development of cooperation betwen smaller CMEA countries could be promoted. [17]

Trade between the USSR and the individual smaller European CMEA countries is developing, therefore, differently from the trade of the latter among each other. However, the dynamic expansion of the volume of their exports to the USSR is not aimed at a dynamic increase of the volume of imports, but to a very great extent at compensating rising import prices of fuels and other raw materials. Both the fact that the quantity of raw materials imported from the USSR is not growing and that, on the other hand, the

quantity of their exports has to be rapidly increased also further on, unavoidably maintain their dependence on a continuous increase of imports from the West. That is, in relations of the USSR with smaller European CMEA countries the features, because of which the latter can do nothing but make great efforts to develop their relations with the West, have not weakened, but even strengthened.

And what about the USSR? In this country – resulting from its deviating potentialities – several questions of foreign economic policy are formulated in a different manner than in other CMEA countries; nevertheless the continuous maintenance and even the growth of imports from the West are very important also for it, too.

This statement of ours is supported first of all by the rapid development of Soviet–Western trade during the last decade. Though the USSR is considered by common knowledge also further on as a country much less dependent on foreign trade (and thus also on that with the West) than other CMEA countries owing to the dimensions of its economy, the directions of its development policy and its more favourable supply with raw materials, nevertheless in reality its import from the West increased during the last decade even more rapidly than that of other CMEA countries on the average. [11], [12] There is no change in the trends of Soviet economic development that necessitated large Western imports. Rather the opposite is true: trends of economic development require a further strengthening of relations with the world economy.

In the coming years the USSR will hardly renounce maintaining the import of grain in large quantities; though the importance of imports of materials from the West is less for it than for smaller CMEA-countries, it cannot be neglected at all; and a lasting suppression of the import of capital goods would amount to giving up such development goals which are of primary importance for the USSR not only from economic but also from world political and strategic viewpoints.

It is obvious from the above that a decline in East-West trade would mean the preservation and increase of present economic tensions, a further slowing down of growth, stagnation of productivity and thus the persistence and widening of the present technological gap between the West and socialist countries, and also falling living standards. Besides, this would seriously harm also CMEA cooperation. Eventual statistical data indicating an increasing share of trade with each other in the entire trade of CMEA countries would be poor consolation for the real consequences of turning inward. Restriction of relations with developed capitalist countries would not result in any acceleration of integration processes within the CMEA, nor in an increasing role of cooperation in the solution of economic tasks member-countries are faced with. Though CMEA countries would be more dependent on each other's deliveries, because of the lack of commodity funds increasing their mutual trade would encounter serious difficulties; their economic growth would increasingly depend on technological development and modernization going on in CMEA countries, but technological progress and productivity increase would further slow down. And this situation would unavoidably reproduce dependence on more intensive relations with the external world, on the fast increase of imports from the West. The pressure for opening towards world economy would not be

eliminated, but would cause much more serious burdens than if economic development took place in the spirit of maintaining or developing intensive world economic relations. As a matter of fact, the present foreign economic tensions can also be attributed precisely to the fact that while import demands were rapidly growing in CMEA countries, the necessary conclusions were not drawn from this phenomenon and the socio-economic and political conditions that would have enabled similarly dynamic export growth were not created.

A specific variant of turning inward: establishing relations with developing countries – at the expense of developed industrial countries

There is a specific variant of the strategy of turning inward, recommending an economic policy for CMEA countries paying special attention to relations with developing countries – at the expense of trade with developed industrial countries. [2]

This concept differs from that discussed in the foregoing in that not only the difficulties of increasing trade with the West are regarded as starting point, but also the circumstance that with possibilities of raw material purchases relatively narrowing down in this region also trade within the CMEA becomes restricted. It is suggested therefore, that individual countries import raw materials, that cannot be obtained within the CMEA, from the developing region, and, first of all in the framework of such long-term production cooperation where developing countries would export raw materials to CMEA countries in a compensation for technological assistance and investments in the extractive industry necessary for them. This production cooperation requires coordinated and joint actions as well as joint investments of CMEA countries. There is no other possibility for CMEA countries to gain access to reliable and efficient fuel and raw material sources; reliance on commercial forms would lead to delays and price losses not to be made up for.

There are several points of this chain of thoughts that can be disputed: the author does not agree with the assumption of an expected general raw material shortage in the world that would justify the above approach, nor with the effect of production cooperation offering price advantages *in general.* Political instability in developing countries is also a risk because of which long-term production cooperation with them aimed at fuel and raw material purchases should hardly be raised to the rank of foreign economic strategy, though such cooperation may be undoubtedly important and advantageous in certain fields. And, as to the joint investments of CMEA-countries to be realized in the developing world, the reasons – rooted in the internal financial and accounting mechanisms – can hardly be disregarded here which make economic clearsight difficult also in the case of joint projects realized in CMEA countries.

But, why should this concept be considered as a variant of inwardlooking strategy? Because it is also a foreign economic policy "manoeuvre" that is not willing to recognize the real importance of trade with developed capitalist countries for CMEA countries. The

concepts referring to the feasibility of this "manoeuvre" from the viewpoint of the socialist countries are just as unfounded – and for very similar reasons – as the assumption that, with increasing cooperation within the CMEA, member-countries could be exempted from the burden of developing relations with the West.

A basic element of the concept is the assumption that, in general, it is "easier" to export to developing countries, than to developed industrial ones, thus compensation for the import from there is also easier. This may be true in several cases – just as sales possibilities may be better elsewhere in other cases – and favourable possibilities should always be exploited to the maximum. However, to enter the markets of developing countries is *generally* just as difficult as in other regions of the world. This refers especially to those solvent developing countries whose markets are dynamically expanding and which may be taken first of all into consideration from the viewpoint of developing relations with them. Exporters of the whole world compete for these markets just as, say, for Western European ones. This statement refers first of all to capital goods, thus also to those which CMEA countries wish to supply to developing countries in the interest of promoting their own raw material imports. But, they have to create and preserve their competitiveness under the same conditions there as on other markets: high technological level, continuous modernization of their supply pattern, fast adjustment to market demands, etc. all requiring the import of equipment, spare parts and materials from the West, cooperation with Western firms (actually also cooperation on third markets), the buying of knowhow and licences, a thorough knowledge of international technological progress and world market changes. On the basis of experience within the CMEA in the 1970s it should be particularly emphasized that realization of major investment projects in the extractive industries, carried out eventually in cooperation with several countries, is highly Western-import-intensive.

From this it does by no means follow that the development of exports to developing countries is not a correct and promising endeavour, but only that the success of such an endeavour cannot be separated from the development of relations with other regions of the world: similarly to the connection between the development of relations within the CMEA and the trade with the West, relations with developing countries cannot develop more rapidly, either, if development is tried at the expense of relations established with developed industrial countries and not parallel with the development of the latter.

But, the concept in question is considered as a variant of inward-turning strategy not only because it does not take into consideration the conditions of increasing exports to developing countries, but also for another reason. Out of all the problems on the solution of which economic development in the CMEA countries depends it picks out arbitrarily only a single one – raw material supply – and makes it a central issue of the entire strategy of economic development. According to this concept the key-issue of the economic growth of a country is that necessary raw materials should be available. Methodologically this concept is fed by the traditional role of product balances (in physical terms) in socialist national planning and by the fact that the main issue of

cooperation within the CMEA has always been the coordination of quantities (and terms) of raw material deliveries. If it turns out that raw materials will not be sufficient in the CMEA, then the primary task will be to make up for arising shortages, and with methods similar to those with which attempts were made previously to diminish or eliminate raw material shortages within the CMEA. The essence of the manoeuvre is, therefore, to ensure regional self-sufficiency also further on, by making use of certain economic relations outside the region in the interest of attaining this goal.

Reasoning in terms of needs expressed in physical units of measurement pushes adequate treatment ot those efficiency problems into the background on which future economic development of CMEA countries is first of all depending. The aspects of safety of supply must by no means be underestimated, what is more, it has to be emphasized that to ensure supply with raw materials is one of the most fundamental conditions of the development and functioning of the economy in general and, concretely, also in the contemporary situation of CMEA countries. Raw material and energy shortages arising from time to time or becoming permanent may bring about – as is well-known – such functional disturbances that might not only slow down growth, but also diminish the actual potential of the economy to a great extent.

However, if the question is raised where the present problems of raw material and fuel supply of CMEA countries result from, then not only the insufficient quantity of available raw materials and fuels has to be referred to (which is anyway unseparable from technological development and productivity conditions, from the technology and techniques applied in these branches). Also the exaggerated material and energy intensity of the economic structure has to be pointed out (which – and this has to be emphasized – developed not as an accident, but is a product of their entire industrialization concept) as well as the extraordinarily high per unit material and energy inputs. This is, however, the consequence of at least two factors, namely, of technical and technological backwardness and of the vasteful consumption that can after all be attributed to the low price and costs sensitivity of enterprise management. This is perhaps enough to illustrate that the solution of raw material and fuel problems requires first of all a development policy basically differing from the previous one and is linked with a million threads to transformation of economic structure, the continual modernization of the entire economy, the introduction of new products and technologies – which all are depending on relations with the world economy taken in the broadest sense. And it is already a commonplace that development of a more up-to-date and export-oriented economy may be the only guaranty for a country that it can really import those raw materials (eventually becoming even more expensive) which it needs. On the basis of all the above we think that also this variant contains all inconsistencies of turning inward and is just as unrealizable as the other.

Opening to world economy: the way and difficulties of solution

Therefore, the point we are trying to make is that turning inward, i.e. replacement of economic relations of CMEA countries with the West by the development of relations within the CMEA (or what is equivalent: the development of CMEA integration at the expense of relations with the world economy) is full of serious contradictions. Consequently, it is a concept that cannot be consistently realized while maintaining the present economic policy priorities of CMEA countries. Even if economic and political developments of the last ten years or so have not yet made anachronistic for CMEA countries to try choosing – again or also further on this way – this may bring day after day such problems and tensions to the fore which will unavoidably put or keep on the agenda the desirability or unavoidability of another alternative.

This other alternative, called *opening to world economy* [10], is based on the recognition that it is an indispensable precondition of balanced growth, of the relieving of economic tensions as well as of improving productivity and efficiency that CMEA countries shall not narrow down, but – precisely the other way round – try to widen their economic relations with other regions of the world.

This is not some kind of a choice between the development of external relations or of CMEA cooperation, respectively. On the contrary: even if, in the present situation of intra-CMEA trade, the trade with Western countries would develop faster then the internal turnover of CMEA countries, it would be *this variant* that would also allow a faster and healthier development of trade between CMEA countries, in harmony with the economic interest and needs of the member-countries. Namely, opening creates more favourable conditions also for the development of relations among each other than striving for self-sufficiency at CMEA level. Faster technological progress and increasing efficiency being characteristic of this alternative could be felt also in the composition and dynamics of commodity turnover among each other and contribute to the promotion of specialization and modernization within the CMEA, expand commodity funds available for their mutual trade (among others raw materials and fuels). But first of all, it would create more favourable conditions for a healthy growth in the individual countries and thus also for a dynamic development of the entire CMEA region. Trade with developing countries could be also given new impulses by modernization, increasing efficiency and knowledge that could be brought about only by a many-sided and close connection with the main stream of world economy.

If the question was raised in connection with the alternative of turning inward, then it has to be asked also here: is this a feasible alternative? Will it not encounter obstacles because of which it has to be rejected as unrealistic from the very beginning? Raising this question is all the more justified, since it is not necessarily included even in the system of arguments proclaiming the necessity of turning inward that an opening towards world economy would not be desirable. The tacit implication is that it is not feasible, however desirable and expedient it would be.

The extraordinary weight and seriousness of arguments indicating the difficulties of realizing such a strategy could hardly be denied. The greatest difficulties result from the fact that this is a strategy of changes and transformations. While an inward looking strategy reckons with things remaining unchanged, i.e. that no relevant changes will take place in the external environment and the economic performance of the individual countries as compared with the present situation already accustomed to, the alternative of world economic opening postulates that also unusual events may occur, i.e. things may change and can be changed.

Analyzing the *economic* consequences of turning inward we have come to the conclusion that serious, unavoidably reproducing contradictions of such a trend will lead to putting another foreign economic strategy on the agenda. In choosing from possible foreign economic strategies, of course, non-economic considerations also have an important part beside economic ones. Endeavours of CMEA countries for collective self-sufficiency in the late 1940s and early 1950s had developed, obviously, first of all as a part and consequence of a political strategy which considered permanently hostile, not only cold-war, but eventually also actually hot-war relations betwen East and West as unchangeable conditions. (Otherwise it is not only the socialist countries, where the important role of non-economic considerations in formulating foreign economic strategy, what is more, in deciding on the direction of the entire economic development to be followed, is characteristic. For example, ideological, political and economic considerations had all had some part in that developing countries chose almost exclusively the way of import-substituting industrial development in the first decades following World War II. [5])

Thus, with a fashionable terminology, we have an interdisciplinary problem here. Economic analysis alone cannot decide whether economic considerations necessitating opening to world economy may prove to be more weighty than other considerations. It is sure, however, that in a negative case, i.e. if the latter prove to be stronger, this would bring about lasting economic tensions, permanently slow growth in CMEA countries and would impede technological progress that would by no means remain only an economic problem. The economic potential of individual countries or groups of countries, their development level, technological-scientific standards, their place in world trade, the intensity and structure of their participation in the international division of labour have growing impacts on the entirety of the system of international relations and power relations at peresent. [4], [6] Precisely on this account, nowadays it may involve greater risks, considerable disadvantages in the short and the long run as well than previously, if decisions on foreign economic policy are made on the basis of viewpoints deviating from those of economic rationality.

Therefore, opening to world economy can be realized only if it is not thwarted by international political relations. Under circumstances of tension it is very difficult for any country to realize a long-term policy aimed at establishing close relations with the world economy. Here we think not only of direct negative effects of prohibitions, restrictions and various state regulations, but first of all of the political atmosphere causing uncer-

tainty when trying to develop a long-term foreign economic strategy or enterprise business policy that could reckon with the development of East-West relations as a potentiality.

We cannot know how the international situation will develop. But, contrary to several forecasts reckoning with the persistence, eventually even a further sharpening of the present tensions as a most probable variant, we deem also the development of another, more favourable international atmosphere very possible at least for medium run. Namely, on the basis of the foregoing we feel that economic interestedness in *détente* is very strong. And – according to experiences of the period after World War II – this interestedness may be of decisive importance in the development of international relations. We have to be prepared for this possibility since the only rational alternative from the viewpoint of the CMEA countriies' economic development is attached to this possibility.

We can formulate it also in another way: this economically only rational alternative also corresponds to the fundamental international political interests of CMEA countries. The thesis on the avoidability of a new world war had already been formulated at the 20th Congress of the CPSU a quarter of a century ago, and the conclusion had been drawn that under circumstances of peaceful coexistence the USSR and the other socialist countries might have the greatest influence on world development through their internal economic development. This thesis means as well that the international situation of CMEA countries is determined, after all by their economic strength and potential. From this it results, however, that it is not only possible but also highly necessary to develop a foreign economic policy setting as an aim the maximum utilization of advantages to be gained from a world-wide division of labour. This is a foreign economic policy adequate to the strategy of peaceful coexistence and the policy of *détente.*

Another serious barrier to opening towards world economy is the *situation of world economy and international trade.* This refers especially to socialist countries exporting manufactured goods which – not independently of the commodity pattern and qualitative features of their exports – are faced with very serious sales difficulties on Western markets. In periods, when there is a world-wide boom and international trade is rapidly expanding, it is easy to formulate the necessity of intensive participation in the international division of labour, since additional sources of growth resulting from increased imports and from exports to dynamically expanding markets can easily be demonstrated. Previously, international trade grew even faster than GNP in such periods, i.e. the role of the international division of labour in the economic development of individual countries strongly increased. But in the twentieth century history of world economy phases of slow economic growth have been characterized by disintegration processes of international economic relations: world trade increased even more slowly than production and in these periods it was very difficult to gain advantages from an active participation in the international division of labour and it was not even worth striving for it.

However, a new situation – differing from the previous one – has developed at present. Even under conditions of slow growth not disintegration, but integration proces-

ses have remained dominant in the world economy. A characteristic feature of the world economic situation, the outlines of which can be seen at present, is precisely that also under circumstances of slow economic growth, as well as of tensions and growth disturbances arising in various regions and countries of the world, world trade is more rapidly increasing – though only to a moderate extent in absolute terms – than world output. Without dealing with this thesis in detail, we would only point out in support of this statement that, apart from some raw material and oil producing countries which are in an exceptional situation in consequence of the rearrangement of terms of trade on the world market in favour of oil still going on for the time being, the individual countries have no other possibility to mitigate their foreign economic tensions and thus to realize a more balanced domestic economic growth, *than to dynamically increase the exports of manufactures* and actively participate in the international industrial division of labour.*

Since this is accompanied – also resulting from their impaired economic situation – by endeavours to restrict import, in certain fields by a further strengthening of protectionism, too, world market competition will unavoidably become *keener,* bringing about further differentiation among producing countries and enterprises. This will especially afflict those countries among whose export articles products representing advanced technological level, embodying the requirements of dynamically developing economic branches and activities, and thus demanded for, are less characteristic, but rather such goods can be found whose markets are expanding only slowly. This refers also to European CMEA countries and this alone creates undoubtedly much more difficult circumstances for world economic opening at present than those of the 1960s had been.

When the difficulties imposed on CMEA countries resulting from the world economic situation are mentioned, several things are often mixed up. It is expedient to separate these from each other when looking for possibilities of foreign economic action. Under circumstances of slowly expanding business total demand of the world is only slowly growing. This means a very strong global limit to all exporters. But it is only a general framework and not an absolute barrier to the individual sellers (exporters). They may increase their sales even on a stagnating market, by ousting other sellers from there, while they may easily be ousted also from dynamically expanding markets if they are not competitive. Therefore, a slow expansion of total import demand alone will not exclude a faster growth of exports of the individual CMEA countries, even if it is made very difficult. By elaborating an adequate market strategy they may, for example, utilize also the situation that their market positions are marginal in most Western countries and product groups.**

Fast changes occurring in the structure of world demands cause greater problems than the business situation. Even under circumstances of recession there production and import demands are rapidly growing and satisfaction of these demands is not limited by protectionistic regulations either. The facts that the export structure of the CMEA-coun-

*A more detailed discussion of this thesis can be found with E. *Havasi* [4].

**Concerning Hungarian exports I. *Lakos* writes in greater detail about this phenomenon. [14]

tries is improving only slowly, that in their exports there are only few products demanded for on dynamically expanding markets and, that therefore, they can make use of possibilities resulting from structural changes in the world economy in their favour only to a very limited extent, are due again, first of all not to the world economic environment but to their own economic policy, mechanisms, etc. It is connected also with this export-structure-preserving effect that they are faced on markets of developed industrial countries more and more with newly industrializing developing countries as rivals.*

Deterioration in the terms of trade – the most frequently mentioned indicator of the external environment becoming unfavourable – is one of the most important signals of the necessity of adjustment. But, as formulated by *Kindleberger,* "preoccupation with the terms of trade is a form of economic hypochondria, like the frequent taking of one's temperature" [7], and not even always favourable for finding the right diagnosis and therapy. It diverts attention from the fact that for a given country the shaping of the export and import price indices is a consequence of not only external, but also of internal factors (changes in foreign trade structure, quality of products, pricing, etc.) and also from the fact that – in the case we are dealing with – deterioration in the terms of trade causes losses for Hungary not only on the world market taken in a broad sense, but also in trade within the CMEA, what is more, this latter itself contributes to tensions in the balance of trade with Western countries, as it has already been mentioned. In the context of our statements this means that though deterioration in the terms of trade really indicates an unfavourable turn in the foreign economic environment, this does not justify any turning inward but – on the contrary – it is an important argument in favour of widening our world market relations and improving our adaptivity.

External factors impeding world economic opening are generally summarized by stating that Hungary's possibilities to increase exports, on the one hand, and to raise further credits, on the other, are limited.

It cannot be doubted that exporters of CMEA countries, among them those of Hungary are in a disadvantageous situation on Western markets as compared with most of their rivals. But, the substance of and the reasons for the emergence of disadvantages have to be analyzed in order to be able to determine what to do. Distinction should be made between consequences of the business situation and of the given export pattern, disadvantages resulting from sales policies of CMEA enterprises (e.g. from the practice of compensation deals) as well as the negative impacts of the backwardness of direct cooperation in production and trade between CMEA enterprises and Western firms. There is no doubt, either, that the agricultural and commercial policies of the EEC are a very serious cause of Hungary's export difficulties. Discrimination against CMEA countries (appearing at present first of all as dispreference as compared with other countries and groups of countries) cannot be separated from the complicated history of relations between CMEA countries and the Common Market. Its elimination, too, is a function of

*A detailed analysis of this competition can be found with É. *Németh-Palócz* [15].

mutual political decisions and agreements on the settlement of relations* and these are very likely to be made under the circumstances of *détente.*

Under conditions of foreign economic tensions development of the *credit market situation* should also be ranked among factors delimiting the development of relations with the West (first of all the increase of imports). On international credit markets – characterized by abundant liquidity in the second half of the 1970s – such processes are going on at present (increasing selectivity, stricter credit terms, development of new channels of the disbursement of credit) which set harder limits to further credit raising by CMEA-countries. Of course, the existing measure of indebtedness sets a limit, too, with special regard to the fact that other CMEA countries cannot be independent of Poland's debt service difficulties, either.

Despite these difficulties channels of credit raising have by far not been closed. New ones – with more favourable terms than at present – could also be opened. Here we think, for example, of CMEA countries' joining the World Bank and the International Monetary Fund. Of course, the realization of this possibility is connected with the international political situation, as is elimination of the disadvantageous situation of European CMEA countries resulting from the fact that they do not participate in several such institutions, nor make use of several such mechanisms rooted in world economic relations considerably easier for other countries of the world, partly already immediately after World War II and partly only recently.

Elimination of obstacles impeding the development of inter-enterprise relations with Western firms, first of all the foundation of joint enterprises can be at present even more important from the viewpoint of drawing in foreign resources into the economic development of CMEA-countries. *Foreign direct investment* could not only widen the existing scanty possibilities of credit raising, but could directly link capital import both with technological progress and modernization, in general, and with the increase of exports to the West, in particular. This would be all the more necessary, as in certain fields – first of all in some of the most up-to-date branches of the engineering industry whose export-oriented development has a very important part also in plans of CMEA countries – it is an almost indispensable condition of increasing exports.

Why no result on the merits of the matter can be reported as yet in this field may be explained not only by general factors of world economy and politics, but cannot be separated from the inner management conditions of CMEA countries which, in many respects, do by far not correspond yet to requirements of an active participation in the worldwide division of labour. In the framework of the present article we cannot undertake even to enumerate the latter, since almost all elements of economic policy (first of all development policy), socio-economic mechanism and institutional system are directly or indirectly linked with export capacity whose increase is a key-issue of world economic opening.

*For more details see [10], pp. 361–395

Instead, we would remind the reader only that opening to world economy has been called in the foregoing the alternative of changes and transformations. And, the statement that it is very difficult to alter traditional ways of thinking, habits and reflexes refers first of all to these problems. It is easy to raise the requirement that the investment policy of a country should be export-oriented, but it is much more difficult to carry out consistently such a revaluation of economic policy priorities that may mean only the pushing into background several branches and activities having very important places in the system of criteria of import-substitution. It is simple to proclaim the necessity of creating a mechanism to promote demand-oriented production, too, but it is much more difficult to find a system of prices and rates of exchange, a system controlling enterprise activity and those organizational solutions – differing from previous ones – which may induce economic units to corresponding development, production and sales policies. Even if it is already clear in Hungary, for example, that the economic mechanism can be made viable in conformity with the changed system of goals only by insisting on the principles of the economic reform [16], it is still much less outlined what changes are required in the socio-political mechanism and institutional system, though changes to be carried out in directions of economic development, the management system and in the organization of economic control will unavoidably affect them, too.

Without underestimating these difficulties we believe that selection of the foreign economic policy to be followed can be based only on the sober recognition that turning inward not only *involves considerable socio-economic sacrifices, it cannot even be realized.* Tensions because of which development of extensive relations with Western countries is qualified undesirable in the system of arguments of those urging for turning inward would not be eliminated, but permanently and more and more sharply reproduced; the necessity to increase exports to the West would also remain – if only avoid further deterioration in the balance of payments –, but with the neglect of export development, inadequate adjustment to world economic changes, while preserving the economic structure and management system, the economy of the given country would be even less capable of this. Products of primary importance would have to be imported from the West in large quantities also further on, but the financing of this import would take place in a much more difficult political situation and under much more explicit "dependence" conditions than if relations of *mutual* dependence became stronger with the progress of many-sided participation of CMEA countries in the international industrial division of labour.

As to the nearest future, only such development can be made probable, taking difficulties not to be underestimated as well as the enormous braking power of old habits and traditions into consideration, where characteristics of both alternatives will be mixed in the individual CMEA countries, though in different ways and proportions. We would hardly be realistic if we reckoned with more than that, namely with an unambiguous choice, but would be hardly sincere as well, if we stated that this prospect gives rise to a more than moderate optimism in us. We fear, namely, that any inconsistency in the realization of the policy of opening would bring about serious consequences, impair the

changes of realization and divert economic policy in the direction of the introverted variant. This may result from the fact that foreign economic tensions alone always mean restrictions and divert economic leadership in the direction of multiplying administrative limitations and prohibitions. Import restriction formulated as short-term government policy may in practice reproduce mechanism, reactions and ways of thinking characteristic of the autarkic economic policy.

Therefore, we have to emphasize in conclusion that realization of the foreign economic policy suggested by us is endangered from two sides, on the one hand, by self-sufficiency concepts formulated in several CMEA countries and at various forums of cooperation, by insisting on previous traditional concepts based partly on non-economic motives, and, on the other hand, by the fact that even though in the individual CMEA countries (we believe that this is more or less generally characteristic of smaller ones) such foreign trade development plans have been formulated for the plan-period just starting whose objectives may be fitted into the variant of opening, it still cannot be stated that also the conditions indispensable for the realization of this variant have been created.

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ПОВОРОТ ВОВНУТРЬ ИЛИ ПОВОРОТ ВОВНЕ: РАЗМЫШЛЕНИЯ О ВНЕШНЕЭКОНОМИЧЕСКОЙ СТРАТЕГИИ СТРАН-ЧЛЕНОВ СЭВ

А. КЕВЕШ

Полемизируя с распространенным мнением, будто известные трудности развития торговли между Востоком и Западом поведут в последующие годы к укреплению интеграции стран-членов СЭВ за счет этой торговли, автор утверждает, что настоящие условия развития экономики этих стран не позволят последовательно осуществить поворот вовнутрь. Стремления к такому повороту вели бы к дальнейшему замедлению роста их экономики, к углублению проблем экономического развития стран-членов и сотрудничества между ними. «Манёвр» по переориентации их внешнеэкономических связей с развитых капиталистических стран на развивающиеся тоже не отвечает характеру и остроте насущных хозяйственных задач в этих странах.

По мнению автора, эти задачи могут быть решены и структурные дефициты в торговле Восток-Запад могут быть ликвидированы только в рамках такой экономической политики стран-членов СЭВ, которая и в дальнейшем будет стремиться к расширению экономических связей с другими регионами мира. Именно такая политика может создать условия и для дальнейшего развития сотрудничества в рамках СЭВ.

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E. HUSZTI

MAIN TRENDS IN THE DEVELOPMENT OF SOCIALIST BANKING SYSTEMS AND ORGANIZATION
(Relations between the functions of issuing (central) and credit banks)

The author presents the views on the transformation of the banking system and organization in connexion with the research on economic mechanisms that began in socialist countries in the 1960s. The opinions concerning the questions of a one or two-level socialist banking system or of the status of the central bank were closely related to the extent of changes in the economic control system, i.e. to the degree of decentralization.

For various reasons the banking system of socialist countries – except for Yugoslavia – has remained a one-level system. In Hungary certain steps have been taken with a view to raising the banking system and organization to a higher level, yet in these days the idea of a sharper separation of the functions of the central bank from those of credit banks has been raised again.

Early views on the development of socialist banking systems and organizations

Ideas concerning the development of the banking systems and organizations first got a wider publicity some one and a half decade ago in the late sixties when in almost every socialist country there was a growing tendency to further develop the economic control system and to ease the rigidities of the system of plan-instructions. It is no coincidence that ideas concerning the development of the banking system were summed up and generalized in Hungary in the period of transition to the new economic control system, in 1967–1968.

First mainly the tasks of the banking system were discussed and little was said about its organization–whether it should be a one or a two-level system. This was explained mainly by the fact that *ideas emerging in the socialist countries were not uniform as to the type of bank system and organization that could best ensure the most reasonable fulfilment of monetary functions.* As a consequence of different approaches, for example in 1967 in Bulgaria, a transition took place from the two-level to the one-level system, whereas in the GDR, instead of a one-level bank-system an issuing bank and separate credit banks were set up. On the other hand in Yugoslavia a strongly decentralized bank system was established.

However, even after the changes there remained so-called mono-bank-systems, i.e. such central banks which united the functions of an issuing bank and the credit banks in a single organization. This bank system is backed up by a bank organization consisting of several banks. In general, besides the central bank this bank system includes investment, foreign trade, in some countries agricultural or food economy and saving banks.*

*In Poland there is a separate food economy bank, in Romania and the GDR there are separate agricultural and food industry banks, too.

The first question discussed in almost every socialist country was the status of the bank, i.e. the subordination of the central banks directly to the council of ministers and the abolition of the supervisory competence of the finance ministers, since this was regarded as a characteristic of the direct control system through plan instructions.

In the late sixties it was thought by economists of several socialist countries that it was the one-level banking system (uniting the functions of issuing and credit banks) that was compatible with the control system of direct plan instructions.

The specialists set out from the practical experience *that the socialist central banks were in general economically passive institutions* performing primarily supervisory, analytical and official functions and aimed at the „activation" of the bank. The objective of changes and modifications carried out in the bank organization in the late sixties was to increase the influence of the central bank on economic processes. Simultaneously, it was stressed again that the functions of issuing and credit banks should be revised and reasonably separated.

In the economic literature of the socialist countries it was pointed out that *issuing banks should establish closer relations with national economic planning* by way of participating in the formulation of medium-term plan concepts, thus realizing their specific monetary viewpoints.

There was a general consensus that the less rigid planning becomes, the fewer the broken-down, compulsory plan figures are, the better should the participants of economic life adapt themselves to the actual economic processes and requirements. For this adaptation, however, not only material assets but also money are required. If the participants of economic life take relatively independent business decisions then, by creating its financial cover, the central banks have the opportunity to represent national economic interests through their credit, deposit, interest and foreign exchange policies. Specialists pointed out that it would be possible to devise a set of reliable banking instruments to limit undesirable trends in the economy and to promote desirable ones.

An integral part of the intended changes was the *establishment of business research as well as reformulation of the connection between the banking system and the budget.*

Bussiness research – in its original form – was even earlier a task for the central banks in some socialist countries where such analyses and forecasts were prepared already in the sixties. In connection with the introduction of the new economic control systems economists expected that there would be larger than earlier fluctuations in economic activity and unexpected events would be more frequent, etc. Therefore, a deeper analysis of the nature of economic processes would be required, examining the possibility of control, in one word, modern business analyses would have to be prepared.

Credit connections between the banking system and the budget were regarded in a new light which implied giving up a relatively long-lived dogma. This dogma stated that under socialist conditions the budget could only show a surplus. The significance of giving up this dogma is not lessened by the fact that in some socialist countries realization of a budget surplus remains compulsory, regularly declared principle, moreover in the credit system such elements are built in which most certainly ensure this. Since the budget

deficit was regarded as one of the serious sources of inflation, it was thought if credit relationships between the budget and the bank system were reformulated, if, by relying on a relative independence central banks were able to limit credit allocations and to assert monetary viewpoints in the economic policy decisions of the government, a large step would be made to prevent inflation.

Finally it should be mentioned that in the course of developing the banking system and organization economists of some socialist countries aimed at creating a two-level bank system and organization which would be institutionally separated.* The idea was that *credit banks would function according to the monetary, credit and foreign exchange policies formulated by the central bank.* For the implementation of the objectives of the central bank a system of reserve funds and interest policy was meant to be used. Credit banks could have used for lending the deposits above the reserve fund requirements (ratio) and also the refinancing credits extended by the issuing bank. It was thought that refinancing credits would in part redistribute money already in circulation, since money holders in the different fields of the economy do not tie down their monetary assets at the same time and in the same proportion. Thus these assets could be regrouped since credit banks would be obliged to deposit their temporarily free assets with the issuing bank. If financial assets regrouped from the credit banks proved to be insufficient, the issuing bank would supplement them by extending money creating credits.

The viability and justification of this system was supported by the fact that the profit motive cannot function with the central bank because it is the interest of the national economy that prevails here. However, credit banks perform enterprising activity and as such they extend credits to finance the most profitable economic actions. Thus they might considerably contribute to the raising of national economic efficiency and the shaping of a favourable economic structure.

The banking system and organization today

Despite differing views and aspirations steps taken to further develop the socialist bank system and organization have remained – with the exception of Yugoslavia – within the framework of the one-level bank system.** Moreover, in several socialist countries – thus also in Hungary – changes made have strengthened centralization promoting the realization of macro-level economic policy objectives in order to counterbalance decentralization observed with the enterprises.

*Suggestions for changes in the banking system assumed the highest conceivable degree of decentralization of the economic control system. As it is known, these far-reaching reform ideas have not been realized.

**In the GDR a two-level, organizationally spearated banking system created in 1967 was reconverted into a one-level system in late 1974, i.e. industrial and commercial banks were amalgamated into the State Bank.

In view of the limits of the one-level banking system and organization, the objectives were still realized in some essential respects. Thus

- the majority of central banks have been transferred to the direct competence of the council of ministers (government);
- short-, medium- and long-term lending to the enterprises has been centralized in one hand, it has become a task of the central banks, ensuring thus uniformity in financing fixed and circulating capital formation;
- a certain division of functions has been established between the central banks and the other members of the bank system;
- definite steps have been taken to strengthen the issuing function of the central banks in the fields of money circulation, lending and foreign exchange management.

In fact, the changes were modest, the banking system remained a one-level system. Nevertheless, there have been measures taken to strengthen the issuing tasks and function.

The question is why the objectives concerning further development of the banking system and organization and the strengthening of the issuing functions of the central bank have not been realized.

The first reason for this is that transition to the "new" economic control system slowed down considerably in some socialist countries or was modified in others and this affected the development of the bank system, too. The second reason is that, as against the original views, considerable doubts arose concerning the creation of commercial banks.

On examining the – not too numerous – publications of the last 10–12 years on this subject in Hungary one can see that since 1976 only six articles (three of them published before 1970) make reference to the necessity of creating credit banks and of the institutional separation of the functions of issuing and credit banks [1], [2], [3], [4], [5], [6]. As for the main line of separation, the division of tasks, etc. there are considerable differences among the above mentioned individual authors. Basically there are two types of credit banks in the suggestions: sectoral credit banks (industry, food-economy, trade, etc.) or business (commercial) banks with general (for example territorial) competence.

Let us compare what kind of views were prevailing and conflicting in Hungary concerning the creation of sectoral or business banks.

Economists find the following *advantages* in an institutionally separated two-level bank system:

1. Without institutional separation of the functions of issuing and credit banks, the central bank can be considered as an issuing bank only to a limited extent and even as a credit bank it lacks business considerations when lending. Separation would mean the strengthening of the issuing bank.
2. In case of a two-level banking system the central bank has greater possibility than any time earlier to realize central intentions. It will be freed from concrete lending obligations and can concentrate on the realization of macro-level requirements.

3. The various parts of the reproduction process can be better distinguished, especially development from current production.
4. The sectoral or business (commercial) banks will compete for clients, for deposits.
5. Business banks will be able to distribute better the available credit possibilities than the one-level bank system did.

Views *against* creating sectoral or business banks can be summarized as follows:

a) The two-level bank system is not in conformity with the existing control system and the achieved level of decentralization and their expected future modifications.

b) Concentrating the functions of issuing and credit banks in a single institution is a reasonable solution from the point of view of control since there is no need for complicated monetary transmissions for the issuing bank to influence economic life.

c) It is wrong to assume that sectoral or business banks will compete for clients and deposits since demand for credits exceeds considerably their supply. Under such conditions it is rather the enterprises that will try to establish such business bank connections where they hope to get more credit on more favourable terms. Credit banks organized by sectors would face the same economic organizations as the corresponding central organs or branches of the National Bank of Hungary. Thus they would not need to compete for deposits since the monetary monopoly automatically ensures that enterprises open accounts with them.

On the other hand, if business banks were organized territorially, this would require fundamental changes. Among others, the monetary monopoly would be replaced by the right of the money-holders to choose freely the credit bank with which they wish to open their accounts. In this case it may happen that with the terms of lending and interest rates competition begins to attract deposits.

d) The sectoral or business banks cannot have more credit resources than the mono-bank creates.

e) It would lead to much complication if the sectoral or business banks could only rely in lending on those credit resources which originate in their territory. It is obvious that they would have to resort to credits from the issuing bank to supplement their own resources, which would affect the whole problem of refinancing sectoral or business banks.

f) In the concept formulated concerning the advantages of sectoral or business banks functioning separately from the issuing bank a considerable role is played by incomplete knowledge of the western bank system and lack of attention to the trends of development. It is a general experience that a *considerable concentration of bank activity is taking place in the West* and the weight of direct lending by the issuing bank is increasing significantly first of all due to deficit financing. Simultaneously, issuing banks are getting stronger and stronger (with an access to an increasing number of legal instruments), controlling more and more credit banks through refinancing and thus becoming more and more a servant to the economic

policy of the government. The will of the government (either an inflationary or a deflationary monetary policy) is easily realized through the banking system.

It appears already from a comparison of the main arguments for and against that a great number of ideas and concepts have clashed, however, they – at least most of them – have not been tested in practice. It should be mentioned in advance that it is an essential result of the debate concerning the further development of the banking system that both groups of economists have taken a stand in favour of widening the issuing bank's functions and perceive the National Bank of Hungary as a "real" issuing bank.

Despite differences in approach the key question in the further development of the banking system and organization remains the definition of the role, functions and competence of the issuing bank. Bank organization as a formal framework cannot be further developed independently of the internal elements the objectives of monetary policy and the instruments of its realization. It is not a purely theoretical requirement when we speak of a form adjusted to the contents. It is a general experience – as it has already been mentioned – that the *bank organization has been adjusted in most cases to conditions forced by life.*

It also happened in the past that it was not the banking organization that was adjusted to monetary policy, but the banking organization acted as a limiting factor in the formulation of monetary policy concepts.

Let us survey the situation of bank organizations and within this of issuing banks in the socialist countries, outlining identities and differences. The *essential identities* are as follows:

- the Hungarian banking system is also one-level system i.e. issuing and credit bank functions "live in a common household" within the National Bank of Hungary.
- The National Bank of Hungary as the central issuing bank has the monopoly of credit creation, money circulation, issuing and foreign exchange;
- The National Bank of Hungary is directly subordinated to the Council of Ministers.

The *essential differences* are as follows

- following from the Hungarian control system credit and monetary plan figures are not compulsory for the national economy but are of informative character. They are, therefore, not broken down to enterprises. The distribution and control of investment credit lines approved by the government for the National Bank of Hungary is carried out as part of regulating effective demand.
- The National Bank of Hungary joins in the planning process already in the process of formulating medium-term plan concepts, thus it can realize its monetary views in a direct manner. However, in the national economic plan the targets expressed in physical units – as it will be discussed later – carry nowadays in Hungary too much weight even in comparison with the conditions and possibilities provided by the economic control system.
- Regulators connected with credit, monetary and foreign exchange management constitute an integrated part of the system of economic regulators as a whole.
- In Hungary monetary policy has greater freedom of movement than in the other socialist countries.

- Monetary policy can rely on a more active price and exchange rate policy and it has to take into account the effects of their changes.
- The National Bank of Hungary formulates its connections with the economic organizations on the basis of equal partnership.

The creation of credit offices within the Hungarian National Bank in 1971 aimed at a more deliberate separation of issuing and credit bank duties. However, we could not realize properly the advantages of this form since simultaneously with strengthening crediting positions we could not realize requirements following from the issuing bank duties to a similar extent. It turned out that the national economic plan did not derive the volume of credits necessary for the domestic use of national income on the basis of available resources but from *plan targets expressed in physical terms.* Since the only task of the issuing bank was to authorize lending by "distributing" the assigned funds, it could be done the most easily in the already established, "usual" manner and not through complicated monetary transmissions.

The National Bank of Hungary has attempted to fulfill issuing banking functions within the bank organization towards the National Savings Bank and the State Development Bank with not too great success. For when demand of the population for Savings Bank credits was increasing, the compulsory reserve ratio, was as a rule, reduced. The National Bank protested regularly in vain against the State Development Bank's, in its opinion exaggerated, refinancing, this view could not be realized.

Changes did not affect much or at all the essential features. Even modest structural changes carried out within the issuing bank and instruments developed according to the needs of the national economy could not be put to use under such conditions when monetary decisions were not duly considered. There may be and there are arguments stronger than those of monetary origin, but it should be clear how long and at what price they could be regarded as secondary aspects. If we are not clear about this, to the necessary extent, a situation develops which is characteristic of today's Hungarian economy, namely that monetary aspects which are regarded as secondary and are not considered satisfactorily come foreward as dominating conditions and the lack of monetary equilibrium becomes a determinant of development. At present and even in the near future it is the equilibrium of the balance of payments which is a determining and restricting monetary factor, which we cannot get rid of as of our own shadow. Adequate separation and delineation of issuing and credit banking functions, the creation of a two-level bank system and organization should be regarded as an important multidimensional problem also from this aspect.

We have put emphasis on the necessity of creating a two-level banking system and organization in the first place and we are trying to establish the necessary preconditions for this. The point is a clear-cut separation of the issuing and credit bank functions and their adequate connection. It may sound as a contradiction that first separation and then the bringing about of connections are emphasized with equal emphasis. The *issuing and credit bank functions can be relatively easily separated but there is no point in it if the complicated system of their connections is not simultaneously created.* As compared to

these questions it is of secondary importance whether separation is carried out within the same organization or separate institutions are created. As a matter of fact, a two-level bank system and organization can be established not only by choosing a formal solution and creating independent business banks.

Thus the two-level banking system can be created also within the same organization through separation of functions. "It is not the concept of the simple bank that can be regarded as basically wrong. The problem is caused by the fact that it performs simultaneously credit and issuing banking functions, while the separation of these functions and the reformulation of their connections have not been carried out." [7] Consequently, it appears also in this context as a rightful requirement to define first what we expect of the banking organization, basically of the issuing bank, what monetary instruments are available or what should be done to achieve this. Only afterwards can we decide what institutional (organizational) frameworks are the most suitable for this purpose under the given conditions.

Nowadays we know much more about the functioning of the socialist monetary mechanism than a decade ago since we have also practical experience. Thus we can judge those monetary danger signals which follow or may follow from the lack of a two-level banking system and organization. Despite this, problems appearing in connection with the control of money supply, effective demand, the size of credit allocations are ascribed very often to the one-level character of the bank system, whereas such phenomena are characteristic also of the two-level Western banking systems. For example, Beckhardt [8] compares crediting in the period of an upswing in the Western countries and under the sustained growth of the socialist economy. He points out that such periods are favourable for diluting investment and deteriorating monetary equilibrium. Under such conditions the Western bank system is more liberal in deciding about terms of lending. It is a frequent case that banks lend short-term resources for medium and long term.

The socialist issuing banks cannot stand up to their duty either, because dynamic growth so-to-say sweeps away their worries concerning the lack of resources. Problems emerge to the surface, as a rule, in the "down-swing" afterwards when it is already extremely difficult to counterbalance them. We have here thus such deeper economic cause which it is incorrect to raise as criticism against the one-level banking system or to draw conclusions from them.

It can be proven that the National Bank of Hungary setting out from the duties of an issuing bank, regularly warned against, "over distribution" and overheated investment demand etc. Since remarks made by the issuing bank were not always satisfactorily taken into account when national economic plans were approved, the plans became a force compelling for lending.

Therefore, it is justified to analyze deeper this problem and to try to solve it. *It appears in the present situation that the advantages of creating a two-level banking system within the same organization, the National Bank of Hungary, exceed the associated disadvantages.* The national economy cannot do without a properly functioning issuing bank which is capable of realizing equilibrium conditions and make monetary limits

accepted on the one hand and ensure the continuous money supply of the economy, on the other.

A concept for creating a two-level banking system and organization

We regard the National Bank of Hungary as such an issuing bank which has to perform basically the following *internal monetary* duties:

- as the "government's bank" it carries out the government transactions
- it coordinates the functioning of business banks (as a *"bank of banks"*);
- *it determines credit conditions and terms of lending* through which it influences effective demand and, finally,
- it regulates money supply.

Performing *external monetary functions* is such a basic duty of the issuing bank which does not depend directly on whether we have a one-level or two-level bank system, so we are not going to discuss it here.

Of the above listed functions of the issuing bank we consider the control of credit and of money in circulation in the national economy as the most important ones. In fact, it would be reasonable to subordinate duties following from the roles of the "government's bank" and of the "bank of banks" to these functions. However, activities carried out as the "government's bank" nowadays frequently impose unilateral duties on the issuing bank, as it will be discussed later.

Within financial policy backing up economic policy the necessary coordination between fiscal (budgetary) and monetary (issuing) policies could not be always established in Hungary. This follows partly from the fact that the national economic plan defining economic policy objectives has a coercive effect upon the financial side rather than allowing for the limits of financial resources. Within financial policy the budget has increased its role, the monetary field, within this credit in the first place, had to undertake the task of balancing the deficit. Thus, requirements of lending could not be realized in many cases.

The issuing bank as the "government's bank"

The issuing bank becomes the "government's bank" first of all through credits extended directly or indirectly to the budget.

It is primarily a task of the government to bring about an adequate division of labour between the two major branches of the financial system, the fiscal and the monetary spheres in order to ensure smooth financial realization of the economic policy objectives. For, if the laying down of the terms of lending is basically a task of the issuing bank, then the complex of credits extended to the budget is also to be included.

Allowing that in certain supply, distribution and redistribution tasks (defence, public order, health, culture and education, infrastructure) it is primarily the budget that has to perform financing duties, it can be pointed out that the budget has played a decisive role in a scope and area wider than justified. The competence of the budget has also extended to such fields where the recovery of financial funds would be a reasonable requirement and thus they would have to be financed rather from resources of the issuing bank. This realization has led to attempts that the credit sphere should try to extend its competence to fields which had been financed earlier from the budget. However, these attempts have not fulfilled hopes since, with the competence and methods of the budget left unchanged, the credit sphere is unable to take over more financing tasks from the budget. It would be reasonable to rearrange functions, to *establish a new division of labour between the budget and the credit sphere, the bank system.*

Credits extended to the budget require increased attention, because the *budget has apparently increased its role in the money supply for production, distribution and redistribution.* For the bank system credit extended to the budget is more than a simple technical question. If the volume of such credits increases, lending shifts to an on average longer maturity, to a field with slower returns.

The expansion of credit connections between the budget and the banking system may cause anxiety from monetary, and thus national economic points of view:

- *Credit to be extended to the budget by the issuing bank is of a coercive character for the issuing bank* since the budget can spend more than its incomes if it can get credit when and how much it requires. Consequently, *in this field of lending the issuing bank cannot realize* objectives connected with efficiency, profitability and the transformation of the structure of the economy;
- Although technically there is no upper limit to the volume of lending of the issuing bank, yet, because of economic limits it is obvious that *the larger the share of the budget, the smaller the volume of credit that may be allotted to the enterprises.* Even if this is not a linear relationship, the tendency is apparent.

It follows from what was said above that prior to the separation of the issuing and credit banking functions, the *requirement of financial policy should most emphatically be realized which links the size of budget deficit – more closely than so far – with the money creation of the issuing bank.* This means that the envisaged budget deficit must not possibly be exceeded or, when it happens, the extra lending to the budget should reduce the amount of credit to be extended to the other fields of the economy. It is obvious that the extra budget outlays increase the incomes of the economic organizations in some form, consequently their credit demand can be reduced.

The central bank as the "bank of banks"

The primary task of the issuing bank as the "bank of banks" is to influence the lending activity of business banks precisely in order to regulate effective demand.

With the organizational separation of the issuing and credit banking functions the basic principle should be realized that within the bank system the issuing bank and associated fields representing issuing bank functions should elaborate and carry out monetary strategy, while the credit banks and associated fields fulfilling credit bank roles the tactics.* It is obvious that in the separation of the two scopes of activity and the reformulation of their connections, the priority of strategy over tactics should be expressed, with the former determining the latter. Although their interaction cannot be ignored, yet at present – on the basis of available evidence – it should be emphasized that the activity of the banking system gets distorted, its development retarded if the above mentioned relationship is reversed. *Whenever tactical elements became dominating, those of the issuing bank were pushed, as a rule, to the background.*

The National Bank of Hungary could not realize its monetary strategy in the main national economic processes, i.e. its weakness manifested itself primarily in lending for final use. However, in its measures taken it could observe the quotas ensured, moreover in crediting circulating assets even the credit limits defined by itself.

The problem is rather that in fact roles were difficult to distinguish: it appeared that the various credit fields created additional money to such an extent that the lending following from the issuing banking function could hardly keep pace. The "credit bank" meets day by day "hands extended for credits" and it is unable to reject demands of enterprises for circulating assets, deemed as justified, only because "issuing bank" has worries about it. This undoubtedly gives such appearance to lending as if it had in fact no limits but this is far from being so. However, following from the duties of the issuing bank the need is regularly raised to limit or freeze effective aggregate demand, to limit lending. The clear picture is also disturbed by the fact that the volume of loans considered in a given period as too much may point not only to excessive lending but also to misallocation of credit, to disturbances in the flow of money created by lending. These may lead, even under the strictest quotas to abundance of money.

This somewhat sharp formulation is not theorizing, it attempts to draw attention to the fact that *in case tactics enjoy priority it is the decision over monetary assets already created that determines the direction of monetary development and not the monetary assets are distributed in order to create more favourable monetary conditions.* The economic and often even the financial control agencies make themselves so-to-say believe that monetary policy is sacrificed for good reasons at the altar of monetary practice. It is only in periods of serious tensions that the question is raised: why the issuing bank was

*Monetary strategy and tactics are of relative character as compared to the strategy and tactics affecting the whole national economy. From this aspect the issuing bank performs rather an operative (tactical) task, as formulation of the conditions of strategic objectives at national economic level lies beyond its competence. This belongs to the competence of government policy, national economic planning. For its realization the issuing bank gives the help it can within its own scope of activity. Monetary regulation requires daily stand-by, and a high degree of operativity. However, this does not exclude that – within its own scope of activity – the issuing bank should formulate a specific set of preconditions for strategy and tactics.

unable to better direct its loans, or to put monetary practice under control. It is a reasonable question to ask: why do we try to control excessive demand already created and why not prevent the creation of that amount which is regarded excessive.

The scope of action of the monetary sphere is rather modest. The priority of economic policy very often strongly reduces even this modest field. *With changes carried out in the monetary organization – even through fission – it is not possible to widen this scope.* Moreover, even with measures initiated exclusively from the financial side – should they be as significant as possible – it is impossible to influence those economic problems which emerge because of nonfinancial factors.

Credit banking activity separated from the issuing banking activity could be established according to the familiar national economic grouping (industry, construction, food-economy, transport – communications, home and foreign trade, other).

Before discussing more closely the relationships, it is necessary to speak a few words about the situation already established.

At national economic level the annual average stock of credit of enterprises and cooperatives in Hungary is about one and a half times the annual average stock of deposits. It is obvious that on the basis of their deposits credit banks would not be able to

Average annual stock of credits and deposits of enterprises and cooperatives in 1975–1978

Thousand million Forints

Year	Average stock of credits (1)	Average stock of deposits (2)	Advances from (–) or deposits with (+) the issuing bank (1)–(2)	Stock of credits as percentage of the stock of deposits (1) : (2)
1975	146.8	93.7	–53.1	156.7
1976	160.5	102.6	–57.9	156.4
1977	182.4	124.0	–58.4	147.1
1978	212.7	141.5	–71.2	150.3

lend so much (allowing also for additional credit creation) without a recourse to loans from the issuing bank. The difference would be even greater if it were possible to eliminate from deposits sums originating from the loans of the issuing bank given to the budget and flowing to enterprises.

The main branches of the national economy have different shares in the loans from the issuing bank, in most cases exceeding their deposits. Certain branches, on the other hand, had net deposits with the issuing bank since their loans were less than their deposits.

The established situation is similar to Western experiences, for the lending of Western banks exceeds as a rule, the accumulation of deposits, i.e. banks are able to extend a larger volume of credit than their deposits. In fact this is connected – as it has already been mentioned – with the creation of additional credit (money). This implies that the credit banks' lending is not as much as the deposits with them and loans from the issuing banks would permit but the situation is the opposite: they attempt afterwards to make the issuing bank refinance the volume of credits exceeding deposits.

Since the enterprise and cooperative sector is structurally in a debtor's position in relation to the issuing bank and this is a significant volume. *It would be a formal solution to attempt that credits should not exceed deposits.* It is impossible and unreasonable to raise the stock of deposits to the level of the credit stock since it could not be realized even in case if the whole volume of credits for circulating assets were replaced by circulating funds since they carry a relatively small weight within the financing of circulating assets. Such a measure would reduce the volume of credit but it would not increase the stock of deposits, enterprises would remain structurally indebted to the National Bank of Hungary.

Under such conditions connections between the issuing bank and the credit banks can be created only by accepting that the established situation should be regarded as a starting point and primarily future changes should be determined.

Issuing and credit bank functions should equally be separated [1] at the management level and [2] in accounting.

[1] *The basic principle of separation at management level is that decision making and execution should be distinguished more sharply than so far.* As regards its composition and tasks the presidium of the bank can come up to this requirement only if in formulating their opinions the representatives of the credit areas consider primarily monetary requirements.* It is therefore, even more necessary to underline emphatically the responsability of the president (or his delegate) also in respect of future tasks following from the issuing bank function. Thus it is the president (or his delegate) who makes decisions – relying on rules to be discussed later and allowing for the opinions of interested national authorities – in questions of rediscounting, refinancing, development and also concerning the credit connections between the issuing bank and the budget, principles of monetary, credit and foreign exchange policies.** He would implement his decisions in the banking credit field through instructions, regulations and the application of certain automatisms.

*The presidium fulfils, in fact, the role of an issuing bank with the president making decisions with personal responsability; consequently, the presidium is an advisory body. However, representatives of the credit areas – if they make decisions with no regard to the standpoint of the issuing bank – exert or may exert inevitably an adverse influence on the personal decision.

**It is necessary to establish a working group for the preparation of decision making which would consist of leading representatives of various fields of the issuing bank, who can represent macro-economic aspects so that they are not limited by worries emerging in case of concrete lending.

[2] *Separation of the issuing and credit banking functions in the field of accounting* requires the insertion of an account of recording character which registers the debts of the various credit areas outstanding (deposits, debts, loans) with the issuing bank detailed by individual areas and also taken together. Thus it would be possible to observe continuously by branches which areas receive loans from the issuing bank and how much it deviates from their deposits accumulated.*

The relation between debts and claims of the individual credit banking areas with the issuing bank deserves attention not only in view of the future functioning of the bank system but also from the aspect of the main argument in favour of a two-level, institutionally separated bank system. For it can be unambiguously proven that it is hardly possible to create such conditions for enterprises that business banks should compete through credit offers for clients, since debts outstanding exceed considerably the accumulation of deposits.

Determination of credit conditions and the terms of lending

Determination of credit conditions and the terms of lending means that *the instruments of connections between the issuing and credit banking areas should be formulated on the one hand and the modes of credit connections between the credit banking areas and the economic organizations should be established, on the other.*

Under the above described conditions *there would not be much point in introducting artificially a formal system of reserve ratios* since deposit accumulation would not permit to establish equilibrium between credits extended and deposits accumulated – even without compulsory reserves. Otherwise, the system of reserve ratios plays an important role primarily in those Western countries where internal accumulation of money exceeds the possibilities of lending (for example in the United States and Switzerland). The compulsory reserve ratio means draining internal liquidity. *The primary aim of the compulsory reserve ratio prescribed for the Western credit banks is to regulate the amount of bank account money that may be created* and not to ensure the liquidity of banks – as many assume to know. If the reserve ratio influences the amount of bank account money that may be created by the credit banks this objective can be achieved not only indirectly, by limiting credit payments from deposits, but directly, by regulating lending. *Consequently, it is not only unreasonable but also unnecessary to operate in Hungary a system of compulsory reserve ratios. Instead, it is necessary to prescribe a "lending rate" being a definite multiple of deposits, which may be changed if necessary.***

*Separation in the field of accounting would be carried out through elaboration of a precise nomenclature of the balances of the credit and issuing banks.

**The exact rates could be determined later, after the basic principles will have been outlined or perhaps accepted. In this context the so-called multiplier effect i.e. the relationship between lending and the size and structure of the volume of money should be analyzed.

It has already been mentioned that we cannot except a fundamental change in the financing systems, a steep rise in the stock of deposits and an essential reduction in the volume of credits, within a relatively short period. Consequently, the system can be regarded as operative if it allows for the established conditions, adjusts itself to them and regulates, influences the changes connected with future growth. Consequently, *it is reasonable to apply an automatism up to the established credit-deposit rate and control in cases of deviations from it.*

On the basis of the aggregate size and the ratio between deposits and credit stock of enterprises and cooperatives *an automatism would be ensured in the credit banking fields if it were declared, e.g., that at the level of the national economy one and a half unit of credit could be extended per one unit of deposit* without authorization of the issuing bank, this rate being a weighted average of the lending rates valid for the individual credit banking areas. (For example the lending rate in the food economy is three times and in transport and communications 0.8 times as high as the deposits.) With this lending rate it would be possible to ensure the volume of money necessary for trade, the reasonable accumulation of cash, and sums tied down for due credit payments.

Automatism does not mean automatic lending because it is justified to maintain the regulations established for financing circulating assets and development. *Automatism expresses freedom of manoevring within the credit banking area, i.e. efforts at creating deposits automatically influence lending possibilities.*

The lending rates specified for credit banking areas aim at keeping the volume of credits unchanged i.e. it tie lending to the stock of enterprise deposits. *In view of expanding production and trade or perhaps development it may be justified to increase the volume of credits, too.*

This may be archieved partly through raising the lending rate if we want to guarantee a linear growth for the whole enterprise and cooperative sector. The lending rates for the individual credit banking areas could be differentiated even in this case, realizing thus a primary, rough selectivity.

"Fine tuning" can be ensured partly also by taking over liabilities purchased by credit banking areas i.e. by refinancing *credits extended by credit banks on claims.* In this manner a selectivity can be realized that reaches down to the enterprise level. In fact, the ideal situation would be if money creation were carried out – beyond budget deficit financing accepted all over the world – exclusively by rediscounting claims, consequently by way of selective short-term lending, that adjust itself to money incomes reflecting expanding production and distribution. However, considering that the issuing bank lends out a part of its medium and long term credits in the form of money created, – above the level of savings – it is only possible to attempt to raise the share of short-term sphere in money creation. In other words, the lending rate can be traced back even in this context to a need for lending more than deposits.

The system would function roughly in the following manner:

– Since the lending rate relates to the total volume of debts outstanding, in the formulation of the relationship between deposits and credits the individual credit

banking areas must not ignore the limitations of the medium and the long term credit quotas. An increase or a necessary reduction in lending becomes feasible in the field of short-term lending as a function of deposits.

- Financing circulating assets is carried out within the lending rate in accordance with the established and valid rules prevailing. The accumulation of deposits and the massive credit demand of enterprises and cooperatives belonging to the given credit banking area do not coincide in time. Thus they can supplement one another, consequently they remain within the scope of the given credit banking area.
- It should be made possible for the credit banking areas to consider, within the limits of the lending rate, whether they wish to satisfy the demand of enterprises for short term credit by way of the usual occasional financing of the circulating assets or by purchasing claims. Since in both cases we have credits to be recovered or repaid from current incomes, it is more reasonable to satisfy demand for short term (liquidity) credits by way of the latter. A part of short-term credit demand serves for liquidity purposes. Their allocation is rather time-consuming and requires much administration, in spite of this their extension is rather formal and automatic. Cession of claims is simpler, of shorter run and better adjusted to economic events of such character.

Purchasing claims would bridge the time difference between the delivery of goods and payment and would not be connected to either of the payment forms (transfer or encashment). A copy of the merchandise document would serve as a basis for discounting by the redit banking area – with a wording like a bill of exchange (as a document ensuring the force of a bill). The maturity of the credit would be maximum one month and the interest to be paid the proportionate part of interest payable after occasional credit.*

If discounting is a too heavy burden on funds provided by the lending rate, the credit banking areas may offer to hand over discounted documents by way of endorsing to other credit banking areas or to the issuing bank for rediscounting. Since the ratio between lending and deposits may be seasonally different in the various credit banking areas the possibility may emerge that rediscounting need not be covered totally from loans of the issuing bank. For, if the given credit banking area has not extended credit up to the limit determined by the lending rate, then, through endorsing, it can allot additional interest incomes to the credit banking areas. Deposits do not bring interest revenue to the credit banking areas, while, endorsing results in additional interest incomes in periods when the given credit banking area has no possibility (because of the exhaustion of quotas, or lack of resources) to lend up to the limit of the lending rate. Rediscounting of claims purchased by endorsing would be carried out also in the issuing bank area.

The final point in rediscounting is the issuing bank area, which puts a part of new money required by growth in this way at the disposal of the national economy. This

*The issuing bank has the right to change maturity date.

proportion of money creation is strictly connected to realization (selling) and thus it increases money supply by regulating primarily the volume of transaction (demand) money participating in trade turnover. This type of lending would be in line with the principle of socialist lending, it would serve as an advance and not as income to be spent. A credit extended in this manner implies in itself, through its close relation with selling the conditions of its repayment.

In order to prevent credit banking areas from shifting credits extended beyond the lending rate automatically onto the issuing bank, it is necessary that claims above the lending rate could be purchased by the credit banking area (crediting the bank account of the enterprise) only to the extent it is acknowledged through rediscounting by the issuing bank area.

The rediscount rate would exceed the discount rate by some percentage points and would refer to the period between rediscounting and the original maturity date of discounting.

Control of money supply

In determining credit conditions the ultimate aim of the issuing bank is to control the volume of money available to the economy. As we have already seen, modifications in the lending rate are destined primarily to influence the quantity of bank account money that may be created by the credit banking areas. Since 90 per cent of the agregate volume of money is bank account money it is the lending that has a decisive role.* But regulation of the volume of money is a complicated task and it cannot be regarded as solved by merely influencing lending.

The volume of money expresses potential demand, therefore its level is not indifferent. The volume of money created intentionally (or unintentionally) ensures considerable economic possibilities for the money holders. Demand of the individual money holders is connected with the present and expected level of money supply. Credit possibilities should also be considered here, they add to the quantity of goods that may be purchased by the money holders. Consequently, the volume of money is much or little not by itself, but in comparison with the economic background that brings about supply to satisfy effective demand. The volume of money may carry positive or negative tensions which may be temporarily concealed or repressed but they emerge sooner or

*Western financial specialists call attention to the fact that the system of modern credit economy built on bank account money, beyond having several advantages, has the disadvantage that with an upswing in the economy too much money is created and since correction occurs too late, problems aggravate. This has primarily inflationary consequences. Under the conditions of full employment this happens if the growth of investments is financed from such bank account money which is not backed up by adequate saving. This makes prices and wages rise so much that it causes prolonged difficulties. The solution is expected to come from the monetary policy of the issuing bank, from the control of the money supply. [9]

later. Nowadays, disequilibrium is, as a rule, of inflationary character, i.e. a part of effective demand is not covered by supply and thus it pushes up prices or creates shortages.

Consequently, the issuing bank is expected to control resolutely the development of money supply so that negative or positive tensions diminish. When regulating money supply the issuing bank undertakes sometimes an "unpopular" task and resistance is especially strong if it requires restrictions. As we have already mentioned, the participants of economic life lay claims to the issuing bank and these should be weighted so that those are favoured which are acceptable for the national economy and those are rejected which are not. It is obvious that as much *as much as it is incorrect to satisfy unjustified requirements so harmful it is to keep the money supply, at a low level, fetishizing it and l'art pour l'art to the detriment of the justified requirements of the economy.*

Restriction or expansion i.e. the regulation of effective demand can be adequately effective only if, beyond the volume of money there is a supply of satisfactory quantity and composition, if money has value, a "sting". With unsatisfactory supply, through limitation of effective demand we can achieve that pressure does not increase any further but it remains a problem to tie down existing purchasing power. Even measures taken to expand effective demand only produce the expected results if they are coupled with an improvement in the supply of material goods and services.

Conclusions

The tasks expected to be performed by issuing bank (government's bank, bank of banks: determination of credit conditions and control of money supply) should be outlined and formulated so that through their realization the main macroeconomic objectives – balanced economic growth, equilibrium of balance of payments, the relative stability of money – could be effectively served.

To what extent will be new possibilities opened up by the creation of a two-level Hungarian banking system and organization in the above mentioned aspects and in what respects will creditor's and debtor's attitudes change?

Macro-level relationships were discussed in relatively great detail in the preceding chapters. Of these it is reasonable to draw attention again to the following ones:

a) *Issuing and credit banking functions are closely interrelated, they influence each other.* We have thought for a long time they were organizationally inseparable, because borderlines between various functions became indistinct (the issuing bank lends directly to the budget, credit banking areas create money, etc.) objectives and instruments have changed places. These have frequently made problems in economic life appear as if they had emerged due to the bank system and organization or more precisely to its one-level character.

b) Most of the criticism concerning our today's banking system is made from two, totally opposite sides: First, it is mentioned that *lending is limitless* which is not in

accordance with the fact that resources are limited. They consider it contradictory that we have to economize on everything, but credit is available without limit. Second, it is considered that the *volume of credits extended to the enterprise sector is insufficient,* and the idea of quantity control is rejected as it contradicts the requirement of proportional development. Thus the question is whether too much or too little credit is extended because of the present banking system and organization. These questions already lead much further than the one- or two-level character of the bank system.

Our suggestions may mean an intermediate solution leaving money creation by the issuing bank technically unlimited, but lending by the credit banking areas would be linked to the accumulation of deposits; in other words for lending beyond the limits of the credit banks an authorization, an action by the issuing bank would be necessary.

c) From the viewpoint of monetary decisions money creation and money redistribution could be more clearly distinguished.

d) Creation of a two-level banking system and organization would mean a further improvement in the financial infrastucture, which might help to establish the favourable conditions already missing today: the increase of monetary viewpoints in high-level decision making, and increased cooperativity of enterprises.

In *micro-aspects* changes in the activity of credit banking areas, in their connection to the issuing banking area.

aa) *Nowadays it already is obvious that the ways and forms of lending do not guarantee the prevention of improper use of credits in themselves.* In fact, the debtor should be more interested than the bank in maintaining his creditworthiness and in liquidating his outstanding debts in time. This has not even been raised so far since formally almost every enterprise satisfies the requirement of creditworthiness. However, in the future modifications are expected also in this respect, if the price and control systems are indeed of normative character.

bb) Obviously the lurking constant question "who is keeping whom", whose money becomes a "source" of lending to others, will disappear. Beside the fact that this is not so even theoretically, it is also a fact that every *credit bank area is "kept" – although to varying extent – by the issuing bank.*

cc) The "establishment of the profit motive" of the credit banking areas is such a requirement which cannot be realized now or in the near future.

If one can speak of a motive at all, it should manifest itself in that the individual credit banking areas decide independently – up to the limits of the lending rate – about lending. Thus the more profitable or quickly recoverable economic activity will be financed from the credit the more the credit banks may expect that their share in gross incomes will increase – in money form – on the accounts, consequently possibilities of lending will expand.

dd) *The possibility of purchasing, discounting and rediscounting claims permits such a form of fine regulation that considers not only the future but also the past.* Through purchasing claims offered by the enterprises the credit banking areas can be selective, and even more so can the issuing bank when rediscounting. It is permitted to

purchase only solid claims since *the purchase of claims and their rediscounting is no right but a privilege for the enterprises.* The enterprise that breaks the payment discipline can be excluded – for a longer, or shorter period – from the system of purchasing claims. Maybe the connection between the bank system and the enterprises would get richer by a new characteristic: the goodwill which would bring tangible benefits for those enterprises which are to take efforts to meet their payment obligations.

ee) *The monetary advantages* associated with the suggested functioning of the credit bank areas may be summed up as follows;

- Connecting the lending rate to the accumulation of deposits may be, from the point of view of the issuing bank, an instrument of bank motives to increase "real" deposits and by this it may disburden money creation by the issuing bank.
- Desposits necessary to expand credit and difficulties associated with obtaining central bank money supplementing it, may push credit banking areas to favour those economic activities which can be realized more quickly and more profitably through credit allocation. The pressure that credit banking areas have to ask for liquidity help from the issuing bank and the money requirements of growth can be satisfied also in this manner, permits for the issuing bank area to realize its monetary requirements through banking instruments to evaluate the whole credit banking activity.
- Possibilities to earn interest to be introduced in the credit bank areas may put into motion an interest mechanism more effective than today's, and which might be connected – in the further future – to personal incentives.
- Within the control of money volume there will be several possibilities to make money functioning more actively and to adjust real money accumulation to the needs of the economy.

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ОСНОВНЫЕ ЧЕРТЫ РАЗВИТИЯ СОЦИАЛИСТИЧЕСКОЙ БАНКОВСКОЙ СИСТЕМЫ И ОРГАНИЗАЦИЙ

Э. ХУСТИ

Автор рассматривает взгляды на преобразование банковской системы и организаций, высказывавшиеся в социалистических странах в 1960-х годах в связи с реформами экономического механизма. Мнения об одно- или двухуровневой банковской системе и статусе эмиссионного банка тесно связаны со степенью предлагаемого изменения системы управления экономикой, степенью ее децентрализации. Далее в статье рассматривается существующее положение, которое характеризуется тем, что — за исключением Югославии — в силу различных причин банковская система социалистических стран осталась одноуровневой. В Венгрии в настоящее время вновь встала проблема более резкого разделения функций эмиссионного и кредитного банка. Автор рассматривает требования, которые могут быть предъявлены к эмиссионному банку (содействие сбалансированному росту, улучшению позиций платежного баланса, сохранение относительной валютной стабильности форинта и т. д.) и функций, которые должны выполняться эмиссионным банком («банк государства», «банк банков», определение кредитных отношений, регулирование массы денег в обращении), и высказывает свое мнение относительно разделения функций эмиссионного и кредитного банка и создания соответствующего инструментария для их деятельности.

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EXPORTS OF MANUFACTURES OF CMEA AND DEVELOPING COUNTRIES TO DEVELOPED INDUSTRIAL COUNTRIES*

One of the key-issues of the development of East–West trade has been for many years to increase exports of socialist countries to the West and to reduce the disequilibrium of turnover. Difficulties and obstacles in this field have often been analyzed many-sidedly. Recently, also another "unfavourable" effect has been added to these problems, namely, the competition raised by the rapidly growing industrial exports of developing countries to the West. In the last 10–12 years both the dynamics and the structural development of industrial exports** of developing countries to OECD-countries have been considerably faster than those of socialist countries. In order to know mutual effects of these two export flows on each other their commodity patterns and regional composition have to be examined as well as changes in export positions in the individual OECD subregions.

In the 1970s the importance of developing countries for the developed West considerably increased not only in their quality as raw material suppliers, but also as exporters of industrial goods. The export*** of manufactured goods by developing countries to OECD-countries increased to more than 13-fold between 1965 and 1977, i.e. by yearly 24 per cent on the average. In their deliveries to the West the share of manufactures increased from 9.5 per cent in 1965 already to 19.7 per cent by 1973 (on the basis of value data) and since the sudden setback (to 13 per cent) caused by the 1974 price explosion of raw materials it has been gradually increasing again, even though with minor fluctuations. As regards volume this increase far exceeded the growth rate of their raw material exports.

The increase in the industrial exports of developing countries to developed industrial ones exceeded not only the growth rate of trade in manufactures of Western countries between each other, but considerably surpassed also the growth of industrial goods deliveries of CMEA-countries to the West (19 per cent on yearly average). While in 1965 the industrial export of developing countries to developed industrial countries exceeded that of CMEA-countries only 2.6-fold it was already 4.4-fold in 1977.

In the exports of CMEA-countries to the West the share of industrial goods amounting to about one third practically hardly changed between 1965 and 1977, not

*This article relies on a chapter of a study by the author published in the series "Forschungsberichte" of the Vienna Institute for Comparative Economic Studies.

**Throughout the article 'industrial exports', 'exports of manufactures', 'exports of manufactured goods', and 'exports of industrial goods' are used as interchangeable terms – Ed. note.

***Industrial goods' main commodity groups SITC 5–8, without item 68.

mainly as a function of changes in relative prices of raw materials and finished products, but depending on the distribution of CMEA-exports to the West between the USSR and other CMEA-countries in the individual years. As a matter of fact in the 1970s the share of industrial goods increased in Western exports of both the USSR and the small CMEA-countries (in Soviet exports from 14 to 17 per cent and in those of other European CMEA-countries from 45 to 53 per cent). But, since the share of the USSR within the total Western exports of the CMEA increased (from 42 to 52 per cent), the proportion of industrial goods in CMEA-exports decreased by a few per cent.

In USSR exports to the West industrial goods have obviously a quite different role than in those of other CMEA-countries for which boothing the export of industrial goods to the West is of vital importance that can hardly or not at all be replaced by other products.* Thus in Soviet exports, the export of industrial goods is basically different from that of other CMEA-countries not only as regards its role, but also its characteristics and composition. Therefore, wherever it is possible, we are going to examine the two export flows also separately.

It should be noted, however, that the above-average increase of industrial exports of developing countries is not characteristic of each country of the developing world, either, but mostly of a few countries, the so-called "newly industrialized (developing) countries". In the framework of differentiated development these could achieve very spectacular export results in consequence of rapid industrialization and active foreign economic policy – general export subventions, export-oriented exchange rate policy and, last but not least, considerable participation of foreign operative capital –, as e.g. Hongkong, South-Korea, Singapore, Brazil or Argentina. This even more justifies to make a comparison between the industrial exports of both regions despite existing considerable differences in orders of magnitude and in other respects. Therefore, exporters of manufactured goods of socialist countries have to face the competition raised not by industrial products of developing countries in general, but by the *concentrated* industrial exports of some developing countries to Western markets.

It can be stated from the table that the industrial exports of both small CMEA-countries and developing countries to the West are characterized by an unambiguous *advance of machines and transport equipments* (SITC-7) as well as of miscellaneous industrial articles (SITC-8), while the share of chemical products (SITC-5), materials and semi-finished products (SITC-6) decreased in both export flows. It is remarkable even within this that – contrary to general belief – within industrial exports to Western countries it was not the export of light industrial consumer goods (products of the clothing and leather industries), but that of machines and equipments that increased most rapidly during the entire period, by 38 per cent on a yearly average (!). Nevertheless, of course, also main commodity group 8 showed an extraordinarily fast growth rate (of

*Poland is somehow an exception from this. Problems of the balance of payments in convertible currencies have become already of such extent that recently industrial exports had to be increased with a simultaneous forced growth rate of raw material exports.

yearly 29 per cent) in the period examined. On the one hand, in the industrial export of CMEA-countries to the West growth rates lagged behind those of developing countries in all commodity groups, and, on the other hand, here it was precisely the export of consumer goods of the light industry that showed somewhat greater dynamics (yearly 23 per cent) than machinery exports (yearly 21–22 per cent).

Table 1

Composition of industrial goods exports to developed industrial countries
(in percentage)

SITC main groups	European CMEA-countries		USSR		Six small CMEA-countries		Developing countries	
	1970	1977	1970	1977	1970	1977	1970	1977
5 Chemicals	17	19	22	33	16	13	10	6
6 Materials and semi-finished products	42	35	49	45	40	30	37	29
7 Machinery and transport equipment	23	24	24	18	23	27	14	22
8 Miscellaneous industrial products	18	22	5	4	21	30	39	43
5–8	100	100	100	100	100	100	100	100

Source: OECD Statistics of Foreign Trade, series „B", 1970 and 1977.

With the comparison of growth rates it has, of course, to be taken into consideration that the machine export of developing countries was of a very low level in 1965 as regards both its share within industrial exports (6 per cent) and its absolute value (amounting altogether to 158 million dollars). Nevertheless, the yearly 38 per cent increase – lasting for more than a decade – is an outstanding phenomenon on a world scale. In 1977 the share of machinery and equipment within industrial exports of developing countries to the West (22 per cent) already strongly approached the corresponding figure (27 per cent) within the export of manufactured products to the West by small CMEA-countries and in absolute terms – as we shall see – the former caught up and surpassed the value of CMEA machine exports, precisely in the 1970s. The composition by main commodity groups of the industrial exports to the West of six small European CMEA-countries and of developing countries, respectively, approached to each

other and by 1977 already showed rather considerable similarity.* In the export of small European CMEA-countries the share of chemical products (SITC-5) and in that of developing countries the proportion of consumer goods of the light industry (SITC-8) are relatively high; but if recent growth trends continue in both export flows also in the future, the deviation between export structures may further decrease.

However, in the structure of the export of manufactures of the USSR to the West just an opposite trend from that outlined in the foregoing developed in the period examined. Within Soviet industrial exports the export of chemical products and – though only to a lesser extent – that of basic materials and semi-finished products increased at the fastest rate. In 1977 already more than three quarters of USSR exports of manufactured products to the West were made up of these two main commodity groups. Alone the weight of chemical products in industrial exports increased from 22 to 33 per cent between 1970 and 1977, in which also price increases had some part. The shares of machinery and equipment as well as of consumer goods of the light industry (SITC 7 and 8) were considerably lower than in the case of other CMEA-countries already in 1970, and this deviation only further widened in the course of the 1970s.

It is worth to briefly examine what economic processes and considerations are lying behind the, in many respects similar, structural changes in industrial exports to the West of developing countries and of small CMEA-countries, in the individual regions. When comparing the export structure of both regions with the structure of *trade in manufactures between various Western countries* it can be stated that the export structure of

*This is verified also by the so-called cosine coefficient suitable for quantification of this similarity, on the basis of the following formula:

$$\cos x_i x_j = \sum_{i=1}^{n} x_{in} x_{jn} \left(\sum_{i=1}^{n} x_{in}^2 \sum_{i=1}^{n} x_{jn}^2 \right)^{-1/2}$$

where x_{in} and x_{jn} mean the export vectors of countries "i" and "j" for product "n" at a given date. (Cf.: EGB Economic Bulletin for Europe, Vol. 30, No. 1, 1978, p. 104.) The value of the coefficient may be between 0 and 1. Value "0" indicates complete deviation, while value "1" complete identity between the two export flows examined. (The examination was carried out in a two-digit product breakdown.)

As indicated by the above coefficient, the structure of the industrial exports of the CMEA (including the USSR) and of developing countries to the West shows only moderate similarity and a minimum approach to each other between 1970 and 1977:

$$\cos x_{in} x_{jn1970} = 0.55$$
$$\cos x_{in} x_{jn1977} = 0.59.$$

Against this, if the composition of the industrial exports of developing countries is compared to that of the six small CMEA-countries, then the cosine coefficient shows a definite approach in the 1970s. Namely:

$$\cos x_{in} x_{jn1970} = 0.55$$
$$\cos x_{in} x_{jn1977} = 0.74.$$

both regions practically approached to that of developed industrial countries to some extent, and within the latter hardly any change took place in the 1970s. Namely, there the share of chemical products (SITC-5) increased within the four main commodity groups of SITC examined from 12 to 14 per cent between 1970 and 1977, that of materials and semi-finished products (SITC-6) decreased from 27 to 24, machinery and transport equipment (SITC-7) increased from 47 to 48 per cent, while the share of main commodity group 8 consisting mostly of consumer goods of the light industry remained 14 per cent.

A change in an unambiguously opposite direction to the development of trade of OECD-countries among each other could be found only in the main commodity group 8 – beside the decreasing share of chemical product exports of developing countries – whose share, anyway outstanding in the export of both regions examined, further increased, though not with the same background, nor on the basis of identical considerations.

In developing countries – and here we think first of all of the newly industrializing developing countries giving the bulk of industrial exports – in the process of change-over from previous economic development of a basically import-substituting character to an export-oriented policy around the mid-1960s, potentialities and comparative costs advantages of these countries were favourable first of all for relatively rapidly paid-off development projects of the light industry. Cheap unskilled or less qualified labour as well as raw materials were available in abundance. Last but not least, fast industrial development was realized in the developing countries through deepening the industrial division of labour with the developed West, – and with an active participation of multinational enterprises, which, in the framework of "structural change-over" "transferred" first of all the "lagging" industries that were more and more losing with them to the developing countries.

In the CMEA-countries cheapness of labour is very relative compared both to the wage-level of developing countries and to Western efficiency criteria; comparative advantages appear only in branches where the relatively low wage-level is coupled with the demand for highly qualified specialists. However, since – despite various attempts – no comprehensive export-oriented development has been realized in CMEA-countries until now, that would have many-sidedly considered economic potentialities while balance problems have become more and more urging in Western trade, the increase of exports of the light industry (e.g. clothing) seemed to be a fast solution. Thus the rapid incrase in the share of these products in exports to the West of small CMEA-countries has been a consequence of the previously prevailing "residual principle", on the one hand, and of the present emergency situation, i.e. the urging necessity not always bringing to the fore the profitability aspects of Western export, on the other.

Table 2

Percentage shares of the 10 most important export products within industrial exports to the West of individual regions in 1977
(1970 percentages in brackets)

SITC product groups	Six small CMEA-countries		USSR		European CMEA-countries, altogether		Developing countries	
512 Organic chemicals	4.2	(5.0)	3.0	(5.1)	3.9	(5.0)		
515 Radioactive and associated materials			22.0	(4.3)	5.8			(4.5)
561 Fertilizers			3.1	(5.7)	2.6	(2.8)		
631 Veneers, plywood board			2.6	(5.7)			2.6	(4.9
641 Paper and paper board			1.6					
652 Cotton fabrics, woven							2.6	(3.0)
653 Textile fabrics, woven							2.2	(5.1)
657 Floor coverings, tape							2.1	
667 Pearls and precious stones			29.3		7.8		5.7	(6.6)
671 Pig iron		(4.1)	2.3	(12.5)		(5.7)		
672 Ingots of iron or steel	4.1	(4.4)	1.8	(7.0)	3.5	(4.9)		
673 Iron and steel bars	3.0	(5.3)				(4.6)		
674 Plates and sheets	3.8	(4.6)		(4.0)	3.1	(4.5)		
715 Metal-working machinery		(4.7)	2.0	(5.0)		(4.7)		
719 Other non-electrical machinery	3.0	(3.4)		(4.4)		(3.6)		
724 Telecommunication apparatus							6.5	(4.2)
729 Other electrical machinery and apparatus							6.3	(4.3)
732 Road motor vehicles	2.8		7.5		4.0			
735 Ships and boats	5.4	(2.4)		(5.0	4.2	(2.9)		
821 Furniture	5.8	(3.1)			4.3			
841 Clothing	12.2	(6.8)			9.4	(5.6)	22.4	(20.8)
851 Footwear	3.3						4.5	
895 Toys, games and sporting goods							3.6	(3)
899 Other manufactures								(5)
Percentage of the 10 products, altogether	47.6	(43.8)	75.2	(48.7)	48.6	(44.3)	58.5	(62)

Source: OECD Statistics of Foreign Trade, series „B", 1970 and 1977.

Comparison of the most important manufactures

For a detailed examination of commodity patterns 10 highly important products within the industrial exports to the West of developing and of CMEA-countries (among them of the USSR and other European countries separately) were selected each, whose percentual shares in the total export of manufactured products are presented in *Table 2.* However, the table says only little about the real interactions of the export flows examined, precisely because of differences in order of magnitude, since the exports of manufactures of developing countries to industrial countries exceed those of CMEA-countries in the overwhelming majority even of those product groups which are not included among their most important products. But the order of most important products and changes in them in the 1970s may give some orientation concerning further development trends of export structures.

It can be seen from the table that in the product pattern of industrial export to the West of developing and CMEA-countries, there are only a few "overlaps" yet, except for the export of ready-made clothes and shoes – at least as regards the 10 most important products, i.e. about half of the total export. But, where overlaps can be found, these are more and more pregnant. Clothing articles (SITC-841) are by far the most important products in industrial exports to developed industrial countries of both the small CMEA-countries and developing countries. Their share dynamically increased also in the 1970s (in case of small-CMEA-countries it approximately doubled). Besides, the share of footwear considerably increased in both export flows. At present it is already rather well-known that competition between the exports of the two regions has sharpened – first of all in the field of clothing articles. Chances of small CMEA-countries to increase their clothing exports to the West are extraordinarily hampered, often even thwarted by the spectacular export achievements of developing countries. But the situation is by far not so unambiguous in the case of other products.

In the export of developing countries electrical equipments (SITC-72) are placed second, following clothing articles, amounting only to 10 per cent of industrial exports of developing countries in 1970, but already to 15 per cent in 1977 (they include telecommunication equipments, various electrical spare parts, household appliances). Chemical products could no longer be found among the 10 most important products in 1977 (true, they were not considerable previously, either) and the share of textile goods (SITC-65) also decreased.

In the export of small CMEA-countries, beside clothing and shoes export with increasing shares, the products of the iron and steel industry (SITC-67) and organic chemical substances (SITC-512) – though both to somewhat decreasing extent – as well as non electrical machines (SITC-71) and vehicles (SITC-73) have an important part. The growth of furniture (SITC-821) in the industrial exports of small CMEA-countries is remarkable in the period examined. Therefore, the product pattern of industrial exports of both regions is at present still much more complementary than similar, apart from the dominant role of clothing articles in both export flows – though some approach can be

experienced in this field in consequence of the decreasing shares of textile exports of developing countries and of iron and steel exports of small CMEA-counctries.

The product pattern of the industrial export of the USSR differs from that of other CMEA-countries even more than its structure by main commodity groups. The reason for this is that in 1977 more than half of the total Soviet export of industrial products consisted of two very special products: uranium concentrate, that was included in the Soviet export assortment in the framework of agreements on uranium concentrate concluded with Western European countries, amounted to 22 per cent; and various precious stones, first of all diamonds, amounted to about 30 per cent, coming to the fore* presumably in connection with the financing of Soviet foreign trade deficits. However, the considerable increase in the share of Soviet motor vehicle exports is remarkable.

It is a common and from the viewpoint of comparison a relevant feature that almost all important traditional export items of both the developing and the small CMEA-countries enumerated in the foregoing belong to "import-sensitive" products in Western countries, afflicted by protectionistic measures on OECD-markets and, therefore, sales difficulties have to be reckoned with. Without overestimating the importance of Western protectionistic measures it can be assumed that the share of traditional export products within industrial exports included in the table will at most stagnate in the future, but in case of several products it may even decrease (as it has already happened with the textile export of developing countries and the iron and steel export of CMEA-countries). Therefore, if developing countries wish to maintain the fast growth rate of their industrial export attained in the 1970s and CMEA-countries want even to increase it in order to reduce trade deficits with the West, then even greater efforts than before have to be made to increase beside the export of traditional products also that of product groups of machine-building not subject to restrictive measures as yet, or if so then only to a small extent.

As it turns out also from *Table 2,* in the export of products of the machine-building industry some special "division of labour" has been enforced between the two groups of countries up to now. Developing countries achieved outstanding results mainly in the export of electrical machines (72), while in the machine export of CMEA-countries non-electrical machines (71) and vehicles (73) have an important part. Of course, this kind of division of labour has developed not only by chance. Electrical machines exported by developing countries are mostly telecommunication mass products and electronic parts or units representing simpler technology easy to learn on the basis of licences, in the production of which manufacturing countries have the same comparative costs advantages as, for example, in certain branches of the light industry.

In the majority of CMEA-countries engineering traditions are undoubtedly greater than in developing countries (machine building, machine-tool engineering, heavy industry,

*Presumably, some changes have occurred in the meantime also in the method of statistical accounting.

to some extent the vehicle-building industry) and this explains why these products have a relatively important place in machinery exports to the West. On the other hand, there are production traditions in the manufacturing of electrical machines and also in telecommunication techniques in several countries, among them also in Hungary. However, precisely this latter very rapidly developing branch is a typical example for the "intermediate" development level of CMEA-countries and its disadvantages in competitiveness on the world market: as regards labour-intensive simple products CMEA-countries cannot compete with the cheap products of developing countries. On the other hand, as regards electrical equipment representing most advanced technology they lag behind the level dictated by the most developed enterprises of the world and the buying of licences has not become such a wide-spread practice, either, as in developing countries.

The product pattern has been rather rapidly modernized first of all in the export of "manufacture exporting developing countries". A part of developing countries that made considerable export achievements in simpler products until now are becoming more and more capable of manufacturing more complicated products and also of their competitive export. While in 1970 the total machinery exports of developing countries to developed industrial countries somewhat lagged behind those of CMEA-countries, yet, by 1977 the former already exceeded the latter more than fourfold. And, what is even more remarkable: this gaining ground is characteristic not only of the electrical appliances already mentioned (with a yearly 37 per cent increase), but also of the export of vehicles which increased yearly by 41 per cent in the 1970s. The growth rate of the export of non-electrical machines (yearly 36 per cent), too, is hardly lagging behind that of electrical machines. Among the export items of the machine-building industry of developing countries road vehicles are the most important: their export to developed industrial countries increased to 1.6-fold (by 48 per cent on a yearly average) between 1970 and 1977. It can be expected that vehicles (and spare parts) will soon belong to the 10 most important industrial export articles of developing countries ousting some textile products.

Table 3

Yearly growth rates of exports to developed industrial countries between 1970 and 1977

(in percentages)

SITC product groups	From CMEA-countries	From developing countries
71 Machinery, other than electric	18	36
72 Electrical machines	24	37
73 Transport equipment	30	41

Source: OECD Statistics of Foreign Trade, series „B", 1970 and 1977.

Between 1970 and 1977 the export of CMEA-countries to the West increased in all the three product groups of the machine-building industry much more slowly than that of developing countries. This is indicated also in *Table 3* presenting the yearly average growth rates.

By 1977 the export of developing countries to the West pulled up to and even exceeded the machinery exports of CMEA-countries in all the three product groups of the machine-building industry also in non-electrical machines and vehichles, and this situation is characteristic not only of products of the machine-building industry. According to the two-digit SITC breakdown, out of the 27 industrial articles merely 4 such industrial products could be found in 1977 (as against 8 in 1970!) where CMEA-countries had a greater share in OECD-imports than developing countries (carbon chemical and petrochemical products SITC-52, chemical fertilizers SITC-56, synthetic materials SITC-58 and furniture SITC-82), but the difference is small or even of a decreasing trend also here. And, from among products of the machine-building industry only agricultural machines, metal-working machines as well as railway vehicles can be mentioned any more where the share of CMEA-countries in OECD-markets still somewhat exceeds that of developing countries.

But, it is worth examining the development of market positions also by major absorptive markets, since in this field very considerable fluctuations can be found in the exports of both regions.

Market shares – by major absorptive markets

The market share of developing countries in the manufacture imports of OECD-countries increased from 4.9 to 8.5 per cent between 1970 and 1977, while that of CMEA-countries from 1.7 to 2.0 per cent during the same period. Therefore, the two regions jointly supply hardly more than 10 per cent of the entire import of manufactures of Western countries, of course, their share is strongly fluctuating by major absorptive markets just as their market orientation is also rather deviating.

In 1977 42 per cent of the industrial export of developing countries to the West (in 1970 more than half of it) were delivered to the USA, 11 per cent to Japan (in 1970 7 per cent) and about 38 per cent (in 1970 36 per cent) to Western European markets. As against this, the decisive part of the industrial exports of CMEA-countries, more than 90 per cent, were concentrated on markets of Western Europe and merely 5 per cent were shipped to the United States.

Conforming to their orientation developing countries had already a more than 20 per cent market share in the industrial imports of the USA and Japan by 1977. Within this the market shares of several products (clothing, leather and shoes, electrical household appliances) exceeded even 50 per cent. Already more than 10 per cent of American and Japanese machinery imports, too, come from the developing world. But the share of CMEA-countries hardly reaches even 1 per cent in the industrial imports of these

Table 4

Market shares of European CMEA-countries and developing countries in individual OECD-sub-regions by SITC main commodity groups
(in percentage)

		5–Chemical products		6 – Basic materials and semi-finished products		7 – Machinery and transport equipment		8 – Miscellaneous industrial goods		5–8 combined	
		CMEA-	Developing	CMEA-	Developing	CMEA-	Developing	CMEA-	Developing	CMEA-	Developing
		countries		countries		countries		countries		countries	
European OECD-countries	1970	2.6	3.3	2.6	4.2	1.2	0.6	2.5	6.3	2.0	2.9
	1977	3.5	2.7	3.3	6.6	1.5	1.8	3.3	12.0	2.6	4.9
EEC	1970	2.2	2.5	2.0	4.0	1.0	0.5	2.3	4.8	1.7	2.5
	1977	3.3	2.5	3.3	7.2	1.2	1.2	3.5	12.8	2.5	5.5
USA	1970	0.6	13.7	0.7	20.7	0.1	5.2	0.5	28.9	0.4	14.7
	1977	0.7	10.6	0.8	19.1	0.2	12.5	1.1	48.0	0.5	21.0
Japan	1970	1.6	4.9	7.8	28.4	1.0	1.9	0.8	19.7	3.0	11.9
	1977	1.6	11.4	1.7	35.8	0.6	12.4	0.7	39.8	1.1	23.9
OECD-countries, together	1970	2.9	4.3	2.3	6.4	0.8	1.5	1.9	12.4	1.7	4.9
	1977	2.9	3.9	2.3	10.5	1.0	4.2	2.5	21.5	2.0	8.5

Source: OECD Statistics of Foreign Trade, series „B", 1970 and 1977.

countries and they have an even smaller share in machinery imports. Nevertheless, a more successful participation of CMEA-countries on American and Japanese markets is hardly impeded by the competition of developing countries, but much more by the low level of bilateral relations, existing trade policy obstacles and by inadequate adjustment of CMEA-exporters to particularities of the American market, respectively. With more elastic business policy, acquiring the most-favoured-nation treatment (as is indicated also by promising prospects of Hungarian–American business negotiations) this very low market position could be considerably improved – independently of the presence of developing countries.

The situation is different on Western European markets. On the one hand, this absorptive market is extraordinarily important for CMEA-exports and, on the other hand, the importance of this region is increasing – even if only slowly – also in the industrial exports of developing countries. As I have already mentioned, on American and Japanese markets developing countries attained such high import shares in several products whose

considerable increase could already hardly be imagined. However, in Western Europe developing countries have only relatively lower market shares as yet, therefore their market expansion endeavours will very likely be concentrated on Western Europe to an increasing extent, signs of this can already be clearly discerned at present.

The share of developing countries in the import of manufactures of Western Europe increased from 2.9 to 4.9 per cent between 1970 and 1977, at the same time that of CMEA-countries from 2.0 to 2.6 per cent. The market positions of CMEA-countries improved in chemical products as compared with those of developing countries, but, on the other hand, they unambiguously deteriorated as regards machinery and equipment (though their West-European market share in non-electrical machines and vehicles still exceeds that of developing countries – true, only to a decreasing extent) and rather considerably lagged behind in main commodity groups 6 and 8 during the entire period.

It must be taken into consideration that also West-European countries are increasingly striving to strengthen their relations and positions with developing countries. This statement holds especially for the Common Market where the decisive part of the Western industrial exports of developing countries is delivered to. In the framework of the General Preference System of the EEC developing countries enjoy considerable advantages over socialist countries. However, for the CMEA-countries there is no real alternative to Western Europe – at least not within reasonable time – for considerably increasing the export of manufactured goods. Though for some CMEA-countries, that have become most-favoured-nations in the United States, prospects are much more favourable on the American market of industrial goods at present than they were previously and they may even increase their market shares to some extent, a considerable strengthening of their positions or a "break-through" that would diminish the predominant role of Western European countries can hardly be expected.

In the industrial imports of Western Europe the joint share of the two regions amounts only to 7.5 per cent, thus more than 90 per cent of their imports of manufactured products come from developed industrial countries. despite this, there is only a very limited possibility for both regions, i.e. both for the CMEA and for developing countries to increase their market shares in Western Europe simultaneously. Of course, it has to be taken into consideration that the situation of individual countries and their products, respectively, may greatly differ and from the fact that markets are globally delimited it does not follow that the individual exporters are equally restricted by this global delimitation on a given market. On the other hand, parallel with the deepening industrial division of labour between developed industrial and developing countries as well as with widening sales possibilities of OECD-countries in the developing world also the readiness of the West is increasing to assign a growing part of their internal markets to exporters of "external", i.e. developing countries.

Some conclusions

It was by no means my intention to exaggerate, in the present article, the role of competition raised by developing countries among factors impeding the industrial exports of CMEA-countries to the West. Obviously, among obstacles to a faster growth of these exports much more important are such inner factors as e.g. inadequate adjustment to qualitative and structural requirements of Western markets, the low competitiveness of manufactured products. Besides, it is known that growing exports even of otherwise competitive products of CMEA-countries are often impeded by the lack of corresponding commodity funds and quotas are often not fully utilized. Despite this fact an examination of the industrial goods export of developing countries and its comparison with that of small CMEA-countries can be undoubtedly useful, since this is also a factor to be increasingly reckoned with when shaping the Hungarian export structure and has necessarily to be taken into consideration when allocating resources serving to increase the export of manufactured goods to Western countries, (here I think of investment projects aimed at export development) and when elaborating long-term concepts.

From the viewpoint of possibilities for European CMEA-countries to increase their export of manufactures to the West the competition raised by developing countries is worthy of attention in several respects. On the one hand, *at product level:* the point is not only that in simple, labour-intensive products (clothing articles, simple telecommunication and electronic parts and units) the developing countries already have advantages over CMEA-countries almost impossible to catch up with. We cannot even envisage to catch up with this disadvantage since it is not expedient to use up further resources for increasing the export of such products which, obviously, do not allow maximum utilization of our economic potentialities and available production factors, and are less and less produced even by "more developed" developing countries. The problem is rather that developing countries can and do appear as competitive exporters on Western markets with more and more products already supposing and representing a higher technological level in consequence of the rapid structural transformation and modernization of their industrial exports, in fields where CMEA-countries had not at all to reckon with their competition previously (or only to a small extent).

The extraordinary successes of a part of developing countries on the markets of industrial products in Western countries may influence the positions of CMEA-countries not only directly, but also indirectly, *in general.* European developed industrial countries pay attention to developing countries among others also because developing countries offer at present more promising absorptive markets for their manufactures than CMEA-countries do, especially since the introduction of import-saving measures by the latter in recent years. Therefore, if CMEA-countries wish to strengthen or even improve their market positions in the West, they have to better rely on their potentialities and on the exploitation of eventual advantages inherent in the "intermediate" situation between the levels of economic development of developed industrial and developing countries, when elaborating their technical-economic development strategies.

Every export-oriented policy postulates a circumspect identification on the product-scale of those procucts which can (or could) be manufactured by small CMEA-countries at a high standard resulting from their economic potentialities – but cannot or at least *not yet* be turned out in such quality by developing countries – and whose production OECD-countries are ready to abandon in the framework of structural transformation. This may be largely promoted also by the development of a division of labour with Western firms more actively and in greater volume than has been the case up to now.

ЭКСПОРТ СТРАН-ЧЛЕНОВ СЭВ И РАЗВИВАЮЩИХСЯ СТРАН В РАЗВИТЫЕ КАПИТАЛИСТИЧЕСКИЕ СТРАНЫ

Э. НЕМЕТ-ПАЛОЦ

Уже в течение целого ряда лет центральным вопросом развития торговли между Востоком и Западом является повышение экспорта социалистических стран в развитые капитилистические страны и сокращение несбалансированности оборота. В статье анализируется только один аспект этой весьма сложной и многосторонней проблемы: в какой степени и в каких отраслях быстрое развитие экспорта промышленных изделий из развивающихся стран в развитые капиталистические страны влияет на возможности сбыта промышленных изделий стран-членов СЭВ на рынках ОЭСР. В 70-е годы развивающиеся страны как по темпам роста, так и по динамике изменения структуры экспорта в развитые капиталистические страны опережали страны-члены СЭВ. В результате быстрой модернизации структуры вывоза промышленных товаров из развивающихся стран произошло явное сближение состава экспорта промышленной продукции развивающихся стран и шести малых стран СЭВ по группам товаров. Доля машин и оборудования внутри экспорта промышленных изделий из развивающихся стран в западные страны, например, уже в 1977 г. значительно приблизилась к доле машинного оборудования в экспорте малых стран СЭВ в западные страны. Для сравнения детальной товарной структуры в статье выбрано по 10 наиболее важных товаров обоих экспортных потоков и делается на этом основании вывод о том, что, за исключением экспорта швейных изделий и обуви, совпадение товарной структуры экспорта промышленных товаров развивающихся стран и стран-членов СЭВ в западные страны пока еще незначительно, но и в этой области также наблюдается определенное сближение. Обострение конкуренции на рынке швейных изделий и обуви сегодня уже достаточно общеизвестный факт, но, кроме того, страны СЭВ должных считаться с усилением конкуренции развивающихся стран и в экспорте изделий машиностроения. Особенно справедливо это для западноевропейских рынков, на которые направлена подавляющая часть экспорта промышленных изделий стран СЭВ. Анализ же соотношения рынков также позволяет сделать вывод о том, что стремление развивающихся стран к расширению рынков в основном будет сосредоточено на Западной Европе.

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GY. ERŐS

SOME PROBLEMS OF THE INTERNATIONAL MONETARY SYSTEM*

Based on different indicators of some industrialized countries, author tries to quantify some facts which show that 1. there is no convincing correlation between money supply and inflation in eight developed countries during a 10-year period; 2. the deterioration of the exchange rate of the US dollar vis-à-vis seven currencies during the same ten years could be explained only to a relatively modest degree by inflation rate differentials; 3. the US dollar was overvalued between 1950 and 1970; it became undervalued by the end of 1979.

In the time of the dollar being overvalued there was a capital flow out of the US, establishing US direct portfolio abroad, in the present undervalued position there is a capital flow into the US. Part of the thus developed international position, namely the short term liabilities, create surplus liquidity, the so-called dollar overhang.

During the next five years the present overhang will be enlarged by the unspendable surplus of some OPEC countries. No currency, not even the dollar will be able to absorb the arising size of liquidity. To avoid chaos, a fundamental reform of the international monetary system seems to be unavoidable within five, preferably three years.

Author outlines some possible solutions with or without the remonetization of gold stressing the paramount importance of the time element, size and the preservation of the purchasing power of the chosen new international currency unit.

Alongside such global problems as peace, energy, overpopulation, famine, etc. stands the problem of the world monetary system. [1] [2] This is not to imply that it is equal in importance to the main problems of mankind that have been mentioned. Nevertheless, we should be aware of the interdependence between finances and these global problems, particularly now when we are experiencing so palpably the interdependence between energy and finances. There is a general similarity between the world's global concerns and monetary questions in the sense that, although the danger in many of these areas is not immediate, a critical point might be reached in a not too distant future unless adequate steps are taken in time. In this context, the aim of this article is to analyze the current situation and to consider some possible solutions in the field of the monetary system.

For many of the recent global problems, the beginning of the 1970s marked the start of a new era. In world finances, similarly, the turning point was August 15, 1971 when the President of the United States declared that the convertibility of the US dollar into gold was to be terminated.

*The manuscript was received in October 1980.

Some problems of the monetary system, however, had been in existence even before this turning point, to be traced as far back as 1914 when the classical gold standard was abandoned. Between 1914 and 1944 some attempts were made to revive the gold standard, but these proved unsuccessful, and created extensive problems in the world economy from time to time.

Writing in 1932, G. *Cassel* remarked, "We have to face the bankruptcy of the old international gold standard, including the role of gold as a numeraire." To this he added, "The US dollar rate is based on a purchasing power parity which is fully dependent on US financial policy, *thus forcing gold to comply with the value of the dollar.*" [3]

This situation was institutionalized in 1944 with the Bretton Woods Agreement. The system created at Bretton Woods was based on a fixed relation between gold and the dollar (1 oz. = $35). All other currencies were compelled to maintain a relation with a very narrow margin either through the gold parity or directly to the dollar. The system served international financial relations relatively well until the end of the 1960s. Then, the price of gold "denied compliance with the dollar". In the framework of the so-called two-tier system, an experiment was made to keep the price of monetary gold in compliance with the dollar and to influence the price level of gold in the free market. All these attempts ended in failure. The USA lost more than half of its gold reserves, the price of gold started its career upwards, and the situation led ultimately to President Nixon's declaration of August 15, 1971.

The world monetary system and its "cornerstone", the US dollar, have undergone some fundamental changes in the last 10-year period. Gold was "demonetized" inasmuch as IMF member countries were not compelled to fix the price of gold. Gold parity was replaced by fixing the relation of currencies to the inconvertible dollar. Finally, the flexible exchange rate system was introduced in 1973, and the US dollar was twice devalued.

The qualification made earlier about the Bretton Woods system, i.e. that it had functioned *relatively* well until the end of the 60s means that while there was stability, the inherent contradiction of the key currency became gradually manifest. This basic contradiction was rooted in the dual requirement the dollar had to meet: it had to be simultaneously both strong and weak. It should have been strong in order to comply with the stability requirement towards a reserve currency. At the same time, it should have been weak to insure sufficient liquidity for international money flows. The US dollar met these requirements only alternately as time progressed: it was strong until the end of the 1960s, and thereafter it became weak and volatile.

An analysis of basic monetary problems should treat the development of the exhange rate of the US dollar. In the search for the main determinants of this development, three factors are usually mentioned:

1. inflation differential;
2. interest differential; and
3. the balance of payments position.

These factors, however, seem to be only external manifestations of two main underlying economic inducements, which are:

A) Demand for and supply of any one currency, induced by internationally traded goods and services. This develops mainly through the influence of price relations, currently, termed, with reason, "inflation differential".

B) Demand for and supply of any one currency, induced by capital movements. This develops partly through the influence of interest differentials *and* rate expectations.

The balance of payments is mainly the aggregate of the two currency flows described above in A) and B). Therefore, the balance of payments is an additional factor only to the extent that the aggregate of the two main factors is exceeded by other payments, such as military aid, etc.

To analyze the interdependence between exchange rate and inflation, some indicators in a few leading industrial countries had to be worked out for the last ten years as in *Table 1* below:

Table 1

*10-year development in some indicators**
(end 1969–end 1979)

	Growth rate (real)	Money supply (M–1 over growth rate)	GNP deflator	Wholesale prices	Consumer prices
United States	132.7	147.6	190.9	221.1	198.1
Switzerland	114.4	166.8	169.3	139.7	161.8
West Germany	136.4	213.9	171.1	161.3	161.–
Netherlands	142.3	224.3	205.1	169.6	196.9
Japan	186.–	302.5	198.7	182.–	235.6
France	128.9	268.8	209.7**	215.1	234.3
United Kingdom	124.4	316.6	321.8	347.5	325.1
Italy	150.4	569.8	345.2	373.3	315.8

*Based on IMF data in *International Financial Statistics* (May 1978 and October 1980).
**Until end of 1978 (1979 unavailable).

Beside the price indicators contained in the last three columns, it is worth noting the extremely weak correlation between money supply and price level in the 10-year period.

For example:

1. *the USA,* with the lowest money supply, had an essentially higher inflation in all three price categories than Switzerland and Germany, and in two categories higher than the Netherlands.
2. *West-Germany,* despite an essentially bigger increase of money supply than Switzerland, had a price development almost identical with that of Switzerland.

3. *Japan,* where money supply was very near to that in the United Kingdom, had essentially lower inflation rates
4. *In the United Kingdom and Italy,* the difference in inflation rates was minor, but the increase in money supply in Italy was substantially higher than in the United Kingdom.

Considering this unconvincing correlation between money supply and price development over a period of ten years in these countries, it is very difficult to understand the monetarist approach in the United States and the impact the weekly money supply figures have on money markets and the shaping of monetary policy.

Table 2

*Exchange rate changes and inflation differentials**

Currency	Exchange rate		US$ Rate Deterioration (–) Improvement (+) (%)	Differential in inflation		
	end '69	end '79		Deflator	Wholesale price	Consumer price
	US $1.00 = :			Relative deterioration (–) Relative improvement (+) of U.S. price level		
Swiss franc	4.318	1.58	–63.4	–11.3	–36.8	–18.3
Deutschmark	3.69	1.7315	–53.1	–10.4	–27.1	–18.7
Dutch guilder	3.624	1.9055	–47.4	+ 7.4	–23.3	– 0.6
Japanese yen	357.8	239.7	–33.0	+ 4.0	–17.7	+18.9
French franc	5.558	4.02	–29.7	+ 9.8	– 2.8	+18.3
English pd. st.	0.4167	0.4496	+ 7.9	+68.6	+57.1	+64.1
Italian Lira	625.5	804.00	+28.5	+80.8	+68.8	+59.4

*Based on IMF data in *International Financial Statistics* (May 1978 and October 1980).

Based on price indicators contained in *Table 1, Table 2* compares the exchange rate development of the US dollar for ten years to the relative price changes (inflation rate differential toward the related country).

From this table one can conclude that in this 10-year period, the inflation rate differential explains the deterioration of the US dollar exchange rate only to a relatively modest degree. Toward the Swiss franc, the Deutschmark, and the Dutch guilder, only roughly 1/3 to 1/2 of the deterioration can be explained by inflation rate differentials. Towards the yen and the French franc, the inflation rate differentials do not provide acceptable justification for the dollar exchange rate deterioration. In the cases of the United Kingdom and Italy, the improvement of the dollar remained far behind the level

equivalent to the inflation rate differentials working in favor of the United States in these countries.

The very wide gap between the deterioration of the US dollar and the related price components during the last ten years can be explained only by the general impact of capital movements. It has been mainly in the case of US dollars that these capital movements have caused an essential distortion of the exchange rate, creating a deviation from the rates that would be justified by price relations. At the risk of some oversimplification, one may regard this deviation as change in the overvaluation of the US dollar.

It is common knowledge that the dollar was overvalued in the 1950s. A quantification of the size of this overvaluation, based on the work of the late Milton *Gilbert* and Irving B. *Kravis,* has been attempted in *Table 3.*

Table 3

Calculated overvaluation of the US$ in 1950 and 1970

Currency (US$1 = :)	Official ER, end of '50	1950 purchasing power equivalent entire GNP* (arith. mean)	Overvaluation in ER (%)	Official ER, end '69	1970 purchasing power equivalent entire GDP** (arith. mean)	Overvaluation in ER (%)
£ Strlg.	0.357	0.254	28.9	0.4167	0.308	26.1
F fr.	3.5	2.638	24.6	5.558	4.48	20.1
DM	4.20	3.066	27.0	3.69	3.14	14.9
It. Lira	625.00	437.00	30.1	625.5	483.00	22.8

ER = Exchange rate.
* = [4].
** = [5].

Despite the many uncertainties such calculations present, one can easily discern tendencies which show the overvaluation of the dollar in 1950 as having been significant, though still relatively evenly distributed (24.6 – 30.1%), and as having dropped in the course of twenty years through 1970, appearing with an appreciable range of difference to the other currencies (14.9% towards the DM and 26.1% towards the pound sterling).

For the period following 1970, works showing purchasing power parity on the broad basis of the GNP or GDP have, unfortunately, been unavailable. An acceptable substitute for the decade between 1969 and 1979 can be found by combining the dollar deterioration with inflation differentials based on producer prices, shown in *Table 2,* and the initial overvaluation, as contained in *Table 3.*

(Of the three price categories, the wholesale (producer) price indicator was chosen, because in a previous study [6] it became evident that between 1970–75 the differentials between the exchange rate and the wholesale price were under 10% in ten out of fourteen

industrialized countries, while the differences in relation to the other price categories were larger. The combination of all the data was possible only in relation to the currencies included in the purchasing power equivalent calculations in *Table 3* plus the yen.)

Table 4

*Current undervaluation of the US Dollar**

Currency	$ Rate (1969–1979) Deterioration (–) Improvement (+) (%)	Wholesale price differential (1969–79) (%)	Decrease in overvaluation (1) – (2) (%)	Overvaluation end of '69** (%)	Undervaluation (–) Overvaluation (+), end of '79 (4) – (3) (%)
	(1)	(2)	(3)	(4)	(5)
Sw fr.	–63.4	–36.8	26.6	n. a.	n. a.
DM	–53.1	–27.1	26.0	14.9	–11.1
D. gldr.	–47.4	–23.3	24.1	n. a.	n. a.
Yen	–33.0	–17.7	15.3	32.2	–16.9
F fr.	–29.7	– 2.8	26.9	20.1	– 6.8
£ strlg.	+ 7.9	+57.1	49.2	26.1	–23.1
It. Lira	+28.5	+68.8	40.3	22.8	–17.5

*Based on IMF data in *International Financial Statistics* (May 1978 and October 1980).
**[5].

In *Table 4,* an undervaluation of the US dollar at the end of 1979, except in the case of the yen, can be ascertained. The size of undervaluation moves according to the different "overvalued" rates between 6.8% and 23.1%. A somewhat different result relating to size can be obtained if the computation is based on the starting purchasing power equivalent as a supposedly correct basis (see *Table 5*).

Even this method shows a general undervaluation of the dollar, but the size of the undervaluation toward the DM is much bigger (24.4% instead of 11.1% as in *Table 4*). With emphasis once more on the many uncertainties of these calculations, the tendency emerging for the US dollar can be summarized as follows:

- In the 1950s and 1960s the dollar as the centre of the international monetary system was significantly overvalued.
- The end of the 1960s marked a turning point in this tendency.
- By the beginning of 1980, the dollar had become undervalued to a significant degree (for example, by approximately 10–25% against the DM).

Table 5

*Undervaluation of the US$ on the basis of PPE**

Currency	$ Purchasing power equivalent computed by Kravis** (US$1.00 = :)	Wholesale price indicator (1969–79) of relevant country	Relative purchasing power equivalent (1) × (2) / US indicator 221.2	Rate, end of '79	Undervaluation (–) Overval. (+) of US$ (4) : (3) (%)
	(1)	(2)	(3)	(4)	(5)
DM	3.14	161.3	2.29	1.7315	–24.4
Yen	244.0	182.00	200.8	239.7	+19.3
F fr.	4.48	215.1	4.36	4.02	– 7.8
£	0.308	347.5	0.4839	0.4496	– 7.1
It. Lira	483.00	373.3	815.1	804.00	– 1.4

*Based on IMF data in *International Financial Statistics* (May 1978 and October 1980) PPE = purchasing power equivalent.

** [5].

This tendency has very serious implications for the dollar and for the future of the monetary system as a whole. At the same time, it offers some explanation for past and present phenomena. The overvaluation between 1950 and 1970 limited the competitive edge of the United States until the beginning of the 1970s and explains the piling up of the United States balance of payments deficit since 1958. By the same token, the "cheap" foreign currencies for Americans and American corporations served to promote the expansion of USA holdings (its "portfolio") abroad. Instead of investing, producing, and exporting in and from the United States, it was more profitable to invest and produce abroad in American "affiliates".

The immense and partly unjustified deterioration of the dollar exchange rate in the 1970s and the subsequent undervaluation are now inducing just the opposite flow: we are now witnessing a continuous increase in foreigners' assets in the United States. The big question for the future is whether this transfer of dollars to the United States by foreigners will help to mop up the overhang of dollars abroad or whether foreign dollar-holders will be diversifying their assets and creating unpredictable movements out of the dollar.

In connection with the present undervalued character of the dollar, it is interesting to note how economic opinion in the world has changed with respect to the undervaluation of currencies. A few years ago a lower rate, even an undervalued currency, was regarded as an unmitigated blessing for balance-of-payments adjustment. Nowadays,

however, we can see how "strong" currencies defend their overvalued position as the best weapon against imported inflation. (Germany and Switzerland have intervened repeatedly in order to lessen their oil bills.) It seems one need not be a Marxist to recognize the adverse effects of an undervalued currency, which means that for every unit of foreign currency, more domestic labor must be sacrificed. In other words, it is a giveaway of one part of the national income. (It is worth reviewing the last twenty years to see how countries with depreciated currencies, like Italy, have become worse off, while countries with appreciated currencies, like Germany and Switzerland, have prospered.)

When discussing inflation differentials, we have identified, by means of some simplification, the component of rate changes not justified by price relations as consequences of capital movements. The effect of international trade and services on exchange rates is "predictable" insofar as price relations themselves are predictable. But capital movements are generally "unpredictable" in terms of quantity, time, and direction; thus, in their effects on exchange rates.

Although detailed data about international capital movements are lacking, four main avenues, excluding purely speculative transactions, can be distinguished in principle:

1. changes in direct investments abroad;
2. changes in official reserves;
3. flow of capital as means of international liquidity needed for financing trade;
4. surplus liquidity in international capital markets, the so-called overhang.

ad 1. Direct capital investments are rather under the influence of profit differentials. In this context, these are more akin to the underlying price relations than to interest level. But in cases of "diversification" (hedging against bearish rate expectations), the "unpredictable" nature of this kind of capital movement does exist.

ad 2. Official reserves are rather sensitive to interest differentials. Mainly in cases of "intervention" or "diversification", the impact on exchange rates could be "unpredictable" and contradictory to the underlying real economic factors.

ad 3. Financing of trade is under the influence of interest and exchange rate expectations.

ad 4. Surplus liquidity – mainly its short-term changes – is the major domain which can be influenced through interest policy.

Therefore, there is no doubt that interest rate differentials are the most efficient and rapid factor behind capital movements and the subsequent exchange rate changes. At the same time, interest policy as a weapon for influencing exchange rates is rather double-edged and short-term in nature:

a) In most cases, the partners try to defend their currencies by the same method. The onset of interest competition can cause higher levels of interest in equal proportions, thereby obliterating the original target of the whole transaction.

b) In international capital flow, the interest level can be independent of exchange rate developments or expectations only in exceptional cases. Capital movement cannot be generally attained through higher interest rates if exchange rate expectations offset the interest differentials. Again, there is a risk of introducing a high interest rate without

attaining the goal. (Only in cases when capital movement is not intended to return in future to the original currency does rate expectation play a minor role. In such cases, the capital movement is governed by the domestic relationship between the rates of interest and inflation.)

c) In interest policy there is frequent contradiction between domestic and foreign impacts. This is the case when a high interest rate is desirable in order to encourage capital inflow, while domestically a low interest is needed to stimulate the economy. At times of bearish rate anticipation it is very difficult to keep the interest at a correspondingly high level without having harmful domestic consequences.

d) Experience shows that the interest weapon could replace real adjustment only in an emergency and for the short term. The differences in average interest rates for the last ten years (USA 7.1%, Germany 6.6%, Switzerland 5.1%, Japan 7.3%, Netherlands 6.1% per annum) cannot offset the exchange rate differences that occurred during this same period.

To the attempt to quantify the undervaluation of the dollar, it must be added that there exists no certainty that the dollar should thereby improve and achieve a balanced rate at some future time. The main reason for this is the "unpredictability" of future capital flows. In its role of key currency, the US dollar could be the most endangered victim of these capital movements. This threat is founded on two main factors:

1. the present structure of the USA's external position;

2. the future development in international liquidity, mainly from the piling up of the so-called "petrodollars".

In respect to the external position of the USA, there is no problem with the *balance* of the USA's external position. At the end of 1979 there was a $95 billion surplus for the United States, with dollar assets abroad amounting to $513.2 billion and foreign assets in the United States equalling $418.2 billion. [7] To the assets we could even add $145 billion in undervalued gold reserves (this reserve is cited at 11.2 billion by official statistics, but calculated on the basis of present gold price amounts in reality to 156.2 billion). However, when we examine the different nature of assets and liabilities in regard to mobility, we get a different picture. The major underlying fact is the basic difference between US direct investment abroad, amounting to 192.6 billion, and foreign direct investment in the US, which comes to only 52.3 billion. Considering the short-term assets and liabilities, the balance again does not seem inadequate. Including the gold reserves, the short-term assets represent a market value of roughly $350 billion, covering the roughly $330 billion in short-term liabilities. But if we suppose that the US government is not really ready to diminish the gold reserve, there remains only $190 billion in short-term assets as against $330 billion in short-term liabilities.

Of the $330 billion in short-term liabilities, 160 billion consists of foreign official reserves held in the United States. In regard to these reserves, there appears to be a contradiction to general belief. The general opinion is that the recent balance-of-payments deficit of the leading competitors (Germany and Japan) would help to improve the dollar rate. Such hopes can be considered false or at least uncertain, for it is highly

probable that these countries are covering their deficits in the balance of payments out of their reserves in the United States. If the counterparts of these competitors (the surplus OPEC countries) no longer continue to keep their surplus in dollars, one could describe the situation as one in which the *United States is covering the deficit of its competitors,* thereby creating an additional supply of dollars in the market. (The fact that the official reserves held in the United States were diminished by $15 billion between 1978 and 1979 tends to verify that this procedure is being followed.)

Besides official reserves, foreigners have about $110 billion in short-term claims against American banks and about $60 billion in private securities ($13 billion in corporate and other bonds, $48 billion in corporate stocks). All of these liabilities are marketable or very mobile in nature. A part of the official reserves and the portion of the remaining 170 billion in liabilities not needed to finance international trade could be regarded as dollar "overhang". This superfluous quantity of dollars, which exerts pressure from time to time on the dollar exchange rate, has been estimated by some experts to be around $60 billion. We would say that the dollar quantity of potential capital movements which exert so volatile an influence on the dollar rate is essentially higher than 60 billion. If the approximately $100 billion in piled-up petrodollars at the end of 1979 is taken into consideration, this overhang could be more nearly estimated at somewhere between $100–150 billion.

The "petrodollars"

The question of the oil supply itself will be dealt with here only to the extent necessary for measuring its monetary effect. There appears to be no doubt that, in addition to forcing up the price, any serious restriction in the oil supply would lead to a widespread disturbance in the world economy far exceeding the effects of a collapse of the monetary system, not to speak of the worldwide crisis of the capitalist economy itself that such a collapse would precipitate. Along with this, we would take into account the rather tight, though still adequate, shortrun supply, estimated on the basis of current stockpiles, sufficient for about 100 days' consumption, together with evidence of beginning efforts at conservation as well as the limited effects of the current Iraqi–Iranian war. To emphasize the point that we cannot count on *economic methods* alone until 1985–90 to effect changes in a situation dictated by OPEC, I should like to refer to a recent work by the Hungarian-born nuclear scientist, Edward *Teller,* in which he maintains that an equilibrium in energy could be attained by the year 2000. Of course, that would be conditional on a vast structural change requiring an investment of several thousand billions of dollars, assuming that along with this in the course of the next twenty-five years gas and oil consumption would increase by no more than 25%, coal-based consumption by 100%, while solar and "biomass" production of energy would increase by 600% and nuclear energy (which Teller firmly believes could be made safe) would be developed to a capability of supplying 20% of the world's energy neeeds. [8]

To focus on the monetary consequences of oil prices, the figures in *Table 6*, depicting the 1980 balance of payments of the OPEC nations, have been calculated on the basis of a realistic estimate of 30 million barrels per day export at an extremely conservative average price of $26.00 per barrel:

Table 6

(In billions of US$)

	1973	1977	1978	1979	1980
Oil exports	26	135	127	180	260
Other exports	5	9	10	11	12
Services and private transfers	2.6	8	8	7	8
Income of firms	0.4	5	7	12	15
Total income	34.0	157.0	152	210	295
Import of goods	20	85	98	110	125
Services and private transfers	7	38	42	50	60
Total payments	27	123	140	160	185
Current transactions surplus	7	34	12	50	110

The "crisis point" could be induced by the newly accumulating "unspendable" OPEC surplus which could amount in 1980 to 100–120 billion and, assuming a continuation at the same rate, could total $500 billion by 1985. If the 100–150 billion overhang at the end of 1979 increases by an additional 400–500 billion by the end of 1985, the monetary system could progressively reach the "crisis point" through the "unspendable" petrodollars. Provided that periodic disturbances were to remain no more pronounced than usual, it is even possible to imagine that in 1980 and 1981, the system could be preserved by means of significantly improved international cooperation, mainly because no other (non-dollar) currency could absorb a surplus of this magnitude and also because it would run counter to the interest of petrodollar-holders to destroy the foundations of the international monetary system.

At the same time, the present situation could be aggravated in the shorter run as well. The swollen surplus of dollars could couse a speed-up in a trend toward diversification into more secure investments. The method of "recycling" may not be able to repeat the "miracle" following 1974. Most likely, international banks will be neither able nor willing to absorb a surplus of this size over and above their present international

positions, simply because they are unable to increase to such a degree the amount of outstanding credits to the developing countries. (In 1980 the present $300 billion indebtedness of the non-oil-producing developing countries will rise by an additional $60 billion due to oil price increases. Beyond the present level of 1–2 billion, direct assistance to the developing nations from the oil-producing ones is not likely to be increased sufficiently in the foreseeable future to effect a significant improvement. Similarly, recycling through the IMF could not achieve the absorption of the future overhang in sufficient quantity. Fixing the oil price and creating the possibility of payment with a basket of currencies instead of that with dollars would create temporary disturbances rather than afford a solution.)

Notwithstanding the short-run developments, one could suggest that in three to five years there will be such conflicts between possibilities and potential hazards that a fundamental restructuring of the international monetary system will become a necessity. By possibilities is meant that, above all, the world energy problem will remain still unsolved by 1985. The potential hazard is that by 1985 the system will be incapable of absorbing the accumulated "unspendable" petrodollars that may well be in the range of $500 billion. No currency, not even the dollar, can absorb a quantity of this magnitude.

Possible solutions

Before discussing some of the possible methods for preventing the collapse that threatens the international monetary system in the near future, it may be worth turning some attention to a somewhat grotesque phenomenon. In the 1970s when the gold stockpiles of the IMF member nations amounted to about 15–20% of their total reserves, very few gave any thought to the "remonetization" of gold. Contrary to this, recent developments in the gold price level, mainly an external manifestation of a confused situation attributable to many causes, have opened new perspectives for the solution of the monetary situation. A total gold stockpile of 35–50 billion at the earlier price or even at $200 per ounce – that is to say, a gold stockpile worth $200 billion – still offered no alternative for the absorption of $250 billion superfluous dollars. But if one considers that at the end of 1979, the 1,033,400 ounces of gold in the possession of IMF member-nations and other international organs were worth $650 billion, this might have afforded an opportunity to absorb the superfluous petrodollars, even when swollen to 500 billion in 1985.

Bearing this in mind, one could certainly imagine that a new Bretton Woods system with some modification could be restored on the basis of the new gold price level, given the huge gold stockpiles in possession of the monetary authorities. Convertibility to gold could possibly be reinstituted in principle, at least partially. With due regard for past mistakes, another desirable change might be to institute convertibility not only toward the dollar, but also toward other leading currencies, *including the IMF's activity for all convertible currencies.* For example, the USA, West Germany, Switzerland, France, and

the IMF jointly (assuming that the latter would require centralization of one-quarter of the gold stockpiles of its other members) could have at their common disposal 730 million ounces of gold backing.

Coupled with this 400–500 billions' worth of gold backing, an exchange rate system in which fluctuations, especially those of broader scale, would be determined by purchasing power parity (that is, differences in the rates of inflation), could provide a means of bridging the time needed to solve the world's energy situation and bring an end to the unrecycleable capital flows. It is otherwise obvious that, along with this system, a certain amount of distribution of gold stockpiles from industrial nations toward some of the oil-producing nations – just as the USA lost more than half of its gold stockpile prior to 1971 – would be unavoidable.

As an alternative to the system based on either a single or several currencies, another increasingly prominent proposal has been the "substitution account", based on the unit utilized by the IMF for the past decade or so – the SDR, a "currency basket" consisting of 16 currencies of predetermined weight.* In general, these proposals have tended toward modifying the SDR, so that it could become a "supra-national" currency which would "substitute" (absorb, convert) the superfluous dollar quantites on the market. Previously, endeavours of this kind were under more urgent consideration. However, the stance of the United States' authorities is very unclear. In May 1980 at a meeting of the IMF, they voted against the substitution account. More recently, Anthony *Solomon,* Chairman of the Federal Reserve Bank of New York, declared that the reform of the monetary system was very much needed. Through the efforts of the Group of Thirty in particular, one can anticipate that official channels, with the IMF at the center, will begin moving in this direction within the foreseeable future. The Group of Thirty, created by the Rockefeller Foundation, is composed of the world's leading currency experts** who participate in the work of the Group independently of their various individual official positions for the purpose of analyzing and formulating proposals concerning the world monetary system. Founded early in 1979, the Group has from the very outset been formulating proposals that would significantly advance the role of the SDR as an international unit of account. It has published the idea that the new unit could fulfill certain means of payment functions in private transactions in addition to being used for settling accounts among banks of issue. In fact, it has even raised that about 60–80 billion dollars in gold (at the current rate) might serve to back the "substitution account."

*Since the manuscript had been received, the composition of the SDR basket has changed. It presently comprises the US dollar, the DM, the F fr., the L and the yen.

**It is worth mentioning that three of the thirty members are Hungarians or of Hungarian origin: János *Fekete,* First Deputy President of the National Bank of Hungary; A. *Lamfalussy,* Chief Economist for the Bank for International Settlements; and Mrs. Marina *Whitman,* Chief Economist for General Motors, who is the daughter of the eminent mathematician, the late János *Neumann.*

Considering the studies published so far by the Group of Thirty as well as the high level of competency of its participants, one can expect some impact from the Group. Through its continued work together with some comprehensive international cooperation, the initial characteristics of the SDR will be substantially altered. Thus, the composition of the currency basket on which the SDR is currently based can be expected to change. Indeed, at present the Swiss franc is not included, since Switzerland is not a member of the IMF. Yet, a new monetary system could hardly be formed without including the Swiss franc. Is is also to be hoped that the solution will move away from the exceptionally limited goals implied by such terms as "substitution" and "account" and draw closer toward the concept of a developed international and supranational currency.

In the preparatory work to be done for the reform, a choice will have to be made between two alternatives determining the relationship to gold:

1. The solution could tend toward determining the conditions of or the proportions in which the new international currency to be created will be convertible to gold. In this case, either a return to formal gold parity or some method of purchasing power parity would come into view for determining the relationship among the various participating currencies as well as between each of them and the common international currency.

2. If gold backing were not to afford the possibility for conversion (or if it were decided to forego gold backing), the new unit would retain the character of a "currency basket", which expresses an average exchange rate of the component currencies. In this case, the "exchange rate" of the new unit could only provide protection against the changing exchange rates of the individual participating currencies. It could not serve as a hedge against the difference between the average change in the rate of the basic currencies and the average change in the price levels of goods.

If the new unit of account were to be installed at the center of the international monetary system without being tied to gold (or, for that matter, to a broad spectrum of prices of other goods), purchasing power parity would inevitably have to be taken into account in the interest of making this unit become money; that is, to fulfill its function also as a measure of value. For example, in order to determine the unit's exchange rate to various other currencies, one would not only have to average the exchange rate differences of the participating currencies but also to correct it for the average changes in price level of the participating countries. To be specific, in the case of inflation the international currency unit should be valued upward vis-à-vis the participating currencies by the average rate of inflation.

The eventual outcome of the attempts at reform cannot yet be fully ascertained. Much remains uncertain. In our view, however, two requirements are foreseeable:

a) A comprehensive reform of the international monetary system must be achieved within five, preferably three years. Quite apart from the oil situation, the capitalist world does not have at its disposal the same 15–20 years it took to accumulate the surplus dollars to drain them off.

b) Whether the reform decides in favor of a "substitution" for the surplus dollars or in favor of an international money tied to gold, the currently proposed $50 billion

substitution as well as the $60 – 80 billion in gold backing are far from adequate as solutions to the problems. Depending on the time it would take to institute any reform, the quantity that would have to be dealt with would more likely be between $300 – 500 billion.

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НЕКОТОРЫЕ ПРОБЛЕМЫ МЕЖДУНАРОДНОЙ ВАЛЮТНОЙ СИСТЕМЫ

Д. ЭРЕШ

Врожденным противоречием системы Бреттон-Вудса было то, что доллар одновременно должен был быть «сильным», чтобы выполнять роль резервной валюты, и «слабым», чтобы поступать в обращение в количествах, соответствующих требованиям международной ликвидности. Доллар не мог одновременно удовлетворять обоим этим требованиям, а лишь раздельно, в периоды, следовавшие по времени один за другим.

Автор дает количественную характеристику этого процесса в период 1950—1970 гг. на основании расчетов (Джильберта и Крэвиса) «эквивалента покупательной способности» валового национального продукта; в период 1970—1980 гг. на базе собственных расчетов — на основе соотношений оптовых цен — паритетов относительной покупательной способности. (Согласно этим расчетам, в отношении западногерманской марки курс доллара в начале 1980 г. был занижен на 11,1—24,4%, а в отношении йены — завышен на 16,9—19,3%.)

Наряду с этим, используя данные по 8 развитым капиталистическим странам периода 1969—1979 гг., автор дает количественную характеристику двух аспектов. По его менению, данные за 10 лет по этим странам не свидетельствуют о наличии корреляционной связи между обращением банковских билетов и уровнем цен, что монетаристская финансовая политика США последнего времени считает имеющим место. Курс доллара в течение этих 10 лет в отношении 7 развитых стран

лишь на 1/3 — на 1/2 может быть объяснен различием темпов инфляции. Остальная часть изменений курса, очевидно, объясняется «причудливыми» движениями капитала.

Курс доллара не только подвержен влиянию капитала, но и оказывает на него обратное воздействие. После краткой характеристики различных потоков капитала автор обращает внимание на два основных фактора «причудливых» движений капитала в будущем, представляющих угрозу международной системе: 1. международная позиция США, 2. будущее международной ликвидности в связи с накоплением т. н. «нефтедолларов».

Неистраченный излишек стран ОПЕК в 1980 г. повысил международную ликвидность почти на 110 млрд. долларов, и до 1985 г. неистраченные «нефтедоллары» возрастут, по всей вероятности, до суммы 400—500 млрд. долларов. По мнению автора, международная валютная система, базирующаяся на долларе, не сможет справиться с излишней ликвидностью таких размеров, поэтому неизбежно кардинальное изменение международной валютной системы в течение ближайших 3—5 лет.

Автор указывает на ряд возможных решений. При изменившейся цене золота автор считает возможным возвращение в общих чертах к старой системе Бреттон-Вудса, однако роль резервной валюты будет играть не только доллар, но и другие валюты при ограничесннои конвертируемости в золото.

Автор считает возможным введение и такой международной или национальной валютной единицы с золотым обеспечением, или без него, которая «заменит» (поглотит, конвертирует) появляющиеся на рынке лишние доллары.

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I. NYIRI

GOLD – GOLD PRICE – CURRENCY RESERVES

By the early seventies gold ceased to function as money. It seemed as if the many thousand years old history of gold money came to an end. In conformity with her interests, the USA has done everything in order to demonetize gold. In spite of this, gold has gradually strengthened its positions in international financial relations. The sudden rise in gold price in 1979–1980 gave a big push to this remonetization tendency. The rise in price can be explained basically with the special nature of gold mining, with the rising costs of extraction and with the chronic excess demand for gold. Also the gloomy prospects of the development of world economy, the growing balance-of-payments imbalances, the again double-digit inflation and, in consequence, the flight from paper money as well as increasing speculative activities all help push up the price of gold. A weighing up of the factors influencing the world economic role and price trend of gold makes it likely that in the next period the price of gold will rise amidst considerable fluctuations.

Marxian economics define gold as a special money-commodity, that had emerged from the world of commodities. The development of capitalism and its turning into monopoly capitalism saw the establishment of the money functions of gold. State monopoly capitalism, in turn, is the period when these functions gradually wane in importance and at last cease to exist. In spite of this, gold today attracts greater attention than ever in the past half century. Central and commercial banks, investors and stock-holders, economists, and the general public show a growing concern about it.

Hungarian and international economic literature abound in publications that deal with the "bygone" role of gold, but works studying gold as an integrated part of todays structure of world economy number but a few. Most publications describe what gold is *not,* though forward-looking insights should concentrate on what gold *has become.* Nor does the present analysis try to give a full answer, first of all because the changes and processes in question are still in progress, so that we have no distinct view of the events as yet, which would make it possible for us to deduct any general rules or laws from the developments in the role played by gold in today's world economy. Nevertheless, it is worth trying to give gold a more detailed, many-sided analysis which might reveal the new features of gold's national and international role.

Gold after Bretton-Woods

The term "after Bretton-Woods" is applied to the period following August 1971. That was the time when the President of the United States declared the convertibility of the dollar to gold suspended. This event, one may say, marked the end of gold being a

money-commodity in the classical sense, a function it had fulfilled for centuries. Two of the money functions of gold (medium of exchange and measure of value) discussed in detail also in Hungarian literature [1], had ceased to act as such before World War II. Consequently, it came to be used less widely as means of payment, too. Still, gold could be partly used to settle payments in international economic relations from the end of the 30s till 1971.

Thus, gold had long ceased to be money of full value. Three of the five functions, analysed by Marx in detail, are no longer characteristic of the yellow metal. However, it kept its features in fields where it cannot be replaced by anything, the least by notes of no intrinsic value. Gold is the most important medium of hoarding even today, and is becoming more and more that. This needs no proving. Just think of the permanent imbalance between supply and demand that has recently manifested itself on the gold markets.* For many years now demand has been exceeding supply. It is quite understandable if we consider the uncertainty around currencies that has been growing stronger and stronger in recent years. This – sometimes panicky – flight from national currencies amplifies the possibility (artificially kept back in the 50s and 60s) of gold to function as world money. Now this possibility is given more stress by the re-emerging function of gold as a measure of value. It is enough to think of the comparisons made between the changes in the price of oil and of raw materials, and the exchange rate of certain currencies.

It was the development of the world economic order that had made gold a money commodity, a universal equivalent of intrinsic value. Not only has the social structure of world economy changed in the last 60 or more years, but the capitalist mode of production has also gone through some fundamental changes. It is clear that in situations like this a factor of the economy will also be modified in its role. Naturally, as gold finds itself surrounded by new economic circumstances, it will not behave the way it did previously. Development of the price of gold was the most evident of all the new effects, and it also gave rise to serious debates. It is worth having a closer look at the problem of the gold price, because it can give an answer to several questions raised recently in connection with the yellow metal.

Gold price and law of value

Let us start with having a look at what happened. After two devaluations of the dollar and the suspension of the gold-exchange standard, the free market price of gold rose abruptly to a soaring level. It went on clearing all the "psychological hurdless" set up by "experts". At the beginning of 1972 it reached the $50 barrier, and less than a year

*On the auctions of IMF, 6 February, 1980, 440.000 oz of gold were sold at a price level of $712 an ounce. Demand was keen even at such a high price. Would-be buyers made offers for a quantity five times larger than the available amounts.

after it rose to a hundred dollars an ounce. Following a period of relatively small price fluctuations, in 1979 the maximum daily rate of the London market first surpassed $350 an ounce, later $500 an ounce, and a few weeks after in January 1980 it passed $850. At the beginning of 1981 it dropped, and seems to stabilize around $500/ounce.

Table 1

Movement of the gold price between 1971–1979
(yearly average prices)

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979
$/oz	41.1	58.2	96.3	159.4	161.1	125.3	147.8	194.2	304.4

Source: Daily medium rates of the London gold market. The table does not reflect the actual prices used at each deal. Not knowing these prices, it was not possible to calculate a weighted price-average.

This table reflects besides gold prices the processes that took place in the world economy during the period examined. Quickest rises in gold price came in 1974 and 1979. It was in these years that the world price of oil rose most sharply, increasing the uncertainty about the future of energy production and consumption. Going through the table, for each year we can find the world economic basis of the rise or fall in gold price, or we can find explanation for it in the international monetary and financial sphere.

Another interesting conclusion can also be drawn from the above figures. Considering the nine years shown the average gold price is around $143 an ounce. This price roughly corresponds to the 1975 price, which was said to be realistic. This hypothesis was at that time a subject debated in literature [2]. Let us examine the question of gold price from the side of production, too. This method must give a reliable guidance to understanding the price movements, which, of course, can be considerably modified by other factors as well. For an economist, gold is a commodity, whose price must be determined by average social production costs. This basic situation is immediately altered in the sphere of production, since gold producers are in a monopolistic position, they charge a monopolistic price for their product, a mining product in this case. Accordingly, the ceiling for mine rent, realized through a monopoly product, and for gold price is to be found on the side of demand. Gold price will keep on rising as long as customers are around. Once there are no customers, the price rise will stop, barring the rise in extra profits.

On the other hand, price-pushing factors on the side of demand affect production, because a high market price makes production profitable in less workable mines. This market reaction results in opening up new mines, as more and more mines will be deemed profitably workable. In the last year a number of mines were opened and re-opened among others in Romania, Czechoslovakia and Yugoslavia. Thus, production costs are

increased by two things. The first is world-wide inflation, whose effects are felt in all economies, including gold-producing countries as well. The second is the upward trend of production costs of mines opened under the influence of market trends. The following table shows the rise in production costs of South African gold mines comparing 1971 and 1979.

Table 2

Production costs of South African gold mines between 1971–79
($/ounce)

Name of the mine	1971	1979
Union Corp. Group:		
Grootvlei	30.6	145
St. Helena	17.0	94
Leslie	30.4	158
Gen. Mining Group:		
Stilfontein*	38.6	173
Buffelsfontein*	30.4	157
Angloval Group:		
Loraine	38.7	289
West Land Cons. Group*	69.6	600

Source: BIKI 1974/3 p. 115; Wirtschaft 17. 5. 1979; Financial Times 12. 6. 1979.

*Considerable uranium production is going on too.

The picture is not complete without mentioning that production costs of gold in South Africa have more than doubled in the last 3 years (1977–79). The figures shown above offer several theoretical methods for fixing the price of gold. On basis of the maximum price of $600 an ounce, we can say that until the gold mined at a production cost of $600 an ounce can find customers, the gold price will be around this figure. If nobody will be interested in buying gold mined at such a high cost of production, i.e. if the gold price will sink below this level, the mine in question is to be closed unless support comes from government or other sources.

Another method of price fixing might be the following. As a starting point, let us assume that the production costs in 1971 could be fitted into the free market price of $45 an ounce, that had been prevailing in the second half of that year. Supposing that production costs and free market price are in direct proportion, free market prices at the beginning of 1980 would have to be somewhere around $387 an ounce, if this price were determined solely by the production costs of South African gold mines. But we all know that this is not the case. South Africa gives a "mere" 75% of the gold produced in the capitalist world. The rest is mined in the USA, Canada, Australia and other countries of

South America, Africa and Asia. Conditions of gold mining in these countries are much worse than in South Africa. While one tonne of rock in South African mines contains 15–35 grs of gold on average, Canadian mines have 7–9 grs, Australians 5–10 grs of pure gold in one tonne of rock.* This, of course, significantly pushes up production costs. As a matter of fact, the countries mentioned are the most important gold producers beside the South African Republic. Average production cost in other gold-producing countries is, without exception, above $500 an ounce, which, even as an average price, is quite close to the free market price.

Price explosion and gold price

Apart from the princing methods given above, it is worth trying another, probably workable solution. The most important feature of the changes in world economy since the early 70s has been the explosion of price levels, and drastic shifts in relative price proportions. It is against this changing background of world economy that we have to find the proper place of gold, its new role and price. If we consider gold to be just one of the metals, then the 15–16-fold price increase observed since 1934 – when the gold price was fixed at $35 an ounce – can hardly be called excessive when compared to the rise in the prices of some important metals. During the last 47 years the price of copper has increased 45-fold, of lead 48-fold, of tin 33-fold and the price of silver has increased as much as 150-fold! The difference between the rise in gold price and in the price of these metals lies partly in the degree of the increase, and partly in the fact that while the gold price had been kept down artificially at a low level between 1934 and 1971 the price of other metals had been able to follow freely the market movements.

To approach the question from yet another point of view, if we think of gold as a raw material, and connect it with the average increase in raw material prices observed since 1931, then, on the basis of the Reuter raw material price index, we can say that the free market gold price at $600 an ounce is quite moderate, in view of the rise in the price of raw materials since 1931 – that is, a 17-fold increase on average.**

Factors influencing the gold price

Reference has been made in what has gone before to the irregularity of the world economic processes that took place in the early 70s. The most characteristic feature of the economic recession which came from the developed industrial countries and spread all over the world, is the continuous rise in prices, accompanied by a rather low growth rate

* With the current gold price new mines were opened where this proportion is even less, i.e. 1,5–3 grs of pure gold per tonne of rock.

**Reuter price index for raw materials 9.3. 1981; 1724,8% Világgazdaság, 12.3. 1981 p. 4

of the economy. The term "price revolution" sprang forth from history books and came to be a household word. In the 16–17th centuries the price level in Europe had greatly advanced in 125 years (by 550%) – mainly because of the silver and gold pouring in from America. [3] In our century a mere 40 years were enough to produce the same rise in price level in comparison with the level of 1931.

This comparison attempts to demonstrate the revolutionary character of today's economic processes. In these changes – which can be aptly termed as "price revolution" – each factor of the economic life obeys several new, as yet little known, laws. Economists experience it day by day. Gold is no exception from this. Let us then examine a few circumstances, and try to find out to what extent they affect the movements in the free market price of gold.

In trade, supply has a decisive role in the movements of price. The past half a year's market was characterized by falling prices and narrow supply. People interested in the gold business are becoming ever more aware of the fact suggested by the International Gold Board's recent study, that more than 60% of the gold deposits on earth have already been mined. The quantity extracted (estimated to be about 90.000 tons) has come from the more workable mines. In order to get the rest, considerable additional investment will be needed, i.e. it will lead to further increases in gold price and to a mounting pressure of demand. The study seems to be supported by the fact that recently the leading gold producers have sold less gold than ever in the near past. This might be explained mainly by a decline in extraction. On the other hand, speculative sales of gold have increased.

Table 3

Gold production and consumption between 1977–1980

(in tonnes)

	1977	1978	1979	1980*
Supply				
Production	970	970	1000	990
Sales by the USSR	401	400	270	115
Sales by the USA	–	126	310	–
Sales by the IMF	175	182	170	–
Other	61	52	50	50
Total	1607	1730	1800	1155
Demand				
Jewel industry	979	1000	900	550
Industry	272	275	275	205
Investments, speculation	356	455	625	400
Total	1607	1730	1800	1155

*estimates.

Source: Les Echos, 19.6. 1979; Világgazdaság 3.7. 1979.

The table shows a state of equilibrium, in which demand and supply seem to meet each other. Still, events of the gold market in the last two years have certainly been different. The equilibrium described above evolved against a background of chronic excessive demand. Even a gold price risen to threefold in 1979 was unable to curb demand.

Gold buyers – including the general public – all know that the supply of the yellow metal will be shorter in the course of years, so no matter how high the price they are paying, they will get more for it at a later time of selling than the price they bought the gold at. No wonder that in February, 1980 18-carat jewellery has temporarily disappeared from the jewellery shops of many countries, yielding their place to 14-carat jewels or to those containing even less gold.This clearly shows how the rush of hoarding has spread out to the public and how people flee from paper money. Thus demand factors of the gold market unambiguously suggest a high, or probably even rising gold price.

World economic prospects also foretell a rising gold price. Balances of payments of developed and developing countries will go deeper into the red, mostly because of growing energy costs. Accordingly, the OPEC countries' current balance-of-payments surplus in 1980 is close to $100.000 million, 50% up from 1979. Part of this sum, of course, can be counted on as a constant factor of demand for gold. Inflation makes a growing number of businessmen of developed industrial countries turn towards gold, a commodity that seems to be able to help wealth through economic shocks.

For such reasons, also more and more middle and large-scale traders of OPEC countries come to gold markets, ever spurring the anyway rising gold price. Eminent place among them is occupied by investors from Saudi Arabia, Kuwait and the Arab Emirates, which are hoarding the unused part of their huge oil proceeds in gold. Their aim is partly speculation, and partly to protect themselves against the losses incurred by depreciating paper moneys – dollar, first of all.* Their large capital ensures success, since periodically falling prices do not force them into selling. Thus, prices are not encouraged in falling by a flight from gold. If you have gold, you can be sure of success.

It seems that the latter statement became the slogan of not only private investors, but also of central banks in leading industrial countries, for they try to keep a bigger part of their currency reserves in gold.

Currency reserves and gold

When in the middle of the 60s, the Banque de France began to draw the dollar reserves accumulated in his hands in gold from the Federal Reserve System, it took a right, economically justifiable step. It was the relative weakness of the French economy

*The author of the present article is convinced that the strengthening of the US dollar in 1980/81 is a temporary phenomenon and the fall of the dollar will be harder and deeper than it happened in 1971 and 1973.

that did not permit full success. Much of the gold reserves amassed was used to ease the country's troubled economy, and to keep the balance of payments in equilibrium. However, it makes no difference to the fact that the French had realized the drawbacks of the Bretton Woods system and the possible development alternatives of the international monetary system already in the 60s. Notable contribution was made to it by Professor Rueff, who for decades had been trying to convince economists of the impossibility of a currency system without gold. Certain countries may take – for some time seemingly successful – steps to demonetize gold, but they will not be able to eliminate it from international monetary settlements.

This is borne out by figures showing that in recent years nearly all countries have made efforts to store a bigger share of their currency reserves in gold, as far as their possibilities allowed. Between 1971 and 1979 gold's share in the reserves of developed capitalist countries jumped from 30% to 63%. This shift was accompanied by a slight decrease in the gold reserves in a physical sense.* Under the advance of gold's share to two thirds there lies the revaluation of official reserves at free market gold price. The events seem to follow the suppositions of the outstanding Dutch monetarist Mr. *Posthuma,* who as a precondition of creating a new, more stable international monetary system pointed to gold's increasing role in international liquidity. Considering gold reserves re-priced at the $400 an ounce price in October, 1979, the proportion of gold in the currency reserves of some countries developed in the following way.

Table 4

Gold's share in the currency reserves of some countries of the world
(per cent)

Industrial countries	63%
of which	
USA	91%
Canada	75%
Switzerland	72%
France	70%
Italy	62%
Federal Republic of Germany	46%
United Kingdom	34%
Japan	30%
Developing countries	24%
OPEC countries	21%

Source: Gold and the Structure of International Reserves, Morgan Grenfell & Co. Ltd. October, 1979.

*A decrease in physical sense in the first half of the period examined and a considerable rise at its end – as regards both rate and volume.

To consider the free market gold price instead of the official price at $42.2 an ounce offers two advantages. Gold's role in the reserves of developed countries becomes more stressed, and, together with a rocketing gold price, the liquidity of these countries also increases vastly.

In the late 60s and early 70s foreign debts of many leading capitalist countries – of the USA, in the first place – were well, sometimes many times above the total currency reserves of these countries. But the rise in the price of gold in 1979–80 considerably narrowed this gap. The current gold reserves of the United States, which are as much as 8300 t, can, at a price level of $ 903 an ounce, cover all the public and private debt accumulated in the past decades in the USA. Now we face a paradoxical situation: to preserve at least part of gold's role we had to demonetize it. This opened the way to a rise in the price of gold, to its growing importance in currency reserves, and to a possible remonetization of it at some later time.

Conclusions

Though events in the past decade did much to demonetize gold, this did not lead to the elimination of gold's outstanding role, as many had believed and tried to prove or reason. The profound changes in world economic setting went hand in hand with changes in certain factors and forms of movements and behaviour in the economy. This applies to gold as well. It has lost some of its functions, but others have strengthened disproportionately.

As far as the movements in gold price are concerned, we cannot preclude the possibility of a four-digit price per ounce of the yellow metal in years to come. This is supported by increasing costs of gold production, and by the self-generating process when high gold price makes unexploited deposits profitable, but new mines with higher production costs push the gold price further up. By now many a mine the world over operates with production costs adjusted to the present high market price.

Demand also gives ground to presume a further increasing gold price, since production shows a more and more distinct downward trend. Geological findings also bear this out. However, on the side of demand there can be found a strong increase, even with speculation filtered out. When compared to supply possibilities, the capacity of the market to absorb gold is, we can say, boundless. We should not forget at the same time that the above discussed tendencies – as economic laws in general – assert themselves in the long run, while temporarily also opposed tendencies may come to the fore.

Neither is it just by chance that even central banks of the industrialized countries are so attracted to gold, and that gold reserves are re-priced and appreciated at current market price. That gold's role in reserves has become more important is a direct consequence of the gloomy world economic prospects and of the liquidity problems that emerged in the mid-70s even in developed countries. The latter in turn may foreshadow and at the same time induce the revival of classic money functions that have so many times been declared gone.

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ЗОЛОТО, ЦЕНА НА ЗОЛОТО, ВАЛЮТНЫЕ РЕЗЕРВЫ

И. НЬИРИ

Марксисткое экономическое учение определяет золото как денежный товар, выдвинувшийся из товарного мира. Денежные функции золота развились в полной мере во время образования капитализма и его перерастания в монополистический капитализм. В период же государственно-монополистического капитализма происходит постепенное оттеснение денежных функций золота на заданий план, а затем и их отмирание. Несмотря на это, золото привлекает сегодня большее внимание, чем когда-либо за последние полсотни лет. Оно привлекает внимание центральных и коммерческих банков, капиталистических предпринимателей, экономистов-теоретиков, а также обширный круг общественности.

Золото постепенно укрепляло свои позиции в области международных финансовыз отношений. В течение 1979—1980 гг. неожиданное резкое повышение цены золота дало значительный толчок тенденции к «ремонетизации». Повышение цен объясняется в основном специфическим характером (особенностями) добычи золота, ростом производственных издержек, а также хроническим превышением спроса на золото над его предложением. Неблагоприятные перспективы для развития мировой экономики, неуравновешенность платежных балансов, рост инфляции, темп которой вновь достиг двухзначных цифр, и, как следствие этого, — бегство от бумажных денег, а также усиление спекуляции — все это также способствует повышению цены золота. Анализ роли золота в мировой экомике и влияющих на его факторов дает основание предположить, что в предстоящий период цена на золото будет расти, хотя и при значительных колебаниях.

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F. MOLNÁR

CONSUMERS' INVESTMENT VERSUS CAPITAL INVESTMENT

(A contribution to the theory of contemporary business fluctuations)

"Experience alone can decide on truth"
(Einstein)

Developing the ideas presented in some of his earlier publications, the author analyzes the role of fixed capital investment in the development of capitalist economy, especially in business fluctuations, contrasting this role with that of consumers' investment.

As a beginning, he gives a short review of the position of marxist respective bourgeois economics, regarding the role of fixed capital investment. On the basis of statistical evidence he draws the conclusion that both in the phase of an unfolding recession and at the beginning of a recovery the main driving force of economic change is consumers' investment and not business fixed investment.

Arguing against the theses of some Hungarian economists, he states that any realistic theory of contemporary business fluctuations has to combine the decisive role of profit changes in the ups and downs of business in a capitalist economy with the facts of life. The combining link is *Kalecki*'s profit equation in its general from. This explains how profit changes can be severed from those in fixed investment; how a recession can develop and a recovery start without a drop respectively a rise in business fixed investment. Namely: changes in profits at the turning point reflect first of all changes in overspending (saving) of wage earners on the one hand and the changes in government domestic deficit on the other hand; showing a drop at the beginning of a recession and turning upwards again at the start of a recovery.

Ragnar *Frisch,* who shared the first Nobel Prize in economics with Jan *Tinbergen,* was of the opinion already half a century ago in a situation characterized by the recent foundation of the Econometric Society that economics was in some sense moving in the direction of becoming an experimental science. (See: [14]) In spite of this we meet even nowadays with widely accepted theorems which, although logical and consistent, yet, contradict our experience.

I am convinced that presently economics constitutes a real-science and I agree with the opinion according to which a system of ideas can be called an economic theory explaining reality only, if it satisfies the definition of a real-science theory, according to which it is: a systematic description of the essential interrelations between the variables of reality, that is . . . theorems and propositions (deduced from assumptions not in

conflict with reality) which describe the real world more or less accurately." ([22] pp. 9–11)

I do not, indeed, regard the views presented in this short study a system of ideas, but I do hope that they can contribute to the elimination of conflict between theory and experience in the field studied here, and its readers will increase the number of those, ". . . who, following their intuitions, have preferred to see the truth obscurely and imperfectly rather than to maintain error, reached indeed with clearness and consistency and by easy logic, but on hypotheses inappropriate to the facts." ([20] p. 371)

The story of an idea in a nutshell

I consider it opportune to make the reader familiar with the long road leading to the formation of the ensemble of views to be presented on the following pages.

I have to go rather far back in time. In 1962, while working on my dissertation for the degree candidate of science*, I found the statistics of US economic development in the one and a half decade following World War II showing that the share of purchases of consumer durables and residential construction (for the group formed by these two items I coined the term: consumers' investment) increased considerably within total demand (GNP). As I also observed in the movement of this group a certain cyclicality which, however, did not coincide in time with the cyclicality of fixed business capital investment, I took the courage to state that "Their increased importance creates a second material basis for the periodicity of crises," adding, however, that this ". . . is not meant to equate qualitatively the importance of fixed capital investment, and consumers' investments as regards their role in the reproduction cycle." ([24] pp. 34–38 and 235) When in two of my later articles I could follow up the statistical analysis to 1973 ([27 and [28]), I felt my idea gathered strength. Even more, my conviction about the outstanding importance of consumer investment became an essential element in formulating my standpoint which stated that ". . . At present the process of capitalist reproduction need not necessarily be cyclical and is, in fact, not cyclical . . ." ([26] p. 376).** At that time this standpoint brought about a lively discussion and also some arguments, serious and worth to consider, were raised against it. ([11])

Studying the development of the most severe recession of the post-World War II period – that of 1974–75 – I could state with firm conviction on the basis of the statistical evidence that ". . . the recession was first of all brought about by the sharp decrease in consumers' investment and not by the fall of business fixed investment." ([25] p. 184)

*The equivalent of a Ph. D. in the USA.

**Namely, I was, and still am, of the opinion that „. . . by a cyclical movement . . . We mean also that there is some recognizable degree of regularity in the time sequence and duration of the upward and downward movements." ([20] p. 314)

More and more convinced though I became that the widely expressed views about the role of investment in the mechanism of recessions and business fluctuations were somehow not quite O. K., I was unable to fit the knowledge based on factual experience into the theoretical framework comprising the relationships of profit, investment and business fluctuation held to be firm also by myself.

Considering at least the substance and role of profit, the work of P. *Erdős* published in 1966 [3], first of all Chapter 23, opened up completely new and forward looking insights. Since, however, in this pathbreaking work the essential relationships were elaborated on a highly abstract level, I was still unable to find it possible to link the facts of reality directly with established theorems.

The essential link to solving this task was provided by making myself familiar with *Kalecki's* profit and business cycle theory. We could first read the relationships based on this profit theory in Hungarian in P. Erdős's second book ([5]) It is, however, regrettable that while in Kalecki's original article – written in 1933 (!) – ([17] pp. 78 and 81) the reader only had to turn a page to arrive from the abstract at the general profit equation, Hungarian economists reading only their mother tongue had to wait ten years to "travel this distance". (P. Erdős's second book was published in 1976)

Now I "only" had to fill the general model of Kalecki with the data of actual statistics. After having developed a method together with P. Erdős (see: [8]) of doing exactly this, it became possible to analyse in this theoretical framework: what were in reality the relationships between profits and their components – first of all investment and the specific profit components whose ensemble we named paper profit – on the one hand and the movement of business fluctuations on the other. We did elaborate these relationships by analysing the movements in the most advanced capitalist economy, that of the United States, during the 1968–1979 period. ([6] and [7]).

Only all this together rendered it possible for me to draw the conclusions I will attempt on the following pages to present as a consistent ensemble of views.

I was strengthened in my conviction also by the circumstance that the noted (Hungarian-born) American economist, George *Katona* in two of his recent articles ([18] and [19]) expressed views similar to mine concerning the important role of consumer investment. I was also encouraged by a standpoint coming from the practical world of business, published in a report of a leading New York bank. As a concluding chord to this development history of my idea I would like to quote this one *verbatim:* "Stripping capital spending of the mystique that has long surrounded it is no easy task. It requires, to begin with, a recognition that demand for capital goods is derived from the demand for final goods and services. No rational manager is going to commit resources for expansion when the utilization of his existing plant capacity is low and prospects for closing the gap are uncertain. And from this proposition it follows that capital spending – far from being the mysterious source of dynamism – is in fact the product, not the cause, of the growth of consumer outlays." ([32] p. 3)

Definitions, notations

In order to avoid possible misunderstandings in the course of the following argumentation, I present here the definitions and notations of the most important categories used.

Gross National Product. Identical with the same notion as used in the National Income and Product Accounts of the United States (further referred to as NIPA). Yearly data exclude imputations (NIPA Table 8.3 Line 3) Notation: *GNP.*

Consumption. Identical with NIPA item 'Personal consumption expenditures', excluding imputations (Table 8.3 Line 6). It comprises consumer outlays on 1 non durable goods, 2 durable goods, 3 services and 4 purchases of owner-occupied dwellings (Table 8.3 Lines 80, 81) This item is regarded to be equal to Department II within GNP.* Notation: C.

Consumers' investment. The sum of components 2 and 4 in C. Notation: *CI.*

Other consumption. The sum of components 1 and 3 in C. Notation: *CO.*

Capitalists' consumption. Accurately: consumption of non-wage and salary earners, i.e. outlays covered from this type of income and destined to purchase C components. (For method of its estimation see: [8] p. 292–295). Notation: *Cc.*

Wage (accurately: wage and salary) *earners' consumption.* Outlays from this type of income and destined to purchase C components. Notation: *Cw.*

Of course: $C = CI + CO = Cc + Cw$.

Investment. Identical with NIPA category 'Gross private domestic investment', excluding imputations (Table 8.3 Line 9) Comprises busines fixed investment plus the change in business inventories. Notation: *I.*

Fixed capital investment. Comprises business fixed nonresidential investment plus residential investment in rental dwellings. This item is regarded to be equal to Department I within GNP.** Notation: *IF.*

Inventory investment. Identical with NIPA category 'Change in business inventories'. Notation: *II.* Of course: $I = IF + II$.

OF course: $I = IF + II$.

Net exports. Identical with NIPA category 'Net exports of goods and services'. In other words: foreign trade balance (surplus or deficit). Notation: *X.*

Government purchases. Identical with NIPA category 'Government purchases of goods and services', excluding imputations. (Table 8.3 Line 12) This item is regarded as Department III. within GNP; i.e. the military sector, although I am fully aware that it comprises not only military goods and services but everything governments purchase: from ICBM-s thorugh bureaucrats' ink to schools and hospitals. It might be, perhaps, more properly termed government sector. Notation: *G.*

*This assumption had to be made since the production of dept. II cannot be calculated. This, however, does not hinder the elaboration of essential relationships.

**I was compelled to do so by the same circumstance as mentioned in connection with Dept. I.

In the NIPA system $C + I + X + G = GNP$. The three departments $(C + IF + G)$, however, do not add up to GNP, their sum is less than that by the sum of $II + X$. Since, however, these two latter items make up only about 2–3 percents of GNP, they can be neglected when analysing the movements and relations of the three Departments and *GNP*.

Profits. Gross after-tax profits (i.e. it includes capital consumption) in other words: the spendable income of non-wage (and salary) earners. (Persons, corporate and non corporate business firms) This is identical with Kalecki's profit category of the "general case" ([17] p. 82), and as far as its practical computation and substance is concerned with that used in the works already mentioned by P. Erdős and myself ([6], [7], [8] and [9]). Notation: *P*.

Capital consumption. Identical with NIPA category 'Capital consumption allowances', excluding imputations (Table 8.3 Line 15). Notation: *CCA*.

Net profits. Equals: $P - CCA$. Notation: *Pn*

Material profit. The part of profit comprising investment and capitalists' consumption. Notation: *Pm*. Hence $Pm = I + Cc$.

Paper profit. The part of any given period's profits not used up as investment and capitalists' consumption in the same period, and hence present in the hands of capitalists at the end of that period in the form of "paper" (cash, deposits, securities, foreign exchange, etc.). Concerning its origin and substance see details in: [10] pp. 3–8. Notation: *Pp*.

The components of paper profit:

Net exports (See under that heading)

Government deficit. Identical with NIPA category 'Government deficit on national income and product account' minus 'Government transfer payments to foreigners' and 'government net interest paid to foreigners'. It might be also called domestic deficit. Notation: *D*.

Overspending of wage (and salary) *earners.* The surplus of consumption outlays by wage earners *(Cw)* over and above their spendable income. Of course, they can have a saving as well, which diminishes profits with its own amount. (For the method of its estimation see [8] pp. 292–295) Notation: *Ow*.

Because of statistical reasons there is also a part of paper profit called statistical discrepancy, identical with that category of NIPA which, however, as it does not constitute an economic category can be neglected in our analysis.

Thus: $Pp = X + D + Ow$ and of course: $P = I + Cc + X + D + Ow = Pm + Pp$.

A few numerical relationships worth to consider

Theoretical theses logically consistent but in disagreement with experience are often constructed because statistical facts describing basic proportions, relationships of the economy are left out of consideration. In order to avoid this, I present here a few

such important relationships. Our data relate to the US economy.* This country can serve, due to its well known characteristics, for the researcher of contemporary capitalism in the same capacity as did the English economy of his time for Marx.

First of all let us have a look at the proportions of the three departments within GNP.

Table 1

Department shares in GNP

(Percentages)

Dept	Year								
	1929	1933	1943	1953	1955	1968	1972	1975	1978
I.	13.0	5.4	3.0	10.5	10.9	11.8	11.9	11.2	12.3
II.	74.9	80.8	49.5	65.3	67.0	62.5	64.3	64.2	64.9
III.	9.1	16.2	49.0	23.9	19.9	24.5	23.2	23.9	22.1

Next we are going to consider the "power relations" of "the parties to the case" indicated in the title of this article.

Table 2

Proportions of consumers' investment to fixed capital investment

(Based on current dollar data, the amount of *IF* equals 1.0)

Year	1929	1933	1943	1955	1972	1975	1978
Proportion	0.92	1.44	1.37	1.48	1.18	1.13	1.19

The data of the following table present information about the relative magnitudes of *GNP, profits* (P) and the most important component of paper profit, that of *government deficit (D).*

*The sources of the data are here and throughout this paper – if not stated otherwise – the official publications of the US Department of Commerce: The National Income and Product Accounts of the United States 1929–74. Statistical Tables US Department of Commerce (Bureau of Economic Analysis), GPO, Washington, D. C. 1976. (for the period 1929–72). Survey of Current Business; July 1976 (for the year 1973), July 1977 (for 1974), July 1978 (for 1975), and July 1979 (for the period 1976–78), and our own computations and estimates based on the above publications.

Table 3

Relationships of GNP, P and D

(Based on current dollar data)*

Item	Year								
	1929	1933	1934	1969	1970	1973	1974	1975	1978
P/GNP percentage	31.7	21.5	24.5	20.1	19.4	19.8	18.2	19.4	19.6
D/GNP percentage	−1.0	2.5	3.7	−1.6	0.7	−1.1	−0.3	4.0	−0.6
D/P percentage	−3.0	11.7	14.9	−7.8	3.5	−5.3	−1.8	20.9	−3.2
D/Pp percentage	−4.0	25.0	25.5	−12.8	6.1	−8.9	3.5	41.2	−5.9

*Negative figures indicate a government surplus.

It is worth mentioning that at cyclical turning points quarterly data show even more astonishing values. For example in the second quarter of 1975 government deficit was the source of profits to the extent of 31.5 per cent, and of net profits to the extent of 60 (!) per cent.

The next set of data gives information about the proportions of gross and net fixed capital investment.

Table 4

Net fixed capital investment as a percentage of gross fixed capital investment

(Based on current dollar data)

Year	1929	1933	1947	1958	1966	1973	1975	1978
Percentage	33.3	−137.0	41.8	15.6	40.6	36.5	14.7	26.6

It seems worth to add that in all recessions of the post World War II period *expanded reproduction* and *accumulation* (in the Marxist sense), *were separated from each other,* since the volume* of fixed capital showed an increase even during the production declines accompanying each and every recession.

Some information about the depth and extent of recessions:

*Volume refers to amounts expressed in 1972 dollars.

Table 5
Percentage drops of real GNP in individual recessions
(Based on 1972 dollar data)

Period	Percentage
1929–33	29.4
1937–38	4.1
1944–47	17.4
1948. 4.–1949. 2.	1.4
1953. 2.–1954. 2.	3.3
1957. 3.–1958. 1.	3.2
1960. 1.–1960. 4.	1.2
1969. 3.–1970. 4.	1.1
1973. 4.–1975. 1.	5.7

Post-World War II recessions, – even the most severe one, that of 1974–75 – involved only a relatively narrow sector, – about a quarter –, of total demand (GNP). Business fluctuations took place only in the demand groups of investment and consumers' investment. The share of these in GNP was 27 per cent at the peak of 1973 and 20 per cent at the trough of the recession. On the other hand, the drop of this group equalled 125.3 per cent of the overall decrement of GNP during the recession. From this it follows, of course, that there were demand groups, which showed an increase even during the recession. And indeed, an other part of total demand – and regarding its share the biggest one (almost two thirds of GNP) – showed practically no cyclical movements at all but displayed an upward trend. This demand group comprises other consumption, and state and local government purchases. In the 1974–75 recession the increase in this group compensated for the drop of the one mentioned above to the extent of 12.3 per cent. The third group which is not cyclical either but can be termed irregular (making up about 10 per cent of GNP) includes the purchases of the Federal Government and net exports. This undergoes considerable fluctuations, the causes of which are, however, often of a non-economic character (e.g. war expenses). In the recession of 1974–75 the expansion of this demand group compensated for the drop in the cyclical one to the extent of 13 per cent.

Our research together with P. Erdős could establish that also within profits groups with character practically identical to those mentioned above are observable and the third of these groups shows explicitly anticyclical movements ([10] pp. 10–14). Within profits it is again the trendlike moving group which is overwhelming (capitalists' consumption plus capital consumption.) At cyclical turning points, however, the anticyclical group

(government deficit plus net exports) becomes a decisive factor of profit changes. Thus, for example, at the cyclical turning point of 1975 already mentioned, net profits originated in this group of profit components to the extent of more than 75 per cent.

I do not want to comment now on the statistical facts presented on the previous pages. I intend to use them during my later argument. Here and now I only would like to ask the reader to ponder over them and compare them with his preformed picture – based, may be, on ideas imbibed at the university – regarding the structure of the contemporary capitalist economy.

A dogma of economics which flies in the face of experience

It is a generally accepted tenet (one can even say a dogma) of both Marxist and bourgeois economics that short-term changes of the economy – i.e. *business fluctuations*, the movements of the reproduction cycle – are determined by the movement of investment, more precisely by that *of fixed capital investment.*

Let us consider typical manifestations of this dogma! First of all let us see the opinion expressed in the most widely used textbook of contemporary bourgeois economics, in Nobel prize-winner professor Samuelson's "Economics", which during the last three decades was published in no less than ten editions and some years ago translated also into Hungarian. In its chapter on income determination we read: "An increase in private investment will cause income and employment to expand; a decrease in investment will cause them to contract." ([30] p. 228) And later on: "It is dynamic investment that pumps national income up and down . . . Income rises and falls with changes in investment." (Ibid. p. 231) And summing up: "Investment calls the tune." (Ibid. p. 232)

It is worth mentioning that Samuelson's opinion, as far as the role of investment is concerned, has through the years undergone a change in the sense of becoming more elastic. This is revealed when one compares the first paragraphs of the chapters on income determination in the 7th (1976) and the 10th (1976) editions of his "Economics". 1967: "Economists are agreed that *the* important factor in causing income and employment to fluctuate is investment. Whether we are to face a situation of inflationary bidding up of prices or shall live in a frigid state of mass unemployment depends, as will be seen, upon the level of investment." ([29] p. 211) 1976: "Economists are agreed that *an* important factor in causing income and employment to fluctuate is fluctuation in investment. Whether we are to face a situation of inflationary bidding up of prices or to live in a frigid state of mass unemployment *can* depend, as will be seen, upon the level of investment." ([30] p. 220 Italics mine. F. M.)

In the chapter of the same textbook discussing business cycles we find: "Our first clue to the nature of the business cycle lies, then, in the fact that it is the durable- or capital-goods sectors which show by far the greatest cyclical fluctuations . . . consumption movements seem the effect rather than the cause of the business cycle; in contrast, there is good reason to believe that the movements of *durable* goods represent key causes in a

more fundamental sense." (Ibid. p. 255) And further: "Most economists today . . . In explaining the major cycles . . . place crucial emphasis on fluctuations in *investment* or *capital* goods." (Ibid. p. 259)

Samuelson's theory of the business cycle is essentially a multiplier-accelerator model and hence while stressing the role of investment his argument is not wholly lopsided: ". . . it is necessary to point out that the general business situation definitely reacts in turn on investment . . . Therefore, especially in the short run, investment is in part an *effect* as well as a cause of income movements." (Ibid. p. 260)

The theoretical source of Samuelson's views can be traced back easily to Keynes. He himself demonstrates this by choosing a quotation from Keynes as the motto of the chapter on income determination.

It is declared to be a merit of Keynes, for example, by P. Erdős that ". . . as against the great majority of his followers he especially stressed the insufficiency of the demand for capital goods." ([4] p. 809) The same author also states (in his "Translator's foreword" to the Hungarian edition of "The General Theory") that "Keynes' worldwide success can partly be attributed to the fact that . . . in the form of the volume of investment he pointed at a category of the reproduction complex, the changes of which are, indeed, tightly correlated with capitalist business fluctuations." ([21] p. 14)

Well, let us now turn to Keynes himself. In his *magnum opus* he writes: "The propensity to consume and the rate of new investment determine between them the volume of employment . . ." ([20] p. 30) And since "In a given situation of technique, resources and costs, income (both money-income and real income) depends on the volume of employment." (Ibid. p. 28), we can draw the conclusion – and it was in fact drawn by the editor of the Hungarian edition of "The General Theory' – that ". . . since saving (and consumption) are a more or less constant part of income, investment determines also the amount of income." ([21] p. 84) And Keynes, summarizing his argument: "But an increase (or decrease) in the rate of investment will have to carry with it an increase (or decrease) in the rate of consumption; because the behaviour of the public is, in general, of such a character that they are only willing to widen (or narrow) the gap between their income and their consumption if their income is being increased (or diminished)." ([20] p. 248) Keynes is – as great and original thinkers generally are – less one-sided than his followers. More than once (see for example pp. 98 and 113 of "The General Theory", in [20]) he states explicitly that the exclusive *("pari passu")* employment-increasing – and hence also income-increasing – effect of investment holds only, if there is no change in the propensity to consume. Although he assumes the propensity to consume to be a "fairly stable" function, he goes into a detailed discussion of the objective and subjective factors influencing it, assigning a chapter to each group of factors. In connection with some ideas to be presented later in this article, I would like to stress that among these factors he discusses also the role of changes in government fiscal (tax) policy. (Ibid. pp. 94–95)

Keynes views about investment as an original outlay, which through the working of the multiplier brings about an increase in employment and income was misunderstood by

some among both his followers and opponents. The basis of these misunderstandings was probably that his statements were indeed misunderstandable. Hansen, an outstanding American follower and popularizer of Keynes, defended his master in this respect and – correctly – stated: "Whatever the initial increase in expenditure, whether private or public investment or simply an increase in private-consumption outlays resulting from tax reduction or perhaps for the spending of privately held liquid assets, the effect, as far as the multiplier process is concerned, is the same." ([15] p. 90)

Analysis of the capitalist business cycle takes up no central place in Keynes' main work. He studies this problem only at the end of the book under the heading' "Short notes suggested by the general theory" ([20] Chapter 22) comprising merely 20 pages. Summing up the essentials of Keynes' analysis Hansen stresses among it main features, that "1. The cycle consists primarily of fluctuations in the rate of investment. 2. Fluctuations in the rate of investment are caused mainly by fluctuations in the marginal efficiency of capital." ([15] p. 213) Keynes himself mentions several times the collapse in the marginal efficiency (we might say: profitability) of capital as the cause of crises. ([20] pp. 315–316)

I am going to present now a very short review of Hungarian Marxists' view on the subject, beginning with a quotation from T. *Erdős* (Not to be mixed up with P. Erdős!), who among Hungarian researchers wrote not only most extensively on the subject, but did so also with a claim to a theoretical analysis comprising the problem in a *contemporary* setting as well (See first of all: [13], parts two and three.) Recently he wrote: "The traditional Marxist theory of economic cycles and crises links the cyclical movement of capitalist reproduction to the periodical fluctuation of fixed capital investment and while doing so it does not explain investment fluctuations with the help of some exogenous factor." ([12] p. 5) The same view is expressed by A. *Bródy* in his recently published book: "Since Marx it has been well known that in order to find the basis of the industrial cycle we have to look into the characteristics of fixed capital reproduction, and also Kalecki tried to depict this." ([1] p. 13)

Although Marx did not produce an elaborate, consistent and systematized theory of crisis*, yet this traditional theory is linked to his name, namely to a sentence of his to be found in Volume II. of Capital where, analysing the turnover of capital, he writes that the turnover cycle of fixed capital ". . . furnishes a material basis for the periodic crises." ([23] p. 189)

The above statement, however, does not justify the assumption that Marx regarded the movement of fixed capital investment as the *immediate,* moreover the *exclusive* cause of business fluctuations. So much can be said about him that "more than any other economist he identified cycles with the process of production and operation of additional plant and equipment." ([31] p. 1131)

**Schumpeter,* who among outstanding bourgeois economists – in striking contrast, for example, to Keynes – showed a high esteem for the theoretical achievement of Marx, has called this, and on good grounds, "the great'unwritten chapter' of his work." ([31] p. 1131)

Paradoxically, but logically, the setting up – independently of his predecessor – of Kalecki's profit theorem in its *abstract* form by P. Erdős – although *per se* an outstanding achievement and a great step forward for Hungarian research in the field of the political economy of capitalism – resulted in the strengthening of the investment dogma and led to its unjustified extension to the theory of contemporary capitalist crises. Quite logically, since if we start – correctly – from the tenet that the main motivating force of the movement of a capitalist economy was and remains profit, and the amount of profits is determined on a macroeconomic level by investment and the consumption of capitalists, then assuming – correctly again –, that the latter one is inelastic, we arrive at the conclusion that the former one has a decisive role in the movement of profits. And concerning crisis and cycle theory it follows that both deterioration and improvement of business have to begin with a corresponding change in investment (a drop respectively an increase in both its volume and GNP share). In other words, it is a drop in investment which plunges the capitalist economy into a crisis and it is again an increase of the same which lifts it from the bottom. The same train of thoughts leads to the conclusion that an increase in consumption brings about through a negative feedback effect the deterioration of business; a correct conclusion with the given abstractions, (assuming government expenditures, and wage earners' overspending to be negligible) but proven as completely erroneous when confronted with the reality of contemporary capitalist economy. Recently the same P. Erdős himself, who presented this thesis some fifteeen years ago, had to state: "To our understanding of the mechanism of contemporary crisis . . . the theory outlined (namely, the one attributing to consumption the detrimental role mentioned above. F. M.) can give little guidance." ([4] p. 815)

The standpoint attributing to fixed capital investment a decisive role in business fluctuations was theoretically presented in detail and applied to contemporary capitalism in T. Erdős's book published in 1976. There he states: ". . . the movement of *proportions of production,* concretely those *of departments I and II** . . . has a central role in the crisis mechanism." ([13] p. 95) And he even adds: "This is especially true for the period following World War Two . . ." ([13] p. 95) A decisive element of his theory of crisis is the mutually opposite change in the growth rate of investment *viz.* consumption (graphically presented this means that their curves intersect), since ". . . their movements represent the movements of profit- respectively wage-shares." (Ibid. p. 105) It is apparent (also from his references) that T. Erdős's theoretical standpoint concerning business cycles is based on P. Erdős's profit theory. It is also apparent that when formulating it, he was not aware of Kalecki's profit theory in its general form $(P = I + Cc + X + D + Ow$ and not simply $I + Cc)$ and hence from the (correct) thesis of profits having a decisive role in business fluctuations he deduced the (incorrect) conclusion that business fluctuations were determined by investment movements.

*He understands here – methodically correctly and making a step forward as compared with other Marxist researchers of the subject – departments within GNP.

Confronting the dogma with facts

Long statistical time series of the American economy render it possible to decide whether it is really the movement of fixed capital investment which determines the movement of the entire economy. The unequivocal answer is that such a general relationship does not exist in contemporary capitalist economy, and did not exist even 40 years ago. The data, namely, indicate that in 11 (i.e. in slightly more than one fifth) years out of 50 (1930–1979), fixed capital investment and GNP did not move in the same direction. In 7 years (1942–43, 1949, 1952, 1961, 1967 and 1971) GNP increased in spite of a drop in fixed capital investment, while in three the former dropped in spite of a rise in the latter, and in one year essentially stagnating fixed investment was accompanied by a sharp drop in GNP. This latter year was – somewhat astonishingly – when the most severe recession of the period unfolded: in 1974*. If we review these years and recall our fading knowledge of history, it is immediately revealed that in the majority of such cases the movement of GNP was determined by the increase or fall in government military expenditure related to the World War (1942–43 respectively 1945–47) or local (1952 and 1967) wars, playing thus effectively the role reserved by abstract theory exclusively for investment; in all other cases the same holds true for consumers' investment.

The factors determining the movement of the economy as a whole are more realistically described by the Post-Keynesian school** than by orthodox Keynesian or neoclassical theory. This school, which while forming its more and more specific image has turned in the last decade against both neoclassical orthodoxy and monetarist counter-revolution, and has openly stated its positive relationship with certain elements of Marxian economic theory; developing thus – in my opinion – as the most progressive tendency within contemporary western economics. In Post-Keynesian theory the movement of the economy as a whole is determined by a demand group called discretionary expenditures.*** That this attitude has its roots more connected with reality is shown by the fact that the amount of such expenditures changed in each and every of the last fifty years in the same direction as did GNP.

So much about that aspect of the investment dogma which relates to movements of the entire economy. It is also evident that if we had looked into quarterly figures (simultaneous or lagged ones) this dogma would have been proven untenable by an even much greater number of cases. The reader will be, however, spared from this. Those said above have been perhaps not quite astonishing for readers who pondered somewhat over Table 1 (See: p. 138) and who maybe have already raised the question: how could such

*To be exact: actually fixed capital investment dropped by 0.4 and GNP by 17.2 billion dollars. It would be patently absurd to assume that this was due to the working of a multiplier with a value of 43 (!). The explanation has to and can be found elsewhere. See: Chart 6.

**Some of its wellknown representatives: *Robinson, Kaldor, Galbraith, Pasinetti, Sraffa, Weintraub, Davidson, Eichner,* etc.

***They comprise expenditures on durable goods and structures independently of whether they come from capitalist enterprises, consumers, governments or the rest of the world. ([2] pp. 31–37)

a small tail (Department I) wag such a big dog (the whole economy)? The answer, expectably, is: no way.

But we are interested, first of all, in the role of fixed capital investment in the mechanism of present-day business fluctuations. Our judgment concerning this problem can be formed on the basis of the following Charts 1–6.

Movements of GNP and its main components (the three Departments) in post-war recessions (based on data expressed in 1972 dollars, quarterly, seasonally adjusted data at annual rate).

Chart 1

1948. 1st quarter–1950. 2nd quarter
Index numbers, 1948. 1st quarter=100

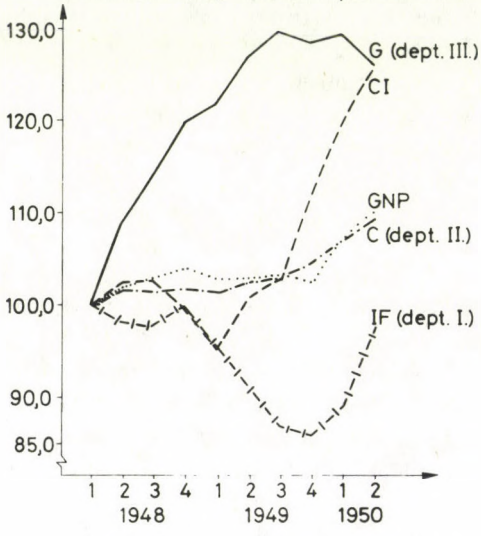


Chart 2

1953. 1st quarter–1954. 4th quarter
Index numbers, 1953. 1st quarter=100

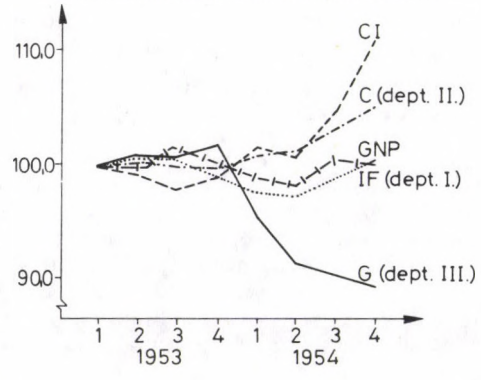


Chart 3

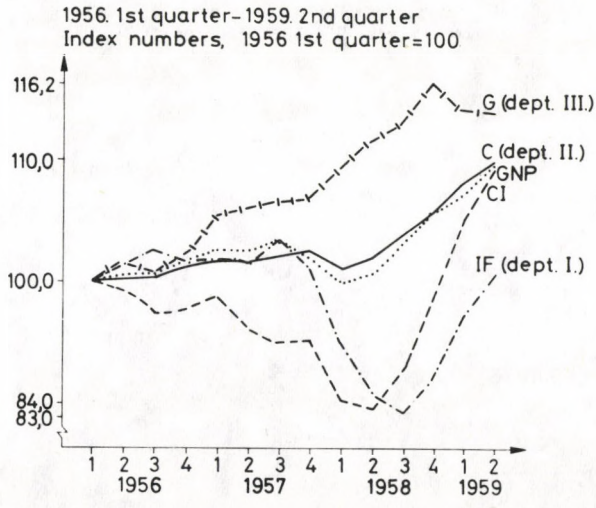


Chart 4

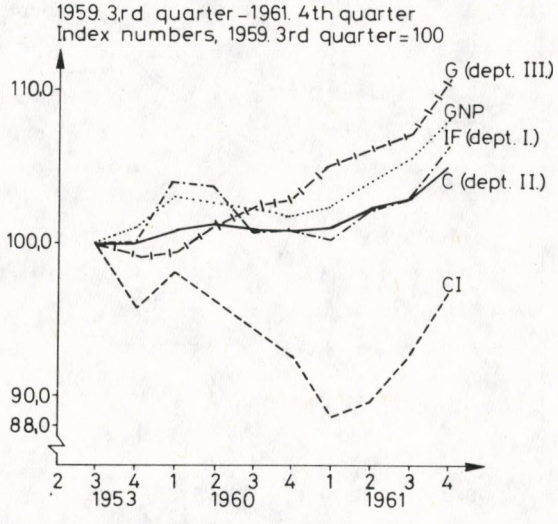


Chart 5

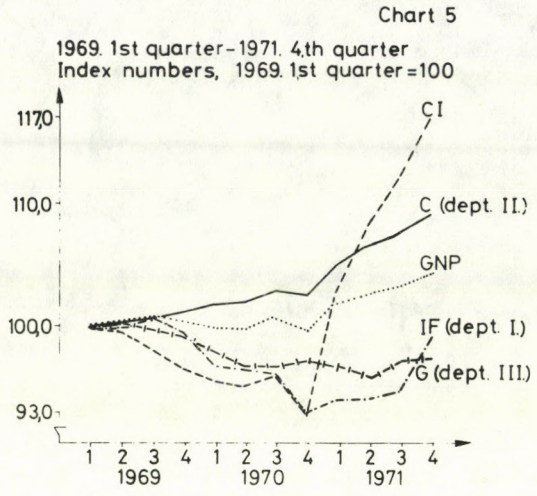
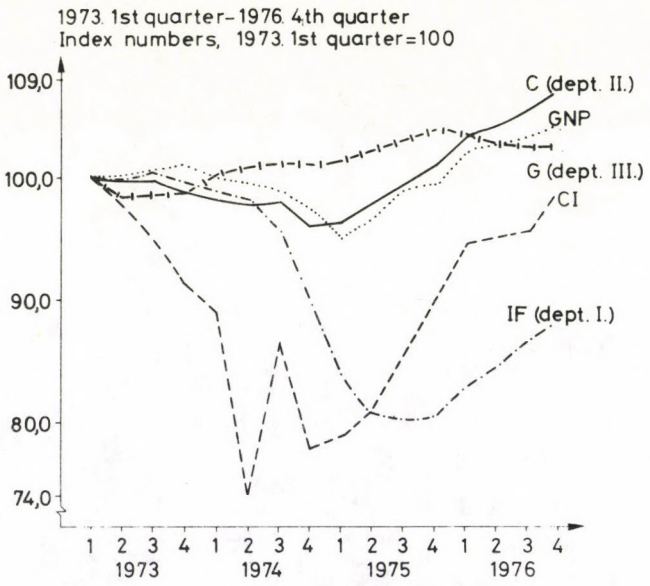


Chart 6



On the charts the movements of the three departments within GNP are presented graphically and also those of the most important and most volatile demand group of Department II – consumers' investment – in the six recessions having taken place in the American economy during the post-war period. The curves illustrate doubtlessly the general rule – valid at least for the period under review – that recessions as well recoveries *begin* with a corresponding change (drop respectively rise) in *consumers' investment* while the change in *fixed capital investment follows* only *with a lag* of about 1/2–1 year. It is important that this regularity shows in the most pronounced form exactly in the most severe recession of the period, that of 1974–1975. Less pronounced is the phenomenon during the unfolding of the 1948–49 recession, although after the same recession, at the turning point, the testimony of this curve is also clear. There is an adage about two thousand years old, stating: *post hoc non est propter hoc.* I.e. the circumstance that some event follows another one, does not prove that the later one is caused by the one taking place earlier. This is, by all means, true. The later one, however *might* be the effect of the earlier one provided we can prove this causal relationship. But it is certainly true that an earlier event can not be caused by one taking place later than itself.

I would like to direct the reader's attention to the fact that the curves present informations about the *time sequence* of movements of demand groups (Departments) and – on the basis of their slope – also about the speed, the *rate* at which the *changes* take place. Thus they also prove that changes in consumers' investment did not only precede those of fixed capital investment in time, but also that the *intersection of the curves* – regarded as important by T. Erdős – does take place indeed, but the curves of the two categories move *in the opposite direction* from what he assumed. The curves *per se,* however, being based on index numbers do not give any information concerning the *quantitative* role of either consumers' investment or of fixed capital investment in the unfolding or ending of any recession. As far as the quantitative role is concerned, a glance at Table 2 reveals that a one per cent change in consumers' investment has a weight far bigger than an equal change in fixed capital investment – both in absolute terms and expressed as a share of GNP. The more so when the rate of change of the former is faster! This meant, for example in the recession of 1974–1975 that during the unfolding of the recession, in the first three quarters of 1974, the drop in GNP amounting to 25.7 billion 1972 dollars originated to the extent of 12.5 billions (i.e. 48.6 per cent) in the collapse of consumers' investment, while only to the extent of 1.8 billions (7 per cent!) in the slight drop of fixed capital investment. These data – I dare say – speak for themselves, no comment is necessary.

Methodological error – theoretical mistake

In spite of the fact presented above in his thought provoking book already mentioned T. Erdős arrived at theoretical conclusions flying in the face of those very facts. This seems astonishing indeed, since in this book under the heading "The mechanism of capitalist crises in the light of figures" ([13] pp. 233–41) he does not simply declare that ". . . if the theoretical presentation reflects the substance of the matter correctly, then the picture obtained on the basis of facts has to be by and large like the one I presented in my theoretical foundation." (Ibid. p. 234); but also he actually checks conscientiously and scientifically on the pages which follow, whether his theoretical thesis does or does not correspond to reality. On the basis of the statistical tables and charts constructed (Ibid. pp. 239–240) he draws the conclusion that it does. This conclusion is, however, erroneous.

The error can be traced back to two sources. The first one is of methodological character, the second one is a statistical misunderstanding. First things first! T. Erdős tries to build the theoretical foundations of the crisis mechanism in contemporary capitalism on a two-sector model (investment goods – consumption goods; in other words: Departments I and II). Remembering the proportions of the Departments, especially that of Department III, presented in Table 1 (See: p. 138) it is easily conceivable that such a method cannot bring satisfactory results. This erroneous path is taken because of an abstract point of departure of the argument – and hence proven uncorrect when confronted with facts. The substance of this is the mistaken judgment concerning the relationship between profits and investment, *practically identifying* these two categories – at least as far as their role in the business cycle mechanism is concerned. This is proven by the following statement: "Exactly depending on the movement of profits does the capitalist economy come to the state of boom or crisis. Exactly the movements of the two Departments do tell us how profits have to move . . . ([13] p. 95)

Taking this theoretical attitude as his point of departure did T. Erdős construct his table and draw his curves – and he found that they corroborated his theory. But, unfortunately, only because the table and the curves were based on a statistical misunderstanding. Namely: his category of "investment goods" is identical with the item "Gross private domestic investment" of US National Accounts, his "consumption goods" with "Personal consumption expenditures" of the same. These, however, do in fact not correspond to T. Erdős's definitions of fixed capital investment and consumption (or Departments I and II).* This is so because the former item in the American statistics

*Falling victim to this misunderstanding T. Erdős is, indeed, in very good company. Kalecki, analysing the high performance of the American economy in the post-war decade, attributed this to the fact that big business' relative share of accumulation of the national product increased significantly ([16] pp. 87–91). He was not aware of the fact that this phenomenon was due overwhelmingly to a spurt in purchases of owner-occupied homes – i.e. of consumption –; since, as illustrated by Table 2 (see: p. 138) the proportion of consumers' respectively fixed capital investment shifted during the period ending in 1955 considerably in favour of the former.

includes besides fixed capital investment also residential construction and the change in business inventories, and the second one comprises household expenditures on goods (durable and nondurable) and services. The overwhelming part (presently about 80 per cent), however, of residential construction is purchased by consumers in the form of family homes, condominiums, etc. Thus this part of residential structures can not be regarded as business fixed capital investment, but constitutes production of consumer goods just as that of toothpaste or chewing gum. Only the construction of dwellings for rent can justifiably be regarded as business fixed capital investment. The change in inventories is, of course, investment, but not fixed investment. It comprises overwhelmingly non-investment goods. Regrouping the data of American statistics and forming items actually corresponding to the definitions of fixed capital investment, and consumption (Department I and II), etc. and drawing curves based on quarterly data of these categories – those presented on Charts 1–6 – we obtain results depicting facts irreconcileable with the theoretical foundations presented by T. Erdős. Since the picture obtained on the basis of hard facts is far from being by and large like the one assumed by theory – "the error is in the theoretical foundations." And there, indeed, it is; and so because *in the real world it is the general case of Kalecki's profit theory which has universal validity* – that is, always and everywhere in a capitalist economy, be it of a state-monopolistic, simply monopolistic or of a laissez-faire type; hence equally valid for crises of the so-called classical type and contemporary business fluctuations as well.

The solution

Attempting to formulate a realistic explanation of the mechanism of contemporary business fluctuations we have to start from two things *given:* 1. also presently ... "depending on the movements of profit* does the capitalist economy come to the state of boom or crisis." ([13] p. 95) and 2. in present-day business fluctuations it is the most volatile (or, if you like, the most unstable, most prone to fluctuation) demand group, that of consumers' investment, which "leads" the entire economy into recession, respectively recovery, and not fixed capital investment. Both things given have to be taken into account and coupled in any explanation of business fluctuations in order to be realistic. This is rendered possible by the $P = I + Cc + X + D + Ow$ formula, since on its basis it is easily understandable that the movement of P does not necessarily hold fast to that of I, even less to fixed capital investment constituting only a component of I (the other one, as remembered, is the change in business inventories: $I = IF + II$), not even when changes in Cc are, because of the latters inelasticity, neglected.

*I would like to mention that, in my opinion, neither Marxist nor bourgeois economics has convincingly answered the question whether the behaviour of capitalists and through this the movement of business is "led" directly by the volume, margin or rate of profit. In this short article I do not want to go into this problem.

Here we come to the core of the problem: it is exactly the changes in components of paper profit, i.e. in the export surplus, the government deficit and the overspending by wage earners, which become more vigorous around cyclical turning points, that do render it possible – and explainable – that profit movements can considerably separate from those of fixed capital investment.

We could experience one of the most striking cases in this respect – showing up even in the yearly data – in the American economy exactly in 1975. In that year, the year of the trough and the turning point of the business cycle, the volume of gross *profits increased* by 3 billion 1972 dollars simultaneously with a *drop* of more than 30 billions in the volume of *fixed capital investment.* The latter, however, was more than compensated by a more than 50 billion jump in paper profit. This jump was due overwhelmingly to the fact that the government surplus of the previous year turned (as a consequence of the tax cut) into a tremendous deficit, adding almost 50 billion dollars to profits.

It remains to be explained how the running ahead of consumers' investment in comparison to fixed capital investment is linked to the separation of the movements of profits from those of fixed investment. This linkage is realized through the fact that movements of consumers' investment and the profit component *Ow* (overspending by wage earners) are tightly connected. The material substance of consumers' investment is the purchase of consumer durables and homes by wage earners. It is well known that these purchases are based mostly on credit: installment and mortgage. Hence a spurt in consumers' investment is accompanied by an expansion of the above types of credit, by households going deeper into debts. In other words wage earners *spend more than their* current *income.* Under such circumstances profit component *Ow* reaches a high value, constituting an important source of profits. When consumers' investment falls, a similar train of events but in the opposite sense takes place. Hence a drop in the value of *Ow* follows, overspending even turns into saving, as happened, for example in 1974 and 1975. The decrease of *Ow,* moreover its turning negative has a profit-diminishing effect.

Thus when consumers' investment drops immediately before a recession or during its unfolding this is equivalent to a change in *Ow* in a profit-diminishing sense, leading to a slowing down of the profit increase, later to a halt of the same and eventually to a drop in profits. When consumers' investment takes again an upward turn, this gives the change in *Ow* a profit-raising character, hence the fall in profits is slowing down, stops and turns into an increase – all these taking place again without a necessary contribution from business fixed capital investment in the form of a rise of the latter.

Exactly this was the way these processes took place during all post-war American recessions. As an example let me refer once again to the recession of 1974–75. We have seen (Chart 6) that consumers' investment was already falling during 1973 from quarter to quarter and the drop became steeper in 1974. Net real profits were stagnating during 1973; in the first quarter of 1974 they fell explicitly. A drop in fixed capital investment was really felt only in the third quarter of 1974. In 1975 consumers' investment was again rising and net real profits increased almost every quarter, although fixed capital investment resumed its growth only at the beginning of 1976.

Concerning the link between the movements of profits and consumers' investment it can be stated that the overspending by wage earners dropped from 15.1 billion 1972 dollars in 1972 to 6.3 billions in the following year and in 1974 turned into a saving of 6.8 billions; i.e. it had in the two latter years a profit diminishing effect of 8.8 and 13.1 billion 1972 dollars, respectively. In the second half of 1975 the saving by wage earners began to drop, involving a profit-increasing effect.

Establishing correctly the roles played by consumers' investment, respectively of fixed capital investment, in the mechanism of business fluctuations should not, however, result in putting up a new fetish in the place of the deposed one. The less so, since to declare consumers' investment the last, the decisive factor in the mechanism of recession, respectively recovery, would also fly in the face of facts. There can be no last cause, since although consumers' investment has its (more or less cyclical) self-movement, it is also well known that – because of its tight connection with credit – it can be influenced considerably by economic policy, first of all through the instruments of monetary policy. Measures of fiscal policy, having a strong influence on the disposable income of wage earners, for example the tax cut of 1975, do also have a measurable impact on its movements.

In the period of maturing, unfolding of a crisis, respectively during the creation of conditions for a recovery the change in consumers' investment, and reflecting the former, the change in the overspending (saving) of wage earners is not the only and quantitatively not necessarily the biggest source of the disadvantageous or advantageous profit effects at work in such periods. The profit-diminishing or profit-increasing effects originating in the changes of government deficit are also considerable. An outstanding example of the latter was already mentioned (see: 139). The government deficit has its role in bringing about a recession, too. To mention again the eve of the 1974–1975 recession, the year 1973: in that year profits were diminished not only by the decrease in the overspending of wage earners, but, reflecting the restrictive fiscal policy of the federal government aimed at cooling the overheated economy, also by the disadvantageous change in the government balance (an increase of the surplus): amounting to 10 billion 1972 dollars.

The new specific features of the business fluctuation mechanism at work in the United States in the post-war period can be shortly formulated the following way: although the role of fixed capital investment is still considerable in the cumulative process of the worsening of business and also in the unfolding of a recovery, in bringing about the fall, respectively the rise of profits, which is a necessary condition of recession, respectively of recovery, the determining factor is the change in consumers' investment (and reflecting this: in profit component *Ow)* and/or the change in the government deficit connected with the movements of Department III (and reflecting this: in profit component D).

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ПОТРЕБИТЕЛЬСКИЕ ИНВЕСТИЦИИ ПРОТИВ КАПИТАЛЬНЫХ ВЛОЖЕНИЙ (К СОВРЕМЕННОЙ ТЕОРИИ КОНЪЮНКТУРНЫХ КОЛЕБАНИЙ)

Ф. МОЛЬНАР

Развивая положения, выдвинутые в ряде своих предыдущих работ, автор анализирует роль вложений в основной капитал в динамике капиталистической экономики, прежде всего в конъюнктурных колебаниях, противопоставляя их потребительским инвестициям.

Вначале он кратко излагает точку зрения марксисткой и современной буржуазной экономической науки на роль вложений в основной капитал. Он констатирует, что положение о решающей роли вложений в основной капитал в динамике капиталистической экономики или об их исключительной определяющей роли в образовании национальных доходов является не чем иным, как догмой, противоречащей действительности. Это подтверждается данными об экономическом развитии США за половину века, которые вместе с тем доказывают, что теоретическое рассмотрение современных конъюнктурных колебаний на основе следующей марксовой схемы двух подразделений (капитальные блага и предметы потребления) невозможно и что следует обязательно принимать во внимание и третье подразделение, которое приобрело большое значение — закупаемые правительством блага и услуги (в основном военного назначения).

В статье с помощью графиков показывается, как складывалось в США в ходе шести спадов за прошедший более чем тридцатилетний период движение конечного продукта и его трех подразделений, прежде всего — потребительских инвестиций и вложений в основной капитал, и на этом основании делается вывод, что в этих спадах, как во время их развития, так и в начале оживлений, основной движущей силой конъюнктурной ситуации были не вложения в основной капитал, а потребительские инвестиции.

Вступая в дискуссию с положениями некоторых венгерских экономистов относительно конъюнктурного механизма, автор указывает, что теория конъюнктуры, отражающая действительное положение вещей, должна согласовать положение о решающей роли прибыли в динамике капиталистической экономики с отмеченными выше фактами. Это возможно благодаря общему уравнению прибыли Калецкого. На основании этого уравнения понятна возможность возникновения кризиса (или оживления) без сокращения (без возрастания) вложений в основной капитал. Во время поворотных пунктов современной капиталистической конъюнктуры прибыль прежде всего изменяется под влиянием динамики увеличения перерасходов или сбережений живущих на заработную плату, на что эффективное влияние оказывает государственная денежная и бюджетная политика, а также под влиянием дефицита государственного бюджета — она сокращается в момент развертывания кризиса и начинает возрастать с началом оживления.

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PROBLEMS AND PROSPECTS OF AN OPEN ECONOMY: FINLAND'S CASE

The international economic situation and the changes occurring in it represent in principle challenges of the same kind for all small and medium-sized open economies. These economies must watch closely the developments taking place around them and adapt their production and trading operations ever more keenly to the international division of labour. The author examines here how this problem is met and dealt with in the particular case of Finland.

Over the last few decades the intensification and diversification of international economic relations have become indisputable facts. National economies have become more open.* They are being bound to each other by ever more numerous ties and ever more complex forms of linkage. This in turn affords growing opportunities for the specification of production and for the enrichment of consumption. Yet, unfortunately, alongside this welfare-promoting development the problems associated with oppenness are apparently growing, too.

The national economies have to rise to the challenge of openness by investigating – and possibly re-evaluating – their role and conduct in the world economy. In the socialist countries the control and management of the economy presupposes, under all circumstances, forecasts, plans, and programs for the future development of the economy. But in the capitalist market-economies, too, after the critical years of 1970's they have begun to study more intensively the prospects for the future, the aim being to prevent as much as possible a repetition of the events of the last decade or an even worse disturbance of harmonious development.

It is a well-known fact that international economic relations are not of equal importance for all countries. For example, the Soviet Union and the United States are to a greater degree self-sufficient than smaller countries. Although these great powers can by no means be characterized as closed economies, the term "open economy" is generally employed in regard to countries whose foreign trade is of decisive importance for the

*In the very long-term, i.e. in a century-long perspective, no clear trend can be observed in the development towards openness in the national economies, if openness is measured by, for example, the ratio between trade and the GNP or the ratio of the balance on current account to the GNP. [1] The value of Finnish exports was about one-quarter if compared with the GNP in the beginning of the century; so it was, too, at the end of the 1930's and again in the 1970's. But if openness is measured not merely by commodity trade but also from the viewpoint of production-factor markets and the internationalization of production, the picture may well be of a different kind.

wellbeing of the country. Undoubtedly, Finland is a country of this kind. In its response to the problems of openness in the 1980's Finland's point of departure differs from that of other countries, especially in that its position in the development of European integration is unique. Nevertheless, many of the viewpoints and factors of influence deserving attention from the standpoint of Finnish interests are relevant for other small and medium-sized European countries as well.

The Finnish economy

Some basic features and trends

Finland is situated in the north, parts being within the Arctic Circle, and it is anyway far from the majority of European countries. For some of the year ice renders sea-traffic difficult, and it should be borne in mind that approximately 80 per cent of Finnish foreign trade is dependent on transport by sea. Finland is the only country in which all harbours freeze in the winter and have to be kept open by ice-breakers. While "the Nordic Exoticism" involves additional expenses and difficulties, it brings with it certain advantages, too, and these not merely for tourism. Finnish achievements and know-how in the building of ice-breakers is one example – but not the only one – of comparative advantages extracted from the climate.

Finland is not all that poor in the incidence of ores and minerals, but it does not belong to that happy group of countries whose soil is enriched by oil, natural gas or coal. An important source of energy even in Finland is that constituted by the rays of the sun, which stimulates growth both in the fields and forests. However, as far as the most important agricultural products are concerned, attempt has been made to adapt production simply to the needs of internal consumption. *But the forests mean very much indeed to the Finnish economy.* Only a few decades ago the openness of the Finnish economy rested in very large part on this natural resource which renews itself.

In the course of one generation the structure of Finnish production has undergone radical changes. The proportion of those employed in primary production has fallen from almost 50 per cent in the year 1950 to a little over 10 per cent in 1980. This change has occurred almost entirely to the benefit of service industries, in which more than half of the labour force is now employed. The proportion of the labour force employed in industry and construction at first increased, but a decline set in during the 1970's and the proportion is now about one-third. The attainment of a good European level of economic growth* has on the one hand been the basis and on the other hand the consequence of these above-mentioned changes, which have included a powerful migration to the densely-populated areas and an internal transformation within industry.

*At the end of the 1970's the per capita income in Finland was smaller than in other Nordic countries (except Iceland), about the same as in Austria, but higher than in Britain, for example.

In the transition during the 1950's to the period of expanding free-trade the traditional division between home-market and export-oriented industries had to be rejected as a model. On the widened markets the swiftest growth among important industries was in the metal and engineering industry which has overtaken in production the forest (wood processing) industry, and in the chemical industry. As far as exports are concerned, however, the wood and paper industry has retained its leading position. Its share of over 40% in Finnish exports does not entirely reflect the significance of the industry in the foreign trade pattern, for in fact the import input in its production is considerably lower than it is for the rest of industry.

Almost 100% of Finnish exports is made up of industrial products. In the commodity pattern of imports the share of raw materials etc. (incl. fuels) is ower two-thirds, while investment and consumer goods constitute under one-sixth each.

The linkage of the Finnish with the international economy is quantitatively of considerable proportions already; the ratio between trade and the GNP is about the same as in the other Nordic countries. *However, as regards the use of various forms of internationalization, Finland lags clearly behind many other advanced countries,* although the information available only for 1969 is not wholly descriptive of the present situation. In that year 91.5 per cent of Finnish exports consisted of traditional commodity exchange, while the corresponding figure in West Germany was 73 per cent, in Sweden 57 per cent and in the USA only 17 per cent. The figures for licensing, in the same order, were 1.5, 6, 3 and 4.5 per cent, for sales through foreign sales units 3, 7.5, 13 and 9.5 per cent, while sales through foreign manufacturing units amounted in Finland to merely 4 per cent, in West Germany to 13.5 per cent, in Sweden to 27 and in the USA to 69 per cent. [2] Nowadays in Finland there are about 1 400 manufacturing firms which are regularly engaged in the export trade; of these about 12% have their own sales units and 6% their own production units abroad. At the end of 1979 there were 975 subsidiaries abroad in which more than 20% of the share capital was Finnish-owned. 144 of these were manufacturing firms.

Direct foreign investments in the Finnish economy do not account for a large sector. As far as industrial production is concerned, 6–7% takes place in companies owned wholly or in part (over 20 per cent) by foreigners. There is no foreign involvement at all in the exploitation of raw-materials resources viz. in the forest and mining industries. In regard to the supply with energy the role of foreign companies is restricted almost entirely to the distribution of petroleum products.

Response to economic integration

In general, it may be said that in making agreements on foreign trade and other international economic relations as well as in determining its membership in organizations and other collective bodies Finland has acted in its own way and only rarely in terms of

how some other countries behaved. The reason for this has been Finland's international position and neutrality-policy in harmony with which economic relations have been developed. This also affects in a most vital way the attitudes taken up towards European integration.

Towards the developing integration in Western Europe at the turn of the 1950's and 1960's a standpoint had necessarily to be worked out in Finland, which, helped by a rather steep devaluation of the mark in the year 1957, took a great stride in the direction of freeing foreign trade. The relationship with the European Free Trade Association became defined in 1961 when Finland made its own special agreement with the Association, called the FINEFTA agreement.

At the end of 1960's, just as at the end of the 1950's, the debate flared up about the mutual economic integration of the nordic countries. After a couple of years of preparations this NORDEK scheme, as it was entitled, nevertheless broke down owing to the fact that Nordic countries had different expectations in regard to Western European integration. Denmark became a member of the EEC, and Norway and Sweden made special arrangements so that they would not remain outside the EEC tariff walls. It seemed possible that without some such arrangements Finland would find itself in an important export market area in a worse position than its competitors. After rather many vicissitudes, and still nagged by doubts, Finland entered into a free-trade agreement with the EEC in 1973.

The concessions granted by Finland to the EEC countries were immediately accorded also to the Soviet Union if they were not already in force on the basis of agreements concluded earlier. In regard to the other CMEA countries Finland made an offer in 1973 to negotiate about the mutual reduction of trade barriers. Agreements of this kind have later been made country by country. Even before these chances to negotiate were offered, Finland had made (the first Western country to do so) an agreement for economic cooperation with the CMEA in the year 1973.

If Finland's handling of all these problems is compared with that of other neutral countries, such as Sweden, Austria and Switzerland, clear differences can be observed. In the first place, Finland was, as it were, a step behind the others, and took its decision only when the necessity and pre-conditions for it had been exploited all round. In the second place, Finland limited its participation and agreements still more closely than the other neutral states to the economic aspect only, without embodying in its choices any political commitments. In the third place participation in the economic aspect of integration was more restricted: formally Finland is only an associate member of EFTA and the agreement with the EEC is more limited than those signed by the above mentioned countries with the EEC. In the fourth place Finland has always borne in mind in its decisions the trade with the socialist countries and has endeavoured to ensure that relations with the Soviet Union and the other CMEA countries are in no way impaired. The striving towards an equitable balance in the development of economic relations may be seen in the way in which the distribution of Finland's foreign trade falls between the various groups of countries *(Table 1)*.

Table 1

Finland' exports to and imports from the economic blocs
(Total export and imports = 100)

Year	EEC		EFTA		CMEA		others	
	Export	Import	Export	Import	Export	Import	Export	Import
1960	28	34	34	30	20	21	18	15
1965	28	31	33	34	21	19	18	16
1970	23	27	43	39	16	16	17	18
1975	35	37	26	23	24	21	15	19
1980	39	33	23	18	20	24	18	25

Problems of economic policy

As in most other market economies at the same stage of development, the external balance, inflation, and unemployment are in the foreground when problems of economic policy are under review.

A deficit on current account was characteristic of Finland in the 1970's. There was a surplus only in the year 1978. The devaluations of the mark occurring in the years 1967 and 1977–78 brought about only a temporary disappearance of the deficit. The significance of changes in the terms of trade has been rather slight for Finland in the last few decades. At the time of the first oil price shock in 1973–74 the rise in Finnish export prices compensated for the increases in the price of oil, but in the second half of the 1970's the terms of trade deteriorated. However, the negative influence in the 1970's was all in all milder than for industrial countries on the average.

In the early 1970's the net foreign debt was about 10% if compared with the gross domestic product. It rose in the middle of the decade to 20% and fell to only 15% in 1979, when an appreciation of the mark occurred. In so far as the deficit in the balance of payments cannot be overcome in the next few years, the foreign debt will easily swell once more to such proportions that improvement of the external balance will become the key, even dominating, question of economic policy.

Inflation, which has eaten into the international competitiveness of Finnish manufacturing, has been a contributory cause of the difficulties in maintaining the external balance. In both the 1960's and 1970's inflation in Finland was almost 1.5 times that of the average OECD inflation: it was 5.1% in the period 1960–72, 15.2% in the period 1973–75, and 10.5% in the period 1976–79. In the light of these figures it will be clear that an investigation into the reasons for inflation is of the utmost importance so that a cure can be effectively devised. Here let us single out just one of these reasons, a matter often brought up by the governments of different countries, especially in the 1970's: the

rise in import prices. According to one estimate the direct influence of this factor during the years 1970–78 was at its highest, over 40% in Finland, but for five years was about only one-fifth of the price increase. [3]

In regard to the question of employment Finland managed well in the early years of the 1970's, but the latter half of the decade was the worst period of unemployment since World War II. An inverse relationship seemed to prevail between inflation and unemployment. From the year 1973 inflation and unemployment appeared in a more unfavourable perspective than ever before. [4] Although, as far as the unemployment rate is concerned, the worst has probably been passed by this time, the structural and regional imbalances are difficult to adjust, because the labour force's ability to move does not correspond to changes in demand.

The changing environment

A small country has to adapt itself to changes in international environment and must do this preferably by anticipating these changes instead of trying to set right a position that has already worsened as a result of changes having taken place. It has to be admitted that the external pressures to which an open economy is nowadays subject to are severe and are in many respects difficult to predict, too.

Energy and raw materials

During the last few years the energy problem has come very much to the fore and the alternative solutions to this problem have been thoroughly investigated. But no really radical solution has been found nor is such a solution to be envisaged within the perspectives of the 1980's. The fact that nuclear energy is being increasingly utilized will not decisively reduce the dependence of industrial countries on oil.

The price of oil and its availability are very important for Finland both directly, as a source of energy by which the economy is powered, and indirectly, because of the effects on world trade. *In Finland, with its cold climate and long distances, the consumption of energy is in relation to the national income and size of the population on the top of the Western European list.* Throughout the 1970's the share of imported oil has been roughly one-half of the energy consumed. The anticipated trend in oil prices will raise production costs, worsen the terms of trade, and strain still further the current account balance. The indirect influence of oil through its effect on the export markets is also a factor of significance. If the trend in the price and supply of oil weakens economic activity in countries that are important for Finnish exports, then there is a reduction in the demand for Finnish products.

Without entering into a more extensive analysis of the prospects regarding the raw materials situation, there is nevertheless reason to note an aspect of importance from the

Finnish viewpoint, namely *the anticipated changes in the price and supply of wood.* The exploitation of new, swiftly-growing forest rescurces in tropical and sub-tropical areas will have the effect of placing Finnish wood in an increasingly unfavourable position as far as price-competitiveness is concerned. The price of standing timber in Finland is already higher than that in important competitor-countries. The competitiveness and development of the forest industry do depend on many other factors besides the price and supply of the raw material, but the latter are still important factors along with the growing transport costs now that oil is becoming more expensive.

The developed Western countries

The period of vigorous economic expansion in the OECD countries seems to have been confined to the years 1946–1973. At least in regard to the first half of the 1980's it is estimated that economic growth will continue to remain much behind that of the above-mentioned years and may be about half of the growth of that period. Hence Finland cannot expect to get any remarkable degree of "pull" for its industry and whole economy from the group of countries on which its dependence is the greatest.

Industrial countries have to be able to face future challenges within the constraints set by slow growth. They must learn to cope with energy problems and with those of the environment, adopt new technology and adapt the structure of their production to the changing international division of labour. In particular, in production the new technology must be made use of (micro-circuits, fibre optics, nuclear technology, bio-techniques, new materials, and so forth). In respect of the application of the "old" technology to industry the markets are being conquered more and more by those newly industrialized countries (NIC) in which low labour-costs, and in part also cheap raw materials, give a comparative advantage.

If external pressures and difficulties of adaptation are felt to be very great or even overwhelming, protectionist measures – whether of a straightforward or more subtle nature – may be resorted to. *But the sealing-off* of *national economies or economic blocs would be clearly unwelcome to Finland,* which is neither protected by any of the systems of economic integration nor exists as some kind of "floating annex" alongside the larger economies. In addition, the growth of self-sufficiency – for example, of that of the EEC – without the aid even of any special protectionist mechanism would worsen Finland's chances of benefiting from foreign trade. Generally speaking, the course of Western European integration is by no means a matter of indifference to Finland, in particular the possibility that some EFTA states may reassess their position in the integration patterns.

The developing countries

The developing countries, which include the oil-producing lands, the countries offering the products of their industries on the world market, the "low income countries", etc., make up a heterogeneous group. Hence the demands and expectations the South seeks to impose on the North are diverse in kind. Changes in income distribution are anticipated both in the interests of the oil producers and the poor nations. The developing countries want a greater share of the energy and raw materials of the globe. A desirable role for them in the international division of labour would be one pre-supposed by the possibilities they have for developing their industrial and other production. Economic cooperation between countries at different stages of development would have to be fairly based and the advantages and disadvantages (e.g. in the latter case to environment) accruing to the weaker party truly taken into account.

All in all it is to be hoped that the countries of the North would take a more serious and positive stand than hitherto towards the New International Economic Order and to the problems of the Third World. In return for really giving something up, the developed countries would be able to participate in new markets and forms of cooperation in the developing countries.

Although the desired objective of increasing the share of the Third World countries in world manufacturing production from 7–8% now to 25% by the year 2000 might not be attained, it is a pointer to the direction in which things will go. This represents a challenge especially to developed countries like Finland whose industrial production is comprised of rather many products of high labour intensity and low skill requirements. These must give way to imports from the developing countries, while on the other hand Finland and other countries in the same position must diversify their industrial structure and create the innovative, intensive production of high technology. Notwithstanding this challenge from the developing countries, the main problem for Finland might probably be in the first place the adapting to the industrial countries' mutual division of labour in circumstances both of changing technology and competition. [5]

East-West trade

Development of economic relations between the socialist and the capitalist countries is of particular interest to Finland, which has engaged in trade with the socialist states to a comparatively greater degree than have other capitalist countries.

For most socialist countries the expansion of trade with the West is being hampered by a real or threatening deficit. The imbalance is in part due to the fact that the socialist countries cannot, for different reasons, market their industrial goods in the West in sufficient quantities. In certain fields of production the coming competition, mentioned earlier, from newly-arising industrial countries will add its own contribution to this problem and to the adjustment of the East-West trade structure.

In this trade between the socialist countries and the capitalist West know-how purchases, projects, coproduction, cooperation in third markets and other such forms of economic activity will become even more general. This development, together with the linking of credits on favourable terms to large purchases, does not particularly favour the small supplier, which the Finnish competitor is. On the other hand, in-trade with the socialist countries Finland has a certain lead in know-how, which will help it to succeed even where competition to trade with the socialist countries tightens.

Is the big beautiful?

Foreign trade extends markets. Through exports the enterprise of a small country, too, can exploit economies of scale and become competitive both at home and abroad.

But it is not merely in reduction of the production costs that the significance of size comes out. The incomparable opportunities that great companies have in financing, research and development, marketing, etc., are well known.

In recent years the trade in systems and projects has become increasingly common – in the future perhaps an ever more significant factor favouring size. The object of such transactions may be the construction of an entirely-equipped hospital or a complete industrial area, the creation of a traffic system, an so forth.

In competing for projects and other ventures demanding plentiful and diverse resources the big companies operating in the country concerned or in a larger economic unit such as the EEC are in a more favourable position than the smaller enterprises of an outside country.

The influence of gravitation: two important neighbours

In spite of the continual improvement of transport and communications, distance is still a significant cost-factor and often an impeding one in international trade. Correspondingly, proximity promotes business. It is therefore perfectly natural that economic relations with neighbouring countries are well developed and in this respect Finland's foreign trade is no exception. Finland's neighbours, the Soviet Union and Sweden are its two greatest trade partners; their share in Finnish foreign trade varies betweeen 15 and 20 per cent. The country's third neighbour, Norway, has also become of increasing importance to Finland and is already competing for the fifth position in the trade statistics after the Federal Republic of Germany and England.

The Soviet Union

In the economic relations between Finland and the Soviet Union the agreements entered into between the states have a key position. From the viewpoint of the development of trade and other forms of economic cooperation the most important basic

agreements are those that were already signed in the late 1940's: the Finnish–Soviet commercial treaty of 1947 and the Treaty of Friendship, Cooperation and Mutual Assistance of 1948. Finland was the first country with a market economy to make a five-year trade agreement with the Soviet Union (for the years 1951–55); the seventh framework agreement for trade will now cover the years 1981–85.

In the year 1967 a permanent commission for economic cooperation was set up between the two governments, and this has with its working-groups an important role in developing trade. In the year 1971 an agreement for the development of economic, technological, and industrial cooperation was signed. The first long-term programme for commercial and economic cooperation (until the year 1990) was adopted in 1977. The agreement for the import of natural gas (running until 1993) and for the import of electricity (running until 1989) are worth singling out among the many other agreements and arrangements entered into. Above all it should be stressed that the whole complex of agreements between Finland and the Soviet Union is unique among countries representing different economic systems.

The trade with the Soviet Union has had a considerable impact on the structure of Finnish exports. In the 1950's and 1960's the share of the metal industry in exports was on an average from 50 to 60 per cent. Then it fell. Nowadays the share of the metal industry is again about 50%. Then exports of forest industry products, machines, equipment, and ships make up over 80% of the total.

In regard to imports, the proportion of raw materials and fuel is high, between 80–90%; Finland imports about 60% of its oil from the Soviet Union. In addition, the import from the Soviet Union of machines, equipment and vehicles is of considerable proportions, and the Soviet Union has also delivered two nuclear reactors to Finland.

An aspect of Finnish–Soviet economic relations deserving particular attention are *the projects undertaken by Finland in the Soviet Union.* For example, the construction of the Svetogorsk cellulose and paper mill and the Kostamus mining-industry combine (both near to Finnish border) have meant an appreciable demand for Finnish products, know-how, and labour.

Although the trade between Finland and the Soviet Union has developed quite favourably, it has been marked by certain disturbing features characteristic of trade between the West and the socialist countries in general. Imports from the Soviet Union are in the main made up rather one-sidedly of fuel and raw materials, nor has the diversification hoped for by the Soviet Union occurred. In the second place, many enterprises find trade with the Soviet Union difficult and even troublesome on account of the differences existing between the economic and trading systems of the respective countries. The greater the trade and enterprise in question the less comparative importance is to be attached to these problems.

Alongside the benefits generally derived from foreign trade, there are certain special gains accruing to Finland from trade with the Soviet Union. First of all, it equalizes and stabilizes the export demand for Finnish products. Although in trade with the Soviet Union, too, a variable pattern emerges, this does not follow the same time-path as the

fluctuations in demand of the Western markets. In the second place, a system of trade agreements the aim of which is the balancing over a period of time of exports and imports does render possible the paying of the growing oil bill through the export of Finnish products, as it indeed happened in the years after 1974. In the third place, new export fields and a wide export of projects provides a good starting-point for the diversification of export endeavours in relation to markets in other countries, too. In the fourth place, five-year trade agreements afford both security and the chance to develop a more complex pattern as far as trade in the future is concerned. This, in the present period of growing insecurity, is quite significant.

The broad lines of development in Finnish–Soviet trade relations were laid down last in 1980 when the long-term trade and economic programme was extended to the year 1995. No radical changes are to be expected in the steadily expanding trade. What will happen is that commodity trade will become more diversified and there will be brighter prospects than ever for Finnish exports of projects. Economic cooperation will be extended, *inter alia,* it will also occur in the Arctic areas, and it is proposed that Finland and the Soviet Union work together in ventures in third countries. As far as Finland's oil supply is concerned, this will depend, to approximately the same extent, on imports from the Soviet Union throughout the 1980's.

Sweden

Historical, geographical, and social factors have determined that for Finnish tourism, emigration, and exports most often the world abroad begins in Sweden. For the Finnish economy the primary base of comparison and index of conditions has again been Sweden, a rich country whose achievements in creating social security and a high standard of living for its population are not easily rivalled elsewhere in the world.

As regards the forest industry, Finland and Sweden are competitors on the world market. As regards their own mutual trade in commodities, the predominant products are those of the metal and engineering industries, the clothing and textile industries, and the chemical industry. In the two countries' economic relations characteristic features are mobility in the factors of production and thus production in which there is both a Finnish and Swedish input. The Swedes have a considerable share (25–100%) in over one hundred industrial enterprises operating in Finland, while the Finns own similar proportions in over twenty Swedish enterprises. If sales companies and other related companies are taken into account, then the number of such ventures is rising manyfold.

Because labour mobility between the Nordic countries has been eased as much as possible* *many Finns have obeyed the call of a high standard of living and a good employment situation and have moved with their families to Sweden.* Emigration to

*Since the Common Nordic Labour Market was established (in 1954), the citizens of the Nordic countries have not needed passports or work-permits in moving from one Nordic country to another.

Sweden was especially strong at the end of the 1960's. During the years from 1975 to 1979, however, while 67,000 Finns moved to Sweden, 31,500 Finns moved back to Finland from Sweden. Although the difference between the per capita incomes in Finland and Sweden – a significant factor in emigration – has fallen from nearly 50% in the 1950's to about 30% in 1980, nevertheless the difference in the standard of living is still a considerable lure to emigration. It is another question whether Sweden has retained its former capacity to absorb Finnish labour.

The acute difficulties that emerged in the latter part of the 1970's in the Swedish economy have dominated recent analyses of the situation in a dramatic fashion. These difficulties are also casting a gloom over the prospects for the 1980's. [6] In regard to the key problems of the Swedish economy and the reasons for them, the following aspects, among others, have been emphasized: slow economic growth, a high rate of inflation, powerful growth of the public sector together with the indebtedness of the state, the deficit on current account, and the withering of industry – especially the export-oriented sector.

Sweden's economic problems cast a shadow over Finland. In the first place, as a result of trade and other economic relations, Sweden's difficulties are inevitably reflected in Finland, too. In the second place Finland has in its development generally followed Sweden with a certain time-lag. The question now is whether Finland will catch the infection of the "Swedish disease". This is quite possible – hence the development of a resistance is of the utmost importance. In comparison with Sweden Finland has certain advantages in respect of both the improvement in productivity and of its international competitiveness. In Finland labour costs are lower than they are in Sweden. The average gap between the level of technology in Finland and the top level in the world is greater than the corresponding gap in Sweden and thus the opportunities for improving productivity through the extended use of high technology and know-how are also obviously greater in Finland. Again, the alternatives provided by the internationalization of the economy have not yet been exploited in Finland as many-sidedly as in Sweden. Finally, Finland's more developed trade with the Soviet Union and other Socialist countries is enabling certain branches of industry (for example, shipbuilding) to prevent the crises from occurring in the same branches as in Sweden, where the opportunities afforded by trade with the Socialist countries are only now beginning to be more widely investigated.

Finland facing the future*

What to produce and export

Even in the future there will be room for the appellation "Finland's green gold" when referring to the forests of the country. This fact finds its manifestation in the great investments that the forest industry is undertaking in the beginning of the 1980's.

Even if the comparative importance of wood in industry and exports should decline, there are nevertheless strong grounds for assuming that *the special significance of wood for the Finnish economy will endure.* Firstly, the country has raw material of its own in this respect for industry. Secondly, success in this field does not so much depend on the conquest of markets as on the maintenance of the Finnish forest industry's already strong position in the world market. Thirdly, the long traditions in this field mean today that there are a high level of technology as well as many-sided skills and know-how both in the forest industry itself and in the machine-building industry and other ancillary industries connected with it.

The productive structure of the forest industry has to be developed in such a way that the high level of technology and the fine quality of wood fibre should be put to better use than ever. Obviously, too, the diversification of export operations and the expansion of the Finnish industry abroad in areas where the raw material is cheap have much to recommend them. The comparative advantage that Finland has in this sector extends, as a matter of fact, beyond the actual forest industry into the field of designing, constructing, and equipping manufacturing units, and this affords plenty of opportunities for the export of technology and know-how to the world markets.

The trend towards the production of high-quality manufactured goods, achieved by a demanding technology, innovation, and a highly-trained labour force, represents a suitable goal for all branches of production. The preconditions for this are mobility both of capital and labour, and structural changes both between various fields of production and within them. Alongside the traditional export sectors new ones must be developed, as has indeed already occurred. The new growth areas need not be restricted to the fields of industry and technology. An unconventional example of new areas of development is that afforded by insurance. In the 1970's the operations of Finnish insurance companies abroad and in reinsurance grew from almost nothing to such an extent that foreign reinsurance now provides greater premiums than any other kind of insurance.

On the basis of recent experience it would seem that *the prospects for know-how exports will be quite good.* From having been almost negligible in the 1950's and 1960's, the trade in technical expertise, which generally refers to the technical know-how needed

*In recent years the following research institutes have, among others, analysed Finland's long and medium-term economic prospects: the Economic Planning Centre (1977–1990), Hudson Research Europe Ltd (1979–), the Economic Research Institute for the Labour Movement (1979–83), the Research Institute of the Finnish Economy (1980–84), and Economic Department of the Ministry of Finance (1980–84).

in the planning and implementation of investment projects, changed markedly in Finland in the 1970's. Receipts from exports of technical expertise have more or less doubled every year since 1973. In 1978 and 1979 the surplus on this trade (licences and royalties excluded) amounted to some 1,000 million marks. Given the high level of technical know-how in certain sectors as well as a generally well-trained labour force, the prospects for a continued export of technical expertise seem bright. Of course the resources available in Finland will set a limit to the expansion of exports. [7]

In delineating an economic role for Finland the proposal has been made that *economies of scale should be combined with "the economy of smallness"* characteristic of the country because of its size. What has to be produced at the lowest cost are great quantities of products just in those fields where it is possible and profitable to do so under Finnish conditions. But, in addition, special attention should be paid to the development of a flexible pattern of production so that there should be an active and quick adaptation to the changes in the international economy. In relation to the products in great demand on the world market Finland is in the position of a marginal seller of slight importance (apart, of course, from certain products of the wood and paper industry). But by means of a selective structural policy resources can be allocated for the manufacturing of certain products, the demand for which is small. In this way Finland can then build itself up into a supplier of some significance.*

In the international division of labour Finland must *increasingly emphasize in the future quality and originality, continue to augment the input of research and development, and above all answer the challange of the power of the great with a small country's flexibility.* Although low costs are not the only nor even the necessary first trump card in international competition, success in warding off inflation is very important. The deficit on current account must also be kept in check, notwithstanding the fact that industrial development is dependent on foreign inputs of capital goods and equipment.

How to act on foreign markets

If it comes to it, the Finns are probably better manufacturers than sellers. For this reason increasing attention must be paid to *the cultivation of sales techniques and skills.* Raising the level of performance in foreign languages is not merely useful but indeed necessary – the Finns like Hungarians are almost the only nation in Europe to derive no help from their mother-tongue when trying to absorb the major languages. But much else has to be put into education and training if enterprise is to remain not simply at the level of commodity trading but is to embrace also production abroad in various fields. In order to achieve saving in costs and the development of sufficient skills and know-how, smaller firms should more often than hitherto cooperate on the export market.

*These points of view have been contributed to the discussion by Professor Jaakko *Honko* in particular. Professor Honko is Chancellor of the Helsinki School of Economics.

The fundament in foreign trade policy for both the state and enterprises are *relationships with different countries.* The opportunities offered for furthering trade with the traditionally-important trading partners should be utilized. But special regard should also be paid to countries with a trade potential so far – for some reason – inadequately utilized. And for the focal point of trade it is, of course, better to choose countries of swift rather than slow economic growth.

As has been noted above, the fifteen-year agreement made in 1980 puts the future of Soviet–Finnish trade into a positive form. In regard to relations with Sweden, the characteristic features have been on the one hand a lively mutual trade and competition in third countries on the other. In the future mutual trade and the industrial integration that is linked with it will probably proceed along the lines laid down in recent years. But it would certainly be to the benefit of both countries *if in the future Finland and Sweden were to act more as partners and less as competitors in other markets than has hitherto been the case.* Both the need and the basic conditions for Finnish–Swedish, or even in some case Nordic, collaboration on international markets are apparent.

It is *the European socialist countries* – with the exception of the Soviet Union – whose trade relations with Finland have not yet been fully exploited. Finland has entered into agreements promoting economic relations both with the CMEA as a whole and then with the individual member-countries separately, but in the 1970's their effect was still not pronounced. Hence the intensive development of these economic relations is the task of the 1980's.

The share of the *developing countries* in Finnish foreign trade has been no more than about 10% in spite of considerable oil imports. Finnish investments in Third World countries are even after the rapid growth of the last few years still extremely modest: in 1979 the number of Finnish-owned subsidiaries in developing countries was 55 and only 10 of them were production companies. Because of the unusual conditions in the developing countries operations there are more difficult and prone to risks than elsewhere. Nevertheless the outlook seems to be one of good opportunities for growth both in regard to technological and scientific project-exports and in regard to the continuance of production operations in these countries. In particular, attention is being focussed on the Middle East, Latin America, and on the swiftly expanding economies of South-East Asia. In 1979 the state established TEKERA, the Industrial Development Cooperation Fund, to promote the social and economic progress of the develoing countries in cooperation with Finnish companies. [8]

The domestic markets of a small and open country do not provide enterprises with sufficient opportunities for growth and development. In meeting the challenge of international competition *the exports and the internationalization of Finnish firms will become of growing importance.* Most Finnish firms see the situation in this light, too. [9] Alongside the export of goods or even replacing it, firms should go in for more demanding types of export operations – at present operations of this type are still less frequent than they ought to be. Support in this direction is also needed from the state, the banks, and the trade union movement.

When production that demands great and many-sided resources for its fulfilment is in question, Finnish firms are often too small – whether alone or even in combination. In such cases they have to act as one part in a greater whole. A possible solution is to act as *sub-contractor.* But, in general, adoption of this role cannot be regarded as positive. For a sub-contractor the fields of innovation, management, and marketing remain undeveloped and, on account of the narrow nature of the production concerned, dependence on the buyer is great. *Part ownership and collaborative partnership* represent on the other hand participation in the planning and marketing of the finished product and its manufacture. This is really the preferred form of internationalization. Possible partners are not to be restricted merely to neighbouring Sweden but a great many other countries and their enterprises come, of course, into question.

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In the light of the above certain conclusions may be drawn, relevant in general to open economies dependent on international trade. In the first place openness should in itself continue to be favoured: participation in the international division of labour should be extended and endeavours should be made to ensure that different countries and blocs should not act against the striving after openness. In the second place, by changing the structure of industrial production and exports it should be possible on the one hand to get nearer the countries of more advanced development level, and on the other prepare to concede markets to the products of the less developed countries. Correspondingly, progress has to be made in the use of different kinds of export operations. In the third place, if the goal of a national economy is a stable and secure line of development, "all the eggs should not be put in one basket". The lesson of the 1970's is to guard against unexpected and even wild changes in the international economy. Hence care must be taken to ensure against an excessive one-sidedness and inflexibility in choices of technology, production lines, export sectors and export products or trade partners. In the fourth place, small countries in particular have to search for forms and possibilities of cooperation. In this way they will have the chance of improving their international competitiveness and of obtaining an increased benefit from international trade.

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ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ОТКРЫТОЙ ЭКОНОМИКИ: ПРИМЕР ФИНЛЯНДИИ

У. КИВИКАРИ

Малые и средние страны могут успешно приспособиться к изменениям международного экономического положения в том случае, если они в еще большей степени подчинят свое производство и торговлю требованиям международного разделения труда. Автор статьи рассматривает, как решает эту задачу Финляндия.

Финская экономика и до сих пор была достаточно открытой, доля экспорта была такой же, как и у других северных стран, однако использование лицензий и присутствие финских фирм за рубежом были недостаточными. В 1961 г. Финляндия заключила особое соглашение с ЕАСТ. Однако в конце 60-х годов попытки создания северной интеграции потерпели неудачу. ЕАСТ начала распадаться, и в 1973 г. Финляндия заключила соглашение о свободной торговле с «Общим рынком» и в том же году — соглашение об экономическом сотрудничестве с СЭВ. Финляндия всегда стремилась к равновесию в своих обязательствах.

В 1970-е годы текущий платежный баланс был дефицитным, только в 1978 г. имело место небольшое превышение. Девальвация финской марки помогла лишь в небольшой степени. Растут размеры зарубежной задолженности, и равновесие становится решающим экономическим вопросом. Темпы инфляции в два раза превышают страны ОЭСР и часто достигают двухзначных цифр. В этом большую роль играл рост импортных цен. Во второй половине 70-х годов безработица приняла угрожающие размеры, и несмотря на некоторое улучшение имеется структурная и региональная напряженность.

Очень остро стоят энергетическая и сырьевая проблемы. Из-за климата и больших расстояний потребление энергии в Финляндии — по сравнению с величиной национального дохода и численностью населения — самое высокое в мире. Большие трудности причиняет компенсация роста цен, поскольку наиболее важная статья экспорта — древесина — также попала в неблагоприятное положение в условиях мировой конкуренции.

По 15—20% общего объема торговли приходится на долю СССР и Швеции (затем следуют по порядку ФРГ, Англия и Норвегия). Торговля с СССР оказывает определяющее влияние на структуру финского экспорта. Доля изделий обрабатывающей промышленности составляет около 50%, а продукции деревообрабатывающей промышленности — свыше 80%. В импорте доминируют сырье и топливо (80—90%). 60% своей потребности в нефти Финляндия удовлетворяет за счет СССР. Велик

и ввоз машин, СССР поставил также две АЭС. Несмотря на определенный прогресс, различия общественного строя двух стран причиняют затруднения во многих отношениях. Тем не менее, торговля с СССР имеет и особые преимущества: например, она оказывает стабилизирующее воздействие на спрос на финскую продукцию, обеспечивает возможность компенсации роста цены на нефть за счет финских товаров, способствует диверсификации экспорта, пятилетние соглашения обеспечивают надежность, что особенно важно при нынешней неопределенности в области экономики.

Вследствие исторических, географических и социальных причин вторым главным партнером является Швеция, которая как богатая страна представляет также в определенной степени пример для подражания.

Две страны являются конкурентами в отношении древесины. Во взаимной торговле основное место занимает продукция машиностроения, текстильной и швейной, а также химической промышленности. Велика мобильность между двумя странами в отношении производственных факторов. В более чем 100 финских фирмах шведское участие составляет 25—100%, финское — в 20 шведских. Большое количество финских рабочих переехало с семьями в Швецию (с 1954 г. не требуется ни заграничного паспорта, ни специального разрешения на получение работы), особенно в 1975—1979 гг., но имеет место и движение в обратном направлении. Шведская экономика в 70-е годы испытывала трудности и ее перспективы также не радужны, что отражается и на Финляндии.

Что же обещает будущее? «Зеленое золото», лес, еще долгое время будет важным для финского экспорта. Необходимо улучшить производственную структуру, чтобы можно было использовать преимущества древесины высокого качества. Многое обещает и деревообрабатывающее оборудование вместе с технологией. Вообще, во всех отраслях производства необходимо производить продукцию отличного качества, применяя первоклассную технологию, а также проведя существенные структурные изменения. Благоприятны перспективы экспорта «ноу-хау». С 1973 г. поступления благодаря этому возрастают ежегодно в два раза. Благодаря своим масштабам финская экономика может гибко и быстро приспосабливаться к изменениям в мировой экономике.

Несмотря на импорт нефти, доля развивающихся стран в финской торговле составляет всего лишь около 10%. В 1979 г. 55 финских фирм имели дочерние предприятия в странах третьего мира, но только 10 из них являются производственными. Несмотря на трудности и очевидный риск, следует стремиться к расширению связей в быстро развивающихся странах Ближнего Востока, Латинской Америки и Юго-Восточной Азии.

Подводя итоги: необходимо повысить степень открытости, изменить структуру производства, обеспечив простор и для продукции развивающихся стран, стремиться к диверсификации, а также к сотрудничеству небольших стран между собой.

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REVIEWS

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ON THE DIFFICULTIES AND DEFICIENCIES OF MATHEMATICAL-ECONOMIC RESEARCH IN HUNGARY

In recent years debates on the role of mathematical-economic research have become animated. In this article I would like to contribute to these debates.* Though I consulted several colleagues before writing it I cannot undertake to describe any common opinion of mathematical economists, all the less because views are different also within this circle. I am expounding exclusively my individual opinion.

At the same time, I am trying to comment on the situation of mathematical-economic research not from "outside", but from "inside". This is the reason why I usually speak about our activities in first person plural. I do so also when I speak self-critically about one or another aspect of our activity, disregarding how much characteristic the mistake mentioned is of my own activity.

I do not strive after drawing a balance; I do not treat achievements and deficiencies equally. Let other studies review the significant achievements of Hungarian mathematical economists. At this place I should like to analyse exclusively the troubles and deficiencies.

Finally, I would like to make one more preliminary remark. I do not believe that the problems I am going to speak about here belong to *major* issues of economics, in general, and within this of Hungarian economics. There are several other more important problems that have to be clarified as well. Nevertheless, discussing these problems of secondary, subordinate importance may perhaps be useful, too.

Grouping of the application of mathematical methods

Firstly, certain notions have to be clarified if only for the sake of unambiguity of later parts.

Mathematics appear in economics mainly in three forms.

1. *Qualitative mathematical models.* The model starts from definite mathematical *assumptions.* (In case these are very general they are called axioms.) Mathematical

*On the basis of a memorandum submitted to the Scientific Council of the Institute of Economics of the Hungarian Academy of Sciences. The intention of the author is to present his ideas in a manner understandable to the non-mathematical, "verbal" economists.

assumptions always imply economic assumptions. (E.g. the Harrod-Domar growth model assumes that production is strictly proportional to capital.)

From the assumptions of the model theorems can be deduced. The logical correctness of the theorem – given the initial assumptions – can be mathematically proved. Then a *mathematical* theorem is obtained that can be *interpreted* in economic terms. (E.g. in the Harrod-Domar model the growth rate can be obtained as the product of the rate of saving and the output/capital ratio.)

Neither the initial assumptions, nor the theorems comprise any numbers. The model is described exclusively by means of symbols: the analysis is made by means of mathematical-logical operations. That is one of the reasons why it is called *qualitative* model. As a starting point certain characteristics of the system formulated with the aid of the model are assumed and from these other characteristics of the same model are concluded to.

In case a qualitative model is used, nothing else is done than logical transformations until we arrive from the assumptions at the theorems. (Though, of course, these are sometimes very complicated transformations.)

Variables of the qualitative model may represent such phenomena, processes or events that are called "quantities" by common economic thinking, but also such phenomena, processes or events that are usually called "qualitative" in the same economic everyday language. Modern mathematics is not only the science of "quantities", but one of the forms to express rules of reasoning.

Let us see some examples for qualitative models:

– Walras' model of the theory of general equilibrium and especially its modern variants.

– The Marxian two-sector reproduction schemes in general mathematical formulation.

– The already mentioned Harrod-Domar growth model and other models of growth theory.

In Western terminology analysis made by means of qualitative mathematical models is called "*theoretical* mathematical economics". What is more, even the interpretation of the expression "mathematical economics" is often narrowed down exclusively to this category (without any distinctive adjective).

2. *Quantitative models.* To construct a quantitative model first of all a qualitative model is needed that can be described without numbers, by means of symbols. This should be then filled in with numbers, symbols have to be replaced by numbers.

If a quantitative model is used no generally valid result (generally valid with the given assumptions) will be obtained. Concrete numerical results valid only for the concrete set of data are obtained. (E.g. technological possibilities, demand conditions, prices, etc. of the next five years are characterized by a definite set of data and from these production, investment, etc. estimates of the next five years are concluded to. However, no conclusion can be drawn for the growth rate or sectoral proportions *in general.*)

Therefore, the result obtainable with the quantitative model depends both on characteristics of the underlying qualitative model (e.g. variables are continuous, equations are linear, etc.) and on the numerical value of the specific input coefficient of iron for steel.)

Quantitative models may be classified from several viewpoints:

a) *Ex post* models analyzing certain relationships of a past period or *ex ante* models giving forecasts for the future. (Certain models can be used for both purposes.)

b) The data are based on actual observations of an economy or are only hypothetic ones to be used for a numerical mental experiment.

c) If data are based on observation, classification may be carried out according to the sphere of observation, the reliability of data, the particular mathematical-statistical methods by means of which primary observations were processed and so forth.

Some examples for quantitative models:

– Input-output models used in planning and price analysis.

– Linear programming (and other mathematical programming) models used in planning.

– Demand functions, as function of prices and incomes.

Some *simulation* models may form a particular transition between categories 1 and 2. Namely, simulation techniques may be used for deriving general propositions, but they are obtained indirectly in such cases. A longer series of computations is made where the underlying qualitative model is always the same. Individual computations within the series differ from each other in that symbols are replaced by different sets of figures. Accordingly, different numerical results will be obtained. Afterwards, statistical analyses are made whether the many different computation results have some characteristic, firm qualitative features. Thus in the end, qualitative statements are obtained, whose truth cannot be proved in a strictly deductive manner, but can only be verified by experiments with the series of computations, i.e. inductively.

3. *Mathematical-statistical analysis of observations.* "Raw" data, e.g. time series, cross-sectional observations are available. It is mostly impossible to utilize all data separately; they have to be "condensed" and "compacted". Two forms of condensation are used by every economist without feeling them "mathematization": they summarize (aggregate) and they compute averages. But these are only the two simplest (though, of course, very important) tools of the large stock of instruments put at the disposal of economics by mathematical statistics. There are several known techniques and methods, let us recall here only some of them: computation of trends, correlation, regression analysis, factor analysis, methods serving for the estimation of parameters of simultaneous equation systems, time series analysis, etc.

We have here on the one hand, the utilization of methods in economics, that were elaborated by mathematical statistics originally on the order of other sciences or as a result of its self-development and, on the other hand, methods that were generated explicitly by demands of economic research.

In Western terminology the expression "econometrics" is preserved for the application of mathematical-statistical methods for the purposes of economic analysis. (Thus, the word "econometrics" is not used as a general collective term, covering all kinds of application of mathematics in economics.)

Many researchers specialize in the study of econometric methods *per se.* They are not dealing directly with economic problems, but explore how statistical conclusions can be drawn from observed and measured economic data.

While the above outlined three categories may be clearly distinguished, overlaps of two or even three categories might eventually occur in a concrete research project. E.g. the author performs qualitative analysis with a qualitative model (category 1); then comes to numerical conclusions by substituting numbers into the same model (category 2); and such numbers are put into the model that were estimated by mathematical-statistical, econometric methods (category 3). However, this overlapping and combination is not compulsory. A work (in some cases all works of a single researcher) may clearly remain within the framework of one or another category.

From the above outlined categorization two important research fields were left out deliberately. One is *mathematical* research whose results are though utilized by mathematical economists, but which contribute to the development of mathematical science directly, without economic interpretation. For example, elaboration of solution methods of mathematical programming with non-continuous variables is a mathematical (and not economic) scientific result even if it will be used later on mostly by economists. The other one is such *computation-technical research* which is though useful for mathematical-economic applications (similarly to the field mentioned before), nevertheless, its value is not attached to them. They may promote the science and practice of computation techniques in themselves – without economic interpretation and utilization. These are obviously neighbouring fields and limits often fade away. On my part, however, I would like to draw the lines as follows: I call mathematical-economic research whose result can be qualified within the frameworks of economics and from the viewpoint of the subjects of economics. Thus, for example, the economic interpretation of an algorithm known in mathematics already for a long time may be qualified as an economic research result if it contributes to our understanding a feature of economic reality. On the other hand, however, elaboration or realization with a computer of a brand-new algorithm cannot be regarded as an economic research result without economic interpretation, be it otherwise a scientific achievement of great importance.

Situation of Hungarian mathematical-economic research

I should like to begin with a preliminary remark as an excuse. I am striving after a general characterization of the situation, and that briefly. It is unavoidable that some of my statements be rough-and-ready; counter-examples can be mentioned concerning all of them. Still, I rather take the risk of over-generalization than to bypass problems.

Mathematical-economic research began in Hungary in the second half of the 1950s, apart from a few exceptions, thus we were lagging behind foreign countries by many decades. In the first period progress was fast and spectacular. Mathematical methods rapidly gained authority both among theoretical researchers and practical economic managers; Hungarian results were followed with attention also abroad.

In recent years development has slowed down. The period of the first great fashion has passed. Many of the first active scientists applying these methods lost their faith and turned towards other research fields. Several economic officials expecting a lot from mathematical methods at the beginning abandoned them with some disappointment. A part of theoretical economists who observed the "explosion" of mathematical methods into Hungarian economic thinking rather with scepticism and respectful shiver at the beginning give voice to their objection more sharply now.

In my opinion expectations were exaggerated at the beginning both within the circle of mathematical economists and also outside it. At present public opinion is turning into the opposite direction as a reaction. This also justifies to appraise soberly where we are now.

I am coming to a more detailed review. In the course of this I will not insist on the original order of the three categories introduced in the previous chapter, but begin with category 2, then come to category 3 and will finally speak about category 1.

Quantitative models

The first results claiming greater attention were obtained in category 2: various quantitative models were built one after the other for the purposes of planning and economic policy analysis in general, under the auspices of the National Planning Office, the Central Statistical Office, the National Office for Materials and Prices and other economic agencies. Work is going on even at present; its methods are continually improving. Still it seems as if the economic authorities were less interested in this activity at present than previously, in the "heroic age". There are several reasons for that, out of which I should like to point out only a few.

At the beginning we could still refer to the fact that our work was of experimental character, that we wished to elaborate rather the method itself and did not attribute even ourselves too great importance to numerical results. However, as time is passing this excuse is less and less justified. At present already *utilizable figures* are expected from model-builders by those making practical decisions. Of course, nobody requires exact computation of estimates, but at least well interpretable numerical results are expected that are reasonable as regards their order of magnitude. Weaknesses blinked at with the first pioneering computations are less and less overlooked by now. In other words, the reason for disappointment is not that present models are worse than former ones, but that the development of models could not keep abreast of rising requirements which suddenly accelerated with the first years of pioneering experimentation gone.

Some ventures proved to be too ambitious. Some model-builders became obsessed with different variants of megalomania. They are dimensioning their models indigestibly large. They raise too great demands towards data supply. They try to run too fast ahead in the computerization of planning and economic analysis. This results in a very impressive model, only it is almost impossible to fill it in with figure; computations take a very long time. And if it gets ready at all by then the decision-maker has already taken his decision. A "traditional" economist is frightened by the complexity of the task, by its overambitious requirements and rather keeps back.

In the field of numerical models two kinds of activity are going on. One is the work of the *research* worker who further develops methodology. The other one is that of the *applier* who utilizes methods already elaborated for the practice. Of course, in reality these two activites are linked, but this combination may be attained in various proportions. In my opinion the research worker's ambition is getting the upper hand in most of us. Everybody wishes to add some "novelty" to the methods used until now, even he who is employed by a government agency expressly for the purpose of practical application. Of course, any application requires some further development. But, some appliers go far beyond indispensable creative imporovements, fully destroying the existing construction with every new computation and beginning almost everything again, for the sake of demonstrating their "independence" and "ingenuity". This is one of the reasons why even computations aimed at direct practical utilization are lasting long because of experimentation. Permanent changes in model structure make also the systematic organization of special data collection serving for the basis of computations more difficult.

The first numerical models described the real sphere, the physical processes of the economy (production, consumption, investment, export, import). Later on, beside them or as a complementation of models of the real sphere, modelling of financial and price formation processes also appeared. It is understandable and justified that work began with this. It is regrettable, however, that up to now very little attention has been paid to the modelling of *economic behaviour.* What is the reaction of economic units to various impulses, e.g. prices, financial incentives etc.? Even what has been done in this field is mostly an imitation of behavioural models based on observations of the capitalist economy. There is little result concerning quantitative modelling of economic behaviour under our circumstances.

I have enumerated some of the mistakes to be found with us, constructors and appliers of quantitative models. However, it would be unjustified if we took the entire responsibility for the situation developed. Many economists working in different institutions and planners stand aside from participation, because they feel the logical rigour of the model uncomfortable: it may easily turn out that there are no facts or data behind their statements; or that there is a contradiction between their various suggestions. In other cases reluctance is explained by intellectual inertia. Though models are operated usually by specially trained experts, it is recommended also for users to be familiar with them; it is good if they are able to follow the general logic of the model and the particular techniques of analysis made with it. There are some who feel it is easier to belittle mathematical methods than to learn them.

While recognizing all these troubles and unhealthy trends I still think there is a possibility for further development. A rather stable, expert staff has developed feeling this topic their profession. Sections specially established for the application of mathematical methods were integrated into several leading agencies. It is to be hoped that the relationship existing between operators of quantitative models and practical economic decision-makers will become a sound, lasting and balanced co-operation after the first "great love" and the first great disappointment.

When already speaking about positive possibilities of cooperation between quantitative modell-builders and practical economists let me mention also a danger. There are also mountebanks among model-builders making computations on the basis of assumptions not thoroughly thought over, remaining tacit about assumptions implied in the model and relying on trifling "data". On the other hand, there are also not too exigent enterprise managers who require a "model" only in order to pretend that their decisions are well founded. This symbiosis of mountebanks and those who are using models for the sake of "scientific" appearance can do much harm. We should fight against these phenomena more definitely.

Mathematical-statistical processing of data

In my opinion we are lagging behind very much in this field. I would not like to restrict this statement only to the circle of mathematical economists. In my view every economist using data should be obligatorily expected, without exception, to properly "condense" and "compact" them – i.e. process them with mathematical-statistical methods. If quantitative statements are made ("this process has accelerated . . .", "this phenomenon is closely connected with . . .") then his own statement should be regarded a hypothesis he is obliged to test: statistically verify or reject.

In Hungarian economic literature works teeming with "indigested" numbers can often be found. Even such elementary tools as correlation computations examining the closeness of some relationship between two groups of phenomena, or fitting trends to a time series, or regression analysis to describe the nature of relationships betwen phenomena are used by relatively few. What is more, some economists are almost proud of their statistical ignorance, though they should be ashamed of it. It is a sign of our uncivilized economic thinking that such analysis of data suitable for mathematical-statistical analysis is not an unconditional requirement to be met even by a third or fourth-term undergraduate, not to speak about experienced researchers with scientific degrees.

Of course, an increased exaction would be needed among those who are building and using quantitative models in the mathematical-statistical processing of the data input. It should be admitted that we often showed bad examples ourselves. Often much greater attention was paid to the structure of our model than to its numerical material. It was correct that experts' estimation were relied upon to a great extent – but this was perhaps done all too one-sidedly. The statistical foundation of our computations was

poorly dealt with and little attention was paid to making estimations with most up-to-date procedures.

Only a few economists have been specializing in econometric research in Hungary. Even they were mostly satisfied with taking over and making small modifications of the methodology developed in advanced capitalist countries, and rarely undertook to examine and overcome specific measuring difficulties arising under our circumstances.

Qualitative models

Several remarkable results were achieved in this category in Hungary. True, relatively few theoretical mathematical-economic studies are carried out in Hungary, but these attain the level of good foreign works. What is more, the majority of these works has a considerable advantage over foreign ones of similar character. A considerable part of the latter is sterile "theoreticisation". However, in Hungary a great part of theoretical mathematical-economic research is dealing with problems – at the level of abstract theory – which were raised by real economic life.

A frequent great defect of theoretical mathematical-economic research and analyses with qualitative models has to be pointed out. It is not always properly indicated what economic assumptions are implied by the mathematical assumptions of the model, what simplifications and omissions they contain and which aspects of reality are disregarded. Similarly, the economic meaning of conclusions and theorems is not always enlightened with proper thoroughness. It is not sufficiently emphasized that any of these theorems is only a conditional partial truth; a more or less rough approach to some aspect of reality. These negligences weaken the self-control of the model. The contents of mathematical-economic theoretical studies is superfluously mystified for outsiders. Thus not only a non-mathematician economist cannot follow their main economic reasoning, but even a reader expert in mathematics (but not familiar with the special topic) will not be able to do so. Especially great circumspection and conscientiousness are required when we wish to draw normative conclusions by means of a qualitative model. What seems to be expedient in the abstract world of the model will not necessarily be so in reality where also circumstances disregarded in constructing the model assert themselves. Unfortunately, this cautiousness is not always observed when practical recommendations are formulated. As a consequence of all these mistakes theoretical mathematical-economists are not guiltless themselves in that their work does not meet with the required understanding everywhere.

Much more incomprehension has to be faced by qualitative models than quantitative ones. It is relatively easily admitted even by the majority of "verbal" economists that where a mass of numbers should be dealt with, description of relationships between them by means of systems of equations may be useful and computations should be made with computers. But many of those accepting this feel any model without numbers only a "meaningless abstraction".

In my opinion there are two forms and sources of opposition and aversion. A part of those showing aversion shrink, as a matter of fact, not only from theoretical mathematical-economic models, but from *any* abstract theory. This has partly a historical explanation. As a healthy reaction to previous dogmatism, demand for practicality became greater in the second half of the 1950s. But this had led to narrow "practicism" with many economists, to impatience with all research not "applicable" immediately, on the basis of which official decisions and measures cannot be immediately taken. Of course, nobody denies the importance of basic theoretical research "in principle", but is sniffing at them facing one or the other particular theoretical paper or book. Works going on at abstract theoretical level are not esteemed too high.

On my part I do not agree with this view, but I consider it at least consistent, since it equally despises all kinds of abstract theoretical research. There exists however, another inconsistent view that, on the one hand, admits the importance of abstract theoretical research, but denies, on the other hand, that this can be made by using qualitative mathematical-economic models.

If we acknowledge the importance of abstraction in economic research then it is impossible to set any simple rule suitable for deciding what degree of abstraction is "permissible", "sound" and what is "meaningless' or "unrealistic". A part of natural sciences is able to isolate some phenomena by means of experimentation from other ones (disturbing from the viewpoint of investigation); to create *ceteris paribus* circumstances artificially. The main tool available for social scientists to this end is the "creation" of an artificial notional world by means of abstraction. Verbal theory applies no less daring abstraction and simplification than the mathematical one – it just formulates them in another language.

I do not allege that the qualitative mathematical model is the only possible tool of abstract theoretical analysis. All mathematical economists have to be aware that this apparatus has very important advantages and disadvantages as compared to verbal analysis, and that advantages and disadvantages appear simultaneously, usually inseparably from each other. Its disadvantage is that it should be kept within the limits of mathematical manageability. Sometimes this involves no special sacrifice, but at other times it is a very serious concern. Another disadvantage is that rigour often leads to intricacy. Sometimes relatively simple phenomena which are easy to enlighten with words of the living language, because rich associations are attached to them, can be formulated mathematically only clumsily. A further disadvantage is that often stronger assumptions should be made than in verbal analysis which relatively easily adopts various stipulations, limitations and special conditions.

On the other side advantages can be found. The most important of these is precisely rigour. It enables, what is more, often even enforces disciplined reasoning. It cannot be left to the phantasy of the reader or open what the assumptions are, these have to be clearly stated. Theoretical analysis made with a mathematical-economic model deliberately reveals its vulnerability: all of its statements are explicitly *conditional* truths. Its truth may be accepted if definite assumptions are accepted as points of departure.

Accordingly, the real contribution of analysis made with a qualitative mathematical model to cognition is frequently of a reverse direction. The theorem is not deducted from assumptions, but the assumptions are looked for with which the theorem is true. This theorem may be eventually a well-known economic statement. There are many who believe that a given statement is generally true before making an exact analysis. On such occasions the result of mathematical analyis clarifies that the statement is only true under definite conditions.

To this one more advantage can be added. With problems where complicated relationships between several variables should be found, the model helps us in revealing indirect connections. These are often very difficult to follow with verbal analysis.

Finally, one more important aspect: for each quantitative model also a qualitative one is needed. Here I would revert for a moment to the economists mentioned before, namely, who acknowledge the usefulness of numerical quantitative models, but query that of abstract qualitative models. But it would be impossible to use, say, input-output tables or linear programming in planning or price formation if the economic nature of these model types were not known *in general,* over and beyond the individual actual economic applications.

If we admit that a qualitative model as a tool of analysis has both advantages and disadvantages, the conclusion is obviously given: in research work both verbal analyses and those made with mathematical models are needed. I should like to emphasize that I do not say this for the sake of the reassuring belief in "peaceful coexistence", nor for that of the principle of *"laissez faire",* but out of methodological conviction. I would add that according to various indications most mathematical economists share this view, apart from some over-zealous colleagues. There are hardly any among us, either in Hungary or abroad, who would belittle the work of non-mathematical economists. On the contrary, several examples can be mentioned for that verbal works raising really significant concepts are received with great respect and carefully studied by mathematical economists. The latter try to translate them into their own language. Precisely this translation makes it possible for them to attempt to further develop the ideas raised in a verbal work.

According to my experience this "game is played at one goal". Both in Hungary and in many foreign countries repeated sharp attacks (often very superficial and incompetent ones) are directed at theoretical mathematical-economic researches. This attitude is by far not general among non-mathematical economists; there is no evil general war between "verbalists" and "mathematicians". Attacks are isolated, but their importance is increased by the fact that some highly respected economists can be found among the most vehement criticizers.

This is actually not a new phenomenon, which fact is reassuring: ever since mathematical economic researches have been going on, sharp methodical refutations could be occasionally experienced. Despite this fact, our research was able to survive and further develop.

On my part, I am of the opinion that there are no exclusively true research methods, nor analytical techniques. It depends on the nature of the problem as well as on

the inner characteristics and abilities of the research worker which can be more succesfully applied. Neither mathematical, nor non-mathematical theoretical researchers have good reason for self-satisfaction. Our knowledge is rather uncertain; neither of the research methods has properly demonstrated its own efficiency. We have every reason to be modest and look at our own performances critically or perhaps with some self-irony and hope that results of others will be eventually better.

Final remarks

My notes dealt with some *general* phenomena in Hungarian economics. It may well be that the shares or relative weights of various phenomena will deviate from general ones at different institutes or universities, but their nature is basically the same.

I do not believe, that any of the undoubtedly existing problems could be solved by resolutions of higher authorities or scientific bodies, or by organizational measures. It cannot be prescribed by a director's order that mathematical economists should give a more detailed economic interpretation of their theorems in the future or that each research worker should fit a trend to his time series or that some of our colleagues should more modestly deal with problems of which they are not experts.

There is only one decision that seems necessary. This is not new, either, and requires no formal "resolution", just another strengthening of the inner conviction of all concerned. Namely, the freedom of choice of research methods should be ensured. It is not enough to allow passively researchers to decide on the methodology they wish to apply. Those making experiments ought to be *encouraged* and in case of obstacles they should be assisted in overcoming them. Among others, also those should be encouraged who make experiments with the application of mathematical methods, qualitative and quantitative mathematical models. This encouragement should be obtained even from those who have doubts themselves concerning these methods. I think that everybody dealing with the direction and organization of scientific work and the education of youth should have some reservations concerning his own approach. He should be ready to consider whether it is not him, but eventually the other one, his scientific discussing partner, his methodological "opponent" who is right? And if he is ready for that, he will be able to encourage generously also such works concerning the results of which he has some doubts.

The more varied the activity of economic research institutions will be from the methodological viewpoint, the more vivid their intellectual life may become and the better will be the chances that at least a part of research will be really successful.

I. DOBOZI

THE FIFTH HUNGARIAN–US ECONOMIC ROUND-TABLE

The Fifth Hungarian–US Economic Roundtable took place in Cambridge (Mass.) USA, on May 7–9, 1980.*

Pursuant to the preliminary agreement three subjects were discussed at the conference: [1] prospects of world economic development in the eighties; [2] East-West economic relations; [3] interrelations of micro- and macroeconomic control in Hungary and in the United States.

Prospects of world economic development in the eighties

On this subject Mihály *Simai* presented a paper under the title "Changes in the international economic environment in the eighties and beyond". He stressed that the 1980s would be the most difficult period for the advanced capitalist countries in the era following World War II. Permanent slowdown of growth and an epoch of development aggravated by conflicts and great uncertainty might be envisaged. Under the new conditions of economic growth, the economic institutional system based on Keynesian economic policy proved increasingly ineffective. To develop adequate instruments of eco-

*1. The conference of economists was organized pursuant to an agreement between the Hungarian Institute of Cultural Relations and the American International Research and Exchange Board (IREX).

The members of the Hungarian delegation were: Mihály *Simai*, Member of the Academy, Deputy Director of the Institute for World Economics, head of the delegation; András *Blahó*, Assistant Professor of Karl Marx University of Economics; István *Dobozi*, Research Fellow of the Institute for World Economics, secretary of the delegation; Gábor *Földváry*, Section Head of the Institute of Cultural Relations; Béla *Kádár*, Head of Department, Institute for World Economics; András *Köves*, Head of Department, Institute for Economic and Market Research; Ferenc *Molnár*, Senior Researcher of the Institute of Economics; Márton *Tardos*, Head of Department, Institute for Economic and Market Research; György *Varga*, Deputy Editor-in-chief of "Figyelő" (Hungarian economic weekly).

The members of the US delegation were: Edward *Hewett*, Professor of University of Texas, head of the delegation; Morris *Bornstein*, Professor of University of Michigan; Joseph C. *Brada*, Professor of Arizona State University; Donald *Green*, Vice-President of Chase Manhattan Bank; Paul *Marer*, Professor of Indiana University; Michael *Marrese*, Professor of Northwestern University; Richard *Portes*, Professor of Birbeck College (University of London); Thomas *Wolf*, Professor of Ohio State University.

US observes were as follows: Abram *Bergson*, Professor of Harvard University; Joseph *Berliner*, Professor of Brandeis University; Padina *Desai*, Professor of Harvard University; William *Diebold*, Senior Fellow of the Council on Foreign Relations; Evsei *Domar*, Professor of the Massachusetts Institute of Technology; Richard *Ericson*, Professor of Harvard University; Oldrych *Kyn*, Professor of Boston University; Ivo John *Lederer* and John P. C. *Matthews*, Deputy Directors of IREX; George *Soros*, Soros Fund Management; Tibor *Vais*, Professor of Harvard University.

nomic policy and new models of economic growth would meet in the 1980s with great difficulties.

The decade of the 1980s would be a new stage of development also for the majority of the European socialist countries. The classical method of industrialization came to an end in all socialist countries and gradual transition to a higher level of development began to unfold. This period would be characterized by a slower growth rate than earlier. The necessity of a structural transformation and the "challenge" of world economy made it imperative to continue developing the economic control system. Under the new conditions it was inconceivable that the socialist countries could solve their economic problems without developing the international division of labour multilaterally and without improving efficiency. A more active participation of the socialist countries in the international division of labour would necessarily result in growing sensitivity to the effects of unfavourable changes in world economy.

An increasing danger of conflicts existed as larger developing countries endeavoured to take leading position. This circumstance increased uncertainty in international relations. Professor Simai called attention to the extraordinary great differences in conditions of development and growth in the developing world and to the resulting strong differentiation that was likely to grow stronger in the eighties. He pointed out that the increasing interdependence made it urgent to build up a system of international cooperation which would prevent or at least restrict the widening of inevitable regional conflicts. As regards the future, solution of the structural problems on world level has become a very important issue. To attain that goal, a more harmonic international cooperation than to-day is needed.

East-West and Hungarian–US economic relations

Four papers were dealing with this subject. In his paper entitled "Effects of the world economic crisis on the East European economies" Richard Portes claimed that the widespread opinion that political *détente* in the 1970s strongly promoted the growth of East-West trade, was questionable. In the case of the CMEA countries, *détente* did not bring about a basic restructuring of their international economic relations. The transfer of technology in the 1970s did not accelerate in the degree some people think. According to statistical data, the share of products representing high technological level in the exports of the advanced industrial countries to the CMEA did not grow between the end of the 1960s and the late 1970s.

The most significant effect of the world recession on the CMEA countries was an unprecedented abundance of credit sources. In addition, underutilisation of productive capacities in the advanced capitalist countries caused by the recession and, consequently, increased orientation of Western firms to the markets of the CMEA countries stimulated the latter to import investment goods from the advanced industrial countries. The almost unlimited access to the Western credits enabled postponement of adjustment to the

problems related to the crisis (deterioration of terms of trade, protectionist tendencies, declining competitiveness, etc.), as well as delaying the restructuring of the economic systems. Thus, Western loans to a great extent served as substitutes for economic adjustment and made it possible to carry on economic policies unsuitable to improve economic performance and the balance of trade in the long run. In the case external financing became impossible or hampered, further pursuit of this policy would involve serious dangers for the CMEA countries.

As regards the future of East-West relations, Professor Portes stressed that no rapid growth could be expected, in fact, it was justified to reckon with a slowdown of the growth rate. In the eighties protectionism would again strengthen in the advanced industrial countries, political factors would have a growing – very likely unfavourable – influence on the development of relations. Credit supply of the Euromarket to the CMEA countries would grow less rapidly, the stock of debts could be growing only at a very low rate. Since under the changed conditions of the eighties the transfer of technology and external financing would substitute for the internal economic reforms only to a lesser extent, a growing economic pressure on the majority of CMEA countries would stimulate them to make effective changes in their economies, i.e., to carry out extensive structural adjustment.

The paper gave rise to a rather vivid debate. Many participants stressed, both on US and Hungarian side, that the speaker underestimated the significance of political factors in East-West economic relations. It was characteristic that the recent deterioration of political relations and the sudden halt in the process of *détente* influenced unfavourably new East-West co-operation agreements. Some US participants supported the concept expounded by the speaker that external financing allowed the postponement of adjustment. One of the Hungarian participants remarked that, at least in the case of Hungary, the unfavourable external impacts – though with a certain time-lag – accelerated the adjustment, i.e., the carrying into effect of some internal economic changes. It was suggested by the speaker that on macroeconomic level the adequate way of adjustment for the CMEA countries was restriction of internal consumption and, on the global level of the CMEA, integration, especially a strengthening specialization in the manufacturing industries.

In his paper "East-West trade: some reflections on today's problems and dilemmas" András *Köves* claimed that there were many in the West who tended to overestimate the importance of East-West trade for the socialist countries. On the other hand, some in the socialist countries underestimated it. In the past, embargoes frequently proved inappropriate for attaining the objective expected from them. According to soberly thinking Western experts, economic pressure exerted on the socialist countries obviously had its own limits. In harmony with Portes, the speaker demonstrated that the share of high technology products had not increased in East-West trade. The main determinant of this trade was the import demand of the socialist countries. The imbalance of economic relations might be unequivocally traced back to the lack of reform within the socialist economies and to unfavourable changes occurring in the foreign markets. Referring to the

solution of equilibrium problems, the speaker touched upon the dilemma of export-orientation versus import substitution, stressing that the former was the rational way of strategy.

Béla *Kádár* in his paper "Prospects of US–Hungarian economic relations in a changing international and domestic economic environment" laid the emphasis on the economic policy interrelations influencing the growth, structure and organizational form, as well as the equilibrium conditions of relations between the two countries, and presented Hungary's interests. He stressed the role of political environment in influencing intensely the economic relations. By having mutually granted the most favoured nation treatment, Hungarian exports to the US significantly increased. Also its structure has developed: the share of engineering products grew higher and reached in exports to the United States a higher level than in the case of several other advanced Western countries. US–Hungarian economic cooperation was characterized by a comparatively significant weight of cooperation agreements. The earlier high degree of enterprise concentration in the mutual relations recently began to decline.

In the debate following the two Hungarian papers several Hungarian participants emphasized that the uncertainties of US trade policy, the tendency to subordinate economic relations to politics, the often delayed process of licencing affected unfavourably the economic relations of the United States with the CMEA countries by bringing uncertainty and too much risk into economic cooperation.

Some members of the US delegation raised the question whether Hungary, with the powerful urge to export, would be able to fulfil the commitments undertaken under GATT. One of them, in turn, stressed that the new reforms in Hungary (as the realistic systems of exchange rates and of prices, the restriction of subsidies) would increase GATT-conformity of the Hungarian economy and rendered it possible for Hungary to take the initiative to attain being handled as a market economy in the GATT.

In his paper "Determinants of Hungarian exports of manufactures" Thomas *Wolf* set forth the results of his empirical survey in which he tried to detect the factors determining Hungarian exports of finished goods to the FRG. According to his econometric survey covering the period between 1970 and 1977, regarding 16 important products, a great number of Hungarian enterprises successfully entered the respective markets of the FRG and increased significantly their market shares. One important factor of this success was that in respect of half of the products the Hungarian enterprises reacted rather sensitively to the relative changes in prices obtained in the domestic and in the FRG markets, which meant that the supply elasticity of the Hungarian enterprises was positive. In the case of more than one-third of the products under investigation the Hungarian market share followed the changes in business cycles in the FRG, so that in the periods of recession the Hungarian market shares declined and *vice versa.* According to the speaker, the decline in the Hungarian market share during the recession periods was attributable rather to the agricultural trade policy of the West-European countries than to the "residual" character of Hungarian exports.

Hungarian economic development and mechanism

Edward *Hewett* in his paper "The Hungarian economy: lessons of the 1970s and prospects for the 1980s" pointed out that the prevailing structural and equilibrium problems of the Hungarian national economy were rooted in the period preceding the reform of 1968. The world-economic changes highlighted the shortcomings of the economic institutional system and contributed to the recognition that the reform failed to attain its main objectives. One of the decisive deficiencies of macroeconomic planning and control was that it was incapable of effectively regulating investments. This led to the perpetuation of excess investment demand, i.e., to a regular increase of the rate of investment. In his opinion a surprisingly high number of economic institutions and behaviour patterns survived the reform of 1968 and adapted their mode of operation to the new conditions. The institutional hierarchy of the economy remained practically unchanged. Implementation of the reform was significantly limited by the fact that the relations of the country with the other countries of the CMEA could only be realized through centralized long-term agreements, incorporating mainly quantitative targets.

With reference to the measures taken in January 1980 he stressed that these produced no basic change in the control system, but revaluated the significance and relative weight of some regulators (mainly of prices and subsidies). It was questionable how far and how long the central bodies would be able to carry through the changes consistently despite the widespread political and economic pressures for exceptional treatment.

Congenial thoughts with the foregoing were expounded by Morris *Bornstein* in his paper "Evaluation of economic reform in a socialist planned economy" analyzing experiences of the Hungarian reform. According to his opinion the new economic mechanism succeeded in realizing but a part of its principles. In certain spheres, despite the formal process of decentralization, some informal central control continued to subsist. Though the production plans imposed by the ministries on the enterprises and the administrative allocation of inputs were formally abolished, the enterprises continued to receive informal "guidance" from the supervisory organs. Though it was the enterprises that carried out two-thirds of all investments, the administrative control through credit granting and subsidies was still extremely strong. Due to the continuing formal and informal control of production, input supply and prices of the enterprises, profit failed to fulfil the function of being a true indicator of performance.

In the opinion of the speaker there were several causes for the only partial and inconsistent implementation of the economic reform. [1] In several economic branches extensive enterprise concentration rendered the unfolding of market competition impossible, though it had been the goal of decentralization. [2] Strong political constraints emerged in respect of full employment, the relative stability of prices and income distribution. [3] CMEA commitments had to be fulfilled. [4] After 1973 the Hungarian economy met with difficulties which had been unforeseen in 1968.

Michael *Marrese* presented a paper on "The role of the second economy: lessons from Hungary". He grouped the activities of the second economy into the following categories: [1] legal private sector; [2] "officially not recorded" activities in the private sector; [3] people employed in the service sector of the first economy whose earnings depended substantially on tips, "thank you" money and bribes; [4] persons who clandestinely utilized state-owned property, stole state-owned raw materials, spare parts and finished goods, or engaged in other types of illegal financial and trade transactions. In his opinion the insufficient or missing regulation of certain aspects of the second economy and insufficient interestedness of enterprises in maximizing profits elicited two negative effects: on the one hand, the individuals kept back their performance in the first economy and, on the other, the incentive character of wage regulation in the first economy became very weak. In order to eradicate the dysfunctional aspects of the second economy the following changes in economic policy were required:

1. to redraw the boundaries between regulated and illegal activity;
2. to institute a better means than today of transferring property rights;
3. to decentralize authority in controlling the activity of the second economy by creating a medium for profit-maximizing enterprise behaviour;
4. to extend efforts to detect and punish those who engaged in illegal activity.

György *Varga* dealt in his paper with the Hungarian control system introduced on January 1, 1980. He emphasized that the reform of economic control and management of 1968 was not an action once for all, but constituted a step in a process which postulated adjustment to the changing internal and external economic conditions. The essence of the changes of 1980 was to strengthen the so-called "normative" character of the regulators and increase the influences of external markets for the sake of creating rational economic orientation and valuation of resources. In the future, he said, modification of the pricing and control system would be accompanied by the development of a healthier enterprise sector and of the system of economic institutions. He emphasized that state monopoly must not be interpreted as an enterprise monopoly.

The subject of Márton *Tardos'* paper was "Economic relations between the state and the enterprises". The new economic mechanism in Hungary, he stated, assigned a greater role than earlier to commodity and monetary relations. In respect of these there were though still significant differences between the practice followed by the socialist Hungarian economy and that of the capitalist market economies. The explanation could be found in the differing functions of money. While in the capitalist economies money served for the integration of economic processes, in Hungary the free circulation of money was limited to strictly separated spheres of business relations. The conclusion of the analysis was that the new economic mechanism was able to reconcile the activation of commodity and monetary relations with the maintenance of a hierarchically centralized decision-making system and central control. The consequence was, though, that the endeavour to transform the Hungarian economy from a sellers' market into a buyers' market failed.

Paul *Marer's* paper was devoted to "Exchange rates and convertibility in Hungary's new economic mechanism". He was searching for reasons of the large discrepancy between the commercial and the tourist exchange rates of the forint. He traced back the strikingly higher purchasing power of the "tourist forint" to three main factors, i.e. [1] the heavy subsidization of many consumer items, in consequence of which the consumer price level became lower than the producer price level; [2] too many highly expensively manufactured goods were exported by Hungary to Western countries the production and export of which was not based on comparative advantages; [3] poor marketing activity and Western discrimination against Hungarian goods depressed the Hungarian export prices. He also stressed that under the prevailing conditions of the Hungarian economy (low price elasticity of demand for imports and of supply for exports, distortions of the internal price system, etc.) devaluation of the forint was inexpedient to improve the balance of trade, it might result rather in increasing inflation. According to an estimate, a 1 per cent devaluation of the forint involved a 0.8 per cent rise in domestic producer prices. Analysing the long-term plan of external convertibility of the forint he noted that it presupposed further improvements on the economic mechanism and, above all, on the price system. He was pessimistic about the prospects of convertibility within the CMEA. As long as the majority of the CMEA countries wished to adhere to the traditional type of economic system, intra-CMEA convertibility could not be realized.

In the debate members of the Hungarian delegation emphasized that the improvement of economic control was to be implemented under conditions essentially different from those in 1968. Economic coercion was much stronger, people were economically much more educated, leaders in the economic life had broader experience than 12 years earlier. These factors guaranteed the possibility of carrying through the reforms despite the more difficult conditions of our days. Economic policy aimed at restriction of the domestic consumption was not a lasting solution to the structural problems of Hungarian economy. This sort of policy could be tolerated only through transitory periods, in the long run it would obviously meet with political and economic difficulties. The goal, they said, was not a global restraint, but a sectorally more differentiated rate of growth.

In discussing the issue of the so-called second economy, some participant on both the US and the Hungarian side questioned the categorization by Professor Marrese. The main objection was that he considered some part of the legal individual activity as also belonging to the sphere of the second economy. Many agreed with his statement that it was the supply problems prevailing in the first economy that were the major causes of partially or totally illegal activity in the second economy. To a certain extent, the second economy corrected the equilibrium problems of the first one.

In the course of the debate on convertibility the representatives of the Hungarian party expressed that we were striving after the external convertibility of the forint which – provided that certain conditions could be realized – was not impossible. According to some US experts, the limited, so-called external convertibility of the forint would not bring about advantages as compared to the present state of affairs.

Problems of control in the US economy

In his paper entitled "Some interrelations of micro- and macroeconomic control in the United States" Ferenc *Molnár,* employing the method he had elaborated together with Péter *Erdős,* member of the Academy, demonstrated how contradictory the results of the macro- and microregulation applied in the United States were, destroying the effects of one another. During the debate the speaker expounded that the present recession was caused by the Carter government itself, more specifically by its budgetary and monetary policy. This evaluation met with the agreement of the US participants. In the question of fighting inflation, especially in regard to controlling wages and prices, an animated discussion emerged between the US economists. Some of them argued against the control of wages and prices by saying that it distorted the allocation of resources, leading thereby to falling incomes and, in addition, stimulating the enterprises to deteriorate the quality of products. Others, in turn, stressed that unemployment resulting from the lack of price and wage control was a distortion in itself and caused decline of incomes, too.

András *Blahó,* in his paper "Direct capital investments abroad and the transnational corporations: impacts on the economy of the United States" claimed that in financing the direct US investments abroad the share of direct contribution by the United States tended to decline. In his view the statistical data system on foreign investments did not enable deep analyses of such important spheres as trade within corporations, or the distribution of financial resources and transfer prices.

Energy policy, socialist finance, economic planning

In a comparative paper entitled "Policy responses to the energy crisis: East and West", István *Dobozi* analyzed the differing and similar features of Eastern and Western reactions to the energy crisis. Pre-crisis energy policy was oriented in both country groups rather towards increasing supply, the aspects of reducing demand were neglected. Under the effect of the energy crisis economic policy both in the CMEA and the advanced industrial countries considered the curbing of the growing energy demand their goal of primary importance. The survey carried out by the lecturer showed that between 1974 and 1978 the growth rate of energy consumption declined in the advanced industrial countries, while it increased in some CMEA countries. Although a certain amount of saving in energy was attained in the advanced industrial countries during the half-decade following the energy crisis, the results were not spectacular and remained significantly below expectations. The speaker advocated a marginal domestic pricing of energy based on the world prices. An energy policy aimed at increasing energy supply and, in connection with that, the rapid increase of domestic energy production in some CMEA countries would result in that energy investments might become obstacles to modernization in the manufacturing industries.

In the course of the debate the US party showed interest first of all in the long-term possibilities of purchasing energy within the CMEA. No significant rise of oil-purchasing possibilities could be expected in the long run, the speaker said. The East-European countries of the CMEA were making efforts to increase oil purchases from the developing countries. As regards the CIA report, he stressed that it could not be considered a reliable source of information since CIA experts were striving to project the long-term energy prospects of the Soviet Union with over-pessimism. The report seriously underestimated the long-term possibilities of increasing natural gas production in the Soviet Union.

Donald *Green*'s paper was devoted to: "The role of banking and finance in East European reforms". In the course of the economic reforms many people in Eastern Europe recognized that the reforms would necessarily lead to a partial monetarization of the centrally planned economies. Many of the difficulties experienced in the 1970s stemmed from the failure to understand this dimension of the reform process. In some cases, reforms in managerial incentives were ineffective, since the monetary medium of commerce was restricted. In other cases, too much was expected from the extensive financial reform without a parallel decentralization of economic decision authority over resources. During the past decade there was only a limited progress towards monetarization in the trade and credit relations of the enterprise sector. The pace of economic reform in Eastern Europe during the 1980s was expected to be more rapid than it had been in the 1970s. Such reforms might be less dramatic than those of the 1960s but would be better co-ordinated with further monetarization of the economy.

The debate following the lecture centred on the question of borrowing by the CMEA countries from abroad. The US delegation called attention to the fact that the CMEA countries seemed to have made a lot of erroneous investment decisions in the respect of financing technology transfer from external resources. Technology transfer was concentrated to sectors where technological progress made a jump in the meantime and where in the long run a significant global excess supply had to be faced. As a result, the CMEA countries had created, or were creating, respectively, export capacities which were technically obsolete and rather vulnerable in the view of marketability.

Joseph *Brada* analyzed in his paper the policymaking considerations and preferences of the fifth (1971–75) and the sixth (1976–80) Czechoslovak five year plans and, employing an econometric model, surveyed the macro-economic consistency of the plans.

The fifth Hungarian-US Economic Round-table proved useful for both parties. The open and impartial exchange of views helped exploring the major problems of East-West and Hungarian–US relations, as well as the possible alternatives to solve them. The discussions contributed to a better understanding of the economies, scientific research and problems of each other as well as to the mutually profitable exchange of views.

NEWS ABOUT THE HUNGARIAN ECONOMIC SCIENCE

From the 140th General Assembly of the Hungarian Academy of Sciences

The Hungarian Academy of Sciences* held its 140th General Assembly between 5–8 May 1980. The General Assembly discussed the activity of the Academy in 1976–1980 and elected its officials. For President János *Szentágothai,* full member of the Academy, for vice president for social sciences Pál Zsigmond *Pach,* full member of the Academy, director of the Institute for Historical Science have been reelected. Lénárd *Pál,* full member of the Academy has been elected Secretary General. The commission of Béla *Köpeczi,* full member of the Academy as deputy secretary general for social sciences has been renewed. Kálmán *Szabó,* full member of the Academy, director of the Institute for Political Economy of the Karl Marx University of Economics** has been elected a member of the Presidium of the Academy.

Iván T. *Berend,* full member of the Academy, professor for Economic History of the KMUE has been elected chairman of the Class for Philosophy and History of the Academy, Ernő *Csizmadia,* full member of the Academy, rector of the KMUE has been elected deputy chairman of the Class for Agricultural Sciences of the Academy.

Kálmán *Kulcsár,* corresponding member of the Academy has been elected chairman of the Class for Economics and Law, and Mrs. Katalin *Falus Szikra,* corresponding member of the Academy, professor of the Institute for Political Economy of the KMUE has been elected its deputy chairman. The following have been elected advisory members of the Class: István *Hetényi,* minister of finance, István *Huszár,* director general of the Institute for Social Sciences of the HSWP, Rezső *Nyers,* director of the Institute of Economics,*** HASc, Mrs. F. *Nyitrai,* state secretary, president of the Central Statistical Office, Zoltán *Román,* dr. sc. econ., director of the Institute for Industrial Economics, HASc.

Reelection of the Committee for Economic Sciences

The Class for Economics and Law expressed its gratitude to Mátyás *Timár,* dr. sc. econ., president of the National Bank of Hungary, as chairman and to István *Hetényi,* as deputy chairman of the Committee for Economic Sciences, and relieved them of their duties. The following members were relieved by the Class with the expression of gratitude: József Káplár, cand. sc. econ, deputy minister of foreign trade, Géza Ripp, dr. sc. econ, head of section of the Kossuth Publishing House, János Szita, dr. sc. econ, ambassador to Rome of the Hungarian People's Republic, Gyula Somogyi, former director of the Institute for Economic Research of the Central Statistical Office.

*henceforth: HASc
**henceforth: KMUE
***henceforth IE

The Department elected István *Huszár* chairman of the Committee for Economic Sciences. The following were elected deputy chairman: Róbert *Hoch,* dr. sc. econ., head of section at the IE, HASc., János *Hoós,* state secretary of the National Planning Office, Antal *Mátyás,* dr. sc. econ., full professor of the History of Economic Thought at the KMUE. Tamás *Földi,* head of the Economic Information Unit, HASc, has remained secretary of the Committee.

The newly elected members of the Committee are: László *Ballai,* head of Department for Economic Policy, CC, HSWP, Iván *Berend,* dr. sc. econ., deputy head of department, National Planning Office, József *Bognár,* full member of the Academy, Director of the Institute for World Economy,* HASc., Béla *Csikós-Nagy,* dr. sc. econ., state secretary, president of the Hungarian Economic Association, Ernő *Csizmadia,* Péter *Erdős,* full member of the Academy, retired professor, and scientific adviser, IE, HASc. Tibor *Erdős,* dr. sc. econ., head of section, IE, HASc., Mrs. Katalin *Falus Szikra,* Ottó *Gadó,* retired deputy president, National Planning Office, István *Hagelmayer,* cand. sc. econ., director of the Financial Research Institute, Tibor *Halay,* cand. sc. econ., deputy director of the Institute for Social Sciences, HSWP, István *Hetényi,* Béla *Kádár,* dr. sc. econ., head of section of the IWE, HASc, László *Kahulits,* cand. sc. econ., professor at the Political School, HSWP, Ernő *Kemenes,* head of department of the Ministry for Culture, János *Kornai,* corresponding member of the Academy, scientific adviser, IE, of HASc., Ferenc *Kozma* dr. sc. econ., head of department, Secretariat of the Government Economic Committee, Tamás *Morva,* cand. sc. econ., director of Institute for Planned Economy, National Planning Office, András *Nagy,* dr. sc. econ., head of section, IE, HASc. Tamás *Nagy,* dr. sc. econ., deputy director of the IE, HASc., Rezső *Nyers,* József *Nyilas,* dr. sc. econ., full professor for World Economy, KMUE, Mihály *Simai,* corresponding member of the Academy, deputy director of the IWE, HASc., Aladár *Sipos,* corresponding member of the Academy, deputy rector of the Political School, HSWP, József *Szabó,* cand. sc. econ., rector of the Political School, HSWP, Katalin *Szabó,* cand. sc. econ., associate professor of political economy, at KMUE, Tamás *Szentes,* dr. sc. econ., professor of world economy at KMUE, Mátyás *Timár,* Ernő *Zalai,* assistant professor, KMUE, Lajos *Zelkó,* dr. sc. econ., professor of political economy at KMUE.

Reelection of the Editorial Board of the Acta Oeconomica

With the expression of gratitude for their activities on the board, the Class for Economics and Law relieved the following members: Péter *Mándi,* cand. sc. econ., head of section, IWE, HASc., Endre *Megyeri,* dr. sc. econ., full professor for Industrial Economics, KMUE, Tibor *Palánkai,* cand. sc. econ., deputy rector of the KMUE, Antal *Stark,* dr. sc. econ , director of the Institute for National Economic Planning, KMUE.

*henceforth IWE

Mihály *Simai* has been reelected *chairman* of the board, and Tamás *Földi* has been reelected *editor.* Members of the new board are: Ernő *Csizmadia,* Péter *Erdős,* Tibor *Erdős,* Ferenc *Fekete,* dr. sc. econ., professor at the Institute for Political Economy, KMUE, János *Fekete,* first deputy chairman, National Bank of Hungary, Iván *Gönczi,* dr. sc. agr., full professor at University of Agricultural Sciences (Gödöllő), István *Hagelmayer,* István *Hetényi,* Robert *Hoch,* István *Huszár,* János *Kornai,* Ferenc *Kozma,* András *Nagy,* Gábor *Párniczky,* dr. sc. econ. professor of statistics, KMUE, Zoltán *Román* and József *Szabó.*

New appointments

On the 1st of April 1981 Aladár *Sipos* was appointed director of the Institute of Economics of the Hungarian Academy of Sciences. Between 1974–1981 Rezső *Nyers* had been Director of the same institute. Tamás *Nagy* deputy director retired, Róbert *Hoch* has been appointed acting deputy director.

In 1981 Professor József *Bognár* has been appointed General Director of the economic research institutes of the Hungarian Academy of Sciences.

Lajos *Osváth* was appointed Director of the Economic Research Institute. Formerly this function was held by Gyula *Somogyi.*

Distinctions of Hungarian economists abroad

Béla *Csikós-Nagy,* chairman of the Hungarian Economic Association, has ben elected honorary president of the International Economic Association and external member of the Austrian Academy of Sciences.

János *Kornai,* corresponding member of the HASc, has been conferred the degree of dr. h. c. by the Université de Paris (Sorbonne), and elected external member of the Swedish Royal Academy of Sciences.

OBITUARY

Jenő Rácz (1907–1981)

After a long illness we had to take leave of Jenő *Rácz,* distinguished economic expert and translator.

He acquired agricultural and legal diplomas and first worked with various representative organizations and held state offices. After the war he continued to work with the new economic government organizations and participated in the preparation of the Hungarian stabilization.

He was not yet forty when he became minister of finance in 1946. He was the only non-party member of the coalition government. During his short tenure the first forint budget of Hungary was drawn up and the working out of budgetary normatives started. As member of the Hungarian delegation he participated at the reparation negotiations in the USA. In the next years he worked as deputy chairman of the Danube Valley Agricultural Institute, then became research worker at the former Institute of Economics. A few years he was active in the publishing business as editor and then spent a year with the People's Control Committee.

From 1959 till his retirement in 1968 he was senior official at the National Planning Office. It was in these years that he wrote his book: "Az állóalapok és a termelés összefüggései a magyar iparban" (Interrelations between fixed assets and production in the Hungarian industry), which earned wide recognition. He was considered an authority on these problems.

After his retirement, but already before it, Jenő Rácz was reckoned among the best economic translators. Beginning with the British classics to present-day Soviet economists he translated the works of several foreign authors into Hungarian. In addition, he contributed to making the world acquainted with Hungarian achievements in economics and in economic development by translating into English, or revising the translations of, a dozen books by Hungarian authors.

His expertise and precise work was frequently availed of also by Acta Oeconomica and his departure is a painful loss to this periodical, too.

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BOOK REVIEWS

KORNAI, J.: *Economics of shortage.* Amsterdam–New York–Oxford, 1980. North-Holland Publishing Co. XX + 630 p. Simultaneous Hungarian edition: *A hiány.* Budapest, 1980. Közgazdasági és Jogi Könyvkiadó. 658 p.

One of the interesting and attractive features of the scientific career of János *Kornai* is that in almost all his books he tackles new topics, uses novel approaches. In 1957 he published a book on the overcentralization of economic control and management, raising several years before the introduction of economic reforms issues, for which the authors of these reforms sought – among other problems – adequate solutions. In two books, written in the first half of the 1960's, he dealt with the utilization of mathematical programming methods in economic planning. In the "Anti-equilibrium", published in 1971, he criticized the general economic equilibrium theory, which is the basis of the static analyses of the neoclassical economics. One year later he contributed important new ideas to the analysis of economic dynamics in the book on "Rush *versus* harmonic growth". In this latest book of his on shortage he again investigates surprisingly new questions, as he formulates on the one hand the outlines of a new economic theory of the market mechanisms and describes on the other hand the functioning of the socialist economic system (at least, as he states, the socialist systems realized in Eastern Europe, first of all in the smaller socialist countries). At the same time he synthesizes and develops the ideas exposed in several of his earlier books, as he treats the consequences of overcentralization, of forced economic growth, and analyzes an economy which is not in the Walrasian neoclassical state of equilibrium.

The very rich and variegated contents of the book might be summarized in the following way. Socialist economy, first of all the traditional one preceding the economic reforms, is characterized by chronic shortage, by the reproduction of shortages. Kornai points to the fact that Soviet economists of the 1920's already noticed this phenomenon, e.g. *Novozhilov* stated that in a socialist economy a general shortage of commodities develops instead of the general overproduction crisis of capitalism. Kornai formulates this in an other way, by stating that classical 19th century capitalism was an economy constrained by demand, i.e. production expanded as long as it found corresponding demand, while in the socialist system an economy constrained by resources came into existence, in which production is expanding till it comes up against the constraint of exhaustion of resources. In very simplified and plain terms this means that capitalism is characterized, among other things, by unemployment, as the effective demand is usually not sufficient to assure the full employment of manpower (this is the starting point of Keynesian economics), while in socialism demand is so high that even in conditions of full employment important shortages persist.

Two comments ought to be added: 1. chronic shortage does not mean that there are no unused reserves, redundancies and badly utilized resources, but they are not easily utilizable; 2. in most parts of the book Kornai refrains from value judgements, so he does not take sides whether a demand-constrained or a resource-constrained economic system is better. He points out, however, that the open unemployment and the even more important hidden underemployment of manpower characterizing Eastern European countries before World War II was liquidated by just this characteristics of the socialist economic system.

The cause of shortage is the almost unsatisfiable demand of the enterprises, both on the market of investment goods and on that of consumer goods. The deep reasons of unsatisfiable demand are phenomena like the expansion drive (each enterprise and public institution wants to grow, to produce more and more products, offer more

and more services), the quantity drive (the main goal being the fulfilment of the ever higher plan-targets, even their overfulfilment), the hoarding of raw materials, machines and manpower (because of fear of shortages), the impossibility to satisfy demand for the free-of-charge services of public institutions. Therefore shortage has a self-generating, self-enhancing character. The reasons of all these phenomena ought to be sought in the economic and social features of the system (e.g. in the fact that managers do not represent the interests of capitalists but in many respects the interests of the working collective under their leadership), in the economic control mechanisms, in the attitudes of the economic decision-makers (managers of enterprises, central planners and leaders of the national economy), developed under the influence of these features and control mechanisms. Kornai deals with one of these characteristics in an especially detailed manner, namely with soft budget constraint. Soft budget constraint means that the budget, the monetary resources of enterprises are not strictly limited, since when the enterprise wants to buy additional materials for production or employ additional manpower or intends to make new investment and has not enough money for that prupose, it can easily obtain credit and help from the state budget. In the socialist economy no enterprise ceases to exist in consequence of insolvency, bankruptcy. Therefore the enterprises are not strongly stimulated by considerations of profitability to moderate their demand. In the last chapter of the book Kornai introduces the term "paternalism" to characterize this situation. The state behaves toward the enterprises like parents with their children, it gives them help, if they are in trouble.

This book has a message and importance on several levels. Let us see first the level of pure economic theory! Kornai states several times that he concentrates his analyses on the socialist economic systems. It is nevertheless of great importance for the whole economic theory that he states and proves that a normal state of production and exchange can develop which is continuously far from the Walrasian equilibrium, as there are long-lasting shortages and slacks (unused resources) in it but which is nevertheless completely capable of functioning. Keynes in the 1930's proved with his theory that capitalist economy was capable of stabilization in a state of long-lasting unemployment, now Kornai has shown that socialist economy is capable of operating under conditions of continuous shortage.

Neoclassical economics could not explain the great crisis and the following long-lasting depression adequately, nor could it offer appropriate economic policies to combat depression and unemployment. This motivated the appearance of the Keynesian theory, which seemed to give a good explanation and to offer acceptable economic policies for advanced capitalist countries till the mid-1960's. But since that time these capitalist countries have been suffering from the parallel existence of high inflation and high unemployment, the so-called stagflation. In these circumstances a widespread disappointment with Keynesian economics developed among economists but no theory of similar comprehensive claim and of similar explanatory power replaced it. For some time part of the economists believed that the monetarist theory of Milton *Friedman* could provide a way out of the theoretical and economic crisis situation. However, it was never so widely accepted as earlier the Keynesian economics, and the economic policies based on it seem rather to be failures till now (e.g. in Britain under the present Conservative government). It is thus no overstatement that economic theory is in a critical state. Kornai never says that he intends to contribute to the resolution of this crisis with his book. But I do not think to be mistaken, if I state that – similarly to his *Anti-equilibrium* – the *Economics of shortage* will have an important influence on world economic literature seeking to find a way out of the crisis.

From this point of view not only the concrete ideas of Kornai on the refutation of the Walrasian equilibrium theory and on the possibility of non-Walrasian equilibrium are important but also his general approach with which he extends his investigations to the social institutions and attitudes, thus renouncing the application of the simplifying *homo oeconomicus* concept, and postulates instead that the actors of the economy might have different interests and goals depending on the given economic and social conditions. It is worth while here to quote for illustration his explanation of the attitude of managers of social-

ist enterprises towards investment and the increase of wages. Kornai explains the "investments hunger", the "inherent expansion drive" by the fact that the manager identifies himself with his job, he is convinced that the activity of the unit under his leadership is important, and therefore ought to be developed. In addition his prestige and his power is enhanced if his enterprise becomes greater and more modern, nay most probably his income and also the income of his immediate collaborators increase in that case. At the same time, because of the soft budget constraint, his "hunger" is not limited by the fear of losses and of failure. And when he takes a standpoint on the wages of his collective, he behaves toward the higher-level authorities in many respects similarly to a trade union activist: he tries to fight for as high wages as possible, not only because he is expected to do so by the collective of the enterprise, but also because by increasing wages he is able to solve many local problems and tensions in his enterprise and to raise the satisfaction of the persons employed there. As the budget constraint is soft, no inherent economic force is stimulating him to limit the increase of wages, only administrative constraints prevent him. This sociological and sometimes politological approach is, in my opinion, very important for an understanding and successful resolution of our present economic problems.

The scientific importance of the book outside Hungary is explained by the fact that all the analyses of Kornai, although referring first of all to socialist economies, can be used also in the investigation of capitalist economy. In his arguments he usually compares the two extreme cases, namely, the traditional socialist economy and the classical completely free-market capitalist economy, and then adds that many characteristics of the economy have changed in Hungary after the reforms, and sometimes also that the present capitalist economies do not, at all, function according to the classical model.

What has changed after the economic reforms in Hungary? Among others shortages diminished, the budget constraints became somewhat less soft, the Hungarian economy shifted to a lower degree of paternalism.

In what respects do the present advanced capitalist economies differ from the classical model? Among others the budget constraints became somewhat softer also in the capitalist economies, the bankrupt great enterprises are often saved by the state, in the last resort through nationalization.

The present-day Hungarian readers are, however, even more interested in the conclusions of Kornai on the actual Hungarian economic situation and on the economic policy to be followed. Directly he says almost nothing on these questions, as he always emphasizes that he wants to describe, and not give advice. Indirectly, however, he says very much. One of the most important conclusions, probably drawn by all readers, is that the economic reforms should be continued. Kornai points several times to the advantageous changes which occurred after the first reforms in 1968 but considers that shortage, the soft budget constraint, expansion drive, etc. are continuing to characterize Hungarian economy. It ought to be added, however, that some of these characteristics have already changed to a certain extent since Kornai wrote the book. The book implicitly suggests that further development of the reforms should be sought in important changes of the control mechanism and of institutions. (E.g. the budget constraint of enterprises ought to be made harder.)

Summarizing my opinion, the importance of the book consists to an important degree in the fact that it stimulates economists for further meditation on the problems raised and for trying to verify empirically its statements. Therefore, we ought to rejoice that it has been written and published, not only because the international fame of Hungarian economics will be further enchanced by it, but even more because it challenges Hungarian economic researchers and economic politicians to face and think over new problems.

R. ANDORKA

KÖVES, A.: *A világgazdasági nyitás: kihívás és kényszer* (Opening to world economy: challenge and necessity.) Budapest, 1980. Közgazdasági és Jogi Könyvkiadó, 420 p.

The changes in international economic life during the seventies and the consequential tasks

of adjustment were studied in many treatises of the past five years, some of which do not belong directly and closely to the discipline.

The book by A. *Köves* is one of the first attempts in the Hungarian and socialist countries' literature at unravelling deeper connexions beneath superficial symptoms, at casting light on the options that are available and the musts that are given to the socialist countries by world economic changes, and at formulating a clearcut guideline primarily for the long-range development strategy and not for the short-term (offhand) economic policy of the moment. Very reasonably, the time horizon is expanded not only towards the future but also back to over 6 decades of socialist construction in quest for the answer to one of the most exciting questions: whether the world economic opening should be regarded as a tactical partial concession in the framework of the long-term strategy of national and regional (CMEA) self-sufficiency or it is a fundamental change that implies the end of the decades long domination of the deep-rooted autarkic concept and, in this context, of course, reassessment of a number of economic, social and ideological notions.

Part One, discussing the historical antecedents, presents some key fields of the foreign economic policy of the young Soviet Union (the concessions, attempts at involving foreign capital, technical-scientific agreements, development of the sectoral and market structure of foreign trade) with a subsequent analysis of the nature of East-West trade after World War II (with special respect to the embargo policy).

Although the analysis reveals features of an economic-political environment which was different from that prevailing now, many a statement is more than "echoing" current problems. Such are, among others, the following ones: technical-scientific agreements were not simply a field of Soviet-Western cooperation but, from the late 20s on, they provided an alternative to direct investment of foreign capital. Import was powerfully concentrated on the key sectors of the development strategy outlined in the five-year plan, first of all on the heavy industry and on the equipment of giant individual projects. As a special paradox of the import substituting economic policy, observable since then through scores of examples, it became less and less possible to balance the import by export, for the increasing interval demands of the economy set limits to the commodity base of export in which raw materials dominated (to this was added the harmful impact of collectivization of agricultural production and export), while the very same cause created growing import requirements. This situation eventually resulted in indebtedness and then in the necessary restriction of import. However, the latter was not regarded as a necessary outcome of the economic policy that had been pursued but was supposed to be a means of reducing dependence on the capitalist world.

Directly after World War II the alternative between external economic opening and enhanced autarky again became an issue. The US lend-and-lease deliveries during World War II, the American credit plans and the probability of Soviet participation in the International Monetary Fund which was then being formed suggest that the idea of giving a much bigger role to the international division of labour in the development of the Soviet economy was quite seriously considered. However, this was thwarted by the cold war and the Western embargo policy applied as an instrument thereof, and thus the development line pursued in the previous stage of the Soviet economy gathered new impetus. But now the strive after autarky became the guideline of the formal economic policy not only in the Soviet Union but also in the East European countries (although economic development of the small socialist countries and their participation in the world-wide economic division of labour had quite different foundations than those of the Russian–Soviet economy). Moreover: autarky got the green light not only on the national but also on the regional (CMEA) level, and thereby it was for a long while and, as the book convincingly and repeatedly shows, it has till now been made the cornerstone of economic development, the Alpha and Omega of "development mentality." It was the "two world markets" theory of Stalin that served as the theoretical-ideological foundation for this practice of economic development.

With economic development advancing in the socialist countries and with new and new demands emerging in the increasingly intricate so-

cialist economies – demands that usually could not be satisfied in the CMEA or not at the right time and in the right quality – East-West trade gained vigour, not at all independently of political détente. It became clear that there was but a single world market and that this market was capable of appreciably affecting the functional mechanism of the socialist economies.

Part Two, containing six chapters where the most fundamental statements are manysidedly proven by the author, discusses the new stage of East-West problems and strains encountered in its course; the discussion comes through a magic chain of narrowing economic opportunities and growing strains to "how to carry on".

The characteristic features of East-West trade in the seventies were in part dynamism and in part, and primarily, the import surplus of the socialist countries and, consequently, their increasing indebtedness. The importance of Western countries in the foreign trade of the socialist countries generally increased, and participation of the latter in the international division of labour expanded considerably. It was realized that what counted was not that the stepping up of the growth rate or the prevention of its unwanted slackening generally necessitated intensification of the international division of labour as a "growth carrier". The higher economic growth rate and the updating pattern of the socialist economy became very closely attached to certain definite Western economic relations which decisively mediated the top technology and expertise of management as well as the musts of adjustment. It was proven that the development of socialist integration was not a suitable alternative to expanding East-West economic relations and without a fast expansion of the latter the carrying on of socialist integration would come up against more and more considerable obstacles.

The author gives a detailed analysis of the reasons for the external economic opening of the socialist countries and derives these from the special ways of development of the socialist economies. Again, it follows that the "alternative" to opening comprises slower development rate, stagnating standards of living, increasing social tensions, conserved technological backwardness, that is, no realistic alternative is available to opening.

On the present level of development of the socialist economies the role of technical progress is more and more decisive, meaning not only the priority technical development of some key industries but also the levelling out of technical differences betwen long neglected branches (naturally not by degrading the most up-to-date ones!). The main carrier of importing modern technology is the purchase of machines, being in turn a function of investment and development policy. Analysis of the CMEA countries machine imports reveals two problems: firstly, intra-CMEA machine import whereby not the top technology is transferred plays a big (and in some plans a growing) role often justified by foreign exchange problems; this may save foreign currency in the short term but preserves technical and structural backwardness for the long term. That is, the basic conditions for the production of convertible export commodity funds are not brought about even over a long period and the clench of the vicious circle of backwardness is strengthened.

The second problem lies in using the modern technology (machines, equipment) bought from Western countries not for enhanced export orientation but for the improvement of autarky on the national and on the CMEA level. This means that the development strategy finances non-convertible commodity funds with convertible currency. But since the convertible currency must be produced by somebody, an increasingly heavier burden is laid on the sectors carrying exports to the West. These sectors are (supposed) to comply with their tasks under the aforesaid development policy so as to maintain or increase their competitivity while their share in Western up-to-date imports contributing to technical development is little or nothing (e.g. agricultural and food industrial products and light industrial articles play a significant role in the Western export of socialist countries). The case is somewhat different with exporters of raw materials, namely, the Soviet Union and partly Poland. However, the costs to be paid in foreign currency for industrial development can be afforded by the raw material sector, too, only provisionally: the cheaper deposits will be depleted while internal demands will steadily increase. Thus, after a while – seeming to be quite near in the late seventies – the maintaining

or increasing of domestic production and the guaranteeing of export suitable for the balancing of import will necessitate the exploration of new and new deposits. This needs enormous funds and in many cases presumes very modern technology. That is, the said countries cannot escape the expansion of Western relations without running substantial losses.

Export capacity is, therefore, becoming a major element of the desired (or still just acceptable) economic growth. Once this is realized, the development concept must be reassessed accordingly. András Köves is right to state: "it is a false idea that the CMEA countries may choose at their discretion: to solve the current tasks either through accelerated transfer of Western technology or with domestic measures taken towards enhánced efficiency" (p. 138). No substantial forward step can be imagined without involving more and more external resources unless it is coupled with the substantial (and not superficial!) reform of the system of economic control. This latter is especially pressing for CMEA countries which are short of raw materials and whose Western export consists mainly of finished products (mainly Hungary, Czechoslovakia, the GDR, and to a smaller extent Poland and Romania).

Provisional „recommendations" of the fire-fighting type still occur against the undoubtedly painful and not at all strainless domestic economic changes. Export specialization in the light industry which seemed to be promising in the early seventies in the easiest way, with the least resistance and, consequently, without substantial transformation, quickly arrived at a lasting structural deadlock in return for short-lived results. And it is not difficult to forecast similar deadlocks of such recommendations as the replacing of Western imports through socialist exports directed to developing countries (what would prompt liquid developing countries to buy poor quality machines from socialist countries; how come that Western companies facing quite bad problems did not discover the promising developing market long ago; and is it true that the development of export directed to developing countries requires an economic strategy different from the one demanded by export directed to advanced industrial countries?) or repeated turning inward, regional autarky on the CMEA level which is supported by many in the face of the world economic changes. The latter is cherished with special devotion by opinions quoting "excessive dependence" on the capitalist world and stressing the "subordination" of socialist countries in the East-West division of labour, András Köves challanges these views; clearly stating: "Nothing emerges more unmistakeably from the analysis of the present situation than the absence of any real hazard of exaggerated adjustment. The only correct and timely way of raising the matter is as follows: adjustment or, in other terms, the formulation of an efficient economic policy and economic mechanism oriented to world market demands. This is the only way whereby dependence and vulnerability may be reduced, and set at a much lower degree than what has been attained in lack of adjustment through a pattern of exports full of products not demanded, of mediocre quality and of a narrow range of assortment . . . Therefore, the attitude refusing adjustment results, irrespectively of intent, is the acceptance of preserved backwardness." (pp. 204–205).

The conduct of the Soviet Union is decisive in East-West economic relations already because of its weight in world politics and world economy. Therefore, it is understandable that the author devotes a special part to the activation of the Soviet foreign economic policy in the section concluding *Part Two* and practically summarizing the main inferences of the book (Autarky or world economic integration?). This part is especially interesting because of its comparability with the trends of the 1920 and early 1930s analyzed in *Part One;* certain features appear to be very long-lived (importance of the import of technology and machines in economic development, import of Western equipment for key sectors; careful selection of major import partners from the viewpoint of the most advanced technology; excess of import over export and financing of the consequential disequilibrium from foreign funds, compensation deals of large volume, etc.). It must not be forgotten that analysis of the pattern of Soviet machine import shows more and more marked separation of machine purchase from CMEA countries and those from Western countries; the first ones are less and less able to

participate in satisfying the technology (in the machninery exports of socialist countries to the Soviet Union a growing share is represented by vehicles and agricultural machines, i.e., of products matched to the low-set requirements of the less developed or downright neglected sectors of the Soviet economy). However, the emergence of two kinds of markets indicates not only the structural backwardness of the socialist countries but also suggests the inference that the alternative of increasing machine imports either from the West or from the CMEA region is not given to the Soviet foreign economic strategy. This fact, together with many other elements (efforts at long-term raw material contracts, compensation agreements) seems to show that the Soviet Union has committed itself to the development of intensive external economic relations for a long run – and not provisionally – and has no intention to return to the autarkic line.

The importance of this statement goes beyond the Soviet economic policy: the development policy trends of the European small CMEA-countries having established close economic relations with the Soviet Union are also closely affected all the more as the limits to the expansion of Soviet raw material shipments are also obvious.

That the world economic opening is a challenge and an exigency for each socialist country does not necessarily mean that the most suitable instruments of successful opening are the same for each country. *Part Four* scrutinizing the forms and methods of world economic opening makes the identities and differences clear, in part by studying some forms of East-West cooperation (compensation, joint enterprises) and in part by analyzing the chances for making relations between the CMEA and the EEC institutional. It is not difficult to see that preferences for desirable forms and spheres of cooperation are occasionally powerfully modified by the different economic development levels and different patterns of production and export in the background of the common goal (opening). However, it is a statement perceptible for all of us and partly supportable in the light of experiences gained so far in cooperation that whatever the forms, instruments and spheres of cooperation be, these cannot be substitutes for comprehensive domestic economic reforms and cannot exempt us from the courses of adjustment which are laden also with difficulties. Moreover, success of the latter is a condition for East-West cooperation to assert its beneficial, growth-boosting and pattern-updating impact.

It is hardly questionable that external strains – of world politics and world economy – do not make the tasks of the socialist economies any easier. Nor is it questionable that the warming up of the idea of national or CMEA seclusion cannot be a successful response to discriminatory measures, to politically motivated embargo, and to developments retarding the process of East-West détente. On the contrary, though it may sound to be paradoxical, the increasingly difficult external conditions press still more momentously towards a substantial transformation of economic strategies of the socialist countries. Success of the different socialist countries' progress in this field will strengthen the socialist community and serve the common interest of the CMEA countries.

The work of András Köves uses a considerable amount of statistical evidence and carefully selected bibliography to give a manysided analysis of tasks facing the socialist countries and of such order of magnitude that the path of further development may be determined for long term and even for generations by the responses they require. The author convincingly shows that this path will be wider and will join the mainstream of world development on condition that the alterations required by export oriented development will have taken place in the whole of socialist economic policy. The author is positive about foreign economic opening being not merely an economic issue but also having basic socio-political aspects and that it also postulates changes in mentality where improvement is perhaps the most important and pressing, but, undoubtedly, also the most difficult. Opening requires not only new lines, new instruments and new ideas but also people dedicated to the new lines and having the talent to handle the new instruments and, especially, to think in new ways.

A. INOTAI

POGÁNY, GY.: *A munkamegosztás rendszeréről és fejlődéséről* (On the system and development of the division of labour.) Budapest, 1979. Kossuth Könyvkiadó. 326 p.

The recently deceased author discusses the historical development, present characteristic features and future prospects of the division of labour. Beside economic viewpoints he takes also historical, sociological, labour psychological and ergonomical aspects into consideration. Accordingly, he utilizes achievements of several disciplines. Beside his own researches he makes use also of relevant achievements of Hungarian and international literature. He makes a critical analysis and explains his views through debates with others.

Chapter One of the book deals with the development and notion of the division of labour. After a brief economic history and economic theory-history survey four senses of the notion of division of labour are distinguished: division of labour by products, social division of labour (sectoral, enterprise, regional division), technical division of labour and division of labour among people in general. Division of labour within a factory is considered as a part of the social division of labour. The author correctly emphasizes that each form of division of labour is a unity of social and technical division of labour without implying identity of the two sides. In his investigations he starts from the existence of their unity and contrast.

In *Chapter Two* the author deals with the interrelation between the development of productive forces and division of labour. He states that development of the division of labour has created technical conditions for mechanization and automation. When examining the qualification structure of the labour force he points out that the number and proportion of intellectual workers are rapidly growing, while those of manual workers are decreasing. The rising qualification level is a determinant factor of economic growth. However, its positive effect is not always asserted. This is connected also with the optimum of education. The author correctly emphasizes that "undereducation" unambiguously constrains economic development. "Over-education" does not cause disturbances of such character, but may be a source of very serious human and socio-economic conflicts. He points out that directions of vocational training, proportions of its individual forms and types, the absolute number of those involved in it and their distribution by sex are primarily determined by the quantative and qualitative demands of society for labour. It must be added that requirements of a many-sided development of man are attributed growing importance in general, and especially in socialism. Within this, general education has to be harmonized with needs in the longer run, while vocational training with short-term ones. A Hungarian particularity in this regard lies in that the general educational level of manual workers is lower, while their average professional qualification level somewhat higher than society would need. In this context the author examines – in a way known from literature – international trends to be experienced in the vocational and extension training of workers and reviews the training system in Hungary.

In *Chapter Three* he discusses the effects of the division of labour on the contents and circumstances of work. From his explanations it turns out that division of labour improves productivity and efficiency, on the one hand, but – on the other hand – it withers abilities of man: it leads to one-sidedness and over-specialization. He analyzes in detail the mainly negative effects and requirements of conveyor-belt work on man, e.g. by changing over from belts with fixed rhythm to those with varying rhythm, on the other hand the necessity of eliminating conveyor-belts which can be realized only in the long run (e.g. by a change-over to automation). In this regard he deals – on the basis of literature – with ways and methods of changes in the contents of work, with the rotation of working tasks, the widening of activity, enrichment of the job, making group work more frequent and the development of workshop democracy.

Chapter Four deals with characteristic features of the contemporary division of labour. Trends towards the maximum division of labour connected with Bedaux's and Taylor's organizational systems are discussed. Depending on the development of sectoral structure seven stages of economic development are distinguished: that of underdeveloped agriculture, agricultural stage,

backward servicing stage, agricultural-industrial stage, industrial economy stage, industrial-servicing stage and developed servicing stage. On the basis of this distinction the position of 74 countries is determined.

Chapter Five is on the *place of labourers in the contemporary division of labour.* In this connection the author analyzes the place of various classes and layers in the social structure. Speaking about the *working class of the socialist society* he notes that it is a direct descendant of the proletariat of the former capitalist society, though living under different social and economic conditions. While accepting this, we can agree with the interpretation of the notion of working class given by the author only with reservation. Namely, he points out that the place of the working class in social production is characterized primarily by manual activity of producing and servicing character. However, this is not a particularity of the working class, since it is characteristic also of peasants and artisans. A more particular feature is that the working class is deprived of the ownership of the means of production. The notion of working class is – correctly – not limited to industrial workers, but narrowed down to workers displaying manual activity. At the same time – resulting from the scientific-technical revolution and other factors – nowadays a large-scale levelling off is taking place in the working and living conditions of workers and employees.

In *Chapter Six* differences caused by the division of labour in Hungary are examined. The author also illustrates the development of Hungarian class structure with the aid of figures. He analyzes the radical changes in class structure and the social division of labour following socialist transformation. He outlines the trend of classes approaching each other. Major manifestations of this process are the following: acceleration of social mobility, rising qualification and educational level of workers and peasants, elimination of exaggerated income differences, considerable levelling off in respect of working and living conditions as well as in health and social supply. Major steps in the levelling process were the land reform, nationalization and collectivization. The author outlines trends of division of labour by age and sex. He reveals the interesting connection according to which "division of labour according to age appears most unambiguously in posts filled, especially with white-collar employees where the scale of posts is much wider than in case of manual workers." Examining the division of labour between agricultural and non-agricultural sectors, town and village he points out partly approximation to each other and levelling off on the one hand and urbanization on the other.

In *the division of labour in a developed socialist society being in the course of building is* outlined. The author forecasts the expected development of employment structure until the end of the century. According to this, the proportion of those employed in industry will decrease in Hungary within the entire population from 51.4 to 49.4 per cent and in agriculture from 22.3 to 12.8 per cent between 1976 and 2001, while the share of those employed in servicing branches will increase from 26.3 to 37.8 per cent. Between 1975 and 2000 the proportion of skilled workers within total employment in state and cooperative enterprises will increase to about 28 per cent as against 27 per cent in 1974, while that of semi-skilled workers will decrease from 31 to 22, of unskilled workers from 14 to 8 per cent.

After that the problem of particularities of socialist work organization is raised. The author points to the contradiction between division of labour inherited from capitalism and socialism. He does not consider the practice of capitalist work organization necessarily inapt for socialist enterprises and does not deem posible to eliminate the contradiction outlined in such a way that nothing should be learnt from capitalist work organization. At the same time he emphasizes that this may only be a starting point for socalism, that has to be learnt, then surpassed and modified to conform to socialist purposes. The claim of surpassing and the particularity of socialism, respectively, are manifesting themselves in the amended goals of work organization, in deviating requirements raised towards labour and in that living and working conditions of man have to be kept in view as well as the participation in and agreement with decisions on work organization have to be ensured for labourers, too. The author does not stop at enumerating these particularities, but examines concrete possibilities for mitigating conflicts caused by the division of labour pointing out that the socialist

science of work organization may grow out only of socialist practice.

Chapter Eight – the last one – is of futurological character, it tries to forecast the division of labour in communist society. It starts from the fact that Marxian classics expected from the communist society fundamental changes in the division of labour. In later Marxian literature two basic standpoints have developed, namely, according to the one division of labour would cease, while according to the other it would continue, what is more, even strengthen in communist society.

Concerning the expected trend of the division of labour of non-class character the author holds the view that the maintenance of division of labour according to jobs, professions and occupations and specialization are necessary, as well as that though some professions or occupations may cease, new ones arise instead of them. He properly points to the labour-division-reducing effect of the scientific-technical revolution. Namely, while the industrial revolution had differentiated working processes, technology, professions, knowledge and directions of training, the scientific-technical revolution integrates them. The final conclusion is that in future society the division of labour will not cease, but will qualitatively be modified. Only the old type of division of labour characteristic of commodity-producing societies will cease that is concomitant with the sticking of individuals to one or two occupations. Division of labour of a new type will come to being that is negation of the old one in the sense that the man of the future will be characterized by many-sidedness.

Gy. Pogány's unfortunately last book is a contribution to the recognition of reality, to new, broader interpretation of employment problems, to the strengthening of our historical approach and to making our image of the future more exact.

SZ. BABANÁSZISZ

LAVALLÉE, L.: *Croissance d'une économie socialiste: la Roumanie* Paris, 1980. Editions Horváth. 188 p.

Literature on the development of the Romanian economy published in French has been written up to now by Romanian authors: mostly known pieces of it are the volume of studies entitled "La Roumanie économique et culturelle" (Economy and culture of Romania.) published in Geneva, 1970 with a foreword by Francois *Perroux*, and a book of the outstanding Romanian economist Costin *Murgescu* entitled "L'Economie socialiste en Roumanie" (Socialist economy in Romania.) published in Bucharest, 1974. This politically committed literature is enriched by the work of Léon *Lavallée*, co-worker at the Economic Department of the French Communist Party specialized for socalist countries, dealing with problems of Romanian economic growth and published with a foreword by Jacques *Duclos* in 1980.

In his clear work of logical argumentation the author tries to understand complicated socio-economic efforts made by socialist Romania in order to eliminate her historically inherited backwardness. In his book L. Lavallée reviews Romanian theses adding his critical remarks while his argumentation is based on facts collected by him.

In *Part One* of the book analyzing the contents of socialist economic growth the author points out that "theoretical superiority of the socialist system . . . may be queried by various deficiencies of the plan, beginning with its concept and including its realization" (pp. 22–23). This theoretical superiority may be realized only in social practice. In East-European socialist countries labour intensity is lower than in developed capitalist countries for historical and other reasons, they are lagging behind as regards quality of growth, too, there is a contradiction between relatively scanty commodity supply on the domestic market and the increase of production. Problems are made more complicated by the fact that one of the objectives of socialist economic cooperation is to eliminate differences in the level of economic development between the individual countries, for the realization of which countries like Romania are striving naturally very strongly.

According to Lavallée the relative backwardness of the level of economic development necessarily brought the requirement to catch up with the level of economic development of more developed countries to the fore at the beginning. Socialist countries had to undertake also the solu-

tion of problems left unsolved in the capitalist stage, as Lavallée writes.

On the part of Romania, being in a very unfavourable situation also in CMEA-comparison, elimination of backwardness requires increased efforts and a high rate of economic growth. Accelerated industrialization and permanent raising of plan targets to be experienced with Romanian fiver-year plans are all aimed at this "catching up".

Thus the industrialization concept based on the primacy of heavy industry, urging for the increase of the rate of accumulation and investment seem to the author justified endeavours. Formulating the Romanian argumentation: "decreasing accumulation would impede extended reproduction, make the elimination of the still considerable difference that separates us yet from developed countries impossible". (p. 47) At the same time Lavallée points out that the efficiency of accumulation is decreasing while the rate of accumulation is raised even several times in the course of plan implementation, the structure of investments does not promote efficiency, either; tensions between investment plans and their non-fulfilment, striving after fast economic growth and the technical knowledge of the new, young, unexperienced and unskilled working class entering into modern industry are unavoidable. A concomitant phenomenon of stepped-up industrialization is limitation of personal consumption, though making this sacrifice will be reimbursed in the longer run according to Romanian theoreticians and the author.

Romanian industrial development was largely based on the import and adaptation of up-to-date Western technology. From the early 1970s on increased Romanian efforts could be observed aimed at mitigating technological dependence developed in this way by bringing domestic research and development activity to the fore. Lavallée points out the advantages for Romania of the CMEA-practice of the free handing-over of technical know-how for many decades.

After outlining changes in the structure of the Romanian economy and society the author deals with the role of external factors influencing the process of economic growth. Raw materials delivered by the USSR are indispensable for the development of Romanian industry, and achievements of Romanian industrialization are acknowledged first of all by markets of member-countries of the CMEA. According to the author the CMEA is a regulator in the supply of socialist countries allowing Romania a more rational exploitation of domestic resources.

In *Part Two* of the book Lavallée reveals the reasons why Romanian industrialization has been concentrated on heavy industry, pointing out that in Romania's case one of the most consistent applications of the Soviet way of industrialization may be witnessed probably until 2000. At the same time the author states (p. 99) that "a country with an area and population like Romania cannot try to establish a complete modern industrial system including all branches of industrial production nowadays", therefore Romania has to specialize if he wishes to maintain the fast rate of industrialization.

This industrialization process is going on full of contradictions according to statements of Romanian political leaders, too. Parallel with the birth of the "young industry" national economic efficiency decreased, socio-economic conditions of assimilation of the new technology have to be created yet.

Modernization did not take place in agriculture yet, the growth of agricultural production is fluctuating and unsatisfactory, thus this sector of the national economy has enormous reserves yet. Fifty per cent of the economically active population worked in agriculture with low labour productivity even in 1970. Through its exports agriculture had long been one of the most important sources of industrialization. Agricultural exports were increased even despite difficulties in domestic supply (e.g. meat, fish, vegatables, fruit). According to the author the proper way to eliminate this situation is not to restrict exports, but to increase production. (pp. 121–122) Decreasing the share of agricultural investments, giving preference to irrigation projects at the expense of mechanization are deficiencies resulting from the economic policy applied. The author points to the important role of household and private plots in Romanian fruit and vegetable growing and animal husbandry, as well as in the supply of the population.

Romanian foreign economic policy is an integral part of overall economic policy. In his

address at the 10th Congress of the Romanian Communist Party in 1969 Gh. Maurer emphasized, too, that Romania could not avoid a deeper participation in the international division of labour, nor integration into the world economy.

The author describes changes in the organization and planning of foreign trade carried out in 1971, then deals with contradictions between industrialization concentrating on itself and foreign economic opening. Among the European CMEA-countries the per capita value of foreign trade is the lowest in Romania, therefore efforts are made to raise this backward level by a rapid expansion of foreign trade. Romania strives for developing an international division of labour unambiguously advantageous for her economy.

Contributing to previous CMEA debates Lavallée states that, in the case of countries with such an important share of agriculture like Romania, coincidence of the commodity pattern of foreign trade with the production structure of the national economy is disadvantageous, therefore value categories and profitability viewpoints may not be applied or at least not exclusively when deciding on directions of economic development. Romania is developing such dynamic industrial branches that may become profitable in the future. This viewpoint of structural transformation is enforced also in debates with CMEA-partners. In this context the author refers to "certain disputes" of Romania with member-countries of the CMEA that had been disclosed in a declaration of the Central Committee of the Romanian Workers' Party in April, 1964. At the same time the USSR ensures the supply with raw materials for Romanian industrialization and means a vast and stable absorptive market for Romanian industrial goods.

In the Romanian concept an evening up of the levels of economic development is required for the realization of so-called equivalent exchange. Lavallée indicates that at negotiations with a young industrial and relatively weak country wishing to express its independence a feeling for tactics and time are required for the dissolution of contradictions.

In *Part Three* of his book the author deals with the social aspect of development, then outlines major features of the plan forecast until 2000. Romania declared in 1972 to be a "developing socialist country", will reach the level of medium-developed countries by 1985. The book is completed by a review of the 11th Congress of the Romanian Communist Party.

L. Lavallée repeats the thesis already disproved by practice, and previously proclaimed also by the Hungarian medias, according to which socialist economies are not sensitively affected by the present world economic crisis. (p. 181) Though the author was wrong here and also elsewhere, his book is a remarkable attempt on the part of a communist, living in a developed capitalist country to understand the development of socialist economy – as was formulated also by Jacques Duclos in the foreword.

M. FÜLÖP

LEIPOLD, H.: *Wirtschaft- und Gesellschaftssysteme im Vergleich. Grundzüge einer Theorie der Wirtschaftssysteme. 2., überarbeitete und erweiterte Auflage.* Stuttgart, 1980. Gustav Fischer Verlag. XI. + 268 S.

Der Autor setzt mit der vorliegenden Arbeit die Untersuchung fort, die sich in den 70er Jahren um den Systemvergleich und insbesondere die Tätigkeit Paul Hensels und seiner Gruppe konzentriert hatte. Im ersten Hauptteil behandelt er systemimmanente (systemindifferente) Elemente der Wirtschaftssysteme, während er sich im zweiten einer konkreteren Analyse bestimmter Wirtschaftssysteme widmet. Gesondert untersucht *Leipold* die Wirtschafts- und politischen Systeme, stellt aber zwischen beiden immer einen Zusammenhang her. Nach dem einführenden Kapitel (Problemstellung, Stellung der Systemtheorie) beschreibt er die wichtigsten Entwicklungstheorien, unter ihnen den Marxschen Ansatz. Nach dem ordungs- und entscheidungstheoretischen Modell versucht er eine Synthese dieser Modelle zu gewinnen, wobei vor allem die Entscheidungs-, Motivations-, Kontroll-, Koordinations- und Allokationssysteme dargestellt werden.

Interessanter sind für den Leser, der das konkrete Funktionieren der einzelnen (nationalstaatlichen) Wirtschaftssysteme kennenlernen möchte, die im zweiten Hauptteil enthaltenen Gedanken.

Leipold schildert sechs unterschiedliche Wege, fünf von ihnen sind für die sozialistischen Länder, bzw. für das sozialistische wirtschaftliche (und politische) Gedankengut charakteristisch. Falls die sozialistischen Länder so zahlreiche Modelle entwickelt und sie wenigstens teilweise auch in der wirtschaftlichen Praxis angewandt haben, stellt sich die Frage, ob das kapitalistische System, das Leipold im Modell der privatwirtschaflichen Marktwirtschaft zusammenfaßt, seinerseits nicht ebenso viele Varianten aufweist. Es geht hier nicht nur um die Entwicklungsländer, die recht unterschiedliche Wirtschaftsmodelle ausgearbeitet haben und zu verwirklichen versuchen, sondern auch um die entwickelten Industrieländer, bei denen manchmal nicht geringere Unterschiede im Funktionieren des Marktes und in der Rolle des Preises aufgezeigt werden können, als die Unterschiede, nach denen der Autor die Wege der Wirtschaftsentwicklung in den sozialistischen Ländern ordnet.

Den eigentlichen Wert der Arbeit stellen die Abschnitte dar, die die sozialistischen Wirtschaftsmodelle behandeln. Leipold nimmt sich zwei Grundkriterien (Planungsebene und Eigentumsform), und mit deren Variierung schafft er vier "Modelle", nämlich:

– dezentrale Planung mit Staatseigentum (Ungarn),

– dezentrale Planung mit Gesellschaftseigentum (Jugoslawien und das Šik-Modell der CSSR),

– zentrale Planung und Staatseigentum (DDR),

– zentrale Planung und Gesellschaftseigentum (das rätedemokratische, in der Praxis nicht vorhandene Modell).

Die so entstandenen Länderstudien zerfallen im allgemeinen in drei Hauptteile. Zunächst wird die Ordnung des gegebenen Wirtschaftssystems (Modells) beschrieben. Dann folgen die allokativen und distributiven Probleme, und am Ende wird der Zusammenhang zwischen wirtschaftlichem und politischem System untersucht.

In der ungarischen Fallstudie macht der Verfasser auf die fehlende (erwartete aber ausgebliebene) Konkurrenzsituation aufmerksam. Das Fehlen kompetitiver Marktverhältnisse wird durch eine von der zentralverwaltungswirtschaftlichen Periode übernommene hochkonzentrierte Industriestruktur und durch systemimmanente Mängel begründet. Es wird festgestellt: "die ungarischen Erfahrungen bieten sich als empirischer Beleg für die Hypothese an, daß sich konkurrenzwirtschaftliche Vehältnisse unter den Bedingungen des Staatseigentums an Produktionsmitteln nicht oder allenfalls nur mäßig entfalten können" (S. 145). Aus der Sicht der Wirtschaftswissenschaften, aber auch mit möglichen praktischen Erfahrungen – nicht zuletzt für die kapitalistischen Länder mit bedeutendem staatlichen Sektor – wäre eine tiefgehendere und differenziertere Ausarbeitung dieses Themas nicht uninteressant. Ist es wirklich und immer das Staatseigentum, das konkurrenzwirtschaftliche Verhältnisse nicht zur Geltung kommen läßt, oder nur der von oben gestartete Konzentrationsprozeß der staatlich geeigneten Betriebe unterschiedlicher Größe? Was für eine Rolle kommt dem erreichten Entwicklungsstand, und damit dem historischen Hintergrund im Wirtschaftsprozeß zu? Zu den besten Seiten des Buches gehören die, welche die Probleme der Allokation von Investitionssummen behandeln.

Die Beschreibung des jugoslawischen Modells konzentriert sich unter anderen Themen auf die Interessenlage der Stammbelegschaft, und leitet die These einer Monopolisierung der Arbeitsplätze ab. Daraus folgert der Verfasser auf einen wesentlichen Grund für die hohe Arbeitslosigkeit in Jugoslawien. Zweifellos kann man in der jugoslawischen Wirtschaft eine relativ kapitalintensive Entwicklung feststellen, sie ist aber vor allem anderen Faktoren zuzuschreiben: der gefolgten Wirtschaftsstrategie der Importsubstitution, die bekanntlicherweise nach den bisherigen Erfahrungen immer kapitalintensivere Reproduktionszyklen hervorruft (aber keineswegs direkt mit dem Modell der dezentralen Planung und dem Gesellschaftseigentum verbunden sein muß); dem niedrigeren Entwicklungsstadium der jugoslawischen Volkswirtschaft; und auch der außenwirtschaftlichen Umgebung, in der bestimmte protektionistische Haltungen immer beobachtet werden konnten und können. In der Organisation der Verteilungsprozesse – und hier kann man mit dem Verfasser einverstanden sein – sind zusätzliche Keime der inflationären Preisentwicklung enthalten.

Charakteristisch für diese Preisentwicklung ist eine "antizyklische" Bewegung: die Preise steigen

in konjunkturell stagnierenden Phasen stärker als in expansiven Perioden.

Eine noch nicht genügend ausgearbeitete, und in der Praxis nicht erprobte Variante des jugoslawischen Modells sieht der Verfasser in den wirtschaftstheoretischen Ansätzen von Ota Šik, auf die im Buch nur kurz eigengegangen wird.

Am ausführlichsten behandelt das Buch die Organisierung und das Funktionieren der zentral geplanten Wirtschaft mit Staatseigentum am Beispiel der DDR.

Leipolds Arbeit, die zahlreiche interessante Feststellungen macht, und vom gründlichen Kennen bestimmter sozialistischer Volkswirtschaften zeugt, ist eine interessante, jedoch nicht immer leicht verständliche Lektüre. Der Verfasser hätte das Buch noch interessanter machen können, wenn er einerseits den sozialistischen "Fallstudien" ein zusammenfassendes, wirklich vergleichendes Kapitel nachgefügt, und andererseits seine Untersuchungen auf die spontanen (nich geplanten und durchdachten) Reaktionen der sozialistischen Länder auf die Veränderung der weltwirtschaflichen Umgebung ausgedehnt hätte. Genau die letzteren hätten eine differenziertere und wirklichkeitsnahe Behandlung der "systemspezifischen" Elemente ermöglicht, und nicht zuletzt darauf aufmerksam gemacht, daß man auch im Sozialismus nicht immer vom Primat der Politik ausgehen kann, und die wirtschaftlichen Prozesse die politischen Lösungsvarianten nicht nur rückwirkend und sekundär beeinflussen, sondern in bestimmten Perioden von ausschlaggebender Bedeutung sein können.

A. INOTAI

BEITEL, W. – NÖTZOLD, J.: *Deutsch–sowjetische Wirtschaftsbeziehungen in der Zeit der Weimarer Republik. Eine Bilanz im Hinblick auf gegenwärtige Probleme.* Baden-Baden, 1979. Nomos Verlagsgesellschaft. 273 S. (Internationale Politik und Sicherheit. Herausgegeben von der Stiftung Wissenschaft und Politik, Ebenhausen. Band 3.)

Der Titel verspricht eine wirtschaftshistorische Untersuchung der deutsch–sowjetischen Beziehungen in den 20er und 30er Jahren. Das Buch gibt aber um ein gutes Stück mehr: die Verfasser, die bekannte Forscher der Stiftung Wissenschaft und Politik (Ebenhausen) sind, versuchen aus der Vergangenheit solche Ansatzpunkte zu gewinnen, die auch bei der Beurteilung der gegenwärtigen Wirtschaftsbeziehungen der Bundesrepublik zur Sowjetunion helfen. Sie zeigen einige Konstanten auf, die die deutsch-sowjetischen Wirtschaftsbeziehungen traditionell und in einer historischen Tragweite charakterisieren, und ihre Zukunftsperspektiven prägen könnten.

Das erste Kapitel enthält gleich eine Zusammenfassung der Eigenarten der bilateralen Wirtschaftsbeziehungen:

– die wirtschaftliche Zusammenarbeit zwischen unterschiedlichen Gesellschafts- und Wirtschaftssystemen ist nicht ein Novum unserer Zeit, sie hat die sowjetische Wirtschaftspolitik in den 20er Jahren und am Anfang der 30er Jahre gekennzeichnet;

– in der erwähnten Periode traten in der sowjetischen Wirtschaftspolitik die Mittel und Formen der Zusammenarbeit in Erscheinung, die heutzutage die Ost-West-Wirtschaftsbeziehungen anwenden. Einen interessanten Versuch der sozialistischen Planwirtschaft stellte die Konzessionspolitik mit Hinblick auf das Heranziehen ausländischen Kapitals dar:

– zwischen 1922 und 1932 entwickelte sich ein deutsch–sowjetisches Sonderverhältnis: den Verfassern liegt es daran aufzuzeigen, daß der Sondercharakter dieser Beziehungen nicht nur mit politischen Faktoren (Rapallo-Vertrag) erklärbar ist, sondern auf kräftigen wirtschaflichen Grundlagen beruhte.

Eine historische Untersuchung kann natürlich keine verbindlichen Thesen für die Gegenwartsbeziehungen anbieten, doch leistet sie – auch in der heutigen, veränderten politischen Situation – Orientierungshilfe. Man darf dabei nicht vergessen, daß bestimmte Merkmale der deutsch–sowjetischen Wirtschaftsbeziehungen unverändert gültig sind (geographische Nähe, unterschiedliches Entwicklungsniveau, deutsche Export- und Importinteressen hinsichtlich der Sowjetunion, unterschiedliche Abhängigkeit der zwei Volkswirtschaften von der internationalen Arbeitsteilung, die der Warenstruktur, insbesondere auf der sowjetischen Exportseite, unterschiedliche Eigentums-, Lenkungs- und Organisationsverhältnisse).

Die nachfolgenden fünf Kapitel befassen sich mit Teilaspekten der deutsch–sowjetischen Wirtschaftsbeziehungen in der Zeit der Weimarer Republik. Die Verfasser weisen auf die politischen Rahmenbedingungen hin, und beweisen an mehreren Stellen, daß sich die Wirtschaftsbeziehungen nicht immer in engem Zusammenhang mit den politischen Verhältnissen entwickelten. (Meistbegünstigung schon in Brest–Litowsk, die Periodisierung der Wirtschaftsbeziehungen zwischen 1925 und 1933).

Zentrale Bedeutung kommt der Frage zu, inwieweit die gegenseitigen (langfristigen) Interessen auf beiden Seiten gegeben waren. Die Sowjetunion sah in der deutschen Wirtschaft eine der Hauptquellen der Bezüge von Investitionsgütern und Technologien. Deutschland erhoffte sich vor allem große Aufnahmemärkte und die Sicherung des steigenden Rohstoffbedarfs der deutschen Industrie.

In der Entfaltung der Wirtschaftskontakte spielten aber auch binnen- und außenwirtschaftliche Faktoren eine nicht zu unterschätzende Rolle. Die sowjetischen Entwicklungskonzepte (NEP und später der erste Fünfjahresplan) schufen eine beträchtliche und dynamische Nachfrage nach Importgütern, vor allem im technologieintensiven Investitionsgüterbereich. Da ein rascher Importzuwachs nicht mit zusätzlichen Exporten zu finanzieren war, trat die Frage der Finanzierung in den Vordergrund. Dabei verbanden sich volkswirtschaftliche Entwicklungsmodalitäten und außenwirtschaftliche Leistungsfähigkeit: die Kredite sollten durch vermehrte Ausfuhr zurückgezahlt werden, eine Tatsache, die in gewissem Umfang die Priorität der Wirtschaftsentwicklung hätte vorschreiben können. Die gegen Ende der 20er Jahre ausgebrochene Weltwirtschaftskrise hat die Suche nach neuen Absatzmärkten intensiver gemacht: da diese Periode zeitlich mit den Jahren des ersten sowjetischen Fünfjahrplanes zusammenfiel, konnten die sowjetischen Bestellungen stabilisierend wirken (eine ähnliche Entwicklung läßt sich – wenigstens in zahlreichen Untersuchungen – auch Mitte der 70er Jahre feststellen).

Die Verfasser verneinen diesen Stabilisierungseffekt keineswegs, sie betonen aber, daß man diese Wirkung nicht überschätzen darf. Die Bedeutung des sowjetischen Marktes für die deutsche Industrie betrug etwa 2 Prozent zwischen 1930 und 1932, während sich für den deutschen Export höhere Daten ergeben (3 Prozent im Jahresdurchschnitt 1925–30, 8 Prozent in 1931 und 11 Prozent in 1932). Eine tatsächliche Stabilisierung durch sowjetische Bestellungen konnte man in wenigen Industriezweigen feststellen (Dampfmaschinen, Werkzeugmaschinen, Turbinen, Pflüge). Noch niedriger war die Abhängigkeit der deutschen Wirtschaft von den sowjetischen Lieferungen. Zwar stellten diese einen beachtlichen Teil der Gesamteinfuhr dar (Roggen, Bohne, Rohöl, Holz), doch bildeten sie einen bescheidenen Anteil des verfügbaren Gesamtangebots (einheimische Produktion und Import).

Deutschland war in den untersuchten Jahren der führende Wirtschaftspartner der Sowjetunion (ebenso wie heute unter den entwickelten Industrieländern). Auch die Exportspezialisierung der deutschen Wirtschaft stimmte schon damals mit der Spezialisierung in unseren Tagen überein (hauptsächlich Maschinen und Ausrüstungen).

Ein wichtiges Problem der zügigen Entwicklung der Wirtschaftsbeziehungen bestand schon damals in der Leistungsfähigkeit der sowjetischen Exportwirtschaft. Sie hätte einerseit durch größere Ausfuhrmengen, andererseits durch die Verbesserung (Veredelung) der Warenstruktur erreicht werden können. Bald stellte sich jedoch heraus, daß die exportierbaren Warenmengen immer kleiner und kleiner wurden, als Folge der betriebenen Wirtschaftspolitik. Die Schwierigkeiten der Landwirtschaft zeigten in der Ausfuhr ihren Niederschlag: der einst wichtigste Posten (Getreide) der russischen Ausfuhr verlor recht rapide an Bedeutung. Zwar kamen neue Produkte auf (Holz, Erdöl), sie konnten aber den entstandenen Ausfall nicht kompensieren. Gleichzeitig brauchte die sich rasch entwickelnde Sowjetwirtschaft immer mehr und mehr Grund- und Rohstoffe, die früher ausgeführt, jetzt aber der einheimischen Produktion zugeführt wurden. Die strukturelle Verbesserung blieb aus: die importierten Investitionsgüter und Technologien resultierten nicht in der Erhöhung der Industriewarenausfuhr (diese blieb belanglos über die ganze Periode). In dieser Lage – und um ihre angekündigte Wirtschaftsentwicklung fortzusetzen – mußte die Sowjetunion langfristige Kredite heranziehen. Da die deutsche Wirtschaft finanziell schwach war

(das kumulierte deutsche Zahlungsbilanzdefizit betrug zwischen 1924 und 1931 mehr als 16 Mrd. RM), bot sich kein direkter Finanzierungsweg. Eine (theoretische) Möglichkeit bestand jedoch darin, kapitalstarke amerikanische Unternehmen zu gewinnen und die deutsche Exportwirtschaft mit amerikanischem Geld zu finanzieren. (Die Amerikaner waren aber dazu nicht bereit, und begannen insbesondere in den 30er Jahren selbst auf dem sowjetischen Markt aufzutreten.) Die andere und auch praktizierte Methode schuf das System der staatlich garantierten Kredite (Bürgschaften). In diesem Rahmen erfolgten dann die deutschen Kreditvergaben, die ihren Höchststand Anfang der 30er Jahre erreicht hatten. Grund dafür war einerseits der Importbedarf des sowjetischen Planes, andererseits die verstärkten deutschen Exportinteressen in der Depression, und drittens die durch Preisrückschläge betroffenen sowjetischen Exporte.

Interessante Aspekte der wirtschaftlichen Zusammenarbeit sind in der Untersuchung der technischen Hilfsverträge und der gemischten Unternehmen (im Rahmen der Konzessionspolitik) dargelegt. Von den im Jahre 1928 registrierten 97 Konzessionen entfielen 31 auf deutsche Unternehmen (vor dem ersten Weltkrieg bestand 20 Prozent des in Rußland tätigen Auslandskapitals aus deutschem Kapital), und die deutschen Fachleute erfreuten sich einen guten Rufes sowohl im zaristischen Rußland, als auch in der jungen Sowjetunion.

Der abschließende und umfangreichste Abschnitt des Buches analysiert die gegenwärtigen Probleme der beiderseitigen Wirtschaftsbeziehungen im Licht der historischen Erfahrungen. Zwar haben sich die politischen Rahmenbedingungen grundlegend verändert, doch wiederholen sich in den Wirtschaftsbeziehungen zahlreiche alte Entwicklungen und Eigenarten: einen engen Zusammenhang zwischen politischen und wirtschaftlichen Verhältnissen konnte man auch in den 60er und Anfang der 70er Jahre nicht feststellen; am Exportgeschäft in die Sowjetunion sind vor allem Großunternehmen beteiligt, die Mittel- und Kleinbetriebe kommen kaum zum Zuge; die dynamische Steigerung der westdeutschen Ausfuhr in die UdSSR machte wieder einmal staatlich verbürgte Großkredite notwendig, usw. Weiterhin interessiert sich die westdeutsche Industrie (vor allem der Maschinenbau) für den sowjetischen Markt. Gleichzeitig ist die (potentielle) Bedeutung der Sowjetunion als Rohstofflieferant für die BRD größer als früher.

Eine der interessantesten – aber nur angedeuteten – Problemstellungen ist die folgende: inwieweit kann man die entstandenen Wirtschaftsbeziehungen zwischen der BRD und der Sowjetunion im Licht der historischen Erfahrungen für stabil und langfristig halten? Wie bekannt, wurde der dynamische Aufschwung der 20er Jahre durch politische und wirtschaftliche Einflüsse rasch zum Stillstand gebracht. Ist eine ähnliche Entwicklung auch heute vorstellbar? Die Verfasser konnten nicht – und wollten wahrscheinlich auch nicht – auf die letzten weltpolitischen Ereignisse (Zunahme der Spannungen) eingehen, sie stellen aber eine hochinteressante wirtschaftspolitische Untersuchung an. Sie betonen, daß die beiden Wirtschaften zwar einander recht gut ergänzen können, doch sind Begrenzungsfaktoren vor allem auf der sowjetischen Exportseite nicht von der Hand zu weisen. In zahlreichen Produkten (Rohstoffe, Grundstoffe, Halbwaren) können die sowjetischen Lieferungen die westdeutsche Nachfrage nicht woll befriedigen. Die sowjetische Exportstruktur ist – in Richtung auf den westlichen Markt – weiterhin unterentwickelt: die langfristig stabilen Wirtschaftsbeziehungen würden gerade einen höheren Anteil der Fertigwaren an den sowjetischen Ausfuhren und damit eine tiefere, organischere industrielle Zusammenarbeit erfordern.

Die Modernisierung der sowjetischen Wirtschaft geht – ebenso wie in früheren Perioden – hauptsächlich in der Form von Großprojekten vor sich: die mit ihnen verbundenen Kompensationsgeschäfte lassen etliche Zweifel an einer verstärkten Exportfähigkeit der Sowjetunion aufkommen. Den wichtigsten Unsicherheitsfaktor für die langfristig gesunde Entwicklung der beiderseitigen Wirtschaftsbeziehungen sehen die Verfasser darin, daß die sowjetische Wirtschaft in historischer Sicht wenig geeignet war, die importierten Produktionsfaktoren in effiziente Exportleistung umzusetzen. Dieses Problem kann nur mit der fortschreitenden Modernisierung des Lenkungssystems beseitigt, bzw. gemildert werden. Andererseits könnten die Wirtschaftsbeziehungen in der Zukunft durch eine vermehrte Zusammen-

arbeit im Rohstoffsektor stabilisiert und weiterausgebaut werden. Das westdeutsche Kapital war bisher recht zurückhaltend in dieser Hinsicht: teils durfte dieses Verhalten auf das ungenügende Vertrauen zurückgeführt werden, teils hängt die Zurückhaltung mit der Größenordung der zu finanzierenden Projekte zusammen (nicht zufällig kam neulich eine westdeutsche "Brückenrolle" zwischen internationalem, und darunter vor allem nordamerikanischem Kapital und sowjetischer Projektverwirklichung in einigen Konzepten auf). Trotz der bestehenden Schwierigkeiten plädieren die Verfasser für eine verstärkte Beteiligung deutscher Unternehmen und deutschen Kapitals an sowjetischen Rohstoffprojekten: diese Form der Zusammenarbeit würde nicht nur die Rohstoffabhängigkeit der Bundesrepublik diversifizieren, sondern gleichzeitig die bilateralen Beziehungen stabilisieren helfen, und dadurch auch zum weiteren Ausbau der Ost-West-Wirtschaftsbeziehungen nicht unbeträchtlich beitragen.

Die auf beachtliche Literatur, Zahlenmaterial und ursprüngliche Dokumente zurückgreifende Untersuchung ist ein ausgezeichnetes Beispiel dafür, wie sorgfältig ausgewählte historische, vergangene Perioden für gegenwärtige und Zukunftsprobleme "aussagekräftig" bearbeitet werden können.

A. INOTAI

SEVENTH WORLD CONGRESS OF THE INTERNATIONAL ECONOMIC ASSOCIATION (1983)

The International Economic Association is organizing in 1981, 1982 and 1983 various round-table conferences leading up to a world congress on "Structural Change, Economic Interdependence and World Development".

Authors of recent contributions to aspects of the above subject matter are invited to send abstracts of their work to the Secratariat of the IEA (4 rue de Chevreuse, 750006 Paris, France) so that they may be forwarded to the different organizers likely to be interested in their contributions for a round-table conference or for the Congress. A copy might also be sent directly to the President of the IEA, Professor Victor L. Urquidi, at: El Colegio de Mexico, Camino al Ajusco No. 20, Mexico 20, D. F., Apartado Postal 20–671, Mexico.

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Adroddiad Blynyddol 1980. Annual report. Aberystwyth, 1980. The National Library of Wales. 115 p.

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Editor's Preface

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INTERVIEWS

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BOOK REVIEWS

BOOKS RECEIVED

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CONTENTS

Editor's Preface 221
M. AUGUSZTINOVICS: The Rate of Economic Growth in Hungary 1950—2000 . . . 223
R. ANDORKA—B. FALUSSY: The Way of Life of the Hungarian Society as Reflected by the Time Budget Survey of 1976—1977 243
É. KIGYÓSSY-SCHMIDT: Sectoral Interrelations between Material and Non-Material Spheres of the National Economy in a Dynamic System 275
L. FÜSTÖS—GY. MESZÉNA—N. MOSOLYGÓ-SIMON: Cluster Analysis 291
T. FÉNYES—J. SÁRI: On the Difference Equation System of the Composition of the Amount of Money 335
F. SZIDAROVSZKY: On the Generalization of Nash's Cooperative Solution Concept . . 361
G. KORNAI: Has the Hog Cycle Ceased to Exist? (An Econometric Model of the Hungarian Pig Farming) 369

INTERVIEWS

Economics and Psychology — An Interview with János Kornai about his Book "Economics of Shortage" 389

REVIEWS

GY. BÁNKÖVI—J. VELICZKY—M. ZIERMANN: New Ways and Means in Econometrics 403

BOOK REVIEWS

A. BRÓDY: Cycle and Control — An Attempt at Constructing the Mathematical Model of the Classical Market and Business Cycle Theory (J. KORNAI—A. SIMONOVITS) 409
M. AUGUSZTINOVICS (ed.): Macroeconomic Models in Long-Term Planning (R. ANDORKA) 414
M. HEGEDŰS—E. ZALAI: Fixed Point and Equilibrium in Economic Models (L. LÖVEI) 417
G. PÁRNICZKY: Foundations of Statistical Informatics (J. ÚJVÁRI) 418

BOOKS RECEIVED

EDITOR'S PREFACE

It was more than a quarter of a century ago that economic research got rid of the brakes that had greatly hindered the development of the discipline in the decade after 1945. In a gradual upswing the evolution of mathematical-economic research has also had its part. It became possible and necessary that this field of research possessed a separate forum for publications. This is why the Mathematical-economic Section of the Hungarian Economic Association launched a new periodical under the title *Szigma* in 1968. In the last fifteen years Acta Oeconomica has published mathematical-economic articles more or less regularly but now we found it timely to devote a complete issue to the subject. This issue was compiled in cooperation with the editorial staff of Szigma. The papers and reviews first appeared in Hungarian in Szigma – with the exception of the articles by M. *Augusztinovics,* R. *Andorka* – B. *Falussy,* G. *Kornai* and the interview given by J. *Kornai.*

We invited Mr. B. *Martos,* editor of Szigma, in the capacity of guest-editor to select articles from the journal for us, and warmly thank him for his contribution.

Acta Oeconomica, Vol. 26 (3–4), pp. 223–242 (1981)

M. AUGUSZTINOVICS

THE RATE OF ECONOMIC GROWTH IN HUNGARY 1950–2000

The sudden drop of the growth rate in Hungary at the end of the seventies has made the problem of the growth rate timely and, through its social implications, interesting also for the layman: why did things happen as they happened and what can be expected from the future? Recent events, the present situation and medium-term perspectives were widely discussed in connection with the sixth five-year plan. (See for example [1].) By surveying the distant past and the farther future I should like to direct attention now to the *secular tendencies* of the growth rate.*

The model

The well-known Harrod–Domar model describes the growth of the economy as a circular interrelation between production and capital: we produce with the aid of accumulated capital and add part of the product to the accumulated capital in order to increase production. The model is based on an identity and on a double assumption:

a) the rate of increase of the capital stock – henceforth *capital rate* – can be broken down into two factors. One is the share of production devoted to the increment of capital stock,** to be called *increment share.* The other is the capital tied up in producing a unit of output, that is, the *capital/output ratio.* The capital rate is the quotient of these two factors.

b) If we assume that the capital/output ratio does not change over time, the growth rate of output will be *equal* to the capital rate. If, in addition, we also assume that the increment share does not change either, this rate will be *constant* over time:

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**The increment of capital stock is not equal either to gross or to net investment because scrapping does not equal depreciation and because part of the current investment gets tied up in the stock of incomplete investments. The distinction is negligible in a theoretic model but we shall have to observe it in a quantitative study.

$$\frac{c + \Delta c}{c} = 1 + \frac{\Delta c}{c} = 1 + \frac{\frac{\Delta c}{g}}{\frac{c}{g}} = 1 + \frac{\beta}{\alpha} \tag{1.a}$$

$$\lambda = \frac{g + \Delta g}{g} = \frac{c + \Delta c}{c} = 1 + \frac{\beta}{\alpha} \tag{1.b}$$

where c = capital stock
g = output
$\alpha = c/g$ = capital/output ratio
β = increment share
λ = growth rate of output

The basic concept of the model and the identity under a) can be accepted without reservation, since they do not comprise any assumption or neglect, they merely describe facts. What we have to do is no more than to relate this identity to concrete periods of time:

$$\frac{c_t}{c_{t-1}} = 1 + \frac{\frac{c_t - c_{t-1}}{g_{t-1}}}{\frac{c_{t-1}}{g_{t-1}}} = 1 + \frac{\beta_{t-1}}{\alpha_{t-1}} \tag{2.a}$$

The double assumption under b) is, however, unacceptable for practical analysis and planning since both the capital/output ratio and the increment share change over time; it is precisely this change and its impact that are subject to analysis and planning. Therefore, we substitute the description of real temporal interrelations for this assumption:

$$\lambda_t = \frac{g_t}{g_{t-1}} = \frac{\frac{c_t}{\alpha_t}}{\frac{c_{t-1}}{\alpha_{t-1}}} = \frac{c_t}{c_{t-1}} \cdot \frac{\alpha_{t-1}}{\alpha_t} \tag{2.b}$$

The substitution produces:

$$\lambda_t = \left(1 + \frac{\beta_{t-1}}{\alpha_{t-1}}\right) \cdot \frac{\alpha_{t-1}}{\alpha_t} \tag{3}$$

It can be seen that in the case of $\alpha_t = \alpha$ and $\beta_t = \beta$ this is identical with the form (1. b). Therefore, equation (3) may be considered as *a generalization of the Harrod–Domar model,* which preserves the basic concept of the model but discards the irrealistic assumption of constant growth rate (constant capital/output ratio, constant increment share) and thus makes the model suitable for analysing and planning the real economy which changes over time.*

It is important to note that *we have not introduced other assumptions* instead of the discarded ones. The expression (3) explaining the growth rate is *an unconditional identity, valid always and everywhere.* This triviality, however, reveals the actual nature of the relationship: the growth rate of output is identical with the product of the capital rate of the preceding year and the reciprocal change of the capital/output ratio. It can be seen that the change over time of the capital/output ratio partly changes the capital rate itself relative to the earlier period (unless this is compensated for by the change in the increment share) and partly it deflects the growth rate of output from the capital rate. This double effect works in one direction and is therefore unambiguous: *a falling capital/output ratio accelerates, a rising one decelerates the growth of output* relative to both the preceding period and the capital rate.

Neither does equation (3) *neglect* anything. It tells about only two factors of the growth rate but it is important to perceive that there are *no additional* factors to be considered. Whatever affects growth in the real economic life would change either the increment share or the capital/output ratio and *through them* the growth rate. Within the simple framework of this model these two factors pick up and consolidate all impacts on growth.

Thus the model described by equation (3) is unconditional and complete while, at the same time, it provides an extremely *abstract and aggregated* view of the process of economic growth. Such a model is needed when, in order to produce a comprehensive survey, *we do not want,* or, lacking more detailed data and information, *we cannot* draw a more concrete, more colourful and more detailed picture.

Depending on the purpose and the possibilities, one can, of course, take further steps, one can examine the various factors affecting the increment share and the capital/output ratio. In this article just one such concrete factor appears: *the allocation of*

*A similar generalization is applied in a book reporting on experience with various macroeconomic models in long-term planning [2].

output between consumption and various uses of accumulation and its impact on the increment share. For this purpose a further trivial accounting identity will be defined:*

$$\underbrace{\beta_t + \frac{p_t + h_t}{g_t}}_{\text{investment share}} + \underbrace{\frac{v_t}{g_t} + \frac{s_t}{g_t} + \frac{f_t}{g_t}}_{\text{accumulation share}} = 1 \qquad (4)$$

where p_t – replacement of fixed capital
h_t – increment of the stock of unfinished investment
v_t – increment of the stock of circulating capital
s_t – net export
f_t – consumption
in period t.

If the task is to analyse past facts or available detailed plans, the numerical value of all these factors is known and the interrelations (3) and (4) only provide a logical framework of analysis. If, however, we wish to outline a hypothetical growth path – for either the past or the future – the trivial identities (3) and (4) become consistency conditions but the two equations comprise eight variables for each period. We thus have considerable freedom in determining a hypothetical growth path. We have to exploit this freedom – or rather to eliminate it – by formulating economic *assumptions* in order to get a unique solution.

The number of conceivable and acceptable systems of assumptions is unlimited. It follows *that we can construct an unlimited number of rational models around the two obligatory conditions.* We only have to make sure that our assumptions correspond to the given concrete purpose of analysis or planning.

In this article changes in the increment share, the capital/output ratio and the rate of growth will be analysed for the period 1950–1980 on the basis of statistical data and for 1981–1985 on that of the background material of the sixth five-year plan; we do not then need assumptions for these years. On the other hand, the main features and possible alternatives of the growth path up to 2000 will have to be outlined by the long-term plan to be worked out in the next two years; the necessary information, sectoral studies etc. on that are not yet available. We undertake here to perform computations for 1985–

*Here we already take into account that, because of the properties of the available data, the notion of "capital" has to be restricted to fixed capital.

2000 only in order to explore logically the limits of the possible range of movement and the dilemmas the growth strategy to be elaborated will have to face.

Accordingly, for computations covering the period 1985–2000 we built the simplest possible model around the two obligatory conditions:

1. The time series for p_t net exports were treated as given, taken over from results of other more detailed computations, the latter in two variants.

2. Further two factors of accumulation were determined with the equations $v_t = a_1 g_t$ and $h_t = a_2 (\beta_t g_t + p_t)$, where a_1 and a_2 are constants.

3. The time series of the α_t capital/output ratio was directly quantified on the basis of a rough hypothesis.

After all this, consumption, the growth rate and the increment share remain to be determined but only one additional constraint can be applied to each period, since the obligatory equations (3) and (4) are valid. We formulated this single constraint in several variants, of which three will be discussed in this article.

In variant MAXIMOST:* $\beta_t = a_3 - \dfrac{p_t + h_t}{g_t}$ $(t = 1,\ T-1)$

In variant MAXIMAJD: $\lambda_t = a_4$ $(t = 1,\ T-1)$

In variant JOBBMAJD: $f_t = a_5 f_{t-1}$ $(t = 1,\ \tau)$

$\beta_t = \beta_\tau$ $(t = \tau + 1,\ T-1)$

and in all three variants: $\lambda_{T+1} = \lambda_T$

where a_3, a_4, a_5 are constants and the computations are performed for $T = 15$ years.

The variant MAXIMOST investigates – with assumed changes in the capital/output ratio – the increment share, growth rate and consumption resulting from *a constant investment share* a_3. The variant MAXIMAJD determines the investment share required for a *constant growth rate* and the resulting consumption. The variant JOBBMAJD requires *a constant rate of increase of consumption* in the first period while the resulting *increment share* of the last – τ-th – year of the first period remains constant in the second period. The common constraint on λ_{T+1} makes the three variants comparable in the sense that each secures its own continuation after the plan horizon.

Finally, whether we examined time series generated with factual or hypothetical or planned data, we have to characterize longer *periods* of several years comprehensively

*These are all Hungarian acronyms: MAXIMOST = present maximum; MAXIMAJD = future maximum; JOBBMAJD = better future (transl. note).

with the aid of *average* indicators. In this article we apply the usual interpretation of average rate for the *growth rates* of output and capital: we compute the average rate as the *geometrical mean* of the annual rates. Similarly accepting the customary practical reasoning, we define the average *increment share* as the *weighted arithmetical mean* of the annual increment shares:

$$\beta_{t,K} = \frac{\sum\limits_{k} \beta_{t+k}\, g_{t+k}}{\sum\limits_{k} g_{t+k}} = \frac{c_{t+k} - c_t}{\sum\limits_{k} g_{t+k}} \qquad (k = 0,\ K-1) \qquad (5)$$

where $\beta_{t,K}$ is the average increment share of a period of K years following year t. The average $\alpha_{t,K}$ *capital/output ratio* of the same period is determined indirectly, with the *provision* that

$$1 + \frac{\beta_{t,K}}{\alpha_{t,K}} = \sqrt[K]{\prod_{k}\left(1 + \frac{\beta_{t+k}}{\alpha_{t+k}}\right)} \qquad (k = 0,\ K-1) \qquad (6)$$

that is, the average capital rate should be a function of the same form of the average increment share and the average capital/output ratio as it is in individual years.* With this we attain that

$$\lambda_{t,K} = \sqrt[K]{\prod_{k} \lambda_{t+k}} = \left(1 + \frac{\beta_{t,K}}{\alpha_{t,K}}\right) \sqrt[K]{\frac{\alpha_t}{\alpha_{t+K}}} \qquad (k = 0,\ K = 1) \qquad (7)$$

namely the average $\lambda_{t,K}$ growth rate of the period can be studied in the same form as the annual rates described by equation (3).

The data

Output is represented in our computations by *the gross domestic product* (GDP), capital by the *stock of fixed assets,* both at constant prices. The statistical time series are available at the following constant prices:

*The resulting $\alpha_{t,K}$ average capital/output ratio equals the arithmetical mean – weighted by output – of such $\alpha_{t,K}$ ($k = 0,K\text{-}1$) annual capital/output ratios that would have developed if the capital stock had increased each year at the average capital rate of the period.

1950–1970	at 1968 prices
1970–1980	at 1976 prices
1980–2000	at 1980 (expected) prices.

We converted the time series to *1976 price level* with the aid of global price indices computed from the data of those years (1970, 1980) for which two sets of data were available. Obviously the annual growth rates computed from the resulting time series are identical with those computed from the original ones both for output and for capital. Though this procedure changes the level of the increment share and the capital/output ratio, their percentual change over time remains unaffected and their quotient is invariably identical with the capital rate. Thus our procedure changes the properties of the original time series only in so far – and this only is its purpose – as it unifies the levels of the increment share and of the capital/output ratio for the whole period of five decades. This is rather a matter of convenience only.

Annual data are contained in Table 1, the average data of periods in Table 2.

The take-off

The story begins with the outstanding growth rate *in 1951* – never repeated with the exception of 1957. This provided the basis for the myth of "first rapid, later decelerating growth": compared to 1951 every later rate is really low. But it can be seen from the data of Table 1 that the capital rate of the preceding year provided only for a growth of 3.5 per cent; it was the unique, almost 10 per cent drop in the capital/output ratio that allowed a 13.5 per cent growth of output. Obviously, this was achieved only by mobilizing existing, idle capacity reserves.* Extrapolation of this unique, unrepeatable performance led to strategic mistakes in that year, such as the revision of the first five-year plan, a drastic raising of the increment share. It thus seems that the forced accumulation in 1951 was not so much the cause of the spectacular increase in output, as rather its consequence. At any rate, it started a series of quakes which could only be more or less damped by 1958. (It is not necessary to handle the year 1956 separately in this respect: as a socio-political consequence it was itself part of the series of quakes.)

From 1950 to 1958 an extremely sharp two-year cycle in the growth rate of output can be observed. It would be difficult to discover any kind of trend in the changes of the rate of growth. In the meantime the capital stock almost steadily increased, it is thus natural that the sharp fluctuations in output were accompanied by a similar two-year

*Ferenc *Jánossy* must surely be right when he allots the year 1951 – as distinct from the official position of the time and usage based upon it – to the reconstruction period following World War Two. [2].

Table 1
Annual data at 1976 price level

Year	Growth rate of GDP (a)	Difference in rates between years (b)	Increment share (c)	Capital/output ratio (d)	Capital rate (e)	Impact of changes in *c/o* ratio (f)
1950	.	.	20.2	5.79	3.5	
1951	13.5	.	24.4	5.28	4.6	1.097
1952	0.3	13.2	22.9	5.50	4.2	0.959
1953	11.1	10.8	18.7	5.16	3.6	1.067
1954	−2.9	14.0	17.5	5.51	3.2	0.937
1955	5.9	8.8	13.7	5.36	2.6	1.027
1956	−9.1	15.0	17.4	6.05	2.9	0.887
1957	22.5	31.6	19.2	5.08	3.8	1.191
1958	4.5	18.0	21.5	5.04	4.3	1.007
1959	5.8	1.3	21.0	4.97	4.2	1.015
1960	9.3	3.5	17.2	4.74	3.6	1.048
1961	4.8	4.5	18.0	4.69	3.8	1.011
1962	6.1	1.3	18.5	4.59	4.0	1.022
1963	5.7	0.4	19.8	4.52	4.4	1.016
1964	4.7	1.0	20.3	4.50	4.5	1.003
1965	1.0	3.7	20.4	4.66	4.4	0.966
1966	7.4	6.4	19.3	4.53	4.3	1.029
1967	7.5	0.1	19.9	4.39	4.5	1.032
1968	4.9	2.6	21.6	4.37	4.9	1.004
1969	6.9	2.0	20.9	4.30	4.9	1.018
1970	4.7	2.2	24.0	4.30	5.6	1.000
1971	6.2	1.5	24.7	4.27	5.8	1.006
1972	6.1	0.1	25.5	4.26	6.0	1.003
1973	6.9	0.8	24.1	4.23	5.7	1.008
1974	5.9	1.0	23.4	4.22	5.6	1.002
1975	6.2	0.3	27.5	4.19	6.6	1.006
1976	3.6	2.2	26.0	4.32	6.0	0.972
1977	7.6	4.0	24.4	4.25	5.7	1.015
1978	4.4	3.2	25.8	4.30	6.0	0.988
1979	2.7	1.7	26.8	4.44	6.0	0.969
1980*	1.7	1.0	27.1	4.63	5.8	0.959
1981**	2.6	0.9	24.9	4.77	5.2	0.971

Note: $a = 100(\lambda_{t-1})$, $b = 100\,|\,\lambda_t - \lambda_{t-1}|$, $c = 100\,\beta_t$, $d = \alpha_t$, $e = 100\,\frac{\beta_t}{\alpha_t}$, $f = \frac{\alpha_{t-1}}{\alpha_t}$

*expected; **planned.

Table 2
Average data of periods at 1976 price levels

Period		Growth rate of GDP (a)	Average of differences in rates between periods (b)	Increment share (c)	Capital/output ratio (d)	Capital rate (e)	Changes in capital/output ratio (f)
1950–1958		5.3	15.9	19.1	5.41	3.5	1.017
1958–1968		5.7	2.5	19.6	4.66	4.2	1.014
1968–1970		5.8	2.1	21.2	4.33	4.9	1.008
1970–1975		6.3	0.8	24.3	4.25	5.7	1.005
1975–1978		5.2	3.1	25.9	4.25	6.1	0.99
1978–1981		2.4	1.0	26.8	4.44	6.0	0.97
1981–1985		3.3	.	22.8	4.85	4.7	0.99
MAXIMOST	1985–1990	3.8	.	22.1	4.95	4.4	0.99
	1990–1995	2.6	.	20.2	5.23	3.9	0.99
	1995–2000	2.1	.	19.1	5.58	3.5	0.99
	1985–2000	2.9	.	20.4	5.19	3.9	0.99
JOBBMAJD	1985–1990	4.5	.	25.6	4.98	5.1	0.99
	1990–1995	4.2	.	29.2	5.25	5.6	0.99
	1995–2000	4.3	.	31.2	5.58	5.6	0.99
	1985–2000	4.3	.	29.0	5.35	5.4	0.99
MAXIMAJD	1985–1990	5.0	.	28.3	5.01	5.6	0.99
	1990–1995	5.0	.	33.2	5.24	6.3	0.99
	1995–2000	5.0	.	35.5	5.58	6.5	0.99
	1985–2000	5.0	.	32.9	5.38	6.1	0.99
1950–1975		5.7	.	21.2	4.48	4.4	1.01
1975–2000	MAXIMOST	3.2	.	21.8	4.76	4.6	0.99
	JOBBMAJD	4.1	.	27.8	5.09	5.5	0.99
	MAXIMAJD	4.5	.	30.7	5.22	5.9	0.99

Note: $a = 100\,(\lambda_{t,k} - 1)$, $b = \frac{100}{K} \sum_{k} |\lambda_{t+k} - \lambda_{t+k-1}|\ (k = l, K)$,

$c = 100\,\beta_{t,K'}$, $d = \alpha_{t,K'}$, $e = 100\,\frac{\beta_{t,K}}{\alpha_{t,K}}$,

$f = \sqrt[K]{\frac{\alpha_t}{\alpha_{t+K}}}$

cycle, synchronous with production, in the changes of the capital/output ratio. It does not seem to make sense to pick any bench-mark year within the period. We can not even say that the year 1955, usually picked as bench-mark because of the five-year planning rhythm, is a particularly wrong one – with an outstanding 5.9 per cent increase between two negative rates – since no other year could be considered better. In 1958, however, we can observe several signs of normalization in the growth process. This was the last year when the difference between growth rates showed two digits. The changes in growth rates and capital/output ratio first fell into an area in which they stayed for many years. Previous year's capital rate and increment share – determining the growth rate of output – first attained and even surpassed the initial level of 1950. On the basis of all these we consider the years from 1950 to 1958 as a single period.

Between 1958 and 1970 the growth rate varied between 4 and 7 per cent, except for the upward jump in 1960 and the downward one in 1965. (These two exceptions show that picking bench-marks according to the five-year planning rhythm is misleading even in this period.) The fluctuation in the growth rate was still considerable but far from the figures characteristic of the preceding period. In consequence, a monotonous decline of the overall capital/output ratio could be clearly observed. Thus, in this twelve-year period we do not find a natural turning point either; still we shall discuss that in a breakdown into two subperiods because of the outstanding importance of the 1968 reform of economic control and management.

In 1970 obviously new tendencies started. It was that year that the increment share attained 24 per cent, (exceptionally implemented in 1951), the capital rate exceeded 5 per cent the first time, and the capital/output ratio – as if hesitating whether to decrease further – stopped for a moment. *From 1970 to 1975* the growth rate varied in a zone between 6–7 per cent, conspicuously smoothly as against earlier years. The increment share settled in the highest so far attained range of 23–27 per cent. The capital/output ratio continued to decrease but only to an insignificant extent. *The year 1975* marks a secular turning point: the overall capital/output ratio reached its absolute minimum. The trend of its movement changed from falling to monotonous rising – after a momentary halt in 1977 – at a rather fast rate. *After 1975* again lower rates and stronger fluctuations appear in the growth of output. Thus the period between 1970 and 1975 is clearly and definitely a distinct one from both preceding and following ones as regards its growth characteristics. It will be treated as a separate period for these reasons and not because it happens to coincide with a five-year plan's horizon.

From here on we shall not consider annual fluctuations any more but use only the data of natural turning points and the average data of periods between them.

The events of 1951, the early, wishful intention of rapid acceleration and the usual mechanical selection of bench-mark years relating to the five-year planning cycle, together created the impression as if growth had been rapid in the early fifties and slowed down later. The fact is, however, that up to the mid-seventies the growth of the Hungarian economy was characterized not only by high, but a clearly accelerating growth rate:

Table 3
Average annual growth rates, per cent

Period	Gross domestic product GDP	Capital stock
1950–1958	5.3	3.5
1958–1968	5.7	4.2
1968–1970	5.8	4.9
1970–1975	6.3	5.7

The two decades from post-war reconstruction to the end of the sixties may be called in Hungary, with considerable simplification but not incorrectly, the era of industrialization and collectivization. This *structural transformation process* was necessarily accompanied – as a condition and consequence – by *accelerating economic growth,* it was simultaneously the period of *take-off.* Though not in one big jump, but over two decades, the economy shifted to a growth path that is radically different from the initial path.

Acceleration of growth essentially provided the desired results. *GDP increased roughly fourfold* in twenty-five years and by 1975 its level was almost twice as high as it would have been along the initial growth path. With this the Hungarian economy has made up for much of its inherited backwardness. *The difference* in per capita output relative to industrialized western countries has considerably *diminished.* Because of the rising share of accumulation the growth of consumption lagged behind that of production, but even so *consumption increased* 3.4-fold in 25 years, that is *by almost 5 per cent on annual average* – much faster than it would have grown if the economy had remained on the growth path of 3.5 per cent determined by the initial proportions.

The acceleration of growth was made possible by a *radically transformed* system of ratios determining the mutual relationships of capital, production and accumulation, to be called the *accumulation structure.* The two main elements of this structure developed as follows:

The acceleration of the increase of *capital stock* was caused by the rising tendency of the increment share and the decreasing trend of the capital/output ratio. In addition: the falling capital/output ratio allowed *production to rise faster* than the stock of capital. It can be seen from the data that up to 1970 it was the decline of the capital/output ratio that was the main driving force of acceleration, since the increment share was hardly changing. From 1970 on they changed roles: the sudden rise in the increment share became the engine, and the capital/output ratio was hardly diminishing further.

This, again, seems to contradict public belief which holds that the *share of investment* increased rapidly right from the start. But in this case there is no contradiction, since a unit increase of capital stock indeed absorbed growing amounts of investment:

Table 4
Development of the increment share and the capital/output ratio between 1950–1975

Period	Increment share		Capital/output ratio	
1950	20.2		5.79	
1950–1958		19.8		5.41
1958	21.5		5.04	
1958–1968		19.6		4.66
1968	21.6		4.37	
1968–1970		21.2		4.33
1970	24.0		4.30	
1970–1975		24.3		4.25
1975	27.5		4.19	

Table 5
Share of gross investment

Period	Gross investment in percentage of the	
	GDP	increment of capital
1950–1958	22.2	116
1958–1968	25.7	131
1968–1970	29.5	139
1970–1975	31.6	130

The faster increase of the investment share is partly natural, since initially there was almost no need to *replace* used up fixed assets, while later the replacement requirement was gradually increasing. On the other hand, for various reasons the share of *unfinished investment* projects strongly increased. The reasons included stop-go type central control, partial interests asserting themselves in the investment bargain and several other factors.

It would be rash to draw conclusions from the *levels* at any time of the increment share, the capital/output ratio or the investment share, since these indicators are influenced by the price system. Ever since 1959 all Hungarian *price systems* have distorted them *upwards,* showing them to be higher than their real magnitude.

It is well-known that ever since the 1959 price reform the price of investment goods has comprised a greater profit rate than the price of consumer goods. Since then, every price reform intended to eliminate this "negative two-level" nature, and the long-term trends in relative price changes have indeed worked in this direction. In spite of this, the gap between the two levels merely narrowed but did not close fully, while the continual price changes between two price reforms again opened it up. This was indicated also by the "total contents" indicators derived from computations with the input-output model.

Accordingly, at *calculative input-proportionate prices,* computed as a function of labour and capital inputs, the share of accumulation *was about 5 percentage points lower* in 1970 than at current prices. The same computation showed the overall capital/output ratio to be *15 per cent lower* at input-proportionate prices than at actual ones. From international comparisons made with the same type of prices it turned out that around 1970 these two important indicators of the Hungarian economic structure were situated within the bracket characteristic of the developed industrial countries of Europe.*

It is thus not the level, but only the *tendency of changes* that may serve as a basis of any judgement of the matter. But it also has to be established *what* can be judged on the basis of these tendencies.

We have seen that the rapid growth of the investment share was not followed by a corresponding rise in the increment share in the first two decades. Thus the increase of the investment share does not in itself describe capital efficiency. It is the *investment process* that can be blamed for the widely opening gap between the two ratios, signalling protracted implementation and all those factors which helped to freeze a growing part of the annual product into the stock of *unfinished* investment.

Nor is the overall capital/output ratio an indicator of efficiency. Its decline does not indicate improvement and its rise does not signal deterioration. Its change is, of course, influenced by the micro-level capital efficiency *but its secular trend depends first of all on the changes in macrostructure.* Its steady decline over twenty-five years was released by the radical transformation of the sectoral allocation of investment and the stock of fixed capital. By this transformation, in the period of the take-off, the economy mobilized structural sources of growth which naturally became exhausted after the stormy age of radical macrostructural transformation.**

The fall of the capital/output ratio strongly slowed down already from 1970; its accelerating effect, raising the rate of growth above that of the capital rate could hardly be felt any more. Thus the turning point, and the necessarily involved change in the growth path, were foreseeable. Accordingly, in the first long-term planning exercise, in the early seventies, computations indicated an average annual rate of growth around 5 per cent for 1971–1985, while in the computations of the second exercise an annual 4.6–4.9 per cent growth was arrived at as the average of the fifteen years 1971–75 to 1985–90.

The reputation of long-term planning was much impaired in those times by the fact that real life took a different course. The vanishing accelerating effect of the capital/output ratio was suddenly compensated for, and even overcompensated from 1970 by the lasting increase of the increment share. Thus, the rate of economic growth remained at the peak attained. Between 1970 and 1975 the average annual growth rate was 6.3 per cent, the highest five-year average ever recorded in Hungarian economic history. And the

*These computations were reviewed in detail in Chapter 8, 9 and 11 of the book [2].

**I intend to provide evidence for these statements with detailed computations by sectors in a forthcoming article.

fifth five-year plan for 1976–1980 reckoned with a further decline of the capital/output ratio and provided for a growth rate near the peak.

All these occurred in spite of the fact that the *loss owing to deteriorating terms of trade* from 1973 to 1974 amounted to 6 per cent of the 1973 GDP, *thus depriving the country of the growth of more than one year.* If we adjusted constant price GDP for this loss – in other words, if we did not impute the loss originating in the terms of trade into GDP, as we do not, for example, impute losses due to natural disasters – 1974 would show a growth of 2.5 per cent, 1975 a rate of 3.4 per cent and we would perceive that the capital/output ratio was alrady rising beginning with 1974. In this case 1974 should be considered the secular turning point, the year when the Hungarian economy changed its growth path.

In terms of half a century, however, one year – 1974 or 1975 – does not matter much. The structural resources which served the acceleration of growth through the falling tendency of the capital/output ratio had become essentially exhausted by the early seventies. The sudden increase of the increment share still maintained the growth rate for the few years preceding the change in the trend of the capital/output ratio, but the historic *period of take-off came to an end* by the middle of the decade anyway.

Rocks on the road of transition

Beginning with the middle of the decade a continuous rise in the overall capital/output ratio started which can be predicted, basically for structural reasons, to continue for a long time. It follows that a *slowing down of the growth rate* relative to the peak has started. And yet, like acceleration, deceleration cannot continue for ever either; in a trajectory characterized by a *lower* growth rate a *balanced growth path* securing more or less even growth may develop, if the transformation of the structure of accumulation is cleverly planned and secures the right conditions. For the time being, this opportunity seems to have been missed or at least put off to the mid-eighties. Changing the growth path has not been controlled without shocks, this time either.

The raising of the increment share that could at least partially counterbalance the new rising tendency of the capital/output ratio and thus brake the slowing down, has occurred already at the beginning of the decade. This reserve has been mostly used up for attaining the peak rate and for maintaining it over several years, in a period when the earlier resources of acceleration already became exhausted.

Thus the effect of a further raising of the increment share could assert itself only for a short time. Between 1975 and 1978 the growth rate was 5.2 per cent on average, while the stock of capital increased faster than ever, at an annual rate of 6.1 per cent. In the present, and in the near future, however, quite on the contrary, we are forced to considerably reduce the share of investment and – with some delay – the increment share, since the parallel process of growing indebtedness has also reached its limits. Stopping and partially reversing it became an external constraint beginning with 1979.

The omission to shift the growth path, due already in the early seventies, was coupled from the middle of the decade with slowness in adaptation to changed world market conditions. On the surface the latter appeared as factor number one forcing a sudden slow-down. But, in fact, we might as well say that the *delayed reduction in the growth rate broke through* in the last quarter of the decade.

The sudden eruption of the accumulated tension involves greater shocks and again leads to a sharper fluctuation in the growth rate and to *more extreme swings* than could be expected if one had proceeded along a planned and gradually decelerating growth path. From 1978 to 1981 we expect a growth rate hardly above 2 per cent on the average of three years. Therefore, the rise in the overall capital/output ratio is now around 3 per cent annually, much faster than its decline was in any period, and higher than warranted by a lasting trend of continuous structural change.

The present growth rate is surely below some imaginary, not exactly determined "normal" trend line of the decelerating stage of the path. As a natural reaction, a kind of recovery will have to follow allowed by the reserves accumulating in the present, almost stagnating, stage. In respect of this recovery of the growth rate the sixth five-year plan is extremely cautious – justly so, inasmuch as it wants to emphasize and secure the efficiency and equilibrium conditions of *healthy* acceleration. The mean of the bracket given in the plan involves an annual growth rate of 3.3 per cent on the average of four years, from 1981 to 1985.

If the expectations of the sixth five-year plan for 1981–1985 come true, then – paradoxically in a decelerating period – we shall reach in the mid-eighties a recovering, temporarily accelerating growth rate, but the major parameters of the structure of accumulation will determine a difficult initial position for further growth. The overall capital/output ratio will exceed its 1975 level by at least 20 per cent in 1985 and the increment share will reach roughly the 1970 level. At the given moment, these factors together will allow an annual 5 per cent growth of capital stock but, obviously, a further rise in the capital/output ratio has to be reckoned with.

Chances for balanced growth

If we manage to reach the sharp improvement *in efficiency* which can be considered the major aspiration of the sixth five-year plan, *then,* after 1985 neither labour productivity nor the world-market performance of the Hungarian economy will set more restricted limits to growth than the structure of accumulation; it follows that growth will again be determined by the latter. Accepting this as an initial working hypothesis, the extreme limits of the trajectory available for growth-strategy up to 2000 can be quantified, given some further assumptions on the structure of accumulation.

Three variants will be presented here which cover between 1985 and 2000 a trajectory from 2.8 per cent to 5 per cent growth on the average of fifteen years. The extreme values of this bracket may be regarded irrealistic but inside the zone there is no

single solution that can be judged as *more probable* than any other – given present knowledge. Therefore what follows should *not* be considered *a forecast, but a logical exploration.*

For the time being there is no quantitative knowledge regarding the future rise in the overall capital/output ratio. Therefore, we select the *simplest possible hypothesis* as a basis of our further computations: we assume that the capital/output ratio will continuously rise, will attain the initial level of 1950 again by 2000 and then become stabilized at that level.* Within that, the rapid rise till 1985 will be corrected between 1985 and 1990 by a slower increase, so that the value of the indicator will be the same in 1990 as it would be with a smooth (constant rate) rise over 25 years. This involves the assumption that capacity reserves will still be available after 1985 and that temporary acceleration will continue for one or two more years, allowing an annual growth around 5 per cent in the years 1986–1987.

Obviously, *alternative* assumptions on the rise of the capital/output ratio could – and in the ongoing long-term planning exercise will have to – be applied. For the time being we can rest satisfied with this *single variant,* for it can be followed quite easily what the impact would be on the quantitative results if we reckoned with a faster or slower rise or assumed earlier or later stabilisation of the ratio.

We have to make *further assumptions.* The most important ones are the following:

– Only a decreasing part of investments can serve *expansion of the stock of fixed capital,* since in the decade around 1990 the need for scrapping will be much greater that before.

– The *stock of debts* in convertible currencies may grow after 1985 parallel with exports at current prices (that is, its ratio to export will remain unchanged).

– The terms of trade have been assumed in two extreme alternatives:

a) The terms of trade will continue to deteriorate steadily and to a considerable extent, by a total of 15 per cent in 15 years.

b) The terms of trade will not change after 1985.

After all these assumptions the growth of output, investment and consumption depend on a single further requirement. We want to grasp the limits for them in two extreme variants (giving them names for easier reference):

MAXIMOST: The *investment share* is held throughout at the 1985 level and we accept the *deceleration of growth* resulting from the rise in the capital/output ratio. This strategy allows *the highest consumption for 1986–1990.*

*This assumption only relates to the economy-wide average. In the background there are assumptions about changes in the capital/output ratios of the main sectors, differing from each other, and from the average.

MAXIMAJD: The *rate of growth* is held throughout at an annual 5 per cent, that is at the assumed level at the peak of the recovery around 1986–87 and we accept the necessary rise in the *share of investment* resulting from the rise in the capital/output ratio. This strategy yields *the highest consumption for 2000.*

The MAXIMOST strategy results in a 2.8 per cent annual growth rate on the average of 15 years, but a steadily declining one. By the turn of the millennium the growth potential declines to 2.1 per cent (that is, assuming stabilization of the capital/output ratio after the year 2000, as much as that can be maintained). As against that, as a result of MAXIMAJD strategy the investment share exceeds the 1985 level by 40 per cent in 1990, and by 50 per cent in the second half of the nineties.

Not only that MAXIMOST strategy does not compensate for the rise in the capital/output ratio, it even strengthens its effects, since, in consequence of the growing replacement needs, the increment share diminishes. Thus, in the years after 1985 a favourable increase in consumption can be attained – reaching an annual 3.4 per cent even with deteriorating terms of trade. Later, however, given the steady deceleration of the growth rate, consumption can be increased less and less: in the last years of the nineties not even by 1 per cent annually. Thus, even consumption does not profit from the unchanged investment share in the long run. The conclusion to be derived from the MAXIMOST variant is that after 1985 the investment share has to be raised and probably significantly and for some longer time.

The MAXIMAJD strategy overcompensates for the rise in the capital/output ratio, since the increase of capital stock has to accelerate in order to maintain the growth rate. In consequence of this rather rapid growth a most favourable consumption level can be attained by the turn of the millennium, in spite of the fact that the share of consumption becomes lower than ever. Immediately after 1985, however, – in case of deteriorating terms of trade – consumption will rise by barely one per cent annually which would be hardly tolerable after the stagnation of the living standards over 6–7 years during the early eighties. The lesson to learn from the MAXIMAJD strategy is that the peak rate of growth likely to develop by the end of the recovery in the mid-eighties cannot be maintained for the following one or one and a half decades.

It is a common conclusion from the two variants that we cannot follow one single strategy with monotonous logic from the first half or the eighties right to the turn of the millennium. *Shifts and manoeuvring will be needed,* not only in order to quickly adjust to unforeseeable external effects, but also because of the *internal* factors determining growth.

Such intermediate "switching" variants can be produced in an unlimited number and at the present level of our knowledge of the future, none of them can be said to be more likely than any other. Just one of them will be presented here:

JOBBMAJD: We are manoeuvring to ward off the disadvantages of the two extreme strategies. We secure an annual 2 per cent increase of *consumption* till 1995 with deteriorating, and a 3.5 per cent one with unchanged terms of trade. In the meantime only the "residual" of GDP at any time is used for raising the increment share. Then, the *increment share* thus developed by 1995 is held constant and the "residual" at any time goes to further increasing consumption.

As a result of the JOBBMAJD strategy the increment share rises by 1995 to the level demanded by the MAXIMAJD strategy already for 1990. With deteriorating terms of trade consumption can rise after 1995 by an annual 3.2 per cent while with constant terms of trade it may rise by 4.3 per cent on annual average.

It may be seen that the JOBBMAJD strategy sets out from a double priority: a given minimum increase of consumption has to be secured even at the expense of accumulation and the rate of growth, but we must not seek for the maximum of consumption at the expense of future growth. This trivial golden rule demands in the given case a switch in time, giving greater weight first to the one and then to the other preference. In spite of that, a surprisingly balanced and smooth growth path emerges.

As a result of the JOBBMAJD strategy the increase of the increment share compensates for the rise in the capital/output ratio in such a way that the *capital rate remains more or less unchanged* in a domain of 5–5.5 per cent. Of course, the impact of the steadily increasing capital/output ratio continues to assert itself so that output increases more slowly than the stock of capital, but the growth of output is almost smooth. The growth rate varies throughout between 4 and 5.4 per cent and finally a 4.2 per cent further growth potential develops by the turn of the century. The moral of the story told by the JOBBMAJD variant *is that it is possible to develop a balanced growth path even with a rising capital/output ratio.* Along this path the growth rate is lower than the capital rate but it essentially secures an acceptable rise in living standards.

In conclusion let the reader be reminded again that the presented variants relied on a number of assumptions. Two of them are really important.

The first is *the change in the terms of trade* which determines the volume of net exports required for maintaining the amount of debts at some given level. It thus indirectly determines the rate of growth with a given consumption requirement or, conversely, with a given growth rate it determines consumption. We have seen in the example of the JOBBMAJD variant that the difference between the two extreme assumptions regarding the change in the terms of trade results in significant difference. If the change in the terms of trade is not considered some blow of fortune but a process depending on domestic efficiency, we may add that the trajectory available for the growth strategy after 1985 will basically depend on the efficiency performance in foreign trade.

The other important assumption is the future increase of the *capital/output ratio,* the extent of which is now quite uncertain. Only the forthcoming less aggregated, sectoral

long-term planning exercise will be able to determine its extent with any probability and among other things to assess the feedback of investment-development policies on the changes in the capital/output ratio – a loop that has been completely ignored in the present article.

Summary conclusions

1. Economic growth from 1950 to the mid-seventies showed *an accelerating tendency. The slowing down* relative to the peak rate attained in the first half of the 1970's *is a lasting, necessary tendency,* although the present drastic drop in growth rates results from the belated sudden braking that could have been avoided.

2. The basic reasons for the necessary slowdown should not be sought in the world market but in *internal* factors within the Hungarian economy, that is, in the changing role of structural transformation, although *the extent* of the slowdown is also gravely influenced by losses suffered in foreign trade.

3. If we emerge from the present situation by meeting the conditions of efficiency, the necessarily lower future growth rate should not be regarded as a sign of some kind of decline, on the contrary, it will be *the natural rhythm of a more mature economy having arrived at a higher level* as a result of the take-off period.

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ТЕМПЫ ЭКОНОМИЧЕСКОГО РОСТА В ВЕНГРИИ В 1950—2000 гг

М. АУГУСТИНОВИЧ

В анализе применяется односекторная модель роста, ядро которой представляет общая, динамизированная форма модели Хэррода–Домара. Анализ привел к следующим результатам:

1. До середины 1970-ых годов наблюдалась тенденция ускоряющего роста. В сравнении с наивысшим темпом, достигнутым в первой половине десятилетия, тендеция замедления является устойчивой и объективно необходимой, хотя настоящий темп замедления, степень которого на

переходный период была весьма резкой, вытекает из запоздалого, внезапного торможения, которого можно было бы избежать.

2. Причины объективно необходимого замедления следует искать в первую очередь во внутренних структурных факторах развития венгерского народного хозяйства, хотя на степень замедления оказывают весомое влияние потери во внешнеторговом обмене.

3. Будущий темп роста, в силу необходимости более низкий, чем в прошлом, не является признаком некоего спада, а наоборот, может стать естественным темпом более зрелого хозяйства, достигшего в результате периода быстрого роста более высокого уровня развития.

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THE WAY OF LIFE OF THE HUNGARIAN SOCIETY AS REFLECTED BY THE TIME BUDGET SURVEY OF 1976–1977

The Hungarian Central Statistical Office investigated the time budget of the population from 15 to 69 years of age in 1976–1977. Some 7000 persons were interviewed on four occasions in the course of the sample survey during the year. The study presents the first results of this survey.

In the 1970's investigation of the way of life came into the focus of interest of the social sciences in the European socialist countries. One of the reasons of this interest is that economic development and the living standards of the majority of the population attained a level, where provision with the basic necessities of life no longer absorbs the overwhelming part of the income of the family, and where the legal working hours have became shorter. In consequence, the individuals and families have greater freedom than earlier in deciding on how to use part of their income and their time. From the viewpoint of the development of the economy and society it is important, how members of the society use a growing part of their income remaining after satisfaction of their basic needs, e.g. whether they buy for it (to use two extreme examples) alcoholic beverages or cultural goods, and it is similarily important whether they spend the time, left over after work and the satisfaction of basic needs, in sport acitivities, making excursions or they simply go to amusement places.

Two kinds of investigating the way of life have developed in the Hungarian scientific literature. The first one concentrates on the problem of the desirable way of life in a socialist society. The other endeavours to study the way of life of the present Hungarian society and to measure its historical changes. This latter tries to demonstrate how persons and families of different sex, age, residence, belonging to particular social classes and strata live. The usual method of investigating the way of life is the time budget method.

Hungarian statisticians and sociologists had an important role in the application and development of the time budget method. The Hungarian Central Statistical Office investigated in 1960 the time budget of women living in urban households of workers and non-manuals [1, 2, 3] and in 1963 performed a national time budget survey [4, 5, 6]. In this latter case the daily time budgets of 12 000 persons, aged 18–59, were registered in March, and the time budgets of members of agricultural cooperatives were once again

registered in August.* This survey encompassing all social classes and strata and analyzing both working time and leisure was at that time exceptional in the world literature of sociology.

A Hungarian sociologist Sándor *Szalai* planned and organized the international time budget survey in 1965 and 1966, in wich 12 countries participated. The Hungarian Statistical Office played an important role in this survey in Hungary.** The sample was selected from one (or several) medium-sized town(s) and its surroundings in each country, from among the non-agricultural households. The survey was performed in a selected month. This survey was very important, as

1. it was one of the first international comparative surveys, in which countries at different levels of economic development and with different social systems (socialist and capitalist) participated, and where the results to be compared were arived at with identical methods;

2. in the framework of this research project the standardized methods of the time budget surveys were elaborated which have been used since then in many other surveys, among them also in the Hungarian time budget survey of 1976–1977.

The time budget technique was used in many other Hungarian studies, e.g. S. *Szalai* investigated the time budget of persons employed in a precision engineering plant in Budapest, F. *Gazsó,* F. *Pataki* and G. *Várhegyi* analyzed the time budget of secondary school pupils in Budapest, L. *Szentirmai* investigated the time budget of university students in Szeged, Zs. *Ferge* and co-authors studied the time budget of teachers and pupils in skilled worker training (secondary) schools. In 1972 the Massmedia Research Centre investigated the daily activities, first of all the time spent on listening to radio programs and on watching the television programs, through a national sample [10, 11, 12, 13, 14, 15].

The Central Statistical Office investigated the time spent on working activities, first of all on work in the household and auxiliary plots of members of households cultivating such plots, in the framework of a National Agricultural Census [16–17].

Because, since the time budget survey of 1963 no new survey was performed and published on a national sample of adults, encompassing all types of activities, the Central Statistical Office made a new national time budget survey in 1976 and 1977, in order to analyze the changes in the way of life since 1963, and to show the characteristics of and differences in the way of life of different social classes and strata and of demographic groups.

*The cooperative peasants were interviewed a second time in August in order to cover the seasonality of their work.

**L. *Cseh-Szombathy* and Zs. *Ferge,* as well as the staff of the Directorate in Győr-Sopron county of the Central Statistical Office participated in the time budget survey performed in the town Győr and its surroundings. The results of this survey were published in [7]. The results of the international comparative analysis were published in the volume [8], a part of which has been published recently in Hungarian [9].

The methods of the time budget survey of 1976–1977

The time budget survey of 1976–1977 was an important step forward as compared to the earlier Hungarian and foreign surveys in that respect, that it was the first national survey covering a complete year. (In organizing the survey, the experiences with the working time budget survey of households cultivating household and auxiliary plots, similarily covering a complete year, were of great help.) A more detailed analysis is facilitated by the fact that the number of time budgets registered during the survey was higher than earlier, so that a simultaneous analysis of the results from several viewpoints, taking into consideration several variables, is not hindered by the small number of observations.

The sample of the time budget survey was selected from the 2 per cent census district sample of the Current Population Survey, in which a 2 per thousand dwelling sample was formed. Every second person aged 15–69 in this 2 per thousand dwelling sample was selected for the time budget survey sample. Thus we had a one per thousand sample of the population aged 15–69.

Omission of the population aged less than 15 was motivated by the fact that the time budgets of pupils of primary schools and of younger children, their activities very much differ from those of the adults, thus it would have been necessary to use different surveying and data-processing methods, first of all different categories of activities. The interviewing of the population aged 70 and more was neglected, because with other similar surveys we had the experience, that the interviewing of these elderly persons entails great difficulties.

Thus the sample consisted of individuals, not of families, although it happened – if there were more than two persons aged 16–69 in the family – that more than one member of the same family was included into the sample. It would have been fortunate to make time budget interviews with all the members of the families, as in this way the division of labour within the family and the relationships between the activities of family members could have been investigated. We, however, renounced that, as it was considered to be too burdensome for a family if all its adult members had been interviewed.

The persons selected into the sample were distributed evenly among 90 days. The survey contained four 90-day periods from November 1, 1976, to October 26, 1977. Each person was interviewed four times, at days separated from each other by 90 days. In this way the number of registered time budgets was increased to fourfold without quadrupling the difficulties of surveying, which would have occurred, if we had interviewed four times as many persons. It was considered to be easier to compile four time budgets with the same person, than to draw up four time budgets with four separate persons. The four time budgets of each selected person might also be advantageous if we tried to construct types of time use, as the authors of the international time budget survey concluded that the time budget of merely one selected day did not provide

sufficient basis for typifying the given person; for that purpose several time budgets and days in more than one season would be necessary [18].

The 1 per thousand sample was considered to be sufficiently large to arrive at conclusions on the way of life of social strata, demographic groups etc., also in a seasonal breakdown. The fourfold interviewing might cause important distortions only in the case of very rare activities (e.g. going to the theatre) and very small population groups.

Altogether 27 607 time budgets were collected and analyzed.

The time-budget was registered by the method of the "yesterday-interview", i.e. the interviewer visited the selected person on the day following the one selected for interviewing him (her) (in exceptional cases 1–2 days later), and made notes of his (her) activities on the basis of his verbal story of the previous day, giving the time of the beginning and the end the given activity, the eventual secondary activities (e.g. listening to radio parallel with household work as main activity), the place of the activity, the other participants and the persons present at the given activity. One time budget questionnaire listed in most cases 20–30 main activities per day.

On the basis of the questionnaire the coders classified the activities into 100 different types, the places of the activities into 37 types and the participants into 10 types. In the first phase of processing the data the 100 activity types were aggregated into 47 main types of activities. These were classified into 12 large categories (like earning activities, productive activities, household work etc.).

Tables giving the time budget data by sex, age, marital status, economic activity, social classes and strata, as well as by social groups of the economically active earners, education and residence etc. were prepared.

The definitions of the social groups of economically active earners used in this study are the following:

Managers – everybody in a leading position in state administration, business and institutions, e.g. head of department of ministry, head of local council, director of enterprise etc.;

Professionals – everybody having a job that requires in principle a tertiary level education, e.g. medical doctor, teacher, engineer;

Simple non-manuals – all other non-manuals, e.g. medical assistants, technicians having secondary education, clerical employees;

Skilled – manuals who are working in a skilled job;

Semi-skilled – manuals who are working in a semi-skilled job;

Unskilled – manuals who are working in a job not requiring any skill or learning;

Agricultural manuals in plant production – persons having an agricultural occupation connected to plant production;

Agricultural manuals in animal husbandry – pesons having an agricultural occupation connected to animal husbandry;

Agricultural machine operators – persons operating agricultural machines, e.g. tractor-drivers;

Self-employed peasants – self-employed peasants and their helping family members, as well as all the adult non-learning dependents of those households, that have household or auxiliary plots;

Self-employed artisans and merchants – self-employed persons not in agriculture and not professional, as well as their helping family members.

Work in the main occupation

On the investigated day 45.9 per cent of the interviewed persons (aged 15–69), and 62.2 per cent of the economically active persons were working in their main occupation.* 11.7 per cent of the in-active earners (pensioners etc.) and 8.4 per cent of the dependent persons did some earning activity outside the small agricultural farm (household or auxiliary plot) of the household and outside the household itself.

The percentage of those engaged in work in the main occupation was similar in all the social groups employed in the socialist sector of the economy.** (See *Table 1*) Three social groups were in a somewhat exceptional position: the work of women employed in plant production in agriculture still showed some seasonality, therefore they worked somewhat fewer days than the average of active earners; the men employed in animal husbandry and the agricultural machine operators worked more days than the average, as the care for animals kept in the large agricultural production units cannot be interrupted even on (otherwise) workfree days, and the machine operators are working in the peak season of agricultural working activities also on workfree days (ploughing, harvesting etc.).

There were, on the other hand, important differences in the length of the time spent working in the main occupation on the days when such kind of work was performed by the interviewed persons. Men generally spent more time working in their main occupation than women, as they more often work overtime, and women are partly working shorter hours, being employed in part-time work. The differences by social groups show very clear tendencies: as we go down in the list of social groups as enumerated in the table, the length of working hours increases. (Self-employed persons and their helping family members are exceptions.) The working hours of the professionals are the shortest, those of the simple non-manuals are somewhat longer, those of the

*The relatively low percentage of persons working on the observed day in the main occupation is caused by sundays, holidays, free saturdays, paid holidays, days spent on the sick-list. The work performed by the self-employed peasants on their farms was coded into the category of income-supplementing agricultural work, in order to unite all working activities in the small farms into the same category.

**In the case of self-employed peasants and helping family members the percentage working in the main occupation is relatively low, as their work in their own farm was classified into the category of income-supplementing agricultural work. The helping family members of self-employed artisans and merchants did not work regularly on all work days.

Table 1

Percentage of those who were engaged in work in the main occupation and the average length of their working hours

Social group	Men		Women	
	engaged in work, per cent	duration of work, hour, minute	engaged in work, per cent	duration of work, hour, minute
Managers	69.5	8.03	68.6	7.37
Professionals	68.5	7.45	61.6	7.06
Simple non-manuals	68.1	8.05	65.3	7.44
Skilled workers	68.3	8.26	61.1	7.49
Semi-skilled workers	66.4	8.25	63.0	7.38
Unskilled	68.4	8.42	62.8	7.33
Manuals in plant production	62.2	8.43	42.8	8.10
Manuals in animal husbandry	78.6	8.33	61.7	8.33
Agricultural machine operators	73.5	9.28	.	.
Self-employed peasants	25.6	8.08	5.9	6.18
Self-employed artisans, merchants	69.6	7.27	38.8	3.22
All economically active earners	67.6	8.24	56.4	7.40

non-agricultural workers are more longer, and the persons employed in agriculture have the longest working time in their main occupation. Thus the differences in working time display a certain social hierarchy. This does not exactly coincide with the hierarchy of earnings achieved in the main occupation (as the earnings of the members of agricultural cooperatives are higher than those of the semi-skilled and un-skilled workers in non-agricultural branches), but is very similar to that one. It might be stated that the social groups having lower earnings work longer hours for these earnings.

It is a noteworthy exception from this rule that managers and other persons in leading positions are working longer hours in their main occupation than professionals, but shorter ones than the members of other social groups. Thus the overburdening of managers as compared to professionals seems to be true.

The fact that the time spent at the place of work in the main occupation was 8 hours and 24 minutes for men and 7 hours and 40 minutes for women (on the days when they were working) indicated that the active earners spent significantly more time at the workplace than the statutory worktime. The main reason of this situation is overtime work.*

*M. *Somogyi* and co-authors [19] found some years ago, that the manuals working in the state and cooperative sector perform 9 overtime hours on monthly average.

Income-supplementing activities

In addition to the work in the main occupation the male active earners are spending daily 61 minutes, the female active earners 52 minutes in activities which provide them with supplementary income. According to the time budget survey the most frequent and the most time-consuming type of income-supplementing activity is the work done in agriculture, first of all in the household and auxiliary plots of the family. (The household plots are the plots given by the agricultural cooperatives to their members, the auxiliary plots are other plots, like gardens, etc. cultivated by people who are not necessarily employed in agriculture as their main occupation.)

Since the time budget survey of 1963 the per capita working time in the household and complementary plots increased: in 1963 at the time of the survey in March the per capita time was 36 minutes, in 1976–1977, in the spring season – it was 61 minutes per interviewed person. Particularly the time spent in these agricultural income-supplementing activities of non-agricultural workers increased since 1963 to approximately four to fivefold.

According to the time budget survey of the General Agricultural Census in 1972–1973, the members of the households cultivating a household or auxiliary plot spent a total of 2.7 thousand million hours in a year in working on these small plots [16] The sample of the time budget survey of 1976–1977 was on the one hand somewhat more restricted than the sample of the 1972–1973 survey as it did not include persons aged 11–14 and 70 and more years, on the other hand it was somewhat wider, as it embraced the whole population of the country, not only those who were living in areas where household and auxiliary farming was customary (as in the 1972–1973 survey). According to the 1976–1977 survey the total time spent on activities in household and auxiliary plots was approximately the same (2.7 thousand million hours) as in 1972–1973.

This fact is especially noteworthy and needs explanation, as according to the agricultural sample survey of the Central Statistical Office in 1978 the number of household and auxiliary plots has decreased by 13 per cent since 1972. At the same time the gross output produced by them has increased. This is a consequence of the fact that the share of gardening has increased in plant production, and that in animal husbandry the number of animals has declined, while parallel to that the yield per animal increased. Thus production in the household and auxiliary plots has become more intensive. It seems that members of the somewhat fewer households cultivating small plots spent on the average somewhat more time working on the plots and thus turned out more products.

The fact that an increasing part of the urban population are cultivating a small garden, partly for the products of the garden, and partly as a hobby, might also have contributed to the finding that the total time input into household and auxiliary plots did not decline. The agricultural surveys included only the villages and the rural parts of the towns, therefore they did not take into account the agricultural activities of typical urban

Table 2
Average duration and distribution by social groups of work in household and auxiliary plots by social groups

Social group	Average duration, hour, minute		Distribution of worktime input per cent		Share of social groups in the sample	
	men	women	men	women	men	women
Managers	0.09	0.05	4.8		1.1	0.3
Professionals	0.13	0.04			1.9	1.4
Simple non-manuals	0.35	0.09			4.4	8.9
Skilled workers	0.37	0.12	8.7	0.7	13.8	3.4
Semi-skilled workers	1.00	0.28	6.0	4.1	5.8	8.4
Unskilled workers	1.17	0.44	4.7	3.4	3.5	4.5
Plant producers	2.52	2.13	6.4	4.5	2.2	2.0
Animal husbandry workers	1.58	1.05	1.9	0.4	0.9	0.4
Machine operators	1.15	.	1.2	.	1.0	0.0
Self-employed peasants	5.46	4.00	2.2	13.2	0.4	3.2
Self-employed artisans, merchants	1.55	1.44	1.2	0.7	0.6	0.4
Inactive earners	1.45	0.46	14.2	8.2	7.9	10.4
Dependants	1.19	1.09	0.8	12.7	2.4	10.8
Total	0.58		100.0		100.0	

residents, while these latter persons were included in the time budget survey of 1976–1977.

Among the different kinds of work in the household and auxiliary plots the working activities which are not agricultural in the strict sense of the word, like the repairing of machines, the purchasing of materials, the selling of products, transport activities connected with with them etc. showed an increasing tendency. These activities were classified as income-supplementing agricultural activities, although they are really non-agricultural acitivities serving the agricultural production of these small plots.

Distribution of these 2.7 thousand million working hours by social categories of the persons who performed them was the following: 43 per cent of the time input was made by active and inactive earners and dependants living in working class households, 42 per cent by members of cooperative peasant households, 10 per cent by self-employed persons and their household members, and 5 per cent by non-manuals and their household members. Thus the labour input of the working class into the household and auxiliary plots is not less, but a little bit more than that of the cooperative peasantry.

When the time spent in income-supplementing agricultural activities is investigated in a more detailed breakdown by sex and social groups *(Table 2)*, it becomes even more conspicuous that although the per capita working time in the small plots of those who

Table 3
Distribution of the labour input into household and auxiliary plots, per cent

Social group	1972–1973	1976–1977
Non-agricultural workers	11.8	27.6
Agricultural workers, cooperative peasants, self-employed peasants	20.1	16.6
Non-manuals and artisans	6.7	6.0
Inactive earners	24.9	22.4
Dependants and helping family members	36.5	27.4
Total	100.0	100.0

have an agricultural occupation is longer than the per capita time of other groups (calculated as an average for those who have and those who do not have a small plot), nevertheless the global labour input of the non-agricultural workers is almost twice as much as the inputs of the manuals in plant production, in animal husbandry and of the agricultural machine operators taken together.

Nearly half of the total labour input on the household and auxiliary plots was made by inactive earners, dependants and agricultural helping family members (mostly helping family members of workers and cooperative peasants), i.e. by persons who – in absence of a small plot – would hardly contribute to the national income. On the other hand the labour input of self-employed persons in the household and auxiliary plots is not important.

The distribution of the total labour inputs into the household and auxiliary plots by social groups has changed to an important degree since 1972–1973. Although, in consequence of the not complete match of the samples, the distribution of the labour input cannot be compared absolutely exactly (first of all because the persons aged 11–14 and 70 and more were not included in the sample of the 1976–1977 time budget survey), it can be concluded that the share of non-agricultural workers increased, while the share of agricultural workers, cooperative peasants and self-employed peasants, as well as of the inactive earners and dependants declined *(Table 3)*.

One of the reasons for these changes is the gradual shift in the social structure of the economically active population residing in the villages, and – related to it – the changes in the composition of the population living in families having household or auxiliary plots. While from 1972 to 1978, according to the agricultural surveys, the number of auxiliary plots decreased somewhat more than that of household plots, the number of active earners employed in agriculture decreased in these households having a household or auxiliary plot much more than the number of active earners employed in the other branches. In consequence, the occupationally mixed character of households having household plots increased, as the share of non-agricultural workers living in them

increased. At the same time, the number of dependants and of helping family members decreased more rapidly than any other social group.

The other explanation is that while many of the former agricultural workers and cooperative peasants became non-agricultural workers, their majority maintained their rural residence, where beside the house there is a farm-yard, there are some farm buildings (pig-sty, henhouse, stable), and a garden, and – if there is a cooperative member in the household – the household plot. This explains why he (she) participates in the activities of the household or auxiliary plot. Thus it is not the way of life of the traditional non-agricultural working class that changed, but the persons who came from the agricultural strata into the non-agricultural working class through social mobility brought with themselves some characteristics of their old way of life. Nevertheless, although in many cases the same families were cultivating the small plot in 1972–1973 and 1976–1977, only their members belonged to other social strata, the shift of the agricultural labour input into the household and auxiliary plots into the time budget of the non-agricultural workers brought basic changes in the features of the time budgets of the different classes and strata in Hungary and changed the differences between classes and strata.

The per capita working hours in the small plots are very much differentiated by social groups. The main reason for this is, however, that the percentage of those who live in households cultivating small plots, much differs by particular social groups. If we consider the duration of work only of those who really worked in the household or auxiliary plot on the observed day, then the differences between the social groups are much smaller: in the case of men the time spent working in the small plot varies from 1 and 3/4 hours and somewhat less than 4 hours, in the case of women between 1 hour 21 minutes and less than 3 hours (neglecting the self-employed peasants who – as they had no other main occupation – worked longer hours on the plots).

Very clear differences can be detected by age: while in the age group of 15–19 years the average time spent in income-supplementing agricultural work was 29 minutes with men and 21 minutes with women, in the age group of 60–69 it reached 118 minutes with men and 82 minutes with women. This indicates that it is possible that the younger generations will be willing to work less and less time in the household and auxiliary plots before and after their regular working hours in the main occupation, and on workfree days. But it is also possible that parallel with ageing the time spent in these activities will increase in each generation.

The frequency and duration of the income-supplementing agricultural activities are strongly varying seasonally and by types of days. These variations are somewhat different by sex and by social group.

The seasonal variation of these activities is influenced by the seasonality of agricultural work tasks *(Table 4* and *5).* In winter these activities occur less frequently and with shorter duration in the time budgets, but in households which keep animals, fluctuation of the amount of work is less important. Therefore the manual men and women having agricultural occupations are mostly working also on winter days in the household and auxiliary plots.

Table 4
Percentage of persons engaged in work in the household and auxiliary plot on the observed day, by season of the year

Social group	Spring	Summer	Autumn	Winter	Together
Men					
Skilled workers	26.0	30.1	28.0	20.8	26.2
Semi-skilled workers	41.3	43.6	41.5	32.9	39.8
Unskilled workers	44.8	52.5	48.5	38.9	46.1
Manuals in plant production	77.1	73.8	75.9	65.4	73.0
Women					
Skilled workers	15.7	16.7	13.1	8.5	13.4
Semi-skilled workers	31.2	36.6	28.5	25.4	30.3
Unskilled workers	40.0	45.2	38.5	30.6	38.5
Manuals in plant production	85.7	80.5	78.3	81.8	82.8

Note: In *Tables 4–7* those four active social groups were shown which, on the one hand, had an important role in household and auxiliary farming, and on the other hand those on which a sufficient number of time budgets were collected to give reliable results for the four seasons and for the three types of days.

Table 5
Average hours worked in the household and auxiliary plots by those who were engaged in this kind of work on the observed day by seasons of the year

Social group	Spring	Summer	Autumn	Winter	Average
	hour, minute				
Men					
Skilled workers	2.31	2.36	2.30	1.37	2.20
Semi-skilled workers	2.28	2.48	2.42	1.57	2.30
Unskilled workers	2.31	3.04	2.51	2.35	2.46
Manuals in plant production	3.52	4.07	4.20	3.22	3.56
Women					
Skilled workers	1.21	1.54	1.25	1.02	1.29
Semi-skilled workers	1.35	1.34	1.51	1.05	1.32
Unskilled workers	1.58	2.24	1.45	1.24	1.55
Manuals in plant production	2.33	3.07	2.52	2.10	2.40

Table 6
Percentage of persons engaged in work in the household and auxiliary plots on the observed day, by different days of the week

Social group	Weekday	Saturday	Sunday
Men			
Skilled workers	25.6	28.5	26.8
Semi-skilled workers	37.2	45.9	45.8
Unskilled workers	46.9	41.2	46.7
Manuals in plant production	71.1	75.0	77.4
Women			
Skilled workers	13.5	13.7	12.5
Semi-skilled workers	31.8	26.6	26.5
Unskilled workers	38.0	37.5	41.9
Manuals in plant production	83.1	81.7	82.9

In addition to the seasonality of the work tasks, the frequency and hours of work in the small plots are also influenced by the amount of time the members of different social groups are free to spend on these activities beside their obligations in the main occupation. The non-agricultural workers, in whose main occupation there is no peak demand for labour in summer, and who are partly able to take their paid holidays in summer and to use them for work in the household or auxiliary plot agricultural work most frequently occurs in summer and they also work longest in the summer in the small plots, as demand for their work is highest in this period. On the other hand, the men working in their main occupation in plant production work less frequently and for shorter hours in the small household plot in summer than in autumn, as their working hours in the main occupation are the longest in summer. The women engaged in plant production, whose work in the main occupation is somewhat less regular and shorter, work in the small plots most frequently and for the longest hours in summer, as they can make more time free for that purpose.

The work in the household and auxiliary plots is concentrated on the weekend days with both non-agricultural and agricultural male manuals (See *Tables 6* and *7*). This is understandable, as their working hours in the main occupation are long and they often commute long and tiring distances each weekday and, in addition, they usually perform the more heavy work tasks in the fields, which are not in the yard or the garden in the neighbourhood of the home. In the case of women no weekend working time peak can be seen, partly because they do the work around the home (caring for animals, work in the garden), partly because the active women concentrate their household chores on the weekends.

In summary it might be stated that the work in the household and auxiliary plots is concentrated on such days and seasons, when demand for work in the state and cooperative sector is not expecially high.

Table 7
Average hours of work in the household and auxiliary plots of those who were engaged in this kind of work, on the observed day, by different days of the week

Social group	Weekday	Saturday	Sunday
Men			
Skilled workers	2.00	3.25	2.56
Semi-skilled workers	2.15	3.18	2.42
Unskilled workers	2.31	4.03	2.58
Manuals in plant production	3.40	4.30	4.33
Women			
Skilled workers	1.29	1.29	1.27
Semi-skilled workers	1.28	1.58	1.32
Unskilled workers	1.54	2.15	1.42
Manuals in plant production	2.43	3.02	2.06

The other manual and non-manual income-supplementing activities appear much less frequently in the time budgets than work in the small plots. We can only make hypotheses about the causes of this finding. It might be supposed that part of these activities can be much clearly separated from the activities at the place of the main occupation, thus the interviewed persons simply included them in the time spent in the main occupation (e.g. a scientist writing an article).

It is, however, probable, that these non-manual and non-agricultural manual income-supplementing activities occur less frequently, than work in the household and auxiliary plots. And it is a common experience of time budget studies, that less frequent activities are less completely shown by the results of the surveys. In the case of those, however, who mentioned to be engaged in such activities in the survey of 1976–1977, they lasted rather a long time.

It is also probable that the income-supplementing activities are mixed to some degree with household activities, as the interviewed persons designated the work connected to housing construction, to the making and repairing of household instruments, to the service of personal cars as household work. If they are done for the household of the interviewed person, they are by definition not coded as income-supplementing activities, although their results are dwellings and consumer durables, and if they were done by persons not belonging to the household, they would have entailed the payment of wages for them, and so would have diminshed the amount of money available to the household. Thus they contribute to the improvement of the living standard of the household. And if these works were done for some other household, they contributed to the improvement of the level of living of that latter mentioned household. Since a widespread network of mutual help and collaboration is existing in the Hungarian society (e.g. the houses built in

Table 8

Percentage of persons engaged in non-manual or non-agricultural manual income-supplementing work and duration of this work engaged in it

Social group	Men		Women	
	engaged per cent	duration hour, minute	engaged per cent	duration hour, minute
	Non-manual income supplementing work			
Officials and managers	1.9	2.02	2.1	1.13
Professionals	2.5	2.43	3.2	2.56
Simple non-manuals	1.1	2.13	0.8	2.35
	Non-agricultural manual income supplementing work			
Skilled workers	1.4	3.10	1.0	3.26
Semi-skilled workers	1.2	4.05	0.6	2.24
Unskilled workers	0.9	3.24	0.8	4.13

Note: Those social groups were displayed in the table where these kinds of income-supplementing activities were relatively frequent.

the villages, and partly also those in the towns are constructed with the collaboration of relatives and neighbours, friends, fellow-workers), it might be assumed that these activities, although performed gratuitously, contribute to the growth of the income of households.

These types of household works occur mostly among men more frequently and last longer (see *Table 9*). 5.4 per cent of the interviewed men did some work connected with building or enlarging or maintaining a house and 10.0 per cent did some work connected with preparing or repairing household instruments and vehicles. The building activities, if they occurred, lasted on the average more than 4 hours, and the activities on instruments and vehicles more than one hour. It is noteworthy that they occurred most frequently among skilled workers.

On the basis of the time budget survey we can estimate the total labour input of the 15–69 years old population into non-agricultural income-supplementing activities. Namely, during the whole year 46 million working hours were spent on non-manual income-supplementing activities, 92 million working hours on non-agricultural manual ones, and 369 million hours on building activities, 185 million hours on the repairing and maintenance of household instruments and vehicles. This total of 692 million working hours is far less than the 2.7 thousand million hours spent in the household and auxiliary plots (in which there are also building and repairing activities), nevertheless these activities also contributed to an important degree to the increase of the wellfare of families and society.

Table 9

Percentage of men engaged in building activities and in the repair and maintenance of household instruments and vehicles, and average duration of these activities of those who were engaged in them on the observed day

Social group	Engaged in		Duration of	
	building	repairing	building	repairing
	per cent		hour, minute	
Managers	4.9	18.2	4.05	1.07
Professionals	3.8	13.3	4.11	1.05
Simple non-manual workers	5.7	11.7	4.45	1.30
Skilled workers	7.0	14.4	4.13	1.34
Semi-skilled workers	5.9	8.4	4.36	1.15
Unskilled workers	5.7	8.0	3.59	0.59
Manuals in plant production	3.3	7.8	4.24	0.45
Manuals in animal husbandry	4.3	7.8	3.40	1.05
Machine operators	5.6	10.4	3.40	0.58
Self-employed peasants	2.0	5.0	5.28	1.25
Self-employed artisans, merchants	5.0	13.7	2.11	1.25
Inactive earners	3.9	3.4	4.45	2.22
Dependants	3.1	6.9	4.56	1.26
Total	5.4	10.0	4.21	1.23

The fact that all kind of income supplementing activities, as well as building and repair and maintenance activities occurred almost in all social groups (e.g. non-manual activities among the manuals and manual activities among the non-manuals) seems to prove that the active earners of Hungarian society endeavour to utilize all kinds of income-supplementing possibilities and to perform the craft work occurring in the household themselves.

We can see essentially the same among the inactive earners and dependants:

Table 10

Average per capita time spent in different kinds of income-generating work (main occupation, income-supplementing agricultural, non-agricultural manual and non-manual work) of inactive earners and of dependants

	Hour, minute
Men	
Inactive earners	2.48
Dependants	1.48
Women	
Inactive earners	1.29
Dependants	1.37

12.4 per cent of the total work (in terms of hours) for income registered during the time budget survey was performed by inactives and dependants (5.3 per cent by men and 7.1 per cent by women). If we add the working hours of the agricultural helping family members (the category comprising the helping family members of self-employed peasants, cooperative peasants, agricultural and non-agricultural workers etc., who have a household or auxiliary plot), which was 3.1 per cent of the total working hours of the interviewed persons, then we might conclude that more than 1/7 part of the total income-generating work was performed by persons, who are usually considered to be non-working people. The share of these latter persons is similar in the building and the repair-maintenance activities too.

Summing up, we can state that a great majority of the members of the Hungarian society spend very long hours in income-generating activities. The time budget survey could not provide information on the intensity and productivity of these activities. The time spent in the main job plus with different supplementary working activities is, however, surely tiring (whether it is intensive or not, whether it is very productive or less so), thus the long working hours cause a heavy burden. This burden is shouldered, because in this way it is possible to contribute to an important degree to the improvement of the individual and familial standard of living.

In addition, however, the attained standard of living of the Hungarian society is to an important degree attributable to the fact, that a great part of the society is willing to work long hours. At the same time it is clear that these long hours spent in working are an obstacle to spending mere time on cultural activites, communal life and human contacts, nay, they even constrain the time left for familial activities not related to work. This problem is enhanced by the fact that the long time spent in transport and in household chores also hamper the development of a more cultured and collective way of life.

Transport

Time budget surveys in developed industrial countries showed that parallel with the shortening of working hours the time needed for transportation is lengthening and, in consequence, leisure time increased much less that the decrease of the working time.

The average time spent in transportation in Hungary is also rather long. It is at least near to or more than one hour in most social groups of the economically active population *(Table 11)*.

Women spend less time in transportation than men, even in the same social group, as they are less willing to take jobs at places far from the home, entailing long commuting time. The most conspicuous difference between the social groups is that those who are employed in agricultural occupations spend somewhat less time in transporation than the non-agricultural groups, as the agricultural work places are mostly in the neighbourhood of the residence, while the industrial and other non-agricultural work places are often in other settlements or in distant places of the towns, so that those who work there necessarily spend much time in travelling there.

Table 11
Average time spent in transport, hour, minute

Social group	Men	Women
Managers	1.30	1.12
Professionals	1.22	1.14
Simple non-manuals	1.18	1.11
Skilled workers	1.20	1.04
Semi-skilled workers	1.22	1.06
Unskilled workers	1.08	1.01
Manuals in plant production	1.00	0.53
Manuals in animal husbandry	1.02	0.50
Agricultural machine operators	0.54	.
Self-employed peasants and helping family members	0.58	0.39
Self-employed artisans, merchants and helping family members	1.18	0.38
Inactive earners	0.49	0.35
Dependants	1.35	0.51
Total	1.14	0.56

Household, shopping, maintenance

We saw that the working hours of women in the main occupation, in income-supplementing activities are shorter and also they spend less time in transportation. On the other hand, it is well known that women spend much more time in household chores. In the mass media and also in social scientific works we can often find the negatively evaluated phenomenon that after work the housewifes, the mothers are cooking, tidying the dwelling, washing etc., while the men, the fathers are reposing, reading newspapers etc.

Also the results of the time budget study demonstrate that women spend much more time – about three times as much than men, in different household instruments, shopping, making use of sevices etc. *(Table 12)* This summary statement, however, can be refined in many respects and recent changes can be shown.

First of all, since the national survey of the Central Statistical Office in 1963 the average per capita time spent by women in household chores shortened to an important degree (from 5 hours and 20 minutes to 4 hours and 19 minutes), while that of men lengthened a little bit (from 1 hour 6 minutes to 1 hour 26 minutes). In consequence there was a clear change in the direction of a more equal distribution of the household burdens The ratio of the inputs of women and men was 4.8:1 in 1963 against 3:1 in 1976–1977.

Inequality in the distribution of household chores between men and women is very different also by social groups.

Table 12
Average per capita time spent in household chores, hour, minute

Social group	Men	Women	Ratio of time spent by women to those of men
Managers	1.25	3.13	2.3
Professionals	1.20	2.57	2.2
Simple non-manuals	1.35	3.14	2.0
Skilled workers	1.34	3.38	2.3
Semi-skilled workers	1.27	3.57	2.7
Unskilled workers	1.16	4.10	3.4
Manuals in plant production	1.03	4.11	4.0
Manuals in animal husbandry	1.03	3.57	3.7
Agricultural machine operators	1.16	.	.
Self-employed peasants and helping family members	1.08	5.34	4.9
Self-employed artisans, merchants and helping family members	1.12	5.05	4.2
Inactive earners	2.19	5.05	2.2
Dependants	0.55	4.54	5.3
Total	1.26	4.19	3.0

In the case of men the time spent in household chores is between one and one-and-half hours in each social group (except for inactive earners, who spend more time in them), and there is a slight tendency for urban and more educated men to work somewhat more in the household, while in the case of women the duration of household chores is decreasing if we proceed from the dependants and the agricultural helping family members to the professional women. This tendency is obviously influenced by the different equipment of the households and by the different number of children, nevertheless we can draw the conclusion that in the more educated and higher income urban households the burden of household chores is much less than the average, and it might be cautiously ventured that these households represent the type becoming predominant in the future.

At last it ought to be pointed out that the inequality of household chores is not similarly high in each special type of activity. (See *Table 13*) Washing, ironing, mending of clothes, needlework are almost exclusively the tasks of women. The share of women is very high also in cooking and cleaning, tidying. On the other hand the role of men is relatively higher in shooping; heating is mostly done by men, and the building works, repair and maintenance, the making of household instruments and caring for vehicles are predominatly performed by men, as already mentioned in the part of the article dealing with income-supplementing activities.

Table 13
Average per capita working hours in different types of household chores

Type of household activity	Average duration 1976–77, hour, minute		Ratio of time spent by women to those by men	
	men	women	1976–77	1963
Cooking, serving, washing-up	0.13	1.58	9.1	18.0
Tidying of dwelling, yard, street	0.14	0.53	3.8	13.0
Heating	0.09	0.04	0.50	1.0
Bringing water	0.01	0.01		
Washing, ironing, mending of clothes, needlework	0.02	0.46	23.0	*
Making, repair and maintenance of household instruments and vehicles	0.08	.	0.14	0.33
Building, enlarging and maintaining of dwelling	0.14	0.03		
Shopping	0.09	0.19		
Utilizing personal, health services (hairdresser, doctor etc.)	0.04	0.05	1.8	2.5
Affairs in public offices	0.01	0.01		

*In the publications of the 1963 survey [4] the time spent by men in washing etc. is 0.0, therefore the ratio would be infinite.

Decline of the burdens of women and the growing participation of men in household chores might be seen also from a comparison with the results of the 1963 survey: the ratios of the working hours of women and men in the different types of activities show in each case important shift in the direction of a more equal distribution of tasks between women and men.

The same can be seen from the changes in the percentage of men engaged, on the observed day in different household activities. E.g. the percentage of men engaged in cooking, serving of meals and washing-up increased from 10.2 per cent in 1963 to 30.2 per cent in 1976–1977, that of men engaged in tidying the dwelling, the yard or the footwalk on the street increased from 10.3 to 31.1 per cent, the percentage of men shopping increased from 11.0 to 21.0 per cent. Thus the participation of men in some typically female household chores also increased to an important degree.*

*The time of building activities, and of the repair and maintenance of household instruments and of vehicles, treated in the previous section of the paper, was included into the total time of household activities. The average time of these was 22 minutes for men and 3 minutes for women. If we omit them from the time of household chores, then the time of household activities of men is more or less equal to the time observed in 1963, and thus the change in the distribution of the household chores in the direction of equalization between women and men is less important.

Total contracted and committed time

Work in the main occupation, other income-supplementing activities, household activities and transportation time are called here the total contracted and committed time, as all these activities are necessary for the sustenance of the individual and the family. Only the time remaining after the total contracted and committed time – and the time necessary for the satisfaction of physiological needs (which are relatively inelastic) – can be disposed of rather freely by the individual.*

The volume of contracted and committed time, calculated in that way, might be considered an indicator of the burden or stress on women and men in different social groups. Therefore in the following list the social groups, distinguished by sex, are given in the decreasing order of the amount of contracted and committed time per day:

Thus from the point of view of contracted and committed time, i.e. of the burden of activities serving sustenance, there are rather important differences between the classes and strata in Hungary. The greatest burden is on the members of agricultural cooperatives and agricultural workers, they are followed by unskilled, semi-skilled and skilled workers in decreasing order. The non-manual strata are clearly in a more advantageous position, and among them professionals have the most advantageous position from that point of view.

Since 1963 the contracted and committed time decreased in all non-agricultural social groups, but this decline showed large variations by the particular social groups, and therefore the differences between social groups increased. While in 1963 there was almost no difference between the contracted and committed time of managers, professionals and simple non-manuals, as well as the non-agricultural worker strata, and only the contracted and committed time of the cooperative peasants was much longer (first of all at the time of the survey in August, less so in March), in 1976–1977 we found very clear differences between these social groups.

As regards differences between males and females two opposing tendencies prevailed:

1. the difference between employed women and men diminished because of the much longer income-supplementing work of men and their increasing participation in household chores,

2. the burden of committed time of women increased because of their growing rate of employment and the decline of seasonality in the work of women employed in agriculture.

*This definition is obviously contestable. On the one hand we might include in addition also the time of care for and education of children, and the time spent in learning. On the other hand it is questionable whether the total time of transportation should be included, as part of it is connected to leisure activities. Nevertheless, we considered that this concept of contracted and committed time can be used to illustrate the relative burden of social groups, and of women and men, resulting from activities necessary for sustenance.

Table 14
Contracted and committed time by sex and social groups

Sex and social group	Hour, minute
Female manuals in animal husbandry	11.04
Male manuals in animal husbandry	10.47
Female manuals in plant production	10.47
Female unskilled workers	10.41
Female self-employed peasants and helping family members	10.40
Male manuals in plant production	10.23
Female semi-skilled workers	10.20
Male agricultural machine operators	10.13
Female self-employed artisans, merchants and helping family members	10.07
Male self-employed peasants and helping family members	9.54
Female managers	9.46
Female skilled workers	9.42
Male unskilled workers	9.40
Female simple non-manual workers	9.38
Male self-employed artisans, merchants and helping family members	9.35
Male semi-skilled workers	9.28
Male skilled workers	9.20
Male simple non-manual workers	9.02
Male managers	8.44
Female professionals	8.44
Male professionals	8.17
Female dependants	7.22
Female inactive earners	7.07
Male inactive earners	5.56
Male dependants	5.34
Total females	9.01
Total males	8.27

It seems that the latter one of these two opposing tendencies was stronger, so that the overburdening of women increased since 1963, the difference between the contracted and committed time of all women and all men observed in the time budget survey in 1976–1977 being more than half an hour.* This resulted in spite of the fact that, with

*The comparison of all men and all women in 1963 with 1976–1977 is made difficult by the fact that the former survey embraced the age groups of 18–60 years, and the latter survey those aged 15–69. Nevertheless, the tendency of change might be guessed from the following data: the total contracted and committed time of all men was 576 minutes in 1963 and 507 minutes in 1976–1977, and that of all women was 546 minutes and 541 minutes respectively.

the exception of the groups employed in agriculture, the difference between the contracted and committed time of women and men decreased in all particular social groups, i.e. within the particular groups a clear tendency toward equalization prevailed.

Care for and education of children

The time spent in caring for and educating children is also rather strongly differentiated by sex and social groups. While men participate equally in playing and learning with children, thus in their education (in the broad sense of this term), the caring for children remained the task of women. On the other hand professional men spent more time in the education of children, and also in caring after them than non-agricultural workers and agricultural male manuals. This is clearly partly the result of the longer working hours of these latter social groups, so that less time remains free for the education and care for children, nevertheless we might state that in the professional families a new pattern of contact with children seems to arise. This pattern might gradually spread to other social groups in the future, parallel with the decrease of the contracted and committed time of these other social groups. At the same time professional women also spent more time in caring for and educating children than women in other social groups.

The per capita average time spent in child care and education (12 minutes for men and 26 minutes for women) is obviously a very abstract indicator, as part of the observed persons had no children in their household.

This time is obviously very much differentiated by the number of children of the mother: married women with one child spend 43 minutes per day, married women with two and more children 68 minutes per day, divorced and widowed women having a child or children 38 minutes per day in these activities.

The time spent in child care and education might be investigated more realistically, if we consider the average time of those who were engaged in these types of activities on the observed day.

In families where children under the age of 6 are living, activities connected with the care for children almost necessarily appear in the time budgets of the mother. They take up about one and a half hour in the case of women under 30, whose children are younger, and about one hour in the case of women aged 30–59, whose children might be older. With women aged 55 and more (55 years being the age of retirement for women), who are mostly grandmothers caring for grandchildren, these activities last somewhat longer. Men of similar age are much less frequently participating in these activities, but when they do it, they spend more than an hour in the care of children. These data show that caring for children is an important additional burden for young mothers, who are under considerable stress already because of the working activities and household chores.

Other activities related to the ecducation of children, i.e. learning with them, playing with them, reading them tales, etc., are much less frequent on the observed days

Table 15
Percentage of men and women engaged in child care and education and the average time spent in these activities

Age	Percentage engaged in given activities on the observed day		Duration of activities of those engaged in them on the observed day	
	men	women	men	women
	Caring for children			
15–29	11.7	42.2	1.02	1.38
30–39	19.2	38.7	0.50	1.09
40–59 (women: 40–54)	4.5	10.6	1.01	0.59
60–69 (women: 55–69)	3.3	8.9	1.32	1.17
	Education of children, playing, reading books			
15–29	10.5	15.7	1.01	1.06
30–39	20.0	21.7	1.03	0.52
40–59 (women: 40–54)	7.0	6.6	1.05	0.58
60–69 (women: 55–69)	5.2	6.2	1.19	1.17

than the care for children. With very young children these activities do not occur, and also with older children they are not similarily necessary as caring for them. Research of child psychology, however, clearly stated that these activities on the part of the mother and the father are very important for the personality development of the child. It thus seems to be disadvantageous that parents spend relatively short time with them. On the other hand it is advantageous that the rate of participation and the duration of the activities is similar in the case of fathers and mothers. Both women and men spend the longest time in the education of children in the age group 60–69, that is grandmothers and grandfathers, if they had grandchildren who were on the observed day in their custody, spent much time in playing etc. with them. This seems to prove the important role of grandparents in the life of children in Hungary at present.

Learning, self-education

According to the coding instructions the following activities were included into this category: learning in the framework of the formal education system (at school and at home, preparing the lessons), self-education, e.g. reading of technical books, studying languages privately, as well as other non-manual work, not performed for income, e.g. writing a diary.

Learning in adult age is increasingly a precondition not only of making a professional career, but also of simply maintaining the attained level of knowledge in the given occupation, as in many professions the the necessary knowledge is developing, may changing at such a rate, that the informations acquired in young age in the framework of formal education become partly obsolete during the occupational career. Therefore adult education is an important factor of individual advancement and also of the socio-economic development of the whole country.

Learning in adult age is strongly differentiated by sex and by social groups. Male active earners are learning much more frequently and spend more time in learning, that female active earners. This is an obvious disadvantage for women, and it is the more remarkable, because in the framework of formal education in young age women are more and more approaching the participation levels of young men. In adult age, however, women having the same education and belonging to the same social groups are learning and self-educating themselves much less, therefore they are gradually falling behind their male colleagues.

Also differences between social groups are highly important. Professionals are participating in these activities most frequently and for the longest hours, managers somewhat less frequently, and even less is the participation of simple non-manuals. Although the skilled workers approached or even attained the level of the simple non-manuals in many other fields (e.g. in respect of income level), in this respect skilled workers are much behind the simple non-manuals. From this fact we can conclude that some less visible social mechanisms are still maintaining the social differences between the simple non-manuals and the skilled manual stratum. Semi- and unskilled workers, as well as manuals having an agricultural occupation are much behind skilled workers in respect of the frequency and the time spent in learning and self-education.

Cultural activities

If the time spent in the activities treated up to this point in this paper, as well as the time spent in the satisfaction of physiological needs (sleeping, eating, dressing, personal hygiene and passive resting) are deducted from the 24 hours of a day, the remaining part shows the amount of time, left more or less at the "free" disposal of the interviewed persons.* The average time left for relatively free disposition demonstrates, similarily to the length of contracted and committed time, the relative position of the particular social

*We deliberately do not use the expression of "free time", as we know that there might be activities among those classified into other categories, which for some persons might be leisure activities, while for others they are not. E.g. the cultivation of a small garden might be a preferred form of recreation for an urban professional, while it is an important source of supplementary income for an agricultural manual in a village, and requires great efforts from him. The same might be said about child education and self-education. Some physiological activities, e.g. eating, might be a source of great satisfaction for some people, while for others they are not.

Table 16
Percentage of those reading books on the observed day

Social group	Men	Women
Managers	38.6	22.9
Professionals	39.2	40.2
Simple non-manuals	24.7	27.5
Skilled workers	18.1	17.6
Semi-skilled workers	11.9	13.3
Unskilled workers	11.1	8.3
Manuals in plant production	5.8	3.1
Manuals in animal husbandry	6.6	1.9
Agricultural machine operators	6.0	.
Self-employed peasants	8.9	2.4
Self-employed artisans, merchants	13.7	15.5
Inactive earners	25.4	18.3
Dependants	31.4	18.8
Total	19.5	17.2

groups. We find rather important differences between social groups: professionals are in the most advantageous position, followed by managers, simple non-manuals, non-agricultural worker strata in the order of their level of qualification, and manuals having an agricultural occupation. Manuals in animal husbandry have the least relatively free time.

Also the utilization of this relatively free time shows important differences by social groups. The reading of newspapers, periodicals and books is the most frequent among professionals and is decreasing, as we go in the direction of manuals of agricultural occupation. Reading of newspapers and periodicals seems to be twice as frequent among men as among women, but the reading of books does not seem to be differentiated by sex (See *Table 16*).

As the reading of books ocurred not only as main activity, but also as secondary activity (e.g. during travel), *Table 16* shows the percentage of those who were reading a book either as a main activity, or as a secondary activity, and not with the aim of learning (in that case it was included into learning activities).

The duration of reading was obviously different also among those who participated in this activity on the observed day, the average of social groups varying between one and two hours. Reading of books proved to be clearly the socially most differentiated home-centered cultural activity.

The data on cultural activities of the time budget survey can not be exactly compared to those types of data which are based on cultural surveys, asking retrospectively for a shorter or longer period the frequency of different cultural activities. Such a survey was made by the Central Statistical Office in 1974 on a sample of 8600 families.

The social differentiation of cultural activities, is, however, clearly shown by both kind of surveys and these differences can be compared. Also the survey of 1974 showed that the reading of fiction literature is the home-centered cultural activity most differentiated by social classes and strata.

The watching of television is much less differentiated by social groups. Taking together the main and secondary activities, it is the most frequent among male managers (75%) and the least frequent among self-employed peasant men (57%). Listening to radio is similarily rather equally frequent in the social groups. The average time spent in watching television (as main and secondary activity) is also rather similar: in almost all social groups it was between 2 and 2.5 hours for those who participated in that activity. It is clear, that in opposition to the book, radio and television are the cultural media which reach all social classes and strata the most equally.

The above mentioned cultural survey of 1974 similarly showed that social differences are rather small in watching television and listening to the radio.

As compared to the above treated activities the other cultural activities have a much less important role in the time budget of the population. Only the traditional female needlework (12.9 per cent of women) and hobby activities (7.2 per cent of men, 4.2 per cent of women) occurred relatively frequently.

On the observed day 2.5 per cent of the interviewed persons were at a cinema, 0.4 per cent at a theatre, 0.4 per cent in a museum, 0.5 per cent at a sporting event (as viewer). Thus, participation in cultural events outside the home is rather rare.

The survey of 1974, which investigated the visiting of cultural institutions by asking the approximate frequency of it (several times a week, once in a week or in a fortnight, once a month etc.), obviously showed much higher participation percentages. On the basis of these latter data also the social differentiation might be investigated much more reliably, than on the basis of time budget data, where these activities occur very rarely. According to this cultural survey the attendance of theatres is much more differentiated by social groups, than that of the cinema.

Social contacts

Another important way of spending the relatively free time – beside cultural activities – is socializing, coming together at parties, visiting each other, talking, dancing, playing. These activities lasted somewhat more than 3/4 hours on the observed day. Men are spending somewhat more time in them than women, and professionals, in general persons having higher education and qualification, spend more time in them than unskilled workers and manuals having an agricultural occupation. This is, however, not because the latter persons talk less with each other or have fewer human contacts, but because the form of their contacts is different. Professionals, simple non-manuals and skilled workers tend to spend time especially in social contacts, while among the unskilled and agricultural workers social contacts happen parallel with the work in the main occupation, with

certain household activities, during transportation, while drinking together alcoholic beverages at the inn.* Therefore, in the time budget study they appear as secondary activities or simply as the presence of other persons at a given main activity.

Sport activities

A rather considerable social differentiation was found with sport activities, excursions, in general with open air walking etc. All these are typical professional-stratum activities, and their frequency diminishes as we go down the list of our social groups in the direction of agricultural manuals.

Active sporting, excursions, swimming in pools and similar activities occurred on the observed day in the time budget of 10 per cent of the professional men, of 5 per cent of the skilled worker men, but only of 1 per cent of the agricultural men.

Men pursued these kinds of activities twice as frequently as did women (6 per cent of men, 3 per cent of women were engaged in them), but when they occurred, their duration was similarly about one and a half hours with both sexes.

There are important differences also by age. Persons aged 15–29 participate in excursions, sports etc. twice as frequently, as do the older generations. It is, however, noteworthy, that in the age groups of pensioners (above 60, and 55) the time spent in these activities is somewhat longer than among the younger persons. This seeems to suggest that also the middle-aged active earners would spend more time in excursions and in sporting, in swimming etc. if they could spare more time for that.

Thus, utilization of the more or less freely disposable time shows rather important social differences. Several factors might have a role in these:

1. among persons with higher education the demand for certain cultural activities and for sporting might be higher, than among persons with lower education;

2. in urban places the possibilities for these activities (cultural institutions, sporting facilities) might be present, but they are not available in rural places;

3. the semi- and unskilled workers, as well as the agricultural social groups are hindered by their long contracted and committed time, as well as by the exhausting characteristics of their work from participating in cultural activities demanding higher intellectual efforts, or departure from the home and from participating in sporting activities requiring additional physical efforts.

*The time spent in drinking alcoholic beverages, whether as main activity or secondary activity, and the time spent at inns (when analyzing the places where the interviewed persons spend their time) all show longer durations for the unskilled and the agricultural manuals, than among the non-manual groups. (Skilled workers are also in this respect between the non-manuals and the unskilled workers.) In our opinion, however, we can not conclude from this data that the unskilled and agricultural workers drink more alcoholic beverages. The difference might be explained rather by the different forms of drinking. The unskilled workers and agricultural manuals go to inns and drink as a main activity. The non-manuals go more rarely to the inns (but more often to restaurants, cafés), they spend less time in drinking itself, and do it mostly as a secondary activity, or simply do not mention it.

Summary: main tendencies in and social differentiation of the way of life

The economy and society of Hungary underwent important changes in the period between the first (1963) and the second national time budget survey (1976–1977):

– the national income more than doubled;

– the share of persons employed in agriculture in the economically active population diminished from nearly 1/3 to 1/5; recently the increase in the share of persons employed in industry and construction has stopped and that of persons employed in the service sector has begun to increase rapidly; parallel to that the share of non-manuals increased from less than 20 per cent to about 27 per cent;

– at the same time the sources of extensive growth (the increase of manpower) became exhausted and Hungary entered a phase where intensive development became necessary (in the sense, that almost the only source of growth is the increase of productivity).

– the share of urban population increased from 42 per cent in 1963 to more than 51 per cent;

– the percentage of persons having tertiary education in the population aged 25 and more increased from 2.9 to 5.1 between 1963 and 1975, that of persons having secondary education rose in the population aged 18 and more from 10.0 to 18.6, and that of persons having at least 8 years primary education increased in the population aged 15 and more, from 38.2 to 58.2;

– the per capita real income almost doubled and also the other indicators of the standard of living show important improvements; the dwelling stock not only increased, but also improved from the viewpoint of quality indicators, e.g. the percentage of dwellings with running water more than doubled; the refrigerator, the washing machine and the television set became, instead of being the property of a small stratum, goods possessed by the great majority of the population; the number of motor cars in possession of the population increased approximately fifteen-fold.

Obviously, these changes in the standard of living and in living conditions were connected with inportant changes in the way of life. The time budget surveys enable us to demonstrate some of the most important changes:

– while the statutory working hours decreased, the time effectively spent at the workplace of the main occupation declined somewhat more slowly in consequence of the widespread overtime work;

– the income-supplementing working activities, performed before and after the regular daily working hours and on weekends, most of all the cultivation of household and auxiliary plots, as well as the building of dwellings and the performance of craft works on "do it yourself" basis and with the help of relatives and friends, became widespread;

– the total volume of the working hours input in the small household and auxiliary plots increased slightly since 1963 and did not change since 1972–1973, but an increas-

ing part of it is performed by persons employed outside the agriculture. This fact is related on the one hand to the social mobility processes, as former peasants who became non-agricultural workers and remained willage residents, are working long hours in these small plots; on the other hand it is related to the increased employment of women, in consequence of which the number of dependants decreased in the households having small plots;

– the total volume of time spent in household chores declined and its distribution among women and men became somewhat less unequal; men, especially professionals and in general the urban residents are increasingly taking part in certain household activities;

– in the field of cultural activities the viewing of television programs plays a dominating role; reading of books is very differentiated by social groups; while professionals read relatively much, among the agricultural manuals this activity is relatively rare.

Social differences in the way of life increased in some respects, and in other fields a process of homogenization can be observed. The social differences in contracted (working) time increased, as it shortened much more among professionals than among agricultural manuals and non-agricultural manual strata. In general, differences between the urban and rural strata increased. The main cause of this is the intensive participation of rural strata in the cultivation of household and auxiliary plots. The working hours in the main occupation, however, are also rather differentiated.

On the other hand the similarly frequent and long viewing of the television tends to contribute to the homogenization of certain patterns of the way of life.

The difference between the contracted and committed time of men and women remained more or less unchanged, although the distribution of household chores became more equally distributed between women and men belonging to the same social group. But the growing employment of women and the decline of seasonality in the work of women employed in agriculture tended to increase the working time burden of women, counterbalancing the gain arising from shorter household chores.

Parallel with several important advantageous changes it ought to be stated that the time taken up by working activities in the time budget of the adult members of the Hungarian society is rather important (although declining). It is thus probable that an international comparison performed today would show, similarly to the international survey of 1965, that the time spent working by the members of the Hungarian society is relatively long as compared to other societies at a similar level of development. However, it ought to be clearly stated that the development of Hungary and the improvement in the living standard in the recent period may be attributed to an important degree to the fact that the members of the Hungarian society were willing to engage in these relatively long working hours.

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ОБРАЗ ЖИЗНИ ВЕНГЕРСКОГО ОБЩЕСТВА НА БАЗЕ НАБЛЮДЕНИЯ БАЛАНСА ВРЕМЕНИ НАСЕЛЕНИЯ В 1976—1977 гг.

Р. АНДОРКА—Б. ФАЛУШИ

В венгерском Центральном статистическом управлении было проведено выборочное обследование баланса времени населения 15—69-летнего возраста относительно 1976—1977 года. В течение года четыре раза было опрошено примерно 7000 человек. Статья приводит первые результаты этого обследования.

Полученные данные можно сравнить с проведенным ЦСУ в 1963 году общим обследованием баланса времени, а также с обследованием баланса времени приусадебных и подсобных хозяйств, осуществленным в 1972—1973 гг.

Согласно данным, проводимое на месте основного занятия время за 14 лет уменьшилось, но сокращение было различным в отдельных общественных группах активного самодеятельного населения. Проводимое на месте основного занятия рабочее время наиболее короткое у работников сельского хозяйства.

Наряду с работой по основному занятию значительная часть опрошенных вела дополнительную деятельность в целях получения добавочного дохода. Наиболее частой является работа в приусадебных и подсобных хозяйствах, объем которой возрос по сравнению с 1963 годом и остался неизменным по сравнению с 1972—1973 годами. Однако в рамках всех затрат рабочего времени увеличилось рабочее время, выполняемое рабочими, так что сегодня все рабочее время, затрачиваемое рабочими в приусадебных и подсобных хозяйствах превышает рабочее время, затрачиваемое крестьянами.

Помимо работы в приусадебных и подсобных хозяйствах, мужчины затрачивают значительное количество времени на строительство, починку бытовых приборов и транспортных средств. Домашняя работа женщин значительно сократилась, а мужчин — несколько возрасла с 1963 года. Однако положение женщин в целом все же не улучшилось существенным образом, поскольку одновременно возросла доля активного самодеятельного населения и в связи с этим время, проводимое женщинами на основном месте работы.

Для свободного времяпровождения остается сравнительно мало времени, причем имеются весьма значительные различия по полам и общественным группам. Смотрение телевизора почти одинаково распростанено во всех общественных группах, в чтении же книг наблюдается большая общественная дифференциация.

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SECTORAL INTERRELATIONS BETWEEN MATERIAL AND NON-MATERIAL SPHERES OF THE NATIONAL ECONOMY IN A DYNAMIC SYSTEM

(On the basis of a dynamic input-output analysis with several years lag covering also non-material sectors.)

The analysis is aimed at obtaining information on national economic interrelations among material and non-material sectors taking the mainly long-term delay of non-material inputs into consideration. For this purpose experimental computations have been made with a dynamic input-output table, enlarged by some non-material sectors. The series of computations referred to the national economy of the GDR divided into 7 sectors for a period of 15 years. Results of the analysis obtained up to now allow the conclusion that the dynamic input-output relations enlarged by some non-material sectors can be applied for the analysis of interdependence among material and non-material sectors of the economy.

Delimitation of the problem

1. Development of the non-material sectors *in adequate structure and to adequate extent* is a more and more urging problem at the present stage of socio-economic development of socialist countries. The relative backwardness of non-material sectors – as compared to the industry and other material sectors – may impede undisturbed realization of the reproduction process and considerably impair the efficient exploitation if available economic resources. Therefore, when evaluating the long-term impacts of economic development an appraisal of the economy-wide interrelations of material and non-material sectors is indispensable, too. By using a dynamic input-output table – while knowing its limitations and possibilities – we wish to contribute to the investigation of the above complex problem.

2. Demonstration of the interrelations between material and non-material sectors – first of all delimitation of the non-material sectors – is largely impeded by the circumstance that the majority of non-material services are simultaneously of consumption and of production-influencing character. We have drawn those *non-material sectors* into the sphere of investigation which have a part in the *reproduction of manpower* and are thus more or less directly connected with material production. Setting out from the reproduc-

tion of manpower no distinction has been made between effects on consumption and production, respectively, of non-material services.

3. The economy-wide interrelations between material and non-material sectors have been examined through the *balance of intersectoral relations.* (I/0 table.) To this end the inner quadrant of the traditional input-output table containing material sectors was completed by some non-material sectors. This completion contained in the first approach national economic inputs into non-material sectors (e.g. budgetary expenses, investment inputs). The completed input-output table means a regrouping and enlargement of the traditional one, while basic input-output relationships remained unchanged. Having non-material sectors in the input-output table does not amount to any reformulation of the category of national income (performances of these sectors do not create new value). The enlarged input-output table is aimed at a confrontation of performances of material and non-material sectors as well as at analyzing their interrelations.

4. Using a dynamic input-output table in economic analysis raises a lot of problems. Among others the problem of convergence and stability as a criterion of economic applicability, furthermore that of economic interpretation are arising. Experimental computations (made with a 7X7 input-output table series for the economy of the GDR for a period of 15 years) allow the conclusion that a dynamic input-output table with a lag of several years may be applied for the analysis of the economic problem raised. The dynamic inverse was convergent in the course of experimental computations. The dynamic input-output table is suitable, as it shows the secondary effects, for tracing the long-term effects of non-material sectors. In a series of experimental computations out of non-material sectors education was selected with a lag of several years. In the course of analysis we have experienced that the total share of the *educational sector* in inputs required for a unit of *industrial end use* amounted in 1975 even to 8–10 per cent on the basis of *dynamic inverse* (total inputs of all sectors being 100). As against this, the total share of the educational sector in inputs amounted merely to 1–2 per cent of a unit of industrial end use in 1975 if computed on the basis of the *static inverse.*

The method is suitable for demonstrating interrelations between material and non-material sectors, among others also because a comparison of the traditional with the enlarged dynamic input-output table allows demonstration of structural effects between material and non-material sectors:

– *various lags of several years* in the gestation period of investments and in non-material inputs enable an analysis of lags from the viewpoint of interrelations between material and non-material sectors;

– by varying investment, production and non-material input coefficients the impact of technological progress on interrelations between material and non-material sectors may be followed, etc.

The method of investigation

5. *Enlargement of the input-output table by non-material sectors* is shown through the example of the static input-output table.*

The block denoted with I′ contains outputs of material sectors for non-material sectors. Blocks I″ and II″ denote outputs of non-material sectors for material and non-material sectors (measured in terms of their inputs). The basic relationships of the traditional input-output table (in the MPS) were not modified in the input-output table completed by some non-material sectors.

One of the key-issues of completing the input-output table by non-material sectors is *the sectoral distribution of the output of non-material sectors.* Since the output of non-material sectors drawn into the input-output table is aimed mainly at the reproduction of manpower, it was distributed among various sectors in proportion to the labour employed. Outputs of the sectors of the health service and public education, respectively, were projected to the individual sectors in proportion to the number of employed.

		Use by material sectors	Final use		
			Public consumption		Personal consumption, investment, etc.
			Use by the non-material sectors included	Other fields of public consumption	
Output of material sectors		I	I′	II	
Net production	output of the non-material sector included	II″	I″	II′	
	wages, profits, etc.	III	III′	IV	
Depreciation					

Fig. 1
Pattern of a static input-output table enlargened by some non-material sectors

*Investigations made with the enlarged static input-output table were carried out at the Central Institute of Economics of the Academy of Sciences of the GDR with the collaboration of the National Planning Office of the GDR, cf. [1]

Outputs of the educational sector were distributed in proportion to the total costs of training manpower of differing qualification level employed in the individual sectors. Distribution structures of outputs of various non-material sectors thus determined did not show any relevant deviation.

For the demonstration of interrelations between material and non-material sectors factual static input-output tables of the GDR were analyzed for various years. Static input-output tables completed by non-material sectors (education, health and public education). Input-output tables with 13 sectors were available in the traditional MPS.

Analysis of the series of experimental computations made with static input-output tables indicates that in consequence of the undervaluation of performance at input level the weight of non-material sectors was not considerable either on the basis of direct or on that of indirect inputs.

6. A considerable part of non-material processes is characterized by their *long-term impacts on the national economy*. In order to elaborate these dynamic impacts investigations were made with a dynamic input-output table completed by some non-material sectors. Leontief's dynamic inverse was modified, cf. [5]. Instead of a one-year lag, time-lags of any duration were allowed and thus the dynamic input-output table was applied in the following form:

$$x_t - A_t x_t - \sum_{\tau=t+1}^{t+h} B_t^{\tau}(x_\tau - x_{\tau-1}) = y_t \qquad (t = 0, 1, \ldots, m) \qquad (1)$$

where:

x_t – vector of gross output;
y_t – vector of final use;
A_t – matrix of technological coefficients;
B_t^{τ} – matrix of investment coefficients;
t, τ – time indices;
h – longest gestation period of investment, in years.

When solving equation system (1) a finite segment of the equation system was taken into consideration. Namely, the given equation system consists of m + 1 equations and m + 1 + h variables (m + 1 means the number of observation periods and h the longest gestation period expressed in the given time dimension). For a unique solution of the equation system the number of variables to be given exogeneously is h. With our solution variables $x_{m+1,\ldots,m+h}$ were considered as exogeneous. The equation system solved in this way is shown in *Table 1*. As it turns out from the table, for the solution of the truncated infinite matrix h number of equations were modified at the end of the period. Given yearly vectors of final use were taken into consideration according to the following relationship:

Table 1

Equation (1) of the dynamic input-output table with several years lag ($t = 1, \ldots, m$)

$$\begin{bmatrix} E - A_0 + B_0^1 - (B_0^1 - B_0^2) - \ldots - (B_0^{h-1} - B_0^h) - B_0^h & & & & \\ & E - A_1 + B_1^2 - (B_1^2 - B_1^3) - \ldots - (B_1^h - B_1^{h+1}) - B_1^{h+1} & & & \\ & & & & \\ & & E - A_{m-h} + B_{m-h}^{m-h+1} - (B_{m-h}^{m-h+1} - B_{m-h}^{m-h+2}) - \ldots - (B_{m-h}^{m-1} - B_{m-h}^{m}) - B_{m-h}^{m} & \\ & & E - A_{m-h+1} + B_{m-h+1}^{m-h+2} - (B_{m-h+1}^{m-h+2} - B_{m-h+1}^{m-h+3}) - \ldots - (B_{m-h+1}^{m} - B_{m-h+1}^{m+1}) & \\ & & & & \\ & & E - A_{m-1} + B_{m-1}^{m} & - (B_{m-1}^{m} - B_{m-1}^{m+1}) & \\ & & & E - A_m + B_m^{m+1} & \end{bmatrix} \times \begin{bmatrix} x_0 \\ x_1 \\ \vdots \\ x_{m-h} \\ x_{m-h+1} \\ \vdots \\ x_{m-1} \\ x_m \end{bmatrix} = \begin{bmatrix} y_0 \\ y_1 \\ \vdots \\ y_{m-h} \\ y_{m-h+1}^* \\ \vdots \\ y_{m-1}^* \\ y_m^* \end{bmatrix} \qquad (1')$$

$$y^*_{m-h+1} = y_{m-h+1} + B^{m+1}_{m-h+1} x_{m+1}$$

$$y^*_{m-h+2} = y_{m-h+2} + (B^{m+1}_{m-h+2} - B^{m+2}_{m-h+2}) x_{m+1} + B^{m+2}_{m-h+2} x_{m+2}$$

$$\vdots$$

$$y^*_{m-1} = y_{m-1} + (B^{m+1}_{m-1} - B^{m+2}_{m-1}) x_{m+1} + \ldots +$$

$$+ (B^{m+h-2}_{m-1} - B^{m+h-1}_{m-1}) x_{m+h-2} + B^{m+h-1}_{m-1} x_{m+h-1}$$

$$y^*_m = y_m + (B^{m+1}_m - B^{m+2}_m) x_{m+1} + \ldots +$$

$$+ (B^{m+h-1}_m - B^{m+h}_m) x_{m+h-1} + B^{m+h}_m x_{m+h}.$$

Using the notations $W_t = E - A_t + B^{t+1}_t$ and $D^\tau_t = B^\tau_t - B^{\tau+1}_t$ equation (1) was solved recursively. We shall deal in more detail with the definition of coefficient matrices K^γ_t of equation (2) obtained as a solution under point 7. Solution of equation (1) is:

$$\left.\begin{aligned} & W_t^{-1} y_t + \sum_{\gamma=t+1}^{m} K^\gamma_t y_\gamma = x_t \qquad (t = 0, 1, \ldots, m-1) \\ & \text{and} \\ & W_t^{-1} y_t = x_t \qquad (t = m). \end{aligned}\right\} \qquad (2)$$

The solution is summarized in *Table 2.*

The algorithm elaborated allows simplification of problems of large volume, since inversion and the carrying out of basic operations with the data basis are needed only *in the order of magnitude of the yearly input-output tables.* In order to check the algorithm experimental computations were made. Bernd *Grahl* determined the dynamic inverse by the direct inversion of the matrix of coefficients with a computer type ES 1040 (of 512 K-Bytes). Rainer *Schwarz* computed the dynamic inverse with a computer type HP-30 (without disc unit, of 16 k-Bytes) according to the algorithm elaborated. These computations required 3 and 90 minutes, respectively. The results of both approximations were identical. The stability of the estimated data basis was investigated for several years by Bernd *Matthes.* According to his results the data basis used, turned out to be stabil.

Table 2

Solution of equation (1) of the dynamic input-output table, dynamic inverse with several years lag

$$\begin{bmatrix} x_0 \\ x_1 \\ \vdots \\ x_{m-h} \\ x_{m-h+1} \\ \vdots \\ x_{m-1} \\ x_m \end{bmatrix} = \begin{bmatrix} W_0^{-1}K_0^1K_0^2 & & & & & & \\ & W_1^{-1}K_1^2 & & & & & \\ & & \ddots & & & & \\ & & & W_{m-h}^{-1}K_{m-h}^{m-h+1}K_{m-h}^{m-h+2} \cdots K_{m-h}^{m-1}K_{m-h}^{m} & & & \\ & & & & W_{m-h+1}^{-1}K_{m-h+1}^{m-h+2} \cdots K_{m-h+1}^{m-1}K_{m-h+1}^{m} & & \\ & & & & & \ddots & \\ & & & & & & W_{m-1}^{-1}K_{m-1}^{m} \\ & & & & & & & W_m^{-1} \end{bmatrix} \begin{bmatrix} y_0 \\ y_1 \\ \vdots \\ y_{m-h} \\ y^*_{m-h+1} \\ \vdots \\ y^*_{m-1} \\ y^*_m \end{bmatrix}$$

7. Determination of the coefficient matrix K_t^γ is based on the following relationships:

$$K_\nu^\gamma = W_\nu^{-1} \cdot \left(\sum_{q=\nu+1}^{\gamma-1} D_\nu^q K_q^\gamma + D_\nu^\gamma W_\gamma^{-1} \right),$$

if $\gamma - \nu < h$, where in case $\gamma - \nu = 1$ $D_\nu^q K_q^\gamma = 0$;

and

$$K_\nu^\gamma = W_\nu^{-1} \cdot \left(\sum_{s=\nu+1}^{\nu+h-1} D_\nu^s K_s^\gamma + B_\nu^{\nu+h} F_{\nu+h}^\gamma \right), \tag{3}$$

if $\gamma - \nu \geqslant h$,
where $F_{\nu+h}^\gamma = W_{\nu+h}^\gamma$, if $\gamma - \nu = h$ and

$$F_{\nu+h}^\gamma = K_{\nu+h}^\gamma, \text{ if } \gamma - \nu > h.$$

($\nu = t + z$ and $t = 0, 1, \ldots, m-1$; $z = 0, 1, \ldots, m-1$; $\gamma = \nu + 1, \ldots, m$).

The dynamic inverse given in *Table 1* shows matrix K_t^γ in a special case, when $z = 0$, consequently, $v = t$.

Determination of K_t^γ $(t = 0,1, \ldots, m-1)$; $(\gamma = t+1, \ldots, m)$ is the following according to relationship (3):

$$K_t^\gamma = W_t^{-1} \cdot \left(\sum_{q=t+1}^{\gamma-1} D_t^q K_q^\gamma + D_t^\gamma W_\gamma^{-1} \right),$$

if $\gamma - t < h$,
where, in case $\gamma - t = 1$ $\quad D_t^q K_q^\gamma = 0$;

$$K_t^\gamma = W_t^{-1} \cdot \left(\sum_{s=t+1}^{t+h-1} D_t^s K_s^\gamma + B_t^{t+h} F_{t+h}^\gamma \right), \tag{4}$$

if $\gamma - t \geqslant h$,
where $F_{t+h}^\gamma = W_{t+h}^\gamma$, if $\gamma - t = h$ and

$F_{t+h}^\gamma = K_{t+h}^\gamma$, if $\gamma - t > h$.

Determination of matrix K_t^γ is shown with the constraint $\gamma - t > h$. (In other cases the procedure may be similarly interpreted.) For the sake of clarity the explicit determination of matrices K_t^γ is summarized in *Table 3.*

As it turns out from the table matrices $K_{t+h+1}^\gamma; K_{t+h+2}^\gamma; \ldots; K_{t+2h}^\gamma$ are produced by using matrices $K_{t+1}^\gamma; K_{t+2}^\gamma; \ldots; K_{t+h}^\gamma$.

If $\gamma - (t + 2h) = 1$, then, on the basis of relationship (3), it is valid that

$$K_{t+2h}^\gamma = W_{t+2h}^{-1} D_{t+2h}^{t+2h+1} W_{t+2h+1}^{-1} \cdot \tag{5}$$

On the basis of equation (5) matrix K_{t+2h-1}^γ may be obtained, etc. and thus, through the determination of matrices $K_{t+2h}^\gamma; K_{t+2h-1}^\gamma; \ldots; K_{t+h+2}^\gamma; K_{t+h+1}^\gamma; K_{t+h}^\gamma; \ldots; K_{t+2}^\gamma; K_{t+1}^\gamma$ matrix K_t^γ will be obtained (on the basis of the initial data of the dynamic input–output table).

If $\gamma - (t + 2h) \neq 1$, then matrix K_{t+2h+1}^γ should be explicitly stated and it has to be examined if precondition $\gamma - (t + 2h + 1) = 1$ is fulfilled.

If the precondition is not fulfilled, then matrix K_{t+2h+2}^γ etc. has to be explicitly stated until the precondition $\gamma - (t + 2h + k) = 1$ is fulfilled with $k = 1,2, \ldots m - 1 - (t + 2h)$. Since the maximum value of γ is m and $t \geqslant 0$ as well as $h > 0$, there exists such a value k with which $\gamma - (t + 2h + k) = 1$ is valid. In this way the matrix K_{t+2h+k}^γ may be determined on the basis of initial data of the dynamic input-output table and matrix K_t^γ may be produced.

Table 3
For determination of the coefficient matrices K_t^γ

$$K_t^\gamma = W_t^{-1}(D_t^{t+1}K_{t+1}^\gamma + D_t^{t+2}K_{t+2}^\gamma + \ldots + D_t^{t+h-1}K_{t+h-1}^\gamma + B_t^{t+h}K_{t+h}^\gamma) \quad \text{(Cf. [4])}$$

On the basis of relationship (5) matrices K_ν^γ ($\nu = t+1, \ldots, t+h$) are produced as follows:

$$K_{t+1}^\gamma = W_{t+1}^{-1}(D_{t+1}^{t+2}K_{t+2}^\gamma + D_{t+1}^{t+3}K_{t+3}^\gamma + \ldots + D_{t+1}^{t+h}K_{t+h}^\gamma + B_{t+1}^{t+h+1}K_{t+h+1}^\gamma)$$

$$K_{t+2}^\gamma = W_{t+2}^{-1}(D_{t+2}^{t+3}K_{t+3}^\gamma + D_{t+2}^{t+4}K_{t+4}^\gamma + \ldots + D_{t+2}^{t+h+1}K_{t+h+1}^\gamma + B_{t+2}^{t+h+2}K_{t+h+2}^\gamma)$$

$$\vdots$$

$$K_{t+h-1}^\gamma = W_{t+h-1}^{-1}(D_{t+h-1}^{t+h}K_{t+h}^\gamma + D_{t+h-1}^{t+h+1}K_{t+h+1}^\gamma + \ldots + D_{t+h-1}^{t+2h-2}K_{t+2h-2}^\gamma + K_{t+h-1}^{t+2h-1}K_{t+2h-1}^\gamma)$$

$$K_{t+h}^\gamma = W_{t+h}^{-1}(D_{t+h}^{t+h+1}K_{t+h+1}^\gamma + D_{t+h}^{t+h+2}K_{t+h+2}^\gamma + \ldots + D_{t+h}^{t+2h-1}K_{t+2h-1}^\gamma + B_{t+h}^{t+2h}K_{t+2h}^\gamma)$$

Some results

8. With a dynamic input-output table completed by some non-material sectors experimental computations were made. Initial data of the dynamic input-output table cover the national economy of the GDR in a 7-sector breakdown for the period 1961–1975. Sectors drawn into the examination were the following:

Industry	Home trade
Building industry	Education
Agriculture and forestry	Health service
Transport and communication	

9. When compiling initial data determination of investment lags by sectors caused a special problem. Lags of several years were taken into consideration in respect of the industry, building industry and education. Delays of investment inputs were estimated by using statistical surveys, experts' estimations and international technical literature. The basis of data estimation was a statistical survey on the activation process of fixed assets for the 1970s:

Activation process of the increment of fixed assets of investment origin in the early 1970s

Sector	Year in which the fixed assets' increment of investment origin to be realized in year t originated (in percentage, total fixed assets' increment of investment origin activated in year t = 100)			
	t–3	t–2	t–1	t
Industry	5	20	35	40
Building industry	–	5	55	40
Agriculture	–	–	45	55
Transport	–	5	35	60
Home trade	–	–	20	80
Education	–	–	20	80
Health service	–	10	30	60

Estimates of the absolute value of the increment of fixed assets of investment origin and the activation process of the stock of fixed assets serves for basis in determining investment lags projecting them in time for the purposes of the dynamic input-output table. (A detailed determination of investment lags can be found in [6].)

Distribution of the gestation period of investments realized in the industry is shown in *Figure 2.*

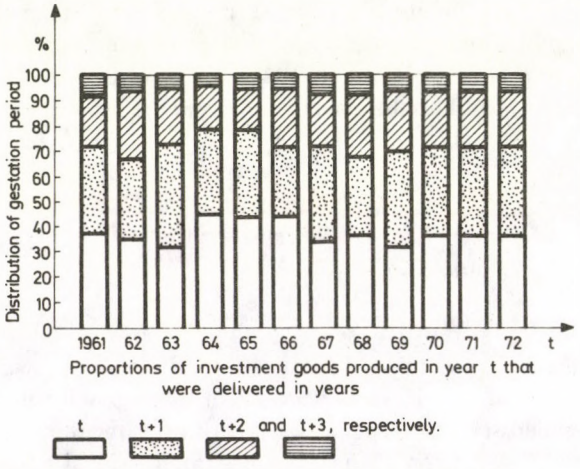

Fig. 2. Distribution of the gestation period of investment goods produced in year t in the industry (1961–1972) (Total gestation period = 100%)

Taking into consideration the compulsory education of 10 classes prescribed in the GDR, only vocational training beyond 10 classes was considered alternative and thus the longest time-lag of educational inputs was stated as 4 years on the average. That part of educational inputs was taken into consideration with more than one-year lag that were spent on the training of students graduating in the period following the year of reference.

10. *Table 4* presents a column of the dynamic inverse. As it may be seen from the table *educational inputs represented a considerable part of the total industrial inputs of 1975.* For the period 1961–1971 the dynamic inverse is converging (except for the 1971 evaluation of the building industry), i.e. when moving backwards in the period inputs are smaller and smaller. The convergence of the dynamic inverse with several years' lag may be attributed first of all to the fact that – in conformity with Leontief's experiences, cf. [5] – input coefficients with several years' lag have shown no considerable fluctuation. The sometimes increasing and sometimes decreasing trend of valuations in the last four years and the appearance of negative values, respectively, may be explained by the fact that the dynamic input-output table has been solved by means of a truncated infinite matrix (cf. point 6). Since in the series of computations a maximum lag of 4 years was taken into consideration and truncation of the matrix was made at the end of the period examined by a corresponding correction of the vector of final use (y_t), economic interpretation of the last four-year period considerably deviates from that of previous years. Negativity and fluctuations emerging in this period may be attributed first of all to the finiteness and interruption of the period examined.

In *Table 4* total inputs falling to final industrial use in 1975 were summarized for the individual sectors. Negative inputs of education may be explained – apart from the effect of the "truncation" mentioned – also by the fact that there was a considerable shift in proportions between inputs of education activated within and beyond one year, respectively, in the GDR between 1961 and 1975:

Educational inputs for the industry
(Total educational inputs = 100)

	Inputs activated	
	within one year	beyond one year
1961	55	45
1965	60	40
1970	63	37
1975	76	24

Using the dynamic inverse with several years' lag in economic analysis is closely connected with the problem of truncation of the infinite matrix. It is a subject of further investigation what effect the method would have on economic interpretation if correction of the vectors of final use were made at the beginning of the period examined. At the

Table 4

Total inputs in the national economy of the GDR falling to a unit of industrial final use of 1975, 1961–1975

Year	Industry	Building industry	Agriculture	Transport	Home trade	Education	Health	First column of the marked matrix of the dynamic inverse (industry)
1961	0.017231	0.005647	0.001589	0.000694	0.000545	0.002835	0.000882	K_{61}^{75}
1962	0.020159	0.006543	0.001825	0.000806	0.000631	0.003296	0.001010	K_{62}^{75}
1963	0.023264	0.007954	0.002084	0.000972	0.000740	0.003822	0.001169	K_{63}^{75}
1964	0.035118	0.011232	0.003312	0.001509	0.001160	0.004959	0.001549	K_{64}^{75}
1965	0.047596	0.017122	0.004728	0.002222	0.001681	0.006068	0.002104	K_{65}^{75}
1966	0.060785	0.023626	0.005944	0.002904	0.002154	0.006971	0.002580	K_{66}^{75}
1967	0.076799	0.027330	0.008392	0.003782	0.002889	0.008410	0.002981	K_{67}^{75}
1968	0.112848	0.028381	0.012651	0.004786	0.003957	0.008330	0.003668	K_{68}^{75}
1969	0.129291	0.037529	0.014743	0.005994	0.004751	0.009174	0.004141	K_{69}^{75}
1970	0.112600	0.044167	0.013003	0.005832	0.004398	0.004404	0.003711	K_{70}^{75}
1971	0.147059	0.028313	0.017120	0.005804	0.005042	0.010986	0.004431	K_{71}^{75}
1972	0.198077	0.040268	0.023218	0.007670	0.006720	0.005382	0.005348	K_{72}^{75}
1973	0.179893	0.103372	0.021476	0.011311	0.007878	−0.001980	0.006080	K_{73}^{75}
1974	0.087705	0.050006	0.010553	0.005572	0.003877	0.000890	0.003093	K_{74}^{75}
1975	0.979427	−0.289003	0.118198	0.021166	0.020480	−0.004641	0.013560	W_{75}^{-1}

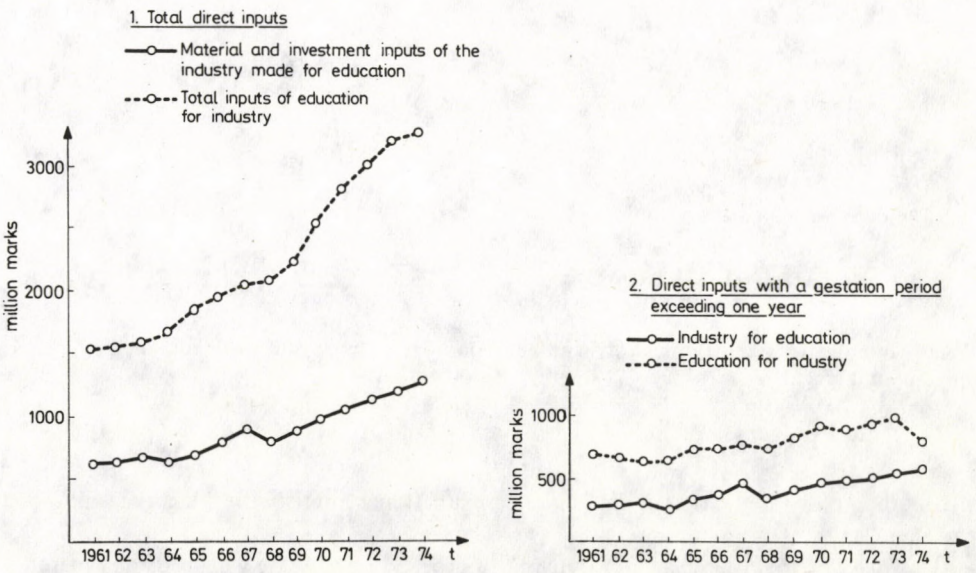

Fig. 3. Interrelations between direct inputs of industry and education (1961–1974)

present stage of researches further experimental computations are made by "shifting forward" the period examined. With a maximum delay of four years until 1980 – mainly by estimated data. In this way it may be expected that the dynamic inverse will provide economically well interpretable data until 1976. However, the uncertainty of estimated data may endanger the stability of the dynamic system. Of course, all these attempts do not eliminate truncation itself (the finiteness of the period examined still exists). The further process of researches here outlined is aimed at contributing to a better founded utilization of the dynamic inverse with several years' lag in the field of economic analysis and planning.

Keeping these and other problems of economic interpretability in view we still believe that in this first approach the dynamic inverse makes interrelations between material and non-material sectors as well as the dynamic character of effects of non-material sectors well perceptible.

11. *Structural* influences of interrelations between material and non-material spheres are demonstrated in *Figures 3* and *4*. As it turns out from the figures, inputs of the industry realized for education considerably lagged behind those of education made for the industry concerning yearly direct inputs. Taking dynamic multiplying (secondary) effects into consideration on the basis of the dinamic inverse, total inputs of the industry spent on education considerably exceed those of education spent on the industry, that is, the relation turns just into the opposite. (The 1973 decrease of total inputs may be

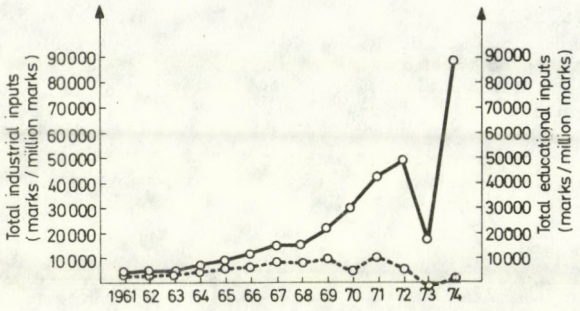

Fig. 4. Interrelations between industry and education on the basis of total inputs of the dynamic input-output table

attributed to the reduction of the share of educational inputs with a lag exceeding one year.)

This fact indicates that in a dynamic approach not only the weight of non-material sectors is greater, but also the total input needs of non-material sectors towards other sectors. The large volume of total national economic inputs thus engaged even more underlines the necessity of an efficient national economic utilization of non-material sectors.

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МЕЖОТРАСЛЕВЫЕ ВЗАИМОСВЯЗИ МЕЖДУ МАТЕРИАЛЬНОЙ И НЕМАТЕРИАЛЬНОЙ СФЕРАМИ НАРОДНОГО ХОЗЯЙСТВА

Э. КИДЁШИ-ШМИДТ

Цель исследования заключается в получении информации относительно народнохозяйственного взаимного воздействия материальной и нематериальной сфер, с учетом чаще всего продолжительного запаздывания нематериальных затрат. В интересах этого экспериментальные расчеты проводились с использованием динамичного баланса межотраслевых связей, дополненного несколькими нематериальными отраслями. Проводимая серия расчетов охватывала период, равный 15 годам, и при этом народное хозяйство ГДР было подразделено на семь секторов. Для принятия во внимание многолетнего запаздывания нематериальных отраслей была модифицирована динамичная инверсия Леонтьева. Для составления динамичной инверсии многолетнего запаздывания был разработан специальный алгоритм. Полученные результаты анализа позволяют сделать такой вывод, что динамичный баланс межотраслевых связей, дополненный некоторыми нематериальными отраслями, может быть использован для анализа народнохозяйственного взаимного воздействия материальных и нематериальных отраслей.

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CLUSTER ANALYSIS

In the introductory part a survey is given on classification methods, measuring scales of various type, their transformations as well as on the concepts of similarity both among criteria and objects and on measurement possibilities. All this is based on [1]

In the subsequent parts the methodological aspects of cluster analysis are discussed. This includes also a summary of classification criteria and the types of decision functions. The authors briefly review various procedures based on durity functions estimation, on the concept of the "mixed model", on the estimation of variance within groups and on discriminancy analysis, as well as relying on graph theory, simple and complete chain methods, respectively.

Introduction

With the spreading of computerized data processing practical possibilities have been provided for the wide-range application of various mathematic-statistical multi-variable methods for the evaluation of results of empirical examinations. Classification techniques enable a ranking into classes of observation objects – under greatly varying circumstances. Objects may be interpreted in the most general possible way, each system made up of individuals defined by quantitative or qualitative characteristics is considered as an ensemble of objects. Determination of classes is the result of a learning process whose two main types are distinguished:

1. Learning with teacher,
2. Learning without teacher (cluster analysis).

In the first case the computer is provided with an evaluated curriculum and – classification is based on this information. In case of learning without teacher classes are set up exclusively by considering the curriculum (the sample) according to a pre-defined decision criterion. The decision criterion has to cover the most important informations concerning the problem. This step of pattern recognition is called *searching for essential features* and includes:

1. Selection of relevant factors, definition of their measuring scales,
2. Unification of the data base, i.e. the necessary transformations of measuring scales of variables,
3. Definition of the measuring system.
4. Solution of the problem of weighing.

The theory of classification methods is rather ramified (see *Table 1*), in the following parts aspects relevant from the viewpoint of cluster analysis will be discussed.

Table 1

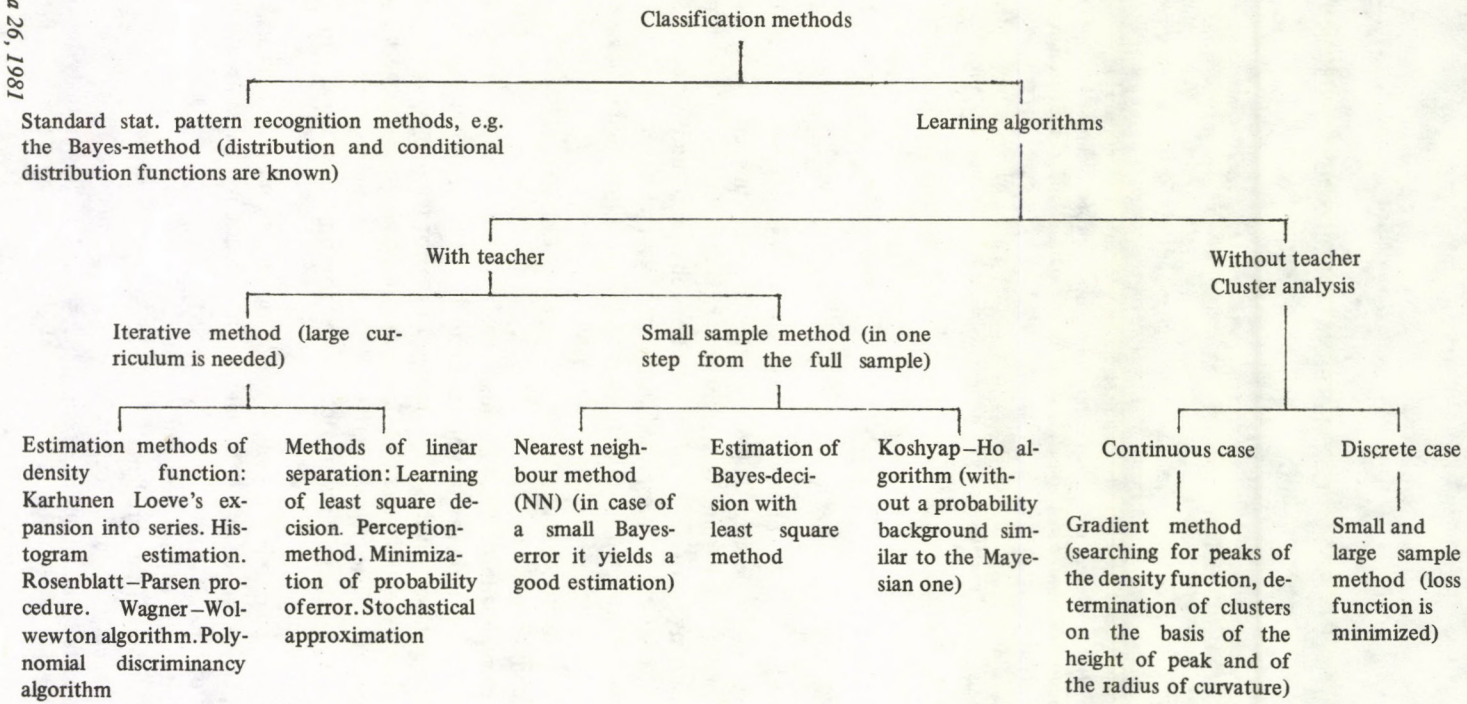
Classification methods
Standard stat. pattern recognition methods, e.g. the Bayes-method (distribution and conditional distribution functions are known)
Learning algorithms
With teacher
Without teacher
Cluster analysis
Iterative method (large curriculum is needed)
Small sample method (in one step from the full sample)
Estimation methods of density function: Karhunen Loeve's expansion into series. Histogram estimation. Rosenblatt–Parsen procedure. Wagner–Wolwewton algorithm. Polynomial discriminancy algorithm
Methods of linear separation: Learning of least square decision. Perception-method. Minimization of probability of error. Stochastical approximation
Nearest neighbour method (NN) (in case of a small Bayes-error it yields a good estimation)
Estimation of Bayes-decision with least square method
Koshyap–Ho algorithm (without a probability background similar to the Mayesian one)
Continuous case
Discrete case
Gradient method (searching for peaks of the density function, determination of clusters on the basis of the height of peak and of the radius of curvature)
Small and large sample method (loss function is minimized)

Table 2
Types of variables

Measurement method	range of value		
	continuous	discrete	binary
Nominal	–	birth place	female – male true – false
Ordinal	sound intensity, light intensity	school achievement appointment	small – large good – bad
Interval	temperature °C	income	number of wife (0 or 1)
Proportion	age	number of children by family	two different unit pairs

Cf. [1], p. 27

Selection of characteristics, measuring scales, scale transformations

Selection of characteristics means the accounting of properties judged important from the viewpoint of examination and the assignment to these properties of variables supplied with a measuring scale. Though any criterion, quantitative value, qualitative state, geographical designation, etc. may be a property, it is the value of the variable assigned to properties that is regarded as a mathematical variable. Methods of measuring relations depend first of all on the type of variables. It is expedient, therefore, to briefly survey the various types.

Distinction is made basically according to two viewpoints: according to the range of value and the measurement method.

With a differentiated distinction of the types of variables and by means of scale transformations between variables of different type the joint handling of mixed types of variables becomes possible. Scale transformation to be applied for the unification is determined by the structure of the system of variables, while minimization of information losses is a general principle.

Methods of measuring relations

Let a statistical population with n elements be given to be denoted with S, S is a finite, non-empty set of objects to be classified:

$$S = \{s_1 \ldots s_n\}.$$

Furthermore the set of properties

$$T = \{X_1 \ldots X_m\}$$

with m elements selected for the purposes of examination is considered also as given.

The starting data basis of classification is the nxm data matrix T containing the objects and their properties.

	T			
S	X_1	... X_j	...	X_m
s_1	x_{11}	... x_{1j}	...	x_{1m}
.				
.				
.				
s_i	x_{i1}	... x_{ij}	...	x_{im}
.				
.				
.				
s_n	x_{n1}	... x_{nj}	...	$x_{nm'}$

where x_{ij} is the observed or measured value of property j of object i. The real input data of classification is the symmetrical DC (dissimilarity coefficient) matrix obtained from matrix T by a comparison of lines or columns by pairs. The DC matrix contains so-called taxonomic distance or similarity index numbers between objects in the former case and between properties in the latter. In the following the problem of the T → DC transformation will be examined. The method of measuring relations is determined, on the one hand, by the type of variables of matrix T and, on the other hand, by whether we wish to compare objects or properties. For this latter case several well utilizable index numbers have been elaborated by mathematical statistics. In some cases it may seem that problems of such kind are not even tasks of automatic classification. However, in botany, zoology and psychology methods of cluster analysis are more and more widely used for the classification of criteria. A brief survey of indicators of such type is justified if only because they may be also used for measuring relations between objects in certain cases with another interpretation.

Indicators of similarity between criteria

General (but not always valid) properties of taxonomic similarity indicators may be written in the following form, if s_i, s_j denote two optional objects to be compared and $A(s_i, s_j)$ in the similarity indicator, then

1. $A(s_i, s_j) = A(s_j, s_i)$ (symmetry),
2. The value of A usually falls within the interval $0 \leqslant A \leqslant 1$ or $-1 \leqslant A \leqslant 1$,
3. $A(s_i, s_j) = 1$.

Measurement methods are separately presented for the individual types of variables.

Nominal and ordinal variables

Measurement is based on the contingency table known from statistics

A \ B	1	2	...	q	
1	f_{11}	f_{12}	...	f_{1q}	$f_{1.}$
2	f_{21}	f_{22}	...	f_{2q}	$f_{2.}$
.	.	.		.	.
.	.	.		.	.
.	.	.		.	.
r	f_{r1}	f_{r2}	...	f_{rq}	$f_{r.}$
	$f_{.1}$	$f_{.2}$	...	$f_{.q}$	n

where f_{ij} is the frequency of the joint occurrence of properties i and j computed from a sample with n elements.

A considerable part of measurement methods is based on the well-known χ^2 statistics. It may be computed from the contingency table and the formula

$$\chi^2 = n\left(\sum_{i=1}^{r}\sum_{j=1}^{q}\frac{f_{ij}^2}{f_{i.}f_{.j}} - 1\right)$$

postulating independence among variables indicates that χ^2 directly depends on the size of the table and with the increase of n it increases beyond any limit. Therefore various normed values of χ^2 may be taken into account. Such an obvious normalizing factor is n, the value obtained falls between 0 and 1. With this in view the contingency coefficients P, T and C were proposed by *Pearson, Chuprov* and *Cramer,* respectively.

$$P = \left(\frac{\Phi^2}{1 + \Phi^2} \right)^{1/2}$$

where $\Phi^2 = \frac{\chi^2}{n}$;

$$T = \left(\frac{\chi^2}{n(r-1)(q-1)} \right)^{1/2};$$

$$C = \left(\frac{\chi^2}{n \cdot \min[(r-1),(q-1)]} \right)^{1/2},$$

Kendall and *Stuart* pointed out the causes of the distorting effects of measures based on χ^2 statistics. These measures are built on the hypothesis that the contingency table represents such a normal distribution with two variables, for which the following relationship is fulfilled:

$$\lim_{n \to \infty} P^2 = r^2 \text{ (where r is the correlation coefficient).}$$

In practice this assumption is usually not justified, thus these measures are suitable for measuring association only to a limited extent.

Another deficiency was pointed out by Goodman and Kruskal: (ref. Anderberg, p. 740) pairs of variables are not comparable on the basis of these measures.

Starting from this they proposed the introduction of γ statistics; this association measure is based on the estimation of optimal class.

The case of nominal variables

If each element of the contingency table is divided by n, the values obtained are relative frequencies which, with the increase of n, well approximate the corresponding probabilities. Thus the introduction of the following notations is justified:

$$p_{ij} = \frac{f_{ij}}{n} ; \qquad p_{.j} = \frac{f_{.j}}{n} .$$

The following probability model will be used: let us randomly select one element from the population with n elements. Let us estimate with the smallest possible error to which criteria class A_i or B_j it belongs. Estimation should be made for two cases:

1. all we know about the selected element is that it may be ranked into two classes;
2. we know class A_i of the selected element.

It is obvious that we have more information in the latter case; the error made may be at most the same as in the first case.

Let P_1 be the probability of the error of ranking in case 1 and P_2 in case 2.

Then the Γ_B is defined as follows:

$$\Gamma_B = \frac{P_1 - P_2}{P_1}$$

Γ_B shows the relative decrease of the probability of ranking error that results from additional information obtained from the knowledge of class A_i. If we introduce the notations $p_{.m} = \max_j p_{.j}$ and $p_{im} = \max_j p_{ij}$, then

$$P_1 = 1 - p_{.m}, \qquad P_2 = 1 - \sum_i p_{im},$$

$$\Gamma_B = \frac{\sum_{i=1}^{r} p_{im} - p_{.m}}{1 - p_{.m}} .$$

If not A_i but class B_j may be identified with the element selected at random, then the similarity index number Γ_A may be defined by complete analogy to the above:

$$\Gamma_A = \frac{\sum_{j=1}^{q} p_{mj} - p_{m.}}{1 - p_{m.}} .$$

The above chain of thoughts may be repeated also if relations between criteria variants A and B have no distinguished direction. Therefore, when selecting any element it may be ranked with a probability of 1/2 into class A_i or B_j. Then the probability of error is in case of unknown predictor class

$$P_1 = 1 - \frac{1}{2} (p_{.m} + p_{m.}) .$$

and in case of a known predictor class it is

$$P_2 = 1 - \frac{1}{2} \left(\sum_{i=1}^{r} p_{im} + \sum_{j=1}^{q} p_{mj} \right) .$$

The value of the association indicator is:

$$\Gamma = \frac{\frac{1}{2}\left(\sum_i p_{im} + \sum_j p_{mj} - p_{m.} - p_{.m}\right)}{1 - \frac{1}{2}(p_{.m} - p_{m.})}$$

Values of Γ fall within the interval $\Gamma_A \leqslant \Gamma \leqslant \Gamma_B$.

Properties of the indicator of association

a) Γ can not be determined if and only if the entire multitude belongs to one class; otherwise $0 \leqslant \Gamma \leqslant 1$,

b) $\Gamma = 1$ if and only if the knowledge of A_i uniquely defines the corresponding class B_j, i.e. there is a functional relationship between the two variables,

c) $\Gamma = 0$ if the classes examined are statistically independent (non-reversible statement),

d) Γ is invariant to permutation of the rows (or columns) of the contingency table.

In cluster analysis

– canonical correlation and

– measures based on the theory of entropy may be well used yet for characterizing relationships between nominal variables.

γ statistics in case of ordinal variables

Now at least one of the criteria variants A and B may be arranged in a natural way. Thus γ can not be invariant to the permutation of rows or columns of the contingency table. The probability model is the following: let us randomly select two elements from the multitude (while putting them back). Let us suppose that the first one belongs to some category $(A_{il}; B_{jl})$ and the second one to some category $(a_{i2}; B_{j2})$ where $1 \leqslant i_k \leqslant r$ and $1 \leqslant j_k \leqslant q$ $(k = 1,2)$. In case of independence it may be justly expected that the arrangement of indices i_k has no relationship with the arrangement of indices j_k, while in case of a relationship this arrangement is usually identical.

Let the probability of a similar arrangement be denoted with P_h

$$P_h = P\{i_1 < i_2 \text{ and } j_1 < j_2 \text{ or } i_1 > i_2 \text{ and } j_1 > j_2\},$$

and the probability of a deviating arrangement with P_e

$$P_e = P\{i_1 < i_2 \text{ and } j_1 > j_2 \text{ or } i_1 > i_2 \text{ and } j_1 < j_2\},$$

and the probability of identity with P_a

$$P_a = P\{i_1 = i_2 \text{ or } j_1 = j_2\}.$$

For the sake of uniqueness this latter case is not allowed when defining statistics, i.e. instead of P_h and P_e the conditional probabilities referring to the inverse of even $i_1 = i_2$ or $j_1 = j_2$ are considered. For example, instead of P_h the probability $P_h/(1-P_a)$ is taken.

The association indicator:

$$\gamma = \frac{P_h - P_e}{1 - P_a}.$$

Properties of the indicator γ

a) γ may not be defined if non-zero elements of the contingency table may be found in one row or column
b) $-1 \leqslant \gamma \leqslant 1$.
c) $\gamma = 1$ if non-zero elements may be found in the diagonal of direction $p_{11} \rightarrow p_{rq}$; then $p_e = 0$;
d) $\gamma = -1$ if non-zero elements may be found in the diagonal of direction $p_{rl} \rightarrow p_{rq}$;
e) $\gamma = 0$ if the precondition of independence is fulfilled. This statement is non-reversible (except for the 2x2 table).

Proportion and interval variables

Elements of matrix T are measurable values, our task is to measure the similarity of any two columns. Let two columns of matrix T be denoted with vectors X and Y, X, Y & R^n.

The angle of inclination of vectors and the correlation coefficient of product moment may be regarded as the measure of similarity.

$$A(X, Y) = \cos \alpha = \frac{X^*Y}{|X|\,|Y|}$$

Let us form vectors $\hat{X} = X - \bar{X}$ and $\hat{Y} = Y - \bar{Y}$ with zero average. The correlation coefficient of product moment will be:

$$r = r(X, Y) = \frac{\mathrm{cov}(X, Y)}{\sqrt{\mathrm{var}(X) \cdot \mathrm{var}(Y)}}$$

where $\mathrm{cov}(XY) = \frac{\hat{X}\hat{Y}}{n}$ and $\mathrm{var}(X) = \frac{X^*X}{n}$.

It may be easily seen that $r(X, Y) = A(\hat{X}, \hat{Y})$.

A(X, Y) is invariant to extension, while r(X, Y) to extension and shifting. From this it results that A(X, Y) may be successfully applied in case of proportion variables, while r(X, Y) in that of interval variables.

Binary variables

Because of the particular property of binary variables it is expedient to deal with them separately, since:

- previous formulae usually have simpler forms for the binary case,
- association index numbers of properties may, in certain cases, be applied also for the comparison of objects, as it has already been mentioned, and this holds especially for binary variables.

Now matrix T contains only numbers 0 and 1. Comparison of any two columns may obviously be reduced to a 2X2 table in all cases.

A \ B	1	0	
1	a	b	$a+b$
0	c	d	$c+d$
	$a+c$	$b+d$	$a+b+c+d=n$

The binary form of the Chuprov-coefficient already introduced will be shown as an example:

$$A_{es} = \frac{ad - bc}{\sqrt{(a+b)(a+c)(b+d)(c+d)}}$$

When constructing binary index numbers, problems are caused by the consideration of value d, on the one hand, namely, this measures the lack of common properties, and, on the other hand, by how fits and unfits should be weighted.

Classified according to the problems raised, the indicators are summarized in *Table 3.*

Table 3

Weighting	0–0 fit in the denominator	0–0 fit in the numerator	
		not included	included
Equal weights	included	1. Russel and Rao $\frac{a}{a+b+c+d} = \frac{a}{n}$	2. Sokal and Michner $\frac{a+d}{a+b+c+d} = \frac{a+d}{n}$
	not included	3. Jaccard $\frac{a}{a+b+c}$	4. –
Double weighting connected pairs	included	5. not suggested $\frac{2a}{2(a+d)+b+c}$	6. $\frac{2a+d}{2(a+d)+b+c}$
	not included	7. Dice $\frac{2a}{2a+b+c}$	8. –
Double weighting with non-connected pairs	included	9. not suggested	10. Rogers–Tanimoto $\frac{a+d}{a+d+2(b+c)}$
	not included	11. $\frac{a}{a+2(b+c)}$	12. –
Connected pairs excluded from denominator	–	13. Kulczynski $\frac{a}{b+c}$	14. $\frac{c+d}{b+c}$

Distance between objects, measures of similarity

In this chapter we shall deal with the comparison by pairs of the rows of matrix T. There are several fields of application where the question is raised exclusively in this way. Let us start with measurable variables. Fundamentally new procedures – relative to the previous ones – may be found in case of these, since the notion of taxonomic distance may be interpreted between the objects.

Metric measures of taxonomic distance

With the practical application of quantitative methods of cluster analysis one of the major problems is definition of the distance between points and sets of points, respectively. An adequate definition of distance requires at least as much circumspection as selection of an adequate classification algorithm. Let us assume that elements of matrix T are measurable variables. Each object may be regarded as a point in the p-dimensional abstract space [4]. Distance-measuring functions with metric property may be interpreted between these points.

Let us denote the distance of the pair of points (x, y) with d(x, y) that has in case of each $x, y, z \in M$ the following properties:

1. $d(x, y) = d(y, x)$,
2. $d(x, x) = O$,
3. $d(x, y) > O$, if $x \neq y$,
4. $d(x, y) \leqslant d(x, z) + d(y, z)$.

These are the general properties of metric space and the function d(x y) fulfilling them is called metric function or, in an abbreviated form, *metrics.* If assumption 3 is not fulfilled then d is called *pseudo-metrics.*

It is worth examining what disturbances may arise if assumption 4, the so-called triangle inequality is not fulfilled. This case is called *semi-metrics.* Those metrics which fulfil the inequality $d(x, y) \leqslant \max [d(x, z) + d(y, z)]$ are called *ultra-metrics.*

Let us suppose that we have five points and denote the distance between i and j with d_{ij}. Let the distances be the following:

$d_{12} = 2$	$d_{23} = 10$	$d_{15} = 1$
$d_{13} = 10$	$d_{24} = 10$	$d_{25} = 100$
$d_{14} = 10$	$d_{34} = 2$	$d_{35} = 1.5$
		$d_{45} = 100$

On the basis of the first two columns two well-separable classes, $S_1 = \{x_1, x_2\}$ and $S_2 = \{x_3, x_4\}$ are obtained, but where should point x_5 be classified into S_1, then it will be farther from x_2 than from x_3, though it belongs to the same class as the former. But,

classifying into S_2 is similarly irrational, because it will be unproportionally nearer to x_1 than to x_4. There remains one more possibility – x_5 constitutes a separate class. But, this is not a satisfactory solution either, because its distance from both x_1 and x_3 will be smaller than that of points x_2 and x_4, respectively, belonging to the same classes.

If the probability distribution of our data system is known, the following measure may be well applied.

Let us suppose that points $x_1 \ldots x_n$ are regarded as values of a p-dimensional probability vector variable and with k fixed number $x^k \ldots x^k$ are values of the corresponding one-dimensional probability variable.

Let D be the covariance matrix of the p-dimensional variable,

$$D = \begin{pmatrix} D_{11} \ldots D_{1p} \\ \\ D_{p1} \ldots D_{pp} \end{pmatrix}$$

where $D_{ij} = M[(X_i - M(X_i))(X_j - M(X_j))]$

Let D^{-1} be the inverse of D. Then a metrics between our points may be defined as follows:

$$d_{ij} = \sqrt{(x_i - x_j)^* S \; D^{-1} S(x_i - x_j)} \; ,$$

where S is a matrix of weights containing diagonal elements.

If we do not wish to weight our variables then S may be left out of the formula. Such metrics is expedient to apply if the distribution is known or if the sample is large enough for estimating the value of D with satisfactory exactness. In this case the distance d_{ij} depends not only on the coordinates of points x_i and x_j, but also on all other points, contrary to metrics to be presented in the following. Nor is it negligible that relationships between various variables have also been taken into consideration. If variables are uncorrelated by pairs, then $D_{ij} =$ if $i \neq j$ and accordingly, D is a diagonal matrix, while D^{-1} such a diagonal matrix in whose main diagonal the reciprocal of the deviation of individual variables can be found, then d_{ij} may be described in the following simpler form:

$$d_{ij} = [w_1(x_i^1 - x_j^1)^2 + \ldots + w_p(x_i^p - x_j^p)^2]^{1/2},$$

where w_i means arbitrary non-negative weights.

Weighting of individual variables should be applied with all metrics, but it is first of all a task of the researcher to judge what system of weights should be applied. It must be noted that even if we wish to take all variables into consideration with the same weight,

weighting has to be applied; and equal weighting will be obtained if each variable is normed with its deviation. In the following it will be assumed that all variables are already normed.

Minkowski's metrics and its special cases

One of the most general classes of metrics giving separate metrics with any $1 \leqslant r < \infty$ value may be defined as follows:

$$d_r(x, y) = \left(\sum_{i=1}^{p} |x_i - y_i|^r \right)^{1/r}$$

In case of $r = 2$ Minkowski's metrics is identical with the well-known Euclidean metrics.

$$d_2(x, y) = \sqrt{\sum_{i=1}^{p} (x_i - y_i)^2} .$$

In case of $r = 1$ the distance measuring function equals to the total of deviations by coordinate:

$$d_1(x, y) = \sum_{i=1}^{p} |x_i - y_i| .$$

In the course of cluster analysis usually these two cases are applied. In many cases instead of metrics similarity between point is defined. Similarity is also a non-negative number, but, contrary to metrics, it is expedient to choose it so that its values fall between 0 and 1. Denoting similarity with h it is required that $h(x, x) = 1$ holds for any point x, i. e. each point (object) be most similar to itself. It is indifferent from the viewpoint of the methods to be reviewed whether distance or similarity is interpreted between the given objects, all to be kept in view is that minimum distance corresponds to maximum similarity and *vice versa.*

If a monotonously decreasing function interpreted over the distance between pairs of points is given, whose values fall between 0 and 1, then a similarity is assigned to the metrics.

The simplest measure of similarity is the correlation coefficient

$$R_{ij} = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{[\Sigma(x_i - \bar{x})^2 \, \Sigma(y_i - \bar{y})^2]^{1/2}}$$

Since $-1 \leqslant R_{ij} \leqslant 1$, the corresponding measure of similarity may be defined, for example, by the equality $R'_{ij} = (1 + R_{ij})/2$.

A further possibility is if distance between points is measured by the angle of inclination of the vectors belonging to them. The cosine of the angle of inclination

$$\cos(x, y) = \frac{\Sigma x_i y_i}{(\Sigma x_i^2 \cdot \Sigma y_i^2)^{1/2}} \qquad x, y \neq 0$$

may be regarded as the similarity of the two points and their distance may be defined by formula

$$d_{ij} = \sqrt{1 - \cos^2(x, y)} \qquad x, y \neq 0$$

in this case d_{ij} will be a pseudo-metrics, i.e. assumption 3 is not fulfilled here; distance between two points will be zero if vectors fall into one line, thus the distance of points $x \neq y$ may be zero, too.

In case of binary variables also another distance in addition to the previous ones may be used.

With notations used with two-dimensional tables

$$d_{ij} = \frac{a + d}{a + b + c + d}$$

is a possible metrics.

Distance between points may be measured also by the value

$$d_{ij} = \frac{2a}{2a + b + c} .$$

With this latter metrics viewpoints of applying cluster analysis have to be thoroughly weighted, because selecting values 0 and 1 of dichotomous variables is often incidental (e.g. with sex male = 0, female = 1 or inversely) and this means that the distance between two points will be different depending on the notation. If, for example,

$$x = (1, 0, 0, 0, 0, 0), \quad y = (1, 1, 1, 0, 0, 0),$$

then on the basis of $a = 1$, $b = 0$, $c = 2$, $d = 3$: $d_{ij} = 1/2$; now, if we exchange notations 0 and 1 in the values of variables, then

$$x = (0, 1, 1, 1, 1, 1), \quad y = (0, 0, 0, 1, 1, 1),$$

that is, $a = 3$, $b = 2$, $c = 0$, $d = 1$ and accordingly, $d_{ij} = 1/4$.

There is no such problem with the metrics discussed previously, where the distance d_{ij} is independent of the numbering of the values of variables.

When applying Minkowski's metrics it should be kept in view that the metrics does not change the different contents or dimension of variables and this has to be taken into account with the interpretation of the value obtained for the distance. Metrics assumes independence between variables, thus it may occur that in case of relations between variables one effect is taken into consideration several times.

Non-metric measures

One type of non-metric measures defines relations between objects and forms groups by processing them on relation-theoretical basis. The other type assumes, as a matter of fact, some metrics – deviating from previous one – relying on which an arrangement of the objects is made, but this arrangement does not possess the properties required from metrics any more.

Interval variables. Calhoun-distance

This distance concept is based on the other points falling between hyperplanes determined by the two points in question and the direction of correlation coordinate axis. For example, the distance between points x_1 and x_2 may be determined by means of the points falling into the shaded field in *Figure 1.*

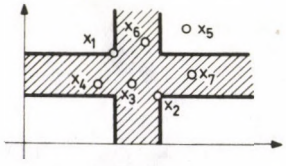

Fig. 1.

Calhoun-distance between two points may be defined as follows:

$$D_c = 6N_i + 3N_b + 2N_z,$$

where

N_i – the number of points falling into the hyperplane determined by two points or into its extension, at least according to one of their variables;

N_b – the number of points not falling between the two points in any dimension, but falling on the boundary according to one or more variables;

N_z – the number of points equivalent to both points according to one or more variables, but not falling within the interior of the hyperplane or on the boundary.

If N is the number of basic points, then the maximum value of D_c is: 6(N–2).

As a measure the Calhoun-distance does not correspond to the requirements of metrics, because the distance between two points may be zero also if the two points do not coincide. This measure may be useful in cases when clusters overlap each other according to one or more variables.

Lance's and Williams' measure

Definition of the distance between two objects is:

$$d_{Lw} = \frac{\Sigma \mid x_i - y_i \mid}{\Sigma (x_i - y_i)}$$

The numerator is Minkowski's metrics, for the case r = 1, and the denominator is the measure of maximum extension. In case of binary variables its form is the following:

$$d_{Lw} = \frac{b + c}{(a + b)(a + c)} = 1 - \frac{2a}{2a + b + c}$$

These measures are rarely used, they satisfy special cases.

Nominal variables (cf. [1], p. 123)

Indicators applied for measuring similarity between criteria are suitable also for measuring similarity between objects.

Comparison is then based on the counting of common and deviating criteria. If the presence or lack of criteria may be uniquely stated, then obtained the 2X2 table introduced with binary variables. It may occur that certain criteria are not characteristic of the object in question; taking this into consideration and by introducing three possibilities instead of the two possible alternatives (0 and 1) we may speak of the extension of binary variables.

Table 4 (cf. [1] Table S. S.)
Linkage coefficients in case of nominal variables

1. $\dfrac{n_{a+d} - n_d}{n_{a+d} + n_{b+c}}$

2. $\dfrac{n_{a+d}}{n_{a+d} + n_{b+c}}$

3. $\dfrac{n_{a+d} - n_d}{n_{a+d} - n_d + n_{b+c}}$

6. $\dfrac{2n_{a+d}}{2n_{a+d} + n_{b+d}}$

7. $\dfrac{2(n_{a+d} - n_a)}{2(n_{a+d} - n_d) + n_{b+c}}$

10. $\dfrac{n_{a+d}}{n_{a+d} + 2n_{b+c}}$

11. $\dfrac{n_{a+d} - n_d}{n_{a+d} - n_d + 2n_{b+c}}$

14. $\dfrac{n_{a+d}}{n_{b+c}}$

13. $\dfrac{n_{a+d} - n_d}{n_{b+c}}$

(Ordinal numbers of the formulae refer to the corresponding numbering of *Table 3*).

Let
n_{a+d} be the number of criteria in which the two objects are identical;
n_d be the number of criteria by which the two objects can not be characterized;
n_{b+c} be the number of criteria in which the two objects deviate from each other.
Using the formulae in Table 3 linkage coefficients summarized in Table 4 will be obtained.

Ordinal variables have a distinguished role in cluster analysis, because the most general classification algorithms are monotonous invariant. It follows that in case of their application it is enough to consider their relative ranking order instead of distance values.

Weighting of variables

When comparing two columns (two criteria) of matrix T we have two vectors each with a homogeneous coordinate, while whith the comparison of two rows (two objects) the individual coordinates often represent variables of differing contents and type. It results

from this that measures are influenced by orders of magnitude and the problem of additivity of various measures arises.

Weighting serves for the solution of these problems. For example, if variables drawn into the scope of examination are not identically important from the viewpoint of the given question, a subjective weighting is applied.

It is a problem of another nature when we wish to eliminate eventuality resulting from the varying dimensions of variables. Standardization most frequently used in statistics may be applied also here, then all variables will have the same weight. In case of Euclidean distance this normalization means $w = 1/s^2$ weighting. This invokes the danger that precisely the role of those criteria is diminished which are most suitable for the distinction of groups. Results would be much more acceptable if we normed with the deviation within the group instead of the total deviation, but – of course – this is not known prior to the examination.

Methods aimed at eliminating the effect of correlation by weighting may be also criticised because of the lack of a priori knowledge, such is also the distance concept of Mahalanobis.

The effect of correlation, distorting the measurement of relations, is properly eliminated by the main factor method of factor analysis, that has the further advantage that the size of the original data matrix is considerably reduced.

It should be noted that weighting does not solve problems resulting from the joint occurrence of various types of variables, for this an adequate transformation of scale has to be performed.

Distance of clusters

Several distances may be interpreted also between sets of points, but here usually only symmetry is fulfilled out of requirements 1–4 of metrics. The most obvious solution is if by distance between sets of points we mean the distance between their nearest and remotest points, respectively.

$$1.\ D(S_i, S_j) = \min_{m,k} (d\ x_{im}, x_{jk}),$$

$$2.\ D(S_i, S_j) = \max_{m,k} d(x_{im}, x_{jk}).$$

Here d may be any distance interpreted between points.

In the following the distance between classes i and j will be denoted by D_{ij} and the distances defined above will be called D_{min} and D_{max}, respectively. It is also usual to consider the distance of centroids as the distance between classes. The centroid of class S_i made up of n_i points is the vector

$$C_i = \frac{1}{n_i} \sum_{k=1}^{n_i} x_{ik}$$

where x_{ik} is point k of class S_i. Then the distance between classes S_i and S_j is

$$D_{ij}^{c} = d(C_i, C_j) .$$

The distance between classes may also be interpreted as the average distance between pairs of points taken from the individual classes.

$$D_{ij}^{r} = \frac{1}{n_i n_j} \left[\sum_{m,k} [d(x_{im}, x_{jk})]^r \right]^{1/r}$$

For any value of r a possible definition of the distance between classes is obtained. In case $r = 1$, D^1 is identical with the previous distance. If $r \to \infty$, then $D^{\infty} \to D_{max}$, while if $r \to -\infty$, then $D^{-\infty} \to D_{min}$.

In the course of classification not only the distance between two classes has to be defined, but – especially with contraction (aggregation) methods – also the distance of the two contracted (aggregated) classes from a third one has to be known. After the individual contractions (aggregations) it is expedient to compute distances by using them. For example, if classes S_j and S_k are contracted (aggregated) S_{jk} with distance D^r, then its distance from S_i is:

$$D^r(S_i, S_{jk}) = \left[\frac{n_j (D_{ij})^r + n_k (D_{ik})^r}{n_j + n_k} \right]^{1/r} .$$

If $r = \pm\infty$ then this formula can not be used with distances D_{min} and D_{max}, instead of it the following relationship is given:

$$D(S_i, S_{jk}) = a\, D_{ij} + b\, D_{ik} + c\, D_{jk} + d\, |\, D_{ij} - D_{ik}\, |$$

where $a = b = \frac{1}{2}$, $c = 0$, $d = -\frac{1}{2}$, if $D = D_{\min}$;

$$a = b = \frac{1}{2}, \quad c = 0, \quad d = \frac{1}{2}, \quad \text{if } D = D_{\max};$$

$$a = \frac{n_j}{n_j + n_k}, \quad b = \frac{n_k}{n_j + n_k}, \quad c = d = 0, \quad \text{if } D = D^1.$$

Methods of cluster analysis

It is required from a scientific classification that identification can be carried out on the basis of objective criteria; this requirement is only fulfilled usually with very serious restrictions. A reason for this is that no classification pattern may be judged unambiguously good or bad in itself, this depends on how suitable the division is from the viewpoint of the examination in question. At the same time, general requirements be determined as follows:

1. Objectivity
2. Stability
3. Predictivity.

By the first precondition we mean that specialists of the given research field should group the objects examined in a way identical in its nature. The second precondition means that it is required from classification that it shall be little influenced by new data; this comes to the fore when new data and results query the old conceptual structure and thus the classification system becomes unstable. The third precondition indicates the very high quality of classification, accordingly, it is only rarely fulfilled (e.g. Mendelejev's periodic system).

Two basic steps of classification models based on classical logics may be distinguished:

– type and concept formation, definition of categories,
– assignment of events to categories already defined.

However, classical logics gives only the definition of such categories, each individual of which is equivalent from all viewpoints. Classification based on such principle is called monothetic classification. This method cannot be handled in case of a large data system with many variables even by a computer, but should this somewhat succeed, it still could not be used in practice because of the fragmentation of results impossible to survey. That is why cluster analysis opening the way to an easily surveyable numerical evaluation of large samples with many variables is of great importance.

The model of cluster analysis differs from those of classical classification in three respects:

a) It does not define types before selecting sample individuals; in the course of procedures notions defining types are assigned to groups developed by classification. This concept is based on the following assumptions:
   – there exist types;
   – even without knowing the type concept, there exists a criterion by the use of which clusters can be recognized;
   – for the cluster recognized type characteristics may be given on the basis of criteria of individuals.

All this means that in an n-dimensional space hyperplanes separating individual types are only becoming visible if elements belonging to the same cluster have already

been determined, and this means that also types occurring only empirically may be recognized.

b) Cluster analysis allows polythetic classes. A class is considered polythetic if its elements are equivalent or similar according to several but not all characteristics. Class limits are not determined in advance. From a practical viewpoint this is a further advantage of cluster analysis, namely, that the number of classes may be considerably reduced also with all characteristics in view.

c) Classical models work only with discrete variables, while cluster analysis allows also continuous, what is more, even mixed types of variables.

Criteria of classification

In the following we shall review the practical requirements of classification. Not each of the methods fulfils all preconditions simultaneously but their usuality may be judged on the basis of concrete evaluation.

1. Uniqueness

From a given set of data always the same result is obtained in case of a given system M.

2. Monotonous invariance

If the final result of classification depends only on the order of DC matrices (DC = input matrix of classification), then the method is monotonously invariant:

$$[Mf(d)][f(h)] = (Md)(h), \qquad \forall\, h \geqslant 0$$

where f means tne mapping producing rank.

3. Independence of scale

If $k > 0$ is a scalar constant then this precondition means the fulfilment of equation

$$M(kd) = k\,M(d)$$

4. Stability

A small change in data should bring about small change in the result, too, that is the mapping

$$M : C(S) \to U(S)$$

is continuous.

5. Keeping of groups (monotony)

Let $h > 0$ be fixed and $S_h \subset (Md)(h)$ a class developed at level h, then the requirement of monotony is:

$$S_h \subset S_l \text{ in case } \forall\ l > h\,.$$

This may be written also in another form. $d' \leqslant d$ should denote that $d'(A, B) \leqslant d(A, B)\ \forall\ A; B \in S$. The monotony may be described as follows:

$$M(d) \leqslant d.$$

6. Optimality

On relations between objects to be classified most information is given in the input matrix DC, that will be subject to a multi-step transformation until classes are developing. During this procedure some information will be last, deviation between the input and output DC matrices should be the smallest possible; that is, if $d \in U(S)$ and $M(d) \leqslant d' \leqslant d$, then the equation $d' = M(d)$ should be fulfilled.

Elements difficult to classify; representative elements

With quantitative classification principles it can usually be numerically measured to what extent (in case of classification according to statistical principles with what probability) an element may be ranked into one or another class. An element is difficult to classify if it may be ranked into several classes nearly to the same extent. Then we have two possibilities:

1. we qualify our procedure as unstable and change the principle of classification accordingly, or
2. the element difficult to rank is considered as a "noise" element (inexactness of measurement or coding).

We call those elements representative which may be classified relatively unambiguously or with minimum risk. This definition includes an optional interpretation of representation if the criteria of classification are properly defined. For example, with centroid methods where classes are characterized by the centre of gravity of objects belonging to them, objects falling near to the individual centres of gravity – to the centroids – will be the representative elements, in other words, objects of nearly average property of the given class. Of course, if viewpoints of classification are changed, then also the notion of representativeness will be different.

Types of decision functions

By decision function and decision criterion, respectively, the principle is meant according to which classes develop when objects to be examined are arranged in an n-dimensional space.

The decision function may measure:

– similarity of elements within the cluster,

– the difference between clusters.

It may be stated from the foregoing that concepts of similarity and difference may be interpreted in several ways; various measures discussed in the foregoing are suitable for measuring similarity or distance between two objects. The task of the decision function is more complex than that, it has to measure or estimate simultaneously similarity and difference, respectively, of several individuals according to several characteristics.

According to the methods applied we may distinguish:

– procedures based on density function estimation,
– procedures based on the separation of a mixture of probability distributions,
– "mixed" model,
– methods based on the estimation of variance within the group,
– procedures based on discriminancy estimation between groups and
– those based on graph theory.

Various decision criteria are linked to various cluster concepts.

Procedures based on density function estimation

Let us consider our observations as realizations of an r-dimensional probability vector variable. The questions raised may be answered in the knowledge of the density function. The theoretical density function is unknown, but may be estimated on the basis of the sample (if this latter is large enough). It is a considerable facility that full knowledge of the shape of the density function is not needed for the solution of problems raised by cluster analysis, because clusters are domains including peaks of the density function. Type formation is aimed at delimitation of such clusters where the concentration of points is relatively dense.

It is enough, therefore, to look for peaks, i.e. local maximum points of the density function. Peaks give the core of clusters and for delimitation the values of peak height and of main curvature at the apex may be used. These characteristics of the density function are estimated on the basis of stochastic approximation, by means of the stochastic variant of the gradient method.

Let $\xi_i \in F^r$ be the probability vector variable observed and f(x) the joint density function.

Since the gradient vector is also unknown an estimation of it will be used for estimation.

$$z_{n+1} = z_{n+1}(Y_n, \xi_1 \ldots \xi_n)$$

where $Y_n \in F^r$ is the probability variable.

The algorithm is:

$$Y_{n+1} = Y_n + \gamma_n z_{n+1}.$$

The initial value Y_n may be optional, but the step has to fulfil the following conditions:

$$\sum_{n=1}^{\infty} \gamma_n = +\infty; \qquad \sum_{n=1}^{\infty} \gamma_n^2 < \infty.$$

Procedures based on stochastic approximation give good estimation, the speed of convergence is usually slower than with gradient algorithms. The reason for this is that the gradient vector is unknown and an estimation of it is used. (Proof of this statement may be found in [15]).

Two important decision criteria based on the estimation of density function are:

a) the method of centres of gravity,

b) localization of peaks of the density function.

a) Method of centres of gravity

Let us suppose that the number of clusters desired is known: s; and let the cluster system be denoted with $C_1, C_2, \ldots, C_s$. The density function is such a special function that cluster C_i may be identified with a point M_i – its centre of gravity.

This is fulfilled if f(x) is constant over connected sets C_i, it vanishes outside them and the diameter of each cluster is smaller than the distance from the centre of gravity of another cluster falling nearest to its centre of gravity. That is, if we suppose that within the disjunct system of clusters the population is of uniform distribution. The criterion separating clusters is that characteristic parameters of uniform distribution are differing by cluster. The decision function fulfilling these constraints is the following, so-called loss function:

$$J(M) = \sum_{i=1}^{s} \int_{C_i} \| x - M^{(i)} \|^2 f(x)dx = \int_{E^k} \min_{1 \leqslant i \leqslant k} \| x - M^{(i)} \|^2 f(x)\,dx.$$

A cluster system is optimal if J(M) is minimal. The loss function estimates expected values of the deviation between the centre of gravity and other points within the individual clusters.

Function J is differentiable, its derivative is the gradient vector, denoted with $U^{(i)}(M)$; i = 1, 2, . . . ,s.

$$U^{(i)}(M) = 2 \int_{E^r} \epsilon^{(i)}(x, M)\,(M^{(i)} - x)\,f(x)dx\,,$$

where $\epsilon^{(i)}(x, M) = \begin{cases} 1, & \text{if } \|x - M^{(i)}\| < \|x - M^{(j)}\|\,, \text{ if } i \neq j, \\ 0, & \text{otherwise} \end{cases}$

If sample $\xi_1, \ldots, \xi_n \ldots$ is given, then

$$Z_{n+1}^{(i)} = 2\epsilon^{(i)}(\xi_{n+1}, M)\,(M^{(i)} - \xi_{n+1})$$

is an unbiased estimation of $U^{(i)}(M)$.

Therefore, the minimum of J with initial value $M_o \in E_k$ will be given by the algorithm

$$M_{n+1}^{(i)} = M_n^{(i)} - 2\gamma_n\,\epsilon^{(i)}(\xi_{n+1}, M_n)\,(M_n^{(i)} - \xi_{n+1})$$

where $M_n = (M_n^{(1)}, M_n^{(2)} \ldots M_n^{(s)}$ is the system of centres of gravity developed in step n and $\gamma_n > 0$ fulfils the previous requirements. Forgy's [6] convergent non-hierarchical method is based on this classical centre of gravity method. Each individual is classified into the cluster with the nearest centre of gravity, then after classifying the entire data system a new centre of gravity is computed and the classifying algorithm newly started. If there is no change in the cluster structure of two subsequent cycles then the minimum of decision function has been obtained, and the classification is optimal.

In order to accelerate the convergence several modifications of the methods have been made. Jancey considers the image of the centre of gravity of the previous cycle reflected to the new centre of gravity as the centre of gravity of the new step *(Figure 2).*

The basic concept of this modification is that the line connecting points 1 and 2 in the loss function is the estimation of the gradient according to the given centre of gravity. If the centre of gravity moves in this direction, the value of the loss function may be best diminished.

MacQueen [24] proposed another method to accelerate convergence.

$$M_{n+1}^{(i)} = M_n^{(i)} + \gamma_n^{(i)}\,\epsilon^{(i)}(\xi_{n+1}, M_n)\,(M_n^{(i)} - \xi_{n+1})\,,$$

where $\gamma_n^{(i)} = (1 + \omega^{(i)})^{-1}$; $M_0 \in E_k$

$\omega_0^{(i)} > 0$; $\omega_{n+1}^{(i)} = \omega_n^{(i)} + \epsilon^{(i)}(\xi_{n+1}, M_n)$

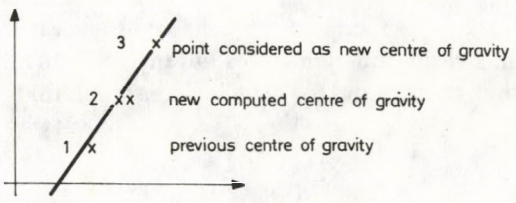

Fig. 2.

With total induction it may be seen that

$$M_{N+1}^{(i)} = \frac{\omega_0^{(i)} M_0^{(i)} + \sum_{n=0}^{N} \epsilon^{(i)}(\xi_{n+1}, M_n)\, \xi_{n+1}}{\omega_0^{(i)} + \sum_{n=0}^{N} \epsilon^{(i)}(\xi_{n+1}, M_n)}$$

If $\omega_0^{(i)} = 1$, then $M_{N+1}^{(i)}$ is precisely the centre of gravity of the initial point $M_0^{(i)}$ and of the arithmetical mean of learning points previously ranked into class C_i. The procedure modifies the centre of gravity after the clusterization of each element. The procedure is known as MacQueen's mean method.

With the application of centre-of-gravity-methods it causes a problem that the system of initial centres of gravity (core points) have to be given in advance. For lifting this such variants of the centre-of-gravity-method were created where instead of giving cluster numbers in advance it is enough to give only certain parameters (e.g. maximal diameter or number of elements of clusters); the number of clusters is determined by the algorithm itself. Such variant of the centre-of-gravity-method is the algorithm working with the parameter estimation elaborated by MacQueen, there exists an optimizing modification of this elaborated by *Wishart* [42], furthermore methods of *Ball* and *Hall* are also known under the denomination ISODATA [4].

b) Localization of peaks of the density function

Here the optimal system is sought after with assumptions more general than those with the centre-of-gravity-method. While according to the basic hypothesis of the centre-of-gravity-method the density function f(x) may be characterized by one point of the cluster and thus a loss function of simple structure may be defined, this algorithm interpretes clusters as the neighbourhood of peaks, i.e. local maximum points of the density function.

Let $\xi_1, \xi_2, \ldots, \xi_n \ldots$ be a series of independent r-dimensional vector variables with the same distribution. Density function f(x) is differentiable and its gradient vector U(x) fulfils the even Lipschitz assumption, i.e. there is a constant L that

$$\|U(x) - U(y)\| \leqslant L\|x - y\|$$
$$\text{and } \|U(x)\| \leqslant M(1 - \|x\|),$$

where $M < \infty$.

For finding maximum points of f(x) the line of reasoning

$$Y_{n+1} = Y_n + \gamma_n Z_{n+1} \qquad Y_o \in E^r$$

may be used where

$$Z_{n+1} = U(Y_n) + \lambda_{n+1}.$$

A computer algorithm has been elaborated by Wishart on the basis of this method [43].

"Mixed model"

It is a type of model well applicable in case of a large sample. The hypothesis postulates probability distributions of the same type for the individual groups, while these latter may differ in parameters. The algorithm assumes the type of distribution as known and determines the optimal cluster structure on the basis of the estimation of distribution parameters. With the assumption of multidimensional normal distribution Wolfe has elaborated a computer algorithm (NORMIX; NORMAP).

Procedures based on the estimation of variance within the group

The procedure is aimed at creating such classes which minimize the total of variance within groups within the entire population.

The linear model of multi-variable variance analysis starts from the following identity:

$$x_{ij} = m + (m_j - m) + (x_{ij} - m_j)$$

where x_{ij} is observation i in group j,
m is the average of the total sample
m_j is the average of group j.

The above formula rearranged is

$$x_{ij} - m = (m_j - m) + (x_{ij} - m_j),$$

that is, the deviation of individual i in group j from the average of the total sample may be divided into two parts: deviation of the group average from the sample average and the deviation of x_{ij} from the group average.

In this basis the basic equation of multivariable variance analysis for the purpose of clusterization will be the following:

$$\underbrace{\sum_{j}^{s}\sum_{i}^{n_j}(x_{ij}-m)(x_{ij}-m)'}_{T} = \underbrace{\sum_{j}\sum_{i}(m_j-m)(m_j-m)'}_{K} + \underbrace{\sum_{j}\sum_{i}(x_{ij}-m_j)(x_{ij}-m_j)'}_{B}$$

$$T = K + B$$

$$i = 1 \ldots n_j;\ j = 1 \ldots s,$$

where n_j is the number of elements of group j, and s is the number of groups.

Cluster analysis is aimed at increasing homogeneity within group, i.e. at minimizing variance within groups and maximizing variance between groups. This goal may be attained by means of several types of decision function.

a) Minimizing the trace of matrix B. This criterion means minimization of the sum of squared deviations from the average measured within groups. Among hierarchic methods both devised on the basis of the decision function tr[B]→min (median-method, Ward-method).

b) Minimization of error related to the variance of the entire population on the basis of Wilks's Λ decision function,

$$\Lambda = \frac{|B|}{|T|} .$$

The algorithm develops a cluster where the value of Λ is minimal.

Procedures based on discriminancy analysis

The essence of discriminancy analysis lies in that the original set of points is projected by means of the discriminancy function into a space where groups to be formed from points are best separated, that is, dishomogeneity between points is as great as

possible. This means maximization of the quotient $|K|$. Using the results of multi-variable variance analysis the discriminancy function will be:

$$\lambda = \frac{v'Kv}{v'Bv} \rightarrow \max!$$

Transforming the above equation into the form

$$(B^{-1}K - \lambda E)v = 0$$

λ and v can be easily determined. λ is the eigenvalue of matrix $B^{-1}K$, while v is its eigenvector. The number of different eigenvalues determines the number of discriminancy functions.

For the verification of the discriminancy effect also Wilks's Λ is used, that is equivalent to the following:

$$\Lambda = \prod_{j=1}^{m} \frac{1}{1+\lambda} .$$

From among hierarchical methods those of Casette, Hung and Dubes are based on discriminancy decision function.

Procedures relying on graph theory

Two types of hierarchical methods are based on the solution of a graph-theoretical problem.

a) Simple chain methods (single linkage)

Let the system of points $x_1 \ldots x_n$ be given in the abstract space X and a metrics d.

Let us determine the minimum tree spanned by the given points. For the construction of the tree the following algorithm is applied:

- we order distances $d(x_i, x_j)$ and connect in each step two points fulfilling the following two preconditions:
- the two points are not yet connected with an edge,
- we can not arrive from x_i at x_j through connected points.

From among pairs of points fulfilling the above two preconditions the distance between x_i and x_j is the smallest. Connected parts of the graph obtained as a result form the individual classes. In the course of the algorithm the number of clusters is gradually

decreasing and, as a final result, the minimum graph spanned by the data system will be obtained.

The graph provides much valuable information on the data system, but in case of a large number of elements it is difficult to survey. This is why procedures redividing the minimum tree were created. Then the number of clusters has to be given in advance and the decision function may be the following:

$$u = \frac{1}{s} \sum_{j=1}^{s} \bar{d}(j) \rightarrow \min ,$$

where s is the number of clusters (connected partial graphs),

$\bar{d}(j)$ the average length of the edges of partial graph j.

b) Complete chain methods (complete linkage)

Similarity between two clusters is measured by the distance between the remotest elements of clusters and for all possible pairing among clusters this value is computed, furthermore, where this is minimal the respective two classes will be contracted by the algorithm. Practically, the procedure minimizes the "diameter" of developing clusters.

Classification methods. Cluster techniques

The variety of decision criteria, their types considerably differing even in their basic hypotheses indicate the diversity of methodology; this circle is further widened by cluster techniques satisfying various special viewpoints. The diversity of procedures becomes further differentiated even with the same decision function (see *Table 5*).

Cluster techniques may be classified on the basis of several viewpoints, the principle most frequently used is the following:

a) overlapping classification,

b) disjunct classification.

The practical importance of overlapping classification is less, its theory is less elaborated, too, and it may be approached on relation-theoretical basis.

We shall deal in detail with disjunct classification methods not containing any overlapping which is justified by their practical importance and theoretical elaborateness. Such classification has two major groups:

1. Non-hierarchic classification dividing the basic population into k classes.
2. Hierarchic classification: at the beginning all elements are regarded as separate classes, than by the aggregation of classes new classification levels are developed step by step until all elements are in one single class. (Of course this line of reasoning may be applied also in an opposite direction.)

Table 5

Cluster techniques	One level methods	One-level optimizing methods	Objective methods	Table 6
			Subjective methods	Table 7
		One-level optimizing methods	Iterative methods	Table 8
			Methods of optimum division of hierarchy	Algorithm dividing minimum graph (PAGE)
	Hierarchical methods	Hierarchical divisive methods	Monothetic methods	Table 9
			Polythetic methods	
		Hierarchical agglomerative methods	Procedures looking for conditional optimum	Table 10
			Procedures not optimizing even in frameworks given by hierarchy	Centroid method for large data systems (WOLFE)

Table 6

Objective methods	Outliers = single centres of gravity	Average chain Centre of gravity method k-mean method (McQueen)
	Simple chain	Elementary cl. analysis (McQuitty)
	Complete chain	Farthest neighbour method "Rank order typal" analysis (McQuitty)

General properties

Methods of obtaining the input data of the classification algorithm – the DC matrix, have been dealt with in previous chapters.

The output of a classification algorithm is a finite series of disjunct partitions of set S. It may be described by such a tree structure where to intersections (modes) of the tree values

$$h \in [O, \max d(A, B)]$$

belong.

Table 7

Subjective methods	Simple chain	Elementary cl. Parameter: min. similarity level Data-overlapping clusters Elementary cl. analysis (Sokal and Sneath)			
		Procedures developing cluster core	Parameter: min. similarity level Overlapping clusters possible	Objective	Max.: dishomogeneity between groups (Zubin, Fleiss, Burdook)
					Max.: homogeneity within groups (Sneath)
			Development of cluster core is based on	Subjective	Max.: dishomogeneity between groups (Bailey)
					Max.: homogeneity within groups (Sawrey, Keller, Conger)
			Parameters: min. similarity and density. Number of outliers depends on k (Wishart)		
	Complete chain	Farthest neighbour method Parameter: min. similarity level (Srensen)			
	Average chain	Clusterization of one individual by segment is allowed Variables are weighted (Sokal and Michener)			
		Clusterization of more individuals by segment is allowed, too. Group pairs method (Sokal and Sneath) With uneven weighting (Lance and Williams)			

Table 8

Iterative methods – Simple cluster core – Polythetic clusters – Natural clusters – Outliers allowed – Stored similarity matrix – Centre of gravity methods	Number of clusters is given	Fixed core points (Rorgy, Jancey)
		Moving core points, convergent k-mean method (McQueenn)
	Number of clusters develops in the course of procedure	k-mean method (McQueenn)
		Variant of the k-mean method (Wishart)
		"Isodata" (Ball and Hall)

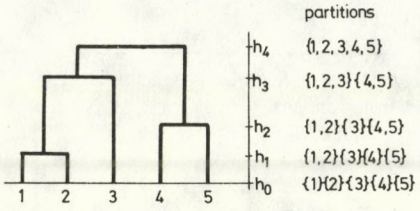

Fig. 3.

Table 9

Monothetic methods (Outliers possible in large number)	Division according to one – mostly separating – variable (Lambert and Williams)
	Characteristics are dichotomized so that the precondition of maximum information loss is fulfilled (Lance and Williams)
	Total of squared deviations within the group is minimized (Sonquist and Morgan)
Polythetic methods (outliers are not separated)	Artificial clusters, discriminancy analysis (Mayer)
	Natural clusters, discriminancy analysis (Casetti, Hung, Dubes)
	Natural clusters, variance analysis, trace criterion (Edward and Cavalli–Sforza)

The above is illustrated by the following simple example where integer numbers represent object.

A given partition of S belongs to a level h of the tree structure, the first element of the series is the set of isolated points, while the last one is the set made up of all objects. Tree structure of such type is called dendogram and is defined as follows.

Let E(S) denote equivalence relations interpreted over set S which uniquely determine disjunct partitions of the set, the equivalence classes.

The dendogram is such a mapping

$$C: [O, \infty \rightarrow E(S)]$$

that has the following properties:

Table 10

Procedures seeking after conditional optimum With stored similarity matrix	Simple chain	Nearest neighbour method Hierarchic cluster analysis (McQuitty)	
	Complete chain	Farthest neighbour method (Saunders, Schueman)	
	Average chain	Similarity of individuals by pairs	Distance measure is minimum within the group (Orlóci) Correlation measure is maximum within the group (Orlóci) B-coefficient of Holzinger (Tyron)
		Centroid methods	Ward Lance and Williams Sokal and Sneath Median method (Gower)
With stored data system (average chain)	Ward-method		
	Variance within group is minimum		
	Minimation of the total of squared deviations within group		
	Centroid methods		
	All data in external store	Ordered similarity matrix, simple chain, nearest neighbour method	
		Modified centroid method (Park)	

1. Monotony: $C(h) \subseteq C(h)'$, if $O \leqslant h \leqslant h'$.
2. There exist two trivial partitions.
3. The series of partitions is well defined, i.e. for a given $h > O$ there exists such $\delta > O$ that

$$C(k + \delta) = x(h).$$

To each pair of objects that level is assigned where they firstly united in the dendogram. At a given level h those objects are in relation between which the distance is smaller than or equal to h.

The initial DC matrix is always changing in the course of iteration steps and the distance between elements of S has to be newly computed in each iteration.

If $d(i_l, j_m)$ denotes the distance by pairs between elements of groups i and j, respectively, and D_{ij} is the set of these distances, then the taxonomic distance between groups i and j is computed by using the function

$$d(i, j) = f(D_{ij})$$

being characteristic of the method.

It follows from the foregoing that the individual methods differ in the selected function $f(D_{ij})$, that is, in the way of interpreting the distance between groups. The definitions most frequently used are summarized in the following table.

Denomination	$d(i, j) = f(Dij)$
Single-Link (SL) or Nearest Neighbour	$d(i, j) = \min d(i_l, j_m)$
Weighted-Average-Link or Group Average (GA)	$d(i, j) = \dfrac{\sum_{l}^{r} \sum_{m}^{s} \lvert i_l \rvert \lvert j_m \rvert d(i_l j_m)}{\lvert i \rvert \lvert j \rvert}$
Unweighted-Average or Simple Average (SA)	$d(i, j) = \dfrac{\sum_{l}^{r} \sum_{m}^{s} d(i_l, j_m)}{r\, s}$
Complete-Link (CL) or Farthest Neighbour.	$d(i, j) = \max d(i_l, j_m)$

Non-hierarchic classification

The essence of the method may be understood on the basis of the following consideration. Let us start from the assumption that set S of our objects has to be divided into two classes, S_1 and S_2 and the division may be carried out in $2^{n-1} - 1$ ways. The efficiency of classification is measured by

$$Q = \sum_{j=1}^{n_1} \sum_{k=j+1}^{n_2} d^2(x_{1j}, x_{1k}) + \sum_{j=1}^{n_2} \sum_{k=j+1}^{n_2} d^2(x_{2j}, x_{2k})$$

i.e. by the sum of squared deviations of pairs of objects belonging to the same cluster. The division is optimal if the value of Q is minimum. As the squared sum of deviations of all pairs of objects

$$\sum_{i=1}^{n} \sum_{k=i+1}^{n} d^2(x_i, x_k) = c$$

is constant, the previous constraint is equivalent to the following: the number

$$Q' = \sum_{j=1}^{n_1} \sum_{k=1}^{n_2} d^2(x_{1j}, x_{2k})$$

should be maximum. Because of the relationship $Q + Q' = x$ the two preconditions are fulfilled with the same division S_1, S_2.

The only problem is by which method the division may be found. The number of all possible cases is $2^{n-1} - 1$ and enumeration can be only carried out for small n values even by means of computer. Precisely on this account, approximating methods are applied. The value of Q is well approached by the number

$$Q_1 = n_1 n_2 d^2(C_1, C_2)$$

it is enough to maximize it. A further simplification is if, instead of Q_1, the square of the distance between centroids is maximized:

$$Q_2 = d^2(C_1, C_2) \rightarrow \max.$$

In the course of the solution, starting from an optional division, points will be transferred to another cluster, one after the other; the algorithm is finished if transfer does not alter the distance between centroids any more.

Maximization of Q' and Q_2, respectively, does not give the same result in each case, generally only if the same number of points belongs to both classes.

The method may be generalized if the procedure divides the population into k number of classes. In case of two classes n steps were needed in order to decide if classification is optimal; in case of k classes (k–1). n kinds of transfer have to be examined.

The procedures applied usually rely on the above principles, such are:

– procedures based on aggregation,

– reallocation procedures.

In connection with these two methods the following questions arise:

1. Is the result obtained independent of the initial classification?
2. Is there any viewpoint according to which the classification may be regarded optimal?

The methods mentioned do not fulfil the preconditions if e.g. the points in *Figure 4* are regarded.

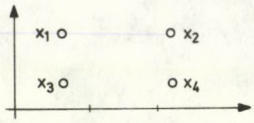

Fig. 4.

Let $S_1 = \{x_1, x_2\}$, $S_2 = \{x_3, x_4\}$ be the initial classification. The algorithm comes to an end in the first step, because each point is nearer to the centroid of its own class that to that of the other class. At the same time it is obvious that this classification can not be qualified good. Centroid methods do not fulfil the requirement of uniqueness and monotony.

Hierarchic classification

The method was developed by *Jardin* and *Sibson.* Hierarchic methods have two main types, namely:

a) Agglomerative procedures: Initially each point is considered as a separate cluster and in the course of the individual steps always two classes are amalgamated.

b) Divisive procedures: Contrary to the previous method here the set of objects is initially considered as a single class and in the course of individual iterations one class is always divided into two classes.

The methods mentioned determine equivalence classes over the set S at each level h. The so-called B_k-method allowing also overlapping between the individual groups is more general, where the measure of overlapping is determined by parameter k.

Let $S_i, S_j \subset S$ be the groups developed by B_k at level h, then

$$S_i \cap S_j \mid \leqslant k - 1, \text{ for } \forall\, h > O.$$

In case of $k = 1$ the B_k-method yields the SL method.

The denomination polyhierarchic is justified on the basis of the k-dendogram representing the development of classes. This is such a tree structure where k number of paths may lead from each intersection to points at higher levels. In *Figure 5* a 3-dendogram is shown.

For $k > 1$ the k-dendogram may be given as the mapping

$$c_n : [O, \infty) \to \Sigma(S)$$

where (S) is the set of symmetric reflexive relations interpreted over S. To the k-dendogram such M(d) may correspond which fulfils the so-called weak k-ultrametric inequality instead of the ultrametric one.

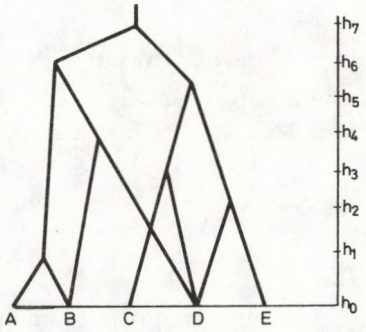

Fig. 5.

That is, if

$$P \subseteq S \text{ and } |P| = k,$$

then for $\forall$ A, B ϵ S, $d(A, B) \leqslant \max \{d(x, y) \mid x \epsilon PU \{A, B\}; y \epsilon P\}$.

This relationship is satisfied by much more out of the DC matrices used in the practice than the ultrametric inequality.

Rohlf elaborated such a computer algorithm based on the creation of trees with minimum edge length where it holds that elements of the input DC matrix satisfying the weak k-ultrametric inequality do not change in the course of classification. However, there are several applications where overlapping of classes may not be allowed, while it is a requirement to find really homogeneous classes. Hierarchic classification of k-th degree means a further development in this direction.

Viewpoints of evaluation

Various classification methods create some classification in the totality of objects in each case. The classification obtained may be qualified according to several viewpoints.

1. Some index number is assigned to the result of the procedure. For example, the sum of squared inner deviations of clusters is related to the total squared deviations. The approximative value of this is:

$$h = \frac{\sum_{i}^{k} \sum_{j}^{n_i} d^2(C_i, x_{ij})}{\sum_{l=1}^{n} d^2(C, x_l)},$$

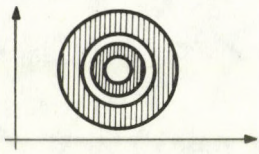

Fig. 6.

$0 \leqslant h \leqslant 1$; the value of h will be zero if each object forms a separate class and one if the centroid of each class is the same.

Obviously, it can not be stated that a classification is the better, the smaller the value of h is. A comparison on its merits is possible only if the number of classes (k) is fixed, but even with this restriction it can not be accepted that h measures in all cases the efficiency of classification. E.g. in case of an adequate classification of *Figure 6* $h = 1$.

If we have two different classifications and the number of classes is identical, then we may decide in favour of one or another classification by comparing the values of h.

With another viewpoint of evaluation a classification is expected to give maximum information on the objects, i.e. the distribution of points among classes be even. In this case the entropy of classification as probability variable is an applicable measure:

$$h = -\sum_{i=1}^{k} \frac{n_i}{n} \log \frac{n_i}{n} \qquad 0 \leqslant h \leqslant \log k.$$

In case of $h = O$ there is a single class and no information is obtained. If $h = \log k$, then an identical number of n/k objects may be found in each class; the average information is maximal.

In most cases several viewpoints must be simultaneously taken into consideration when qualifying a classification. Thus it may occur that a classification is from one viewpoint better, while from another one worse than the other one. Therefore, we may look for such a criterion, too, according to which optimal classifications may not be compared with each other, nevertheless, we may unambiguously choose between certain classifications. This concept may be generalized as follows:

Let $S_1 \ldots S_n$ and $Z_1 \ldots Z_k$ be two divisions of set X and let us asume that elements $x_1 \ldots x_n$ may be rearranged into a series $x_{i1}, x_{i2}, \ldots, x_{in}$ in such a way that if x_j and x_k belong to the same class in division S, then also the corresponding points x_{ij} and x_{ik} belong to the same class in division Z and inversely. With such assumptions we may say that division S is at least as good as Z, if

a) for any pair of points belonging to the same class

$$d(x_j, x_k) \leqslant d(x_{ij}, x_{ik}) \quad \text{and}$$

b) for any pair of points belonging to different classes

$$d(x_j, x_k) \geqslant d(x_{ij}, x_{ik}).$$

If there is a strict inequality at least at one place, then division S is better than Z.

Therefore, a partial order relation may be interpreted between classifications. Consequently, for the comparability of two classifications it is a necessary (but not sufficient) precondition that classes may be made to correspond to each other in the sense that the same number of objects belongs to corresponding classes.

2. It is required from classification methods that the result should be independent of the initial classification. Another frequent requirement is that the method should be invariant to linear transformations: if the procedure is applied to points $ax_1 + b$, $ax_n + b$ instead of points $x_1 \ldots x_n$, the result should not change. The satisfaction of this requirement depends also on how we define the distance between our points. If the cosine of the angle of inclination of vectors is considered as distance, then under the effect of transformation $ax + b$ the distance between points will not change proportionally. A possibility for evaluating the stability of methods is the following: let us assume that by some procedure the division $S_1 \ldots S_k$ has been obtained; it seems a natural requirement that if the procedure is repeated with the omission of the objects of class S_i, then the classification $S_1 \ldots S_{i-1}, S_{i+1} \ldots S_k$ has to be obtained.

3. For evaluation of the set of data itself no generally usable method can be given. Though abstract definitions be given for when the structure of a set of points is "good", those preconditions are almost never satisfied in practice. What we can do is to repeat analysis by various procedures and if our results are in sufficient harmony, we accept them. In an opposite case we continue our work. Then our task is to reveal the interrelation between methods and the set of data, to select a realistically functioning algorithm. For this it is expedient to make use also of further methods of multi-variable data analysis.

4. Also our variables may be qualified according to the role of individual variables in the development of classes. If beside variables $x_1, x_2, \ldots x_r$ also the classification of points is regarded as another variable x, then the relationship between x and the other variables may be examined so that we arrange the variables according to values of correlation coefficients $R(x, x_i)$. It will be more efficient than that if we measure by mutual information $I(x, x_i)$, to what extent the variable x_i determines the classification. If $I(x, x_i) = 0$, then the variable x_i had part in the development of classes; such variables may be omitted.

If we number our variables in such a way that in case of $i < j$ $I(x, x_i) \leqslant I(x, x_j)$, then also the variables themselves may be classified. Metrics will be in this case:

$$d(x_i\, x_j) = |I(x, x_i) - I(x, x_j)|.$$

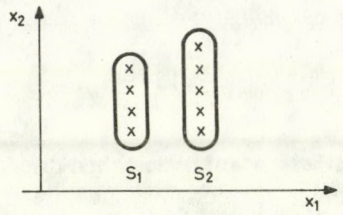

Fig. 7.

The simplest case is when we divide variables into two groups:

$S_1 = x_1 \ldots x_j$: irrelevant variables,
$S_2 = x_{j+1} \ldots x_r$: relevant variables.

After the classification of variables it is expedient to repeat the classification of objects exclusively on the basis of relevant variables. (A similar goal may be attained if factor analysis of variables is made prior to classification.) In *Figure 7* it may be properly seen that variable x_1 completely determines classification, x_2 is independent of classification. If objects are projected to axle x_1, then, though distance changes, the same points will belong to one class.

It may be well seen in the figure that omission of x_2 is justified not only because it has no part in classification, but because also the quality of classification may be improved: the quotient of external and inner deviations considerably decreases.

The mutual information $I(x, x_i)$ may be used also for the weighting of variables: if precisely $I(x, x_i)$ is chosen as weight w_i of variable x_i, then classification may be repeated with these weights. The mutual information with the individual variables of the new division as variable x' may be computed again; as a next step weights may be modified as $w'_i = I(x', x_i)$. The weights obtained at the end of the iteration express the role of individual variables in the final classification.

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КЛАСТЕРНЫЙ АНАЛИЗ

Л. ФЮШТЭШ—Д. МЕСЕНА—Н. МОШОЙГО-ШИМОН

Во вводной части на основании книги Андерберга: «Cluster analysis for applications» дается обзор методов классификация, различных типов измерительных шкал, их трансформации, возможностях измерения, а также понятия подобия критериев и объектов.

В дальнейшем рассматриваются методологические аспекты кластерного анализа. Здесь происходит также и обобщение критериев классификации, типов функций принятия решений. Кратко излагаются методы, основанные на оценке функции частоты, опирающиеся на представления «смешанной модели», использующие вариационную оценку в рамках группы, в основе которых находится дискриминационный анализ, теория графов, простые методы цепей, а также полные методы цепей.

В некоторых случаях затрагиваются и, например, в отношении дендограммы, технические, неиерархические, агломеративные и дивизивные методы, излагаются наиболее важные точки зрения оценки.

Данная статья завершается довольно объемной блок-диаграммой, отражающей системный подход, а также и обширным списком литературы.

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ON THE DIFFERENCE EQUATION SYSTEM OF THE COMPOSITION OF THE AMOUNT OF MONEY

Concerning its mobility money stock can be divided at least into two major groups according to the spending or saving purpose, respectively, namely, active (mobile) money really participating in the realization of circulation and inactive (idle) money laid by, withdrawn from circulation. The problem to be solved is to determine which share of active money will turn into inactive and vice-versa; furthermore, how long the time-lag is in this transformation.

The mathematical description of these processes is a system of difference equations indicating also the effect of induced and spontaneous money movements on the supply with money of the national economy, on its sufficient or insufficient volume, on viable, and stable situations following the mobility of money and on resulting regulation possibilities.

The investigation is aimed at determining how the state of equilibrium can be established in the course of financial regulation according to the model set up by the authors and how it can be maintained in the system described.

In our previous article published in Szigma [1] the flows of money and credit were examined through balance changes and practically the national credit balance was formulated in the form of a time-lagged model. This time real money flows will be more precisely followed and not only changes in the entire stock of money, but also those in its inner composition will be observed and described. Movement of money is a series of permanent changes that manifests itself through flows according to the intensity of putting into or withdrawing from circulation of money (pressure or suction), but, after all, in the form of changes in stock at dates of measurement. Concerning its mobility the stock of money can be divided into at least two major groups depending on the spending or saving purpose. To the first group belongs the amount serving for the realization of payments, for the settlement of transactions (active money), while to the other that not participating in the fulfilment of obligations during a given period (usually one year), but laid by in the form of savings in banking accounts, savings deposits or even in cash (inactive money) [2]. In the present article we make an attempt at presenting changes in the composition of money in a model, formulating the conditions which are indispensable for maintaining or establishing a state of financial equilibrium. Finally, computations are made by means of the mathematically described model in order to verify the possibility of practical utilization.

Economic aspects of money flows

The flow of payments in the mutual relations of money holders is always realized by using the amount of money available at a given date t. Additional amounts of money required by extended reproduction are emitted by the issuing bank through disbursement of credit or through foreign exchange purchases (mainly because of exports). In the circulation of material processes a part of money flows back to the issuing bank (in consequence of final uses) and ceases to be money, namely, because of repayment of credit or foreign exchange sales (imports). At the closing date of the observation period the stock of money becomes measurable again. The aforementioned statement can be described by the following simple relationship:

$$P(t-1) + N(t) - V(t) = P(t), \tag{1}$$

where:

$P(t)$ = stock of money at the end of period t;
$N(t)$ = amount of new money emitted (pressed into circulation) during period t;
$V(t)$ = total amount of money withdrawn (sucked away) from circulation in period t.

In the following t denotes a given period in case of flow data or the closing date of a period in case of stock data.

From the viewpoint of its mobility the stock of money is divided into two major parts, namely,

– active (mobile) money really participating in the transaction of circulation and
– inactive (idle) money laid by, withdrawn from circulation. That is:

$$P(t) = P_A(t) + P_I(t) \tag{2}$$

Equation (2) expresses a static relationship (stock) existing at the end of a given period t. However, the full amount of money and within it that of mobile and idle money, respectively, is permanently changing, either increasing or decreasing according to need. The outward form of appearance of the process of changes between two dates is the circulation (flow) of money. Changes in the share of active or inactive money, respectively, also take place in the form of decrease or increase which, after all, result in permanent structural changes in the mobility and composition of money. The newly emitted money – $N(t)$ – is always put into circulation as active money, but may become inactive after a certain time if it is no longer needed by circulation. This becoming inactive may occur either at the discretion of the money holder (deposits) or saving is prescribed by legal rules (e.g. formation of enterprise reserve funds). A part of money laid by is a result of deliberate human action, while another part of it becomes automatically inactive by the fact that its

holder cannot spend it at a given date or during a given period. The three data in (1) referring to the changes in the stock of money are closely interrelated as variables. Namely, the difference between emission and withdrawal alters not only the full amount of money but also that of active money; and inner structural changes are complementary to each other in the sense that to the extent the stock of inactive money increases or decreases will that of active money decrease or increase. Describing this process of changes in a formula the following two equations my be stated:

$$P_A(t) = P_A(t-1) + [N(t) - (V(t)] - [\alpha P_A(t - T_I) - \beta P_I(t - T_A)] \quad (3)$$

$$P_I(t) = P_I(t-1) + [\alpha P_A(t - T_I) - \beta P_I(t - T_A)], \quad (4)$$

where

α = the proportion of money becoming inactive related to the stock of active money;
β = the proportion of money becoming active related to the stock of inactive money;
T_I = the period while active money becomes inactive (in the practice $T_I = 1$ year).
T_A = the period while inactive money becomes active in years.

Through adding up equations (3) and (4) the results of (1) and (2) are obtained with the important statement that composition of the amount of money at date t is determined by changes occurred T_I and T_A periods earlier, while effective changes in the stock are independent of the existing amount of money. The measure of pressure and suction as well as their effect on the amount of money depend on the given level of development of the national economy, the total of payments effected or to be effected and on the velocity of money circulation. That is

$$N(t) - V(t) = P(t) = \theta[K(t), f(t)] \quad (5)$$

where

K = value of money demand factors (money flow because of trade + income distribution);
f = velocity of money circulation.

In the following dependence on money demand factors and on the velocity of money circulation will not be taken into consideration in the difference between pressure and suction, but it will be directly expressed as a function of time:

$$N(t) - V(t) = \Phi(t). \quad (6)$$

The composition of stock may change even if the entire amount of money does not change from one period to another. Let us return, therefore, to equation (3) from which it results that though the amount of active money directly changes by the difference

between pressure and suction, but over and beyond that it decreases by the value that becomes inactive from it during a certain period, and increases by the amount that becomes active during the same period from inactive money existing T_A periods earlier. Conforming to (4), the transformation process of active money brings about a modification of the same amount in inactive money with a reversed sign. From the aforementioned there result two very important conditions for us:

– firstly, it should be determined what part of active money becomes inactive and *vice-versa,* and the regularities of this process should be studied;
– secondly, the *time-lag* of this transformation should be determined.

It is a precondition of smooth realization of money circulation that there should be enough active money available to the national economy to meet payment liabilities. In the socialist national economy the issuing bank ensures smooth functioning of the national economy through planned emission of money. However, it does not result from this yet, that the amount of money and its composition according to mobility may be modified only at a rate and in proportions determined by development. The measure of inactivation may vary within wide ranges related both to the income produced and to consumption. Thus, for example, if the rate of transformation is too fast, then money will not be enough for the settlement of transactions, the distribution and redistribution of income, or, whether we want it or not, shortages will have to be made up for through the emission of new money. On the other hand, if saving propensity decreases, and inactivation is slow under conditions of a given incomes policy and economic-financial regulators, then – even in case of money emission in unchanged proportions – demand will be too great and that may cause tensions in the economy. Therefore, in this case the issuing bank has to restrict the emission of money, first of all credit granting. The converse of this statement is also true *vice versa.* Namely, if money laid by is too rapidly accumulating, this may be attributed not only to increased save propensity to, but also to the fact that money cannot be expediently utilized by their holders and that the price system is not elastic enough, either, to establish a state of equilibrium between demand and commodity funds.

Concerning data of a properly selected base period it may be assumed that N (pressure) and V (suction) of similar proportions will be enough to realize circulation also in the future, because major proportions of economic development will not be considerably modified (in the medium and long run). But, if undesirable changes take place in the composition of money, then, though the total amount of money might seem to be enough, the amount of mobile money serving for the settlement of transactions will be either more or less than required. This will result either in excess demand or in the development of an opposite situation and there will be payment difficulties. The right solution may be that

– proportionately to the increase of inactive money, more money is put into circulation that would have been done under original conditions; or in the opposite case:
– emission is diminished by the amount of money released through mobilization of inactive money.

The above outlined regulation of the amount of money is aimed at ensuring always enough money for the realization of circulation. This can be achieved with the aid of a mechanism that practically determines the emission of new money according to a numerical connection formulated in the *Marxian law on money circulation.* Impulses produced by various influencing factors may be plotted and analyzed by means of indicators derived from various data on money circulation and the stock of money. Out of them special importance is attributed to indicators of the velocity of money circulation, characteristics of the movement and functioning of active and inactive money. In our previous work [1] we dealt first of all with indicators of the velocity of money circulation in a model describing control of the amount of money. This time stress is laid on parameters characterizing structural changes. Determination of parameters α and β in (3) and (4) gives a reliable result only if proportions of such periods are taken into consideration when the national economy was in a state of relative equilibrium and these periods should be as many as possible. It follows that such conditions should be envisaged that are able to bring about optimum proportions between money emission and withdrawal as well as activation and inactivation. Precisely on this account, in Chapter III we look for practically acceptable values of the parameters, using simulation computations, in order to deliberately approximate the amount of money required for the realization of transaction and its proportion within the total stock.

Concerning the role of parameters some basic assumptions are presented. *Assuming* that the total stock of money is the same in periods $t = 0, 1, 2. \ldots$ parameters α and β may bring about a permanent ratio between amounts of active and inactive money, only if the economy realizes simple reproduction (is stationary). Then namely – with the velocity of money circulation unchanged – the national economy will require always the same amount of active money to realize circulation and consequently, also the stock of inactive money remains constant. However, in case of extended reproduction demand for active money is also increasing which – in lack of new money emission – may be satisfied only from money laid by. It follows that in such cases the value of α necessarily decreases, while that of β increases. But changes are delimited by the circumstance that the transformation of active money into inactive one gradually stops ($\alpha = 0$) and in an extreme case inactive money runs out because of reconversion into active ($\beta = 1$). Then the transformation process stops and may be started again only through the emission of new money. Of course, there is no stationary economy in reality; but our statement that the rate of transformation may vary within relatively narrow limits remains valid. Apart from extraordinary situations such a stock and structural composition of money can always be created through the planned control of the economy that correspond to needs and can keep solvent demand within reasonable limits in a given period.

Activation and inactivation of money take place with a definite time-lag relative to a preselected date. According to international banking habits the amount of *money laid by for at least 1 year* is regarded inactive money and this can be accepted also in our practice. Actual recording of this amount of money would cause several difficulties. Therefore, such a solution has been chosen, both in capitalist countries and in Hungary,

that this amount is determined on the basis of the character of bank accounts and of the duration of blocking deposits. However, the activation of inactive money is not merely a matter of qualifying assets in bank accounts, but also depends on the time passing until the money will be really used again, i.e. newly participate in circulation. Concerning this flow data of bank accounts are available, by means of which the extent of activation may be determined. The quotient of the circulation data of a given period t and the average stock of inactive money corresponds to *a special velocity of circulation of inactive money* from which also the length of the time-lag follows numerically.

In the present article primarily structural relationships and transformation of money are examined from the aspect of consequences that will result from the system of conditions of the model for the preservation of financial equilibrium, with due consideration to stability. From the model built up by us practically a double relationship is obtained, resulting from the fact that

- on the one hand, the total amount of money is divided into *active* (mobile = transaction) and *inactive* (idle = lasting) money, and
- on the other hand, distinction is made between changes in the amount of money *generated* in the system (altering also the magnitude of the entire stock of money) and *spontaneous* changes in the stock of money taking place through free transformation (modifying only the structural composition of the stock of money).

On the basis of this latter

$$P(t) = P_s(t) + P_g(t). \tag{7}$$

In the following we shall formulate the mathematical model of money flows, solve the equations and examine the stability of the system.

Mathematical description of money flows

Money flows bring about permanent changes in stocks as regards both their total volume and structural composition. These flows are described mathematically by a difference equation system demonstrating also the effect of generated and spontaneous money flows on the money endowment of the national economy, on its sufficient or insufficient extent, on viable, stable situations following from the mobility of money and on resulting control possibilities.

Difference equation system of the transformation of money, generated and spontaneous money flows

With the mathematical formulation of the model we start from relations (3) and (4) given in *Chapter I.* Concerning the mobility composition and development in time of money stocks let us consider the following difference equation system in two variables:

$$\Delta P_A(t) = \Phi(t) - \alpha P_A(t - T_I) + \beta P_I(t - T_A)$$

$$\Delta P_I(t) = \alpha P_A(t - T_I) - \beta P_I(t - T_A) \tag{8}$$

$t = 0, 1, 2, \ldots$
$T_I; T_A$ = positive integers
$0 < \alpha < 1; 0 < \beta < 1.$

The two equations given in (8) provide a mathematical model of real money flows and money transformations, that has been justified by economic considerations in the foregoing. The coefficients α and β are considered constants in the model; the known function $\Phi(t)$ being the difference of money emission and money withdrawal (pressure and suction) will be called excitation of the system. We postulate that the following constraint that is obvious under normal economic conditions will be fulfilled:

$$T_A > T_i \geqslant 1. \tag{9}$$

(8) will be solved with operational calculus. The substance of this is that (8) is converted into an algebraic equation system over the discrete operator field whose solution will directly give the operators of amounts of active and inactive money. Concerning the theory on operators we refer to [3]. In this paper basic knowledge of discrete operational calculus and the notation applied there are assumed.

Adding the two equations of (8)

$$\Delta P_A(t) + \Delta P_I(t) = \Phi(t) \tag{10}$$

is obtained, expressing the simple fact that the change in the total amount of money is equal to the difference between money emitted and withdrawn. Therefore, instead of (8) the following formally simpler equation system will be examined:

$$\Delta P_A(t) = \Phi(t) - \alpha P_A(t - T_I) + \beta P_I(t - T_A)$$

$$\Delta P_A(t) + \Delta P_I(t) = \Phi(t). \tag{11}$$

Let us consider amounts of active and inactive money as elements of the discrete operator field in the following form:

$$P_A = \sum_{j=0}^{\infty} \frac{P_A(j)}{(1+q)^j}$$

$$P_I = \sum_{j=0}^{\infty} \frac{P_I(j)}{(1+q)^j}, \tag{12}$$

where the abstract element q is the so-called difference operator, and 1:1 + (q) is the lag operator. Convergence holds trivially in operational sense. Considering (12) and the basic properties of the lag operator, (11) may be expressed in the following operational form:

$$P_A - \frac{1}{1+q} P_A - P_A(-1) = \Phi - \frac{\alpha}{(1+q)^{T_I}} P_A - \alpha \sum_{k=1}^{T_I} \frac{P_A(-k)}{(1+q)^{T_I-k}} + \\ + \beta P_I \frac{1}{(1+q)^{T_A}} + \beta \sum_{k=1}^{T_A} \frac{P_I(-k)}{(1+q)^{T_A-k}}, \tag{13}$$

$$P_A - \frac{1}{1+q} P_A - P_A(-1) + P_I - \frac{1}{1+q} P_I - P_I(-1) = \Phi$$

Rearranging the above, the following will be obtained:

$$\frac{q(1+q)^{T_I-1} + \alpha}{(1+q)^{T_I}} P_A - \frac{\beta}{(1+q)^{T_A}} P_I = \Phi + \\ + P_A(-1) - \alpha \sum_{k=1}^{T_I} \frac{P_A(-k)}{(1+q)^{T_I-k}} + \beta \sum_{k=1}^{T_A} \frac{P_I(-k)}{(1+q)^{T_A-k}}, \tag{14}$$

$$P_A + P_I = \frac{1+q}{q} \Phi + \frac{1+q}{q} [P_A(-1) + P_I(-1)]$$

which is an algebraic equation system in two variables: the unknown amounts of money. By solving it the operators of amounts of money will be obtained:

$$P_A = \Phi \frac{\beta(q+1) + q(1+q)^{T_A}}{qZ} + \\ + \frac{\beta(1+q)[P_A(-1) + P_I(-1)] + P_A(-1) q(1+q)^{T_A}}{qZ} - \tag{15}$$

$$- \frac{\alpha q \sum_{k=1}^{T_I} P_A(-k)(1+q)^{T_A-T_I+k} + \beta q \sum_{k=1}^{T_A} P_I(-k)(1+q)^k}{qZ},$$

$$P_I = \Phi \left[\frac{1+q}{q} - \frac{\beta(1+q)+q(1+q)^{T_A}}{qZ} \right] + \frac{q+1}{q} [P_A(-1)+P_I(-1)] -$$

$$- \frac{\beta(1+q)P_A(-1)+P_I(-1)}{qZ} +$$

$$+ \frac{P_A(-1)q(1+q)^{T_A} - \alpha q \sum_{k=1}^{T_I} P_A(-k)(1+q)^{T_A-T_I+k} + \beta q \sum_{k=1}^{T_A} P_I(-k)(1+q)^k}{qZ} .$$

In the above:

$$Z = (1+q)^{TA} - (1+q)^{TA-1} + \alpha(1+q)^{TA-TI} + \beta \tag{16}$$

is the so-called characteristic polynomial of (11).

Our problem has been solved in principle and the operators of the amounts of money looked for have been obtained. What has been left is to write expressions (15) as *functions of time t* eliminating the abstract operational notations.

For this we introduce in connection with the amount of active money the notion of the amount of generated money (P_{gA}) and that of the amount of spontaneous money (P_{sA}). For definition be

$$P_A = P_{gA} + P_{sA}, \tag{17}$$

where, on the basis of (15)

$$P_{gA} = \Phi \frac{\beta(q+1)+q(1+q)^{T_A}}{qZ} \tag{18}$$

$$P_{sA} = \frac{\beta(1+q)[P_A(-1)+P_I(-1)]+P_A(-1)q(1+q)^{T_A}}{qZ} -$$

$$- \frac{\alpha q \sum_{k=1}^{T_I} P_A(-k)(1+q)^{T_A-T_I+k} + \beta q \sum_{k=1}^{T_A} P_I(-k)(1+q)^k}{qZ} . \tag{19}$$

The amount of generated money is that component of the entire amount of active money that depends only on the excitation Φ of the system and is independent of initial

values of amounts of active and inactive money prescribed for the base interval. Mathematically P_{gA} is the operator of the solution of the inhomogeneous system (11) with zero initial conditions. Thus it describes the external or generated movement of active money (with zero initial conditions).

The active money generated spontaneously is that component of the entire amount of active money that depends only on the initial values of amounts of active and inactive money prescribed for the base interval and is independent of the generation of the system. Mathematically P_{sA} is the operator of the solution of the homogeneous system belonging to (11) with optional conditions where $\Phi = 0$. Thus, this describes the inner or spontaneous movement of active money and the entire amount of (active) money is the sum of generated (active) and spontaneous (active) money. Amounts of generated inactive and spontaneous inactive money, respectively, may also be defined and described by a formula in a completely similar way. Namely, it is valid here that

$$P_I = P_{gI} + P_{sI}.$$

Also the total amount of generated and spontaneous money can be interpreted, for which the following relationships are valid, which are obvious by economic considerations:

$$P_g(t) = P_{gA}(t) + P_{gI}(t) = \sum_{i=o}^{t} \Phi(i)$$

$$P_s(t) = P_{sA}(t) + P_{sI}(t) = P_A(-1) + P_I(-1) = \text{constant}.$$

By breaking down into partial fractions (18) and (19) can easily be expressed as functions of time t.

Let us consider the characteristic equation of the polynomial given in (16):

$$\xi^{T_A} - \xi^{T_A-1} + \alpha\xi^{T_A-T_I} + \beta = 0. \tag{20}$$

Let us denote its different roots with ξ_k and their multiplicities with δ_k. Since the operator

$$\frac{\beta(q+1) + q(1+q)^{T_A}}{qZ}$$

in (18) can be described as a rational function of (1 + q) whose numerator and denominator are equally of the T_A + 1st degree, a function will be produced that may be expressed in a form of the following partial fraction expansion

$$\frac{\beta(q+1)+q(1+q)^{T_A}}{qZ} = \gamma \frac{(1+q)}{q} + (1+q) \sum_{k=1}^{M} \sum_{p=1}^{\sigma_k} \frac{\gamma_{k,p}}{(q+1-\xi_k)^P}, \qquad (21)$$

where: $M \leqslant T_A$ and coefficients γ, $\gamma_{k,p}$ may be obtained through well-known elementary methods.

It is known from elements of operational calculus that

$$\frac{1+q}{(q+1-\xi)^P} = \left\{ \xi^{t-p+1} \binom{t}{p-1} \right\}.$$

Therefore, the final form of the amount of generated active money will be the following, taking (21) into consideration:

$$P_{gA}(t) = \gamma \sum_{i=0}^{t} \Phi(i) + \sum_{i=0}^{t} \Phi(i) \sum_{k=1}^{M} \sum_{p=1}^{\sigma_k} \gamma_{k,p} \xi_k^{t-i-p+1} \binom{t-i}{p-1}. \qquad (22)$$

(19) may easily be expressed as a rational function of the operator 1+ q where the denominator is of degree $T_A + 1$ and the numerator at most of degree $T_A + 1$. Accordingly, its partial fraction expansion is of the form

$$P_{sA} = \frac{\vartheta(1+q)}{q} + (1+q) \sum_{k=1}^{M} \sum_{p=1}^{\sigma_k} \frac{\vartheta_{k,p}}{(q+1-\xi_k)^P} \qquad (23)$$

if the degree of the numerator is $T_A + 1$. ϑ and $\vartheta_{k,p}$ are also elementarily derived.

It may easily be seen from (19) that the case when the degree of the numerator is less than $T_A + 1$ may arise if

$$P_A(-1) - \alpha P_A(-T_I) + \beta P_I(-T_A) = 0. \qquad (24)$$

is fulfilled.

This, however, may be disregarded on the basis of economic considerations, since in this case $P_{sA}(0) = 0$. Thus the final form of active spontaneous money will be:

$$P_{sA}(t) = \vartheta + \sum_{k=1}^{M} \sum_{p=1}^{\sigma_k} \vartheta_{k,p} \xi_k^{t-p+1} \binom{t}{p-1} \quad (t \geqslant 0), \qquad (25)$$

if the numerator of (19) is of degree $T_A + 1$. We note that coefficients γ, δ are independent of the characteristic roots ξ_k and

$$\gamma = \frac{\beta}{\alpha+\beta}; \quad \vartheta = \frac{\beta}{\beta+\alpha}\,[P_A(-1)+P_I(-1)]\,. \tag{26}$$

In the course of our later investigations ϑ will have a very important role.

On the basis of (22) and (23) also the spontaneous and generated components of inactive money P indicated in (15) may be simply expressed as functions of time t.

Note: Expressions (22) and (25) are largely simplified if all roots of the characteristic equation are distinct. Furthermore, in case of complex roots these expressions will produce real valued functions, where trigonometric expressions can already be found as well. Then spontaneous movements may contain also oscillations. (Cf. paper [1] of the authors.)

Viability of the model, stability, equilibrium states of money flows

The model described by (11) is called viable if $P_{sA}(t) > 0$, $P_{sI}(t) > 0$; $P_{gA}(t) > 0$, $P_{gI}(t) > 0$, for $0 \leqslant t < \infty$ and if values of α and β possess such a neighbourhood $\alpha_0 < \alpha < \alpha_1$, $\beta_0 < \beta < \beta_1$ that the positivity conditions are fulfilled whatever coefficient $\tilde{\alpha}$ and $\tilde{\beta}$ is selected from it. Negative amounts of money make no economic sense.

In professional literature systems with constant coefficients of type (11) are called stable, if all roots of their characteristic equation fall within the interior of the unit circle of the complex plane, that is if $|\xi_k| < 1$. Then it is also said that the characteristic polynomial (16) is stable. A stable solution may be also negative. We shall demonstrate that if (11) is viable, then system (11) is stable. This is of great importance, since criteria of stability may be simply given, while viability is verified by the results obtained.

If the characteristic equation (20) has a root with an absolute value exceeding 1, then such $\tilde{\alpha}$ and $\tilde{\beta}$ may be selected from any small neighbourhood of α and β with which it is obvious on the basis of (25) that P_{sA} is increasing (or decreasing) beyond any limit. Then, however, inactive spontaneous money ought to decrease (increase) beyond any limit, too. The model is thus not viable in this case since negative amounts of money make no sense in this context. We would like to mention that eventually occurring roots of the characteristic equation (20) with an absolute value of exactly 1 can not induce stable and economically interpretable processes, either. Although to those with multiplicity 1 there correspond pure periodic components in (25) but any small change of coefficients α and β in (20) may transfer such roots to the exterior of the unit circle.

Therefore, if the model is viable then the absolute value of characteristic roots is less than one and it immediately follows from formula (25) that

$$\lim_{t\to\infty} P_{sA}(t) = \vartheta = \frac{\beta}{\beta+\alpha}\,[P_A(-1)+P_I(-1)] \tag{27}$$

and active spontaneous money approaches to its equilibrium point whose value is ϑ. It can be immediately stated even without any computation that then also the spontaneous component of the amount of inactive money approaches to its equilibrium point whose value is

$$\rho = \frac{\alpha}{\beta + \alpha} [P_A(-1) + P_I(-1)] \tag{28}$$

In ϑ and ρ given in (27) and (28), respectively, values of active and inactive money stocks at time $t = -1$ are included and it is true that

$$\vartheta + \rho = P_A(-1) + P_I(-1)$$

We can see that equilibrium values depend only on the values of the entire money stock at time $t = -1$ and are independent of values of money stocks at periods $t < -1$ of the base interval, i.e. they are independent of initial conditions prescribed for periods $t < -1$.

The spontaneous flow of the quantity of money is considered as a *transient process.* In the long run the transient process will die out and its equilibrium value will become set and from that time on the process becomes stationary. This means that the effect of initial conditions referring to $t < -1$ will no longer be effective. The proportion $\vartheta/\rho = \beta/\alpha$ is a quantitative characteristic of the relationship between spontaneous active and spontaneous inactive money. Since the characteristic polynomial (16) is not stable in general, it is of fundamental importance to decide if (16) is stable or not in a given concrete case. For this several procedures have been elaborated in literature. The so-called division method is very simple and with its aid stability of a given polynomial may be relatively rapidly decided. (Cf. [4]). We shall not review this here but show that if $T_A = 2$ then (16) is always stable, while for $T_A = 3$ stability criteria will be given.

If $T_A = 2$ then (16) is stable. Then $T_I = 1$ indeed and the characteristic equation (20) has the following form:

$$\xi^2 - (1 - \alpha)\xi + \beta = 0 \tag{29}$$

If the roots are complex then they have identical absolute value and since

$$\xi_1 \xi_2 = \beta < 1,$$

it is evident that $|\xi_1| < 1$, $|\xi_2| < 1$. If the roots are real, then solving (29)

$$\xi_{1,2} = \frac{1 - \alpha \pm \sqrt{(1 - \alpha)^2 - 4\beta}}{2},$$

from which it can be easily seen that both roots are positive and less than one. Therefore, (16) is stable.

If $T_A = 3$ and $T_I = 1$ then (16) is stable if and only if

$$\frac{\beta(1-\alpha)}{1-\beta^2} < 1 . \tag{30}$$

If $T_A = 3$ and $T_I = 2$, then (16) is stable if and only if

$$\frac{\alpha+\beta}{1-\beta^2} < 1 . \tag{31}$$

Finally, for the case $T_A = 2$ we give the condition that the amount of spontaneous active money (and then also the amount of spontaneous inactive money) could be described with damped oscillation around its equilibrium. This occurs if the roots of (29) are complex. The discriminant of (29) is

$$D = (1-\alpha)^2 - 4\beta . \tag{32}$$

The discriminant is negative if

$$\left(\frac{1-\alpha}{2}\right)^2 < \beta , \tag{33}$$

and that is the oscillation criterion of spontaneous money movement.

Let us turn to generated money movements. We accept that stability of the characteristic polynomial (16) is fundamental also from the viewpoint of positivity of generated money movements. As we know, the amount of generated money is determined by emission Φ. If (16) is not stable then it can be seen from (22) that $\tilde{\alpha}$ and $\tilde{\beta}$ may be selected from any small neighbourhood of α and β so that even the smallest emission will result in an amount of generated active money increasing to infinity or decreasing to minus infinity and, accordingly, in generated inactive money decreasing to minus infinity or tending towards infinity which are determined by roots $|\xi_k| > 1$. Thus we arrive at a negative value of generated money amount and that is an economic nonsense. Let us demonstrate this with a simple example. Let $\Phi(0) = 1$ and $\Phi(t) = 0$ if $t > 0$. For the sake of simplicity let the roots be distinct and real. Then (22) will change into the following form:

$$P_{gA}(t) = \gamma + \sum_{k=1}^{T_A} \gamma_{k,1} \xi_k^t$$

Furthermore:

$$P_{gI}(t) = P_g(t) - P_{gA}(t) = 1 - \gamma - \sum_{k=1}^{T_A} \gamma_{k,1} \xi_k^t .$$

If there is one among the roots ξ_k with an absolute value exceeding one then, depending on the coefficients $\gamma_{k,1}$, one amount of generated money should tend towards $+\infty$, while the other tovards $-\infty$ if $t \to \infty$.

Results of this section are summarized in the following *Theorem I.*

If system (11) is viable then the polynomial

$$Z = (q+1)^{T_A} - (1+q)^{T_A - 1} + \alpha(1+q)^{T_A - T_I} + \beta \tag{34}$$

is stable, that is, its characteristic roots fall within the interior of the complex unit circle. Amounts of spontaneous money then tend towards their equilibrium values

$$\vartheta = \frac{\beta}{\beta + \alpha} [P_A(-1) + P_I(-1)],$$

$$\rho = \frac{\alpha}{\beta + \alpha} [P_A(-1) + P_I(-1)]$$

if $t \to \infty$ Furthermore, if $T_A = 2$ then (34) is always stable. If $T_A = 3$, $T_I = 1$ then the necessary and sufficient condition of the stability of (34) is

$$\frac{\beta(1-\alpha)}{1-\beta^2} < 1 .$$

If $T_A = 3$, $T_I = 2$ then the necessary and sufficient condition of stability of (34) is

$$\frac{\alpha + \beta}{1-\beta^2} < 1 .$$

Finally, in case $T_A = 2$ the necessary and sufficient criterion of the oscillation of spontaneous money movement is the condition

$$\left(\frac{1-\alpha}{2} \right)^2 < \beta .$$

System with exponential excitation

In case the national economy develops at a constant (average) rate, the relationship

$$\Phi(t) = \varphi(t)[P_A(t-1) + P_I(t-1)], \qquad \varphi = \text{constant}. \tag{35}$$

holds in practice between emission $\Phi(t)$ and the entire money stock $P_A(t) + P_I(t)$ where $0 < \varphi(t) < 1$ and $\varphi(t)$ is a function with small fluctuation.

If, for the sake of mathematical convenience $\varphi(t)$ is considered constant, interesting further results may be obtained which are connected with amounts of generated money. Let, therefore, be

$$\Phi(t) = \varphi\,[P_A(t-1) + P_I(t-1)], \qquad \varphi = \text{constant}. \tag{36}$$

In view of (10) we get

$$\Delta[P_A(t) + P_I(t)] = \Phi(t) = \varphi[P_A(t-1) + P_I(t-1)]. \tag{37}$$

Our equation obtained in this way is a difference equation of first order for the entire money stock whose solution is

$$P_A(t) + P_I(t) = [P_A(-1) + P_I(-1)](1+\varphi)^{t+1} \qquad t \geqslant 0, \tag{38}$$

and on the basis of (37)

$$\Phi(t) = \varphi[P_A(-1) + P_I(-1)](1+\varphi)^t \qquad t \geqslant 0. \tag{39}$$

The entire amount of money generated during period t is

$$P_g = \sum_{i=0}^{t} \Phi(i) = [P_A(-1) + P_I(-1)]\,[(1+\varphi)^{t+1} - 1]. \tag{40}$$

Let us determine the composition of P_g for the case of exponential excitation of (39). The following theorem II is valid.

Let (11) be viable. If the excitation has the exponential form given in (39) then amounts of generated money P_{gA}, P_{gI} may be described asymptotically also with exponential functions in the following way:

$$\tilde{P}_{gA} = \gamma_1 (1+\varphi)^t, \tilde{P}_{gI} = \gamma_2 (1+\varphi)^t, \tag{41}$$

if $t \to \infty$ γ_1, γ_2 are positive constants.

Proof: Firstly we demonstrate that (41) is a particular solution of (11). Substituting (41) into (11) and taking (39) into consideration we obtain that

$$\gamma_1(1+\varphi)^t - \gamma_1(1+\varphi)^{t-1} = \varphi\,[P_A(-1) + P_I(-1)](1+\varphi)^t - \\ - \alpha\,\gamma_1(1+\varphi)^{t-T_1} + \beta\,\gamma_2(1+\varphi)^{t-T_A}$$

$$\gamma_1(1+\varphi)^t - \gamma_1(1+\varphi)^{t-1} + \gamma_2(1+\varphi)^t - \gamma_2(1+\varphi)^{t-1} = \\ = \varphi\,[P_A(-1) + P_I(-1)(1+\varphi)^t.$$

Reduced by $(1+\varphi)^t$ a system of equations in two variables is obtained for γ_1, γ_2 whose solution is:

$$\gamma_1 = [P_A(-1) + P_I(-1)]\,\frac{\varphi(1+\varphi)^{T_A} + \beta(1+\varphi)}{(1+\varphi)^{T_A} - (1+\varphi)^{T_A-1} + \alpha(1+\varphi)^{T_A-T_I} + \beta} \tag{42}$$

$$\gamma_2 = [P_A(-1) + P_I(-1)]\,\frac{\alpha(1+\varphi)^{T_A-T_I+1}}{(1+\varphi)^{T_A} - (1+\varphi)^{T_A-1} + \alpha(1+\varphi)^{T_A-T_I} + \beta}$$

It can be easily seen that $\gamma_1, \gamma_2 > 0$.

Effective amounts of generated money may be expressed in the following way:

$$P_{gA}(t) = \eta_1(t) + \gamma_1(1+\varphi)^t \tag{43}$$
$$P_{gI}(t) = \eta_2(t) + \gamma_2(1+\varphi)^t,$$

where η_1, η_2 yield a solution of the homogeneous equation system belonging to (11). Since (11) is viable, functions $\eta_1(t)$, $\eta_2(t)$ are bounded – as we have seen in the foregoing – thus amounts of generated money have asymptotically the form (41). Functions η_1, η_2 mean the transient processes arising in case of exponential excitation which become negligible in the long run compared to terms of exponential growth. The proportion

$$\frac{\gamma_1}{\gamma_2} = \frac{\varphi(1+\varphi)^{T_A-1} + \beta}{\alpha(1+\varphi)^{T_A-T_I}}$$

is an amount characteristic of the relationship between generated active and generated inactive money.

In the following we shall focus our investigations on the possible joint proportion of generated and spontaneous active money within the entire money stock with various values of α and β.

Practical application of the model

In our analysis and forecasting we rely on two pillars:

- on experience proven to be correct economically and
- on stable states obtained from the model.

Active money necessary for the realization of transactions and inactive money resulting from the accumulation of savings in money form are objective economic categories. This double form of appearance follows from the essence and functions of money. Functioning in turnover and payment as well as in the saving process are such qualitative characteristics without which money cannot function, nor exist as a quantitative measurement for the volume of values. Quantitatively determined money categories are quantitatively placed within certain bounds in practice. The ratio between the two forms results from the following changes:

- from stocks of already existing active and inactive money at the base date,
- from the growth rate appearing as diffference between amounts of money emitted and withdrawn during a given period t.
- from the rate of transformation of active money into inactive money and
- from the rate of transformation of inactive money back into active money.

The purpose of the investigation is to find out how a state of equilibrium can be attained in the course of financial regulation according to the model constructed and how it can be maintained in the system described. By state of equilibrium we mean that

- there is enough active money available to the national economy to realize transactions, i.e. money emission is proportional to economic growth and, as a result, economic organizations have usually no payment difficulties;
- accumulation of money resulting from saving as well as its continuous utilization in a later period do not alter the condition that ensures undisturbed realization of payments;
- the magnitude of disposable incomes is in harmony with the price total of the market supply of products for final consumption. Thus, a balance between solvent demand and commodity supply has to be achieved.

In the mathematical discussion exact knowledge or prognostization of parameters α, β and φ were assumed. In practice, however, there exist very complicated relationships between these ratios characterizing the development of payment circulation and savings. As a matter of fact they quantify circulation processes when showing changes in the entire amount of money and its composition by mobility. The composition itself is expressed by the share of active money (Ψ) related to the entire money stock.

The three parameters in the model are predetermined enough. Namely,

- φ, i.e. the rate of money emission is economically predetermined and changes practically in proportion to the development of the economy, and observation of planned proportionality is a postulate for monetary management;
- in the model α is a factor depending on φ, β and Ψ, while in the economy it is determined by the financial control system for organizations of the socialist sector

and a result of several millions of individual decisions for the population. As a result, its development is partly predetermined and partly stochastic. In the following α will be regarded as an endogeneous parameter computed on the basis of the model;

– β is determined only according to the model, thus economically it is an indicator with quasi-determination and signals the rate of utilization, i.e. the activation of inactive money. This indicator develops through free or at least largely free decisions of extraordinarily numerous money holders and becomes a characteristic feature of payment circulation.

The value of the gross national product determining the rate of money emission increases in volume both at present and presumably also under the sixth five-year plan-period (1981–85) by 4–5 per cent yearly, while the average price level rises by about 3–5 per cent yearly. Since with current payments the velocity of money circulation has been about the same for many years, money demand for transactions increases by 7–10 per cent yearly. But, over and beyond this, also savings demand money (an autonomous money demand factor independent of circulation), that should be partly replaced, otherwise there would be disturbances in the realization of circulation. Current investment projects mostly determining the rate of development in the future also require some financial advancement. It is therefore, a wrong view that if the spending of incomes is frozen, then financial equilibrium will automatically improve to the same extent. Conclusions drawn from computations made with the model indicate that this is not only a quantitative problem taken in a global sense, but also that of proper distribution of money incomes between national economic sectors (including the population), which is first of all an allocation problem. In other words, we might also say that it is a quantitative problem interpreted for the entire national economy, in general, but partially also a distributional one at the same time. According to experience about 2–3 per cent surplus emission relative to the growth rate of demand factors (circulation processes) is required in order to ensure that there should always be enough money available to sectors, economic organizations and the population using it. In the interest of simulation computations and broader analysis based on its results a wider limit of ± 5 per cent has been allowed in the course of our investigations.

Parameter β indicates the rate of activation of inactive money from the viewpoint of determination. If statistical and planning conditions are directly taken into consideration, then it is first of all the velocity of circulation of permanent money that will provide information about the value of β. However, in the course of our investigations we consider not only the transformation of money forms, but also how much earlier placed deposit, i.e. inactive money is used by their holders in the present period. The economic importance of these time-lags lies in that e.g. from the relationship between money circulation in the same period t and the relevant average money stock we get 2.5–3 years lag on inactive money; while, according to the time-lag formulated above this period will be reduced to round 2 years. And from this follows that utilization of inactive money is considerably faster than it would be expected on the basis of the habitual calculation on

simultaneous velocity of circulation. The reason for this is that the rate of money accumulation (saving) was relatively fast in the 1970s and increasing stocks resulted in a slowdown of the velocity of circulation. In the mathematical exposition, conforming to empirical figures, periods $T_A = 2$ and $T_A = 3$ were discussed when dealing with stability. And, since the value of parameter β depends on the time factor, for β the reciprocal of the duration of the period, i.e. 1/2 will result from $T_A = 2$.

However, with simulation methods we performed computations for values between bounds 1/3; 2/3 taking into consideration 1.5–3 years for circulation period. The purpose of the analysis was first of all to determine the share – more precisely, the possible share – of active money required for the realization of money flows within the entire amount of money from among the above values of α and β which are acceptable in the economic sense and applicable also in practice, furthermore, the rate of transformation of active money into inactive (α).

Before answering this question on its merits we have to get acquainted with one more concept. This is the *share of active money* within the entire amount of money. Let us denote this value with Ψ. I.e.:

$$\Psi = \frac{P_A}{P_A + P_I} .$$

With the actual values $T_I = 1$ and $T_A = 2$, $\alpha = 1/3$, $\beta = 1/2$ it was obtained from the model that for a (stationary) economy realizing simple reproduction ($\varphi = 0$) the share of active money within the entire money stock fluctuates around 0.6. This result is also supported by the following relationship computed from (25) describing *spontaneous* changes in time:

$$P_{sA}(t) = 60 - (0.707)^t(0.17 \cos 1.08\, t + 6.986 \sin 1.08t).$$

Accomplishing the operations and starting from the base years 1975–1976 we obtained that the share of active money within the entire amount of money is around 60 per cent with a ± 1 per cent deviation (oscillation) from $t = 2$ on and with a ± 0.2 per cent one from $t = 5$ on.

However, socialist national economy is characterized by development. Starting from the fact that the money required for the growth of the economy is always active money at the time of emission and becomes partly or fully inactive only later on, after one or more years, it follows that the share of active money can only be more than 0.6.

From (22) – with the above parameters the following relationship follows *for generated active money:*

$$P_{gA}(t) = 0.6 \sum_{i=0}^{t} \Phi(i) + \sum_{i=0}^{t} \Phi(i)(0.707)^{t-i}$$

$$[0.4 \cos 1.08(t-i) - 0.1067 \sin 1.08(t-i)]$$

Assuming exponential excitation, in case of

$\varphi = 0.1$ we shall obtain that

$$\begin{aligned}
&\text{in period } t = 0 \quad \Psi_g = 1.00\\
&\text{in period } t = 1 \quad = 0.84\\
&\text{in period } t = 2 \quad = 0.72\\
&\text{in period } t = 3 \quad = 0.665\\
&\qquad\vdots \qquad\qquad \vdots\\
&\text{in period } t = 10 \quad = 0.637\\
&\qquad\vdots \qquad\qquad \vdots\\
&\text{in period } t = \infty \quad = 0.624
\end{aligned}$$

The last ratio of 0.624 is, of course equal

$$\frac{\gamma_1}{\gamma_1 + \gamma_2}.$$

The figures indicate that the share of generated active money within the entire amount of generated money approaches the share of spontaneous active money within the entire amount of spontaneous money, i.e. 0.6. Therefore, the joint share of generated and sponteaneous active money (Ψ) within the entire money stock will be theoretically between 0.6 and 0.624 in infinity (in case of $\varphi = 0.1$, $\alpha = 1/3$ and $\beta = 1/2$). But in practice the period T_A is determinant for money processes, and it is not longer than 2–3 years. Thus, on the basis of data computed with the model the share of all active money will be between 60 and 72 per cent of the entire amount of money. On the basis of effective and computed values the share of active money, i.e. the lower and upper limit of the value of Ψ was between 0.63 and 0.73 in the 1970s. Therefore for Ψ we accepted in our computations the values 0.6–0.75.

For the rate of money emission (φ) also the value of α and β is to some extent determinant beside the money demand factors already defined. Though, in principle, it may be stated for both that they may move within the interval [0; 1], in practice their values are moving within much narrower bounds. To verify this statement let us consider the following – very limited – table:

Computed values of α

φ	β \ φ	0.60	0.675	0.750
0.05	0.33	0.250	0.185	0.133
	0.5	0.375	0.278	0.200
	0.67	0.500	0.371	0.267
0.10	0.33	0.278	0.210	0.156
	0.5	0.417	0.315	0.233
	0.67	0.556	0.420	0.331
0.15	0.33	0.306	0.235	0.178
	0.5	0.458	0.352	0.267
	0.67	0.611	0.469	0.355

The figures of the table demonstrate that – with an identical rate of money emission (φ) – greater values of α postulate usually also greater values of β and *vice versa* Furthermore, both change in direct ratio also with φ, while the share of active money (Ψ) is inversely proportional to α. The zone of movement of α can not after all, be either around 0 or 1 in the practice, because, on the one hand, this would make the realization of transactions impossible and, on the other hand, accumulation of money would not be ensured in adequate amounts for the financing of real accumulation (investments). Furthermore, always new (generated) money should be pumped into the national economy in the interest of an undisturbed realization of circulation. The direct result of these computations is that also the possible values of α, i.e. the rate of transformation of active money into inactive, an indicator characterizing the saving propensity has its bounds which are still acceptable in practice.

β and Ψ determine the value of α which latter affects values of the former again, that is, there is a mutual interrelation between the three factors. This statement simultaneously means that the relationship of the order of magnitude α; β, determined in the model, cannot be regarded as a strict constraint in practice. From this it follows, however, that even acceptable values of α do not necessarily coincide with real limits of tolerance of values β and Ψ. Since simulations provide some orientation also in this respect, computational results referring to the individual parameters were summarized in a table so that they possibly inform experts engaged in financial control and regulation thus promoting their successful work. Thus, e.g. maintaining the share of active money at the seemingly realistic $\Psi = 67.5$ per cent of recent years is possible with the yearly 5–16 per cent acceptable rate of money emission only if the relationships

$$0.25 \leqslant \alpha \leqslant 0.475 \quad \text{and} \quad 0.4 \leqslant \beta \leqslant 0.67$$

hold. If 75 per cent is chosen as the share of active money, already considered as a maximum under conditions of contemporary money management, then the rate of transformations will fall between

$$0.25 \leqslant \alpha \leqslant 0.35 \quad \text{and} \quad 0.5 \leqslant \beta \leqslant 0.67.$$

In this case, however, the degree of freedom of measures to be taken by the monetary management will be extraordinarily delimited. The following table should serve to characterize the rate of money emission (φ).

Values of φ if $\Psi = 0.75$

α \ β	0.500	0.667
0.250	0.125	0.031
0.275	0.162	0.059
0.300	0.200	0.087
0.325	0.238	0.115
0.350	0.275	0.144

Therefore, if the money stock available for transactions of the national economy amounts to 3/4 of the entire amount of money, a 5.9–14.4 per cent rate of money emission (to be found in the framed part) belongs to the maintenance of equilibrium, provided that inactive money will be spent by their holders within 1.5–2 years. Then the money laid by amounts to yearly 25–35 per cent of the active money. That is a rather high share, but that of β characterizing the utilization of inactive money is not less so, either. We note that if $\beta = 1/3$, i.e. inactive money were put into circulation during three years, then the rate of money emission would be over 30 per cent in case of $\alpha = 0.25$ and $\Psi = 0.75$ which already indicates an inflationary economy.

Taking the present growth rate of the national economy into consideration, *a 10–12.5 per cent annual rate of money emission seems to be realistic* in the practice. Therefore, control of solvent demand justifies – also resulting from this – great circumspection and measures thoroughly thought over. Formation of enterprise funds as well as reservation or freezing of money at free disposition should be done very carefully. In general, the lesson may be drawn that the greater the demand for active money, the more the possibility of free action will diminish if we want to keep to the measure of money emission justified by the development of the national economy, to the law of money circulation.

The model can already be applied in two fields:

– *analyses can be made* by using empirical data;
– *decision variants can be elaborated* by forecasting parameters on the basis of simulations.

Our aim was to point out interactions among various relationships, the determination of money emission, saving and their utilization. The model may serve as a tool for a better foundation of monetary policy being aware of the low degree of freedom of the leadership when deciding on the rate of money emission under given economic conditions – namely, because of changes in the financial control system and in the saving propensity of the population. The planned money supply of the national economy and especially the maintenance of a proper quantitative proportion of the active money required for an undistrubed realization of the flow of payments are tasks, but also possibilities for monetary agencies, first of all for the central bank of the socialist state. We wished to assist them in solving their problems by the system of difference equations presented in the foregoing.

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О СИСТЕМЕ РАЗНОСТНЫХ УРАВНЕНИЙ СОСТАВНЫХ ДЕНЕЖНОЙ МАССЫ

Т. ФЕНЬЕШ—Й. ШАРИ

С точки зрения мобильности в зависимости от целей траты или экономии денежная масса может быть подразделена на две большие группы: активные деньги, действительно принимающие участие в обслуживании обращения (мобильные) и пассивные сэкономленные деньги, не участвующие в обращении (неподвижные). Вся масса денег и, в рамках этого, величина (stock) мобильных и неподвижных денег постоянно меняется. Внешней формой проявления этого процесса в какой-то определенный период является денежный поток (flow). Задача состоит в определении того, какая доля активных денег становится пассивной и наоборот; далее, при каком сдвиге по времени осуществляется такое преобразование.

Математическое описание этих процессов осуществляется с помощью системы разностных уравнений и при этом указывается воздействие искусственного и стихийного движения денег на

обслуживание народного хозяйства деньгами, удовлетворительность или же недостаточность этого, эффективные стабильные ситуации, связанные с мобильностью денег и вытекающие из этого возможности регулирования.

В социалистическом народном хозяйстве государственный банк обеспечивает бесперебойность функционирования экономики планомерной эмиссией денег. Условием бесперебойности денежного обращения является то, чтобы в распоряжении народного хозяйства всегда имелось достаточное количество активных денег для покрытия обязательств по платежам. Поэтому цель исследования заключалась в установлении того, каким образом в ходе финансового регулирования авторами, и каким образом в рамках данной системы можно его поддерживать, т.е. в рамках сложившихся экономических условий какой степенью свободы располагает руководство при решении вопроса о темпах эмиссии денег. Практическое использование представляется возможным в двух аспектах:

— анализ может выполняться с использованием эмпирических данных,

— могут разрабатываться варианты решений путем прогнозирования параметров на базе симуляционных расчетов.

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ON THE GENERALIZATION OF NASH'S COOPERATIVE SOLUTION CONCEPT

In the paper a general method is presented for the solution of cooperative games. Nash's solution concept for bimatrix games is generalized for the case of n-person games. In this paper we look for a Pareto-optimum satisfying an adequate axiom-system. It is shown in the paper that the axiom-system has exactly one solution and it is proved that this unique solution is equivalent to the solution of a nonlinear programming problem.

The symbol $\Gamma = (n; S_1, \ldots, S_n; \varphi_1, \ldots, \varphi_n)$ is considered an n-person game if $S_1, \ldots, S_n$ are strategy sets, $S \subset \overset{n}{\underset{k=1}{\mathrm{X}}} S_k$, $D(\varphi_k) = S$ $(k = 1, 2, \ldots, n)$, $R(\varphi_k) \subset R^1$. Then sets S_k are called strategy sets, set S a simultaneous strategy set and functions φ_k pay-off functions. Nash's equilibrium point of the game is an n-type $x^* = x_1^*, \ldots, x_n^*) \in S$ such that for any $(x_1^*, \ldots, x_k, \ldots, x_n^*) \in S$ the following holds:

$$\varphi_k(x_1^*, \ldots, x_k, \ldots, x_n^*) = \varphi_k(x_1^*, \ldots, x_k^*, \ldots, x_n^*).$$

In economic terms this means that no player may increase his pay-off belonging to the equilibrium point by one-sidedly changing his strategy. In other words, the strategy belonging to the equilibrium point is optimal for all players provided that all other players also choose strategies corresponding to the equilibrium point. In the course of practical applications Nash's equilibrium point often does not describe the real situation, when not all players are interested in striving after the equilibrium point. Such cases occur when at the equilibrium point some players obtain unfoundedly large pay-off, while others obtain too small profits, eventually suffer losses, since choosing equilibrium strategies is contrary to the interests of these players. Then the players choose a so-called cooperative solution. For the solution of cooperative games several concepts are known which are different in their principles. A good survey of them may be found in [2], [7] and [8]. One of the solution concepts comes from Nash. He accepts such payment as cooperative solution that is "good enough" for all players and fulfils also some axioms that seem obvious. Nash proved the existence and uniqueness of the solution only for the case of bimatrix games.

In my paper I am going to generalize this solution concept for the case of n-person games with not necessarily linear pay-off functions. Results of the paper naturally contain Nash's corresponding theorems as special cases.

Let now $\Gamma = (n; S_1, \ldots, S_n; \varphi_1, \ldots, \varphi_n)$ be some n-person game. Let S denote the simultaneous strategy set of players. It is not a precondition that $S = S_1 X \ldots X S_n$. Furthermore, let

$$\Phi = \{f | f = (\varphi_1(x), \ldots, \varphi_n(x)), X \in S\} \tag{1}$$

denote the set of possible payments and L the convex hull of Φ. In the following any element of L will be allowed as payment. Let
$(\varphi_1(x^{(i)}), \ldots, \varphi_n(x^{(i)})) \in \Phi$ $(i = 1, 2, \ldots, m)$,
then with optional constants $0 \leqslant \lambda_i \leqslant 1$ $(1 \leqslant_i \leqslant m)$, $\sum_{i=1}^{m} \lambda_i = 1$
the payment:

$$\left(\sum_{i=1}^{m} \lambda_i \varphi_1(x^{(i)}), \ldots, \sum_{i=1}^{m} \lambda_i \varphi_n(x^{(i)}) \right) \in L$$

can be obtained, for example, so that in case the games are played several times players play strategy $x^{(i)}$ in 100 λ_i per cent of the games. Let us suppose furthermore, that a payment f*, the so-called status quo point is given the meaning that if the players can not reach an agreement, then they will play strategies corresponding to point f*. In this way any n-person game may be characterized by the pair (L, f*). The endeavour of players is, in case they cooperate, to construct and play a pay-off $f \in L$ more suitable than f*. Obviously, it is a natural precondition of agreement that in case of f no player should get into a worse situation than in case of f*.

After this we may pass to the definition of the cooperative solution.

Definition. A function φ is called cooperative solution function if the following axioms are fulfilled:

1. $D(\psi) = \{L, f^*) | L \subset R^n$ is a bounded, closed, convex set, $f^* \in R^n$ and there exists $f \in L$ such that $f \geqslant f^*\}$

$R(\psi) \subset R^n$, where D is the domain and R is the range of ψ;

2. $\psi(L, f^*) \in L$ (feasibility);

3. $\psi(L, f^*) \geqslant f^*$ (rationality);

4. If $f \in L$, $f \geqslant \psi$ (L, f^*), then $f = \psi(L, f^*)$ (Pareto-optimality);

5. Let $L_1 \subset L$ as well as $\psi(L, f^*) \in L_1$, then $\psi(L, f^*) = \psi(L_1, f^*)$ (independence of unfavourable alternatives);

6. Let $\alpha_k > 0$, $\beta_k (1 \leqslant k \leqslant n)$ be arbitrary constants, $f^* = (f_1^*, \ldots, f_n^*) \in R^n$, a bounded, clused, convex set, $\psi(L, f^*) = (\psi_1, \ldots, \psi_n)$ furthermore, $f^*, = (\alpha_1 f^* + \beta_1, \ldots, \ldots, \alpha_n f^* + \beta_n)$

$$L' = \{(\alpha_1 f_1 + \beta_1, \ldots, \alpha_n f_n + \beta_n) \setminus (f_1, \ldots, f_n) \in L\}.$$

Then $\psi(L', f^{*'}) = (\alpha_1\varphi_1 + \beta_1, \ldots, \alpha_n\varphi_n + \beta_n)$ (independence of increasing linear transformation);

7. If there exist indices i, j such that $f = (f_1, \ldots, f_n) \in L$ if and only if $\varphi = (\varphi_1, \ldots, \varphi_n) \in L$ $(\varphi_k = f_k,\ k \neq i,\ k \neq j,\ \varphi_i = f_j,\ \varphi_j = f_i)$, furthermore, for vector $f^* = (f_1^*, \ldots, f_n^*)$ $f_i^* = f_j^*$, then also for vector $\psi(L, f^*) = (\psi_1, \ldots, \psi_n)$, $\psi_i = \psi_j$ (symmetry).

The first axiom gives the domain and range of solution function ψ, while according to the second axiom a cooperative solution has to be a feasible solution. The third axiom states that a cooperative solution should ensure at least as much payment for all players as they would obtain at the "status quo" point. The fourth axiom means Pareto-optimality, while the fifth one states that if a cooperative solution falls to a further constrained possible set, then solutions of the restricted problem and of the original one should be identical.

The sixth axiom indicates independence of the cooperative solution of linear transformation, meaning, for example, that with payments computed in another currency the cooperative solution would not change. The seventh symmetry axiom gives that property of the game according to which if two players cannot be distinguished either in the feasible set or at the "status quo" point, then they should obtain the same payment in case of the cooperative solution.

The main result of the exercise is the following theorem:

Theorem. There exists exactly one solution function ψ.

Proof: The proof of the theorem consists of several steps.

a) Let L, f* correspond to axiom 1. Let $r \leqslant 0$ be the largest number for which with suitable indices $i_1, \ldots, i_r$ there exists $\varphi = (\varphi_1, \ldots, \varphi_n) \in L$ such that $\varphi \geqslant f = (f_1^*, \ldots, f_n^*)$, furthermore, $\varphi_{ik} > f_{ik}^*$ $(1 \leqslant k \leqslant r)$. We shall prove that then there is no $\tilde{\varphi} = (\tilde{\varphi}_1, \ldots, \tilde{\varphi}_n) \in L$, $\tilde{\varphi} \geqslant f^*$ such that with any $i \neq i_k$ $(1 \leqslant k \leqslant r)$ $\tilde{\varphi}_i > f_i^*$. If there were $\tilde{\varphi} \in L$ fulfilling the precondition then, because of the convexity of L $\bar{\varphi} = (\bar{\varphi}_1, \ldots, \bar{\varphi}_n) = 1/2(\tilde{\varphi} + \varphi) \in L$ and

$$\bar{\varphi}_{ik} = \frac{1}{2}\,\tilde{\varphi}_{ik} + \frac{1}{2}\,\varphi_{ik} > \frac{1}{2}\,f_{ik}^* + \frac{1}{2}\,f_{ik}^* = f_{ik}^*, \qquad (1 \leqslant k \leqslant r)$$

$$\bar{\varphi}_i = \frac{1}{2}\,\tilde{\varphi}_i + \frac{1}{2}\,\varphi_i > \frac{1}{2}\,f_i^* + \frac{1}{2}\,f_i^* = f_i^*,$$

that contradicts the choice of r.

b) Let now L, f*, r, $i_1, \ldots, i_r$ correspond to the previous statement. Let us then consider the following non-linear programming problem:

$$\frac{\begin{array}{c}\tilde{\varphi} \in \\ \tilde{\varphi} \geqslant f^*\end{array}}{g(\tilde{\varphi}) = g(u_1, \ldots, u_r) = \prod_{k=1}^{r} (u_k - f_{ik}^*) \to \max}, \tag{2}$$

where now $\tilde{\varphi} = (\tilde{\varphi}_1, \ldots, \tilde{\varphi}_n)$, $\tilde{\varphi}_{ik} = u_k$ $(1 \leqslant k \leqslant r)$, $\tilde{\varphi}_j = f_j^*$ $(j \neq i_k,\ 1 \leqslant k \leqslant r)$.

The set of vector $u_1, \ldots, u_r$ fulfilling the assumption is bounded, closed, the objective function is continuous, thus there exists an optimal solution. We shall prove that the optimal solution is unique. Let us suppose that both $(u_1, \ldots, u_r)$ and $(u_1, \ldots, u_r)$ are optimal solutions. It is obvious that in case $k = 1, 2, \ldots r$ $u_k > f_{ik}^*$, $u_k' > f_{ik}$, since in an opposite case the value of the objective function would be zero, but choosing adequate components of φ positive, and this would contradict the optimality of solutions. Let in case of $k = 1, 2, \ldots, r$ $a_k = u_k - f_{ik}^*$, $b_k = u_k' - f_{ik}^*$, then the vector with component $u_k'' = 1/2(u_k + u_k')$ $(1 \leqslant k \leqslant r)$ is a feasible solution on the basis of the convexity of L and

$$g(u_1^n, \ldots, u_r^n) = \prod_{k=1}^{r} \frac{a_k + b_k}{2} \geqslant \prod_{k=1}^{r} \sqrt{a_k b_k} =$$

$$= \sqrt{\prod_{k=1}^{r} a_k \cdot \prod_{k=1}^{r} b_k} = g(u_1, \ldots, u_r)$$

There must be an equality here because of the optimality of $(u_1, \ldots, u_r)$ which is only possible if for $k = 1, 2, \ldots, r$, $a_k = b_k$, i.e. $u_k = u_k'$.

c) After that let $u_1, \ldots, u_r$ be the optimal solution of problem (2), furthermore $\tilde{\varphi} = (\tilde{\varphi}_1, \ldots, \tilde{\varphi}_n)$, $\tilde{\varphi}_{ik} = u_k (1 \leqslant k \leqslant r)$, $\tilde{\varphi}_j = f_j^*$ $(j \neq i_k, 1 \leqslant k \leqslant r)$. Let $\psi = \psi(L, f^*)$. We see that this choice fulfils the axioms of the definition. No. 1 obviously holds; on the basis of the construction, also nos. 2, 3 and 4 are fulfilled. The fulfilment of no. 5 follows from the fact that if $\psi(L, f^*)$ is an optimal solution over set L, then, in consequence of $L_1 \subset L$, $\psi(L, f^*) \in L_1$ it gives optimum also over the restricted set L_1. Property 6 may be easily seen as follows. Let $\alpha_k < 0$, $\beta_k (1 \leqslant k \leqslant n)$ be suitable constants, and L, f*, r, $i_1 \ldots, i_r$ corresponding to statement a). Let L', f*, fulfil axiom 6, then in case of a transformed game $r' = r$ and indices $i_1, \ldots, i_r$ have also here the same properties as in case of game L, f*. The statement may be directly read from the fact

$$g(f') = \alpha_{i_1} \ldots \alpha_{i_r} \prod_{k=1}^{r} (f_{i_k} - f_{i_k}^*) = \alpha_{i_1} \ldots \alpha_{i_r} g(f)$$

that in case of any $f = (f_1, \ldots, f_n)$.

There remains nothing but to agree to axiom 7. Let us suppose that indices i, j fulfil the predictions. Let $\varphi^* = (\varphi_1^*, \ldots, \varphi_n^*)$, where $\varphi_k^* = f_k^*$ $(k \neq i,\ k \neq j)$, $\varphi_i^* = f_j^*$, $\varphi_j^* = f_i^*$. Then, on the basis of our assumption $\varphi^* = f^*$. Furthermore, let $\tilde{\varphi} = (\tilde{\varphi}_1, \ldots, \tilde{\varphi}_n)$ be the solution of (2) and $\tilde{\psi} = (\tilde{\psi}_1, \ldots, \tilde{\psi}_n)$ $(\tilde{\psi}_k = \tilde{\varphi}_k,\ k \neq i,\ k \neq j,\ \tilde{\psi}_i = \tilde{\psi}_j,\ \tilde{\psi}_j = \tilde{\psi}_i)$ $\tilde{\varphi} \in L$ if and only if $\tilde{\psi} \in L$, furthermore $i \in \{i_1, \ldots, i_r\}$ if and only if $j \in \{i_1, \ldots, i_r\}$. If $i, j \notin \{i_1, \ldots, i_r\}$, then $\tilde{\varphi}_i = \tilde{\psi}_i = f^*$, thus there is nothing to be proved. If $i, j \in \{i_1, \ldots, i_r\}$, then the identity $\tilde{\varphi}_i = \tilde{\varphi}_j$ (i.e. $\tilde{\varphi} = \tilde{\psi}$) results from the equality of φ^* and f^*, as well as from the uniqueness of the optimal solution of problem (2).

d) Let again L, r, $i_1, \ldots, i_r$ f^* correspond to point a). We shall prove that the vector $\tilde{\varphi} = (\tilde{\varphi}_1, \ldots, \tilde{\varphi}_n)$ obtained from the solution of (2) maximizes the function

$$h(\varphi) = \sum_{k=1}^{r} \left(\sum_{\substack{j=1 \\ j \neq k}}^{r} (\tilde{\varphi}_{ij} - f_{ij}^*) \right) \varphi_{ik}$$

over the set L. Let us suppose that, contrary to the statement, there is $\varphi = (\varphi_1, \ldots, \varphi_n) \in L$ such that $h(\varphi) > h(\tilde{\varphi})$. Let in case of $0 < \epsilon < 1$

$$\bar{\varphi} = \tilde{\varphi} + \epsilon(\varphi - \tilde{\varphi}).$$

Then it may be seen by simple computation that

$$g(\bar{\varphi}) = \prod_{j=1}^{r} [\tilde{\varphi}_{ij} - f_{ij}^* + \epsilon(\varphi_{ij} - \tilde{\varphi}_{ij})] = g(\tilde{\varphi}) + \epsilon h(\varphi - \tilde{\varphi}) + (\epsilon^2 a_2 + \ldots + \epsilon^r a_r),$$

where $a_2, \ldots, a_r$ are suitable constants (not depending on ϵ) and, on the basis of the linearity of h, $h(\varphi) - h(\tilde{\varphi}) = h(\varphi - \tilde{\varphi}) > 0$. Thus in case of $0 < \epsilon < 1$, $h(\varphi - \tilde{\varphi}) > -\epsilon a_2 \ldots - \epsilon^{r-1} a_r$, it is obvious that $g(\bar{\varphi}), > g(\tilde{\varphi})$, which contradicts the selection of φ.

e) Finally, we shall see that the function satisfying the definition is necessarily identical with the solution of problem (2). Let also now L, f^*, r, $i_1, \ldots, i_r$ fulfil point a), furthermore let φ be the optimal solution of problem (2) and

$$H = \{ \varphi | h(\varphi) \leqslant h(\tilde{\varphi}), \varphi = (\varphi_1 \ldots, \varphi_n) \geqslant f^*,$$
$$\varphi_i = f_i^* (i \neq i_k,\ 1 \leqslant k \leqslant r) \}$$

Then it is obvious that $H \supset L_1$, where

$$L_1 = L \cap \{\varphi | \varphi \geqslant f^*\}.$$

Let us then introduce the linear transformation

$$\varphi'_{ik} = \frac{\varphi_{ik} - f_{ik}^*}{\tilde{\varphi}_{ik} - f_{ik}^*} \quad (1 \leqslant k \leqslant r),\ \varphi'_j = \varphi_j \quad (j \neq i_k,\ 1 \leqslant k \leqslant r)$$

Then f* and $\tilde{\varphi}$ will be transformed into

$$f^{*'}_{ik} = 0 (1 \leqslant k \leqslant r),\ f^{*'}_j = f_j\ (j \neq i_k,\ 1 \leqslant k \leqslant r),$$

$$\tilde{\varphi}'_{ik} = 1 (1 \leqslant k \leqslant r),\ \tilde{\varphi}'_j = \tilde{\varphi}_j\ (j \neq i_k,\ 1 \leqslant k \leqslant r),$$

thus the form of set H will be

$$H' = \left\{ \varphi' \quad \sum_{k=1}^{r} \varphi'_{ik} \leqslant r,\ \varphi'_{ik} \geqslant 0,\ \varphi'_i = f_i^*\ (i \neq i_k,\ k = 1, 2, \ldots, r) \right\},$$

that is symmetrical in indices i_k. Therefore, by the use of axiom 7 for vector $\psi' = (\psi'_1, \ldots, \psi'_n) = \psi(H', f^{*'})$ $\psi'_{ik} = \psi'_{il}$ $(1 \leqslant k,\ l \leqslant r)$ and because of Pareto-optimality $\psi'_{ik} = \psi'_i l = 1$ $(1 \leqslant k, l \leqslant r)$. Transformed back and by the use of axiom 6 we immediately have that $\psi(H, f^*) = \varphi$. However, axiom 3 implies that $\psi(L, f^*) \in L_1$, thus in consequence of axiom 5 $\psi(L, f^*) = \psi(L_1\ f^*) = \tilde{\varphi}$, which is that had to be proved. Thus, the theorem has completely been proved.

In our case the selection

$$f_k^* = \max_{x_k} \min_{x_i (i \neq k)} \varphi_k (x_1, \ldots, x_n)$$

corresponds to Shapley's concept of bimatrix games, that is, the so-called "security level" determined by maximum strategies of the players should be the *status quo* point.

As a *status quo* point also some equilibrium point may be chosen it may, however, cause a problem what should be choosen if there are several equilibrium points, since it cannot be expected at all that there exists a point of equilibrium evenly best for all players.

The solution of programming problem (2) is largely facilitated by the fact that element of L may be described as a convex linear combination of at most n + 1 elements from Φ. Thus in (2) the precondition $\varphi \in L$ may be written also in the form

$$\tilde{\varphi} - \sum_{i=1}^{n+1} \lambda_i f(x^{(i)}) = 0$$

$$\sum_{i=1}^{n+1} \lambda_i = 1,$$

$$\lambda_i \geqslant 0 \qquad (1 - i - n + 1)$$

$$x^{(i)} \in S$$

easier to handle, where $f(x^{(i)}) = (\varphi_1(x^{(i)}), \ldots, \varphi_n(x^{(i)}))$ and the decision variables are $x^{(i)}$, $\lambda_i (1 \leqslant i \leqslant n+1)$.

Solution of the nonlinear programming problem may be also very complicated in case of multi-dimensional problems, thus further researches are needed to make simplifications and elaborate algorithms well applicable in practice.

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К ВОПРОСУ ОБ ОБОБЩЕНИИ КОНЦЕПЦИИ КООПЕРАТИВНОГО РЕШЕНИЯ НЭША

Ф. СИДАРОВСКИ

В работе дается общий метод решения кооперативных игр. Концепция Нэша по решению биматричных игр обобщается относительно игр с числом участников «n». В данном случае ищется оптимум Парето, удовлетворяющий некоторой применимой системе аксиом. В работе указывается, что система аксиом имеет только решение и доказывается, что такое решение эквивалентно решению задачи линейного программирования.

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G. KORNAI

HAS THE HOG CYCLE CEASED TO EXIST?
(An econometric model of the Hungarian pig farming)

The cyclical development of slaughter hog production in Hungary causes serious problems along the whole vertical line of meat production. The author describes the behaviour of pig-raising farmers with the aid of an econometric model comprising ten stochastic equations.

The coefficients of the econometric model constructed on the basis of the cobweb theory were determined with linear regression estimation. The system of equations thus arrived at seems to prove that one of the reasons for the Hungarian pig cycles may be found in the "expectations" of pig breeders in small farms, in a delayed adjustment to the changing economic environment.

In the course of analysing the system of equations it also turns out that the cycle is generated precisely by the – for the model – exogeneous and random effects decisively determining the behaviour of pig breeders. Two of these are examined by the author in some detail: he presents the cycle-boosting impacts of "free-market interventions" and of "changes in the producers' attitude to production".

This paper is concerned with the modelling aspects of the Hungarian hog cycle. At first sight is appears to be a very partial and even a pseudoproblem: the pig is only one out of tens of thousands of different products, and, as some Hungarian experts believe, the cycle itself is no longer to be found.

In spite of these the problem is very crucial:

– *Pigs are essential for food and meat supply,* pork is a basic input of food industry. Pig farming – as one of the most important agricultural activities – is having a 15–18% share in the gross agricultural output. Pork gives the half of meat consumption and about three quarters of bony meat retailed in trade.

– *Nearly one tenth of the Hungarian population* – about 1 million people – *breed pigs.* According to the technology applied and the type of ownership we can distinguish two main subsectors of pig farming, namely the so-called large farms and the household plot farms. The altogether not much more than 1000 state and/or cooperative-owned large pig farms use relatively high breeding and raising technologies. Large farms give 45–50 percent of pigs for slaughter. The average number of hogs is about 3.5–4 thousand per farm. The household plot farms – giving the larger portion of pig production – are on the opposite end of the technology scale. The average number of pigs in a privately owned household-plot farm is somewhere between 4 and 5. Farmers generally utilize some of their residual worktime for pig breeding. The role of household pig production is of great importance in meat supply and consumption. Though there is practically no quantitative meat shortage in Hungarian towns today, meat retailers and

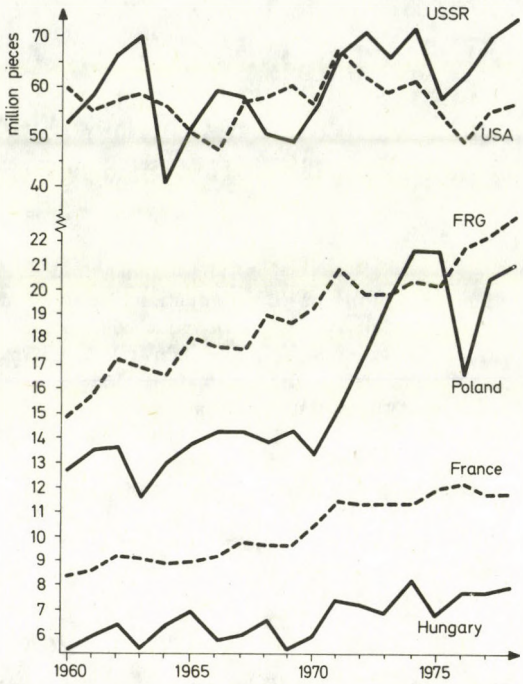

Fig. 1.

butcher's shops are relatively rare in the countryside, especially in small villages. That is why the household pig farming – for the market and for own consumption – seems to be the only way to meet the nation's demand for meat.

– *The pig cycle is a very typical cyclical phenomenon of microeconomics.* Similar cyclical characteristics could be shown for most of the agricultural products. As hog cycles emerge in every country having a significant livestock, some specifics of the Hungarian hog cycle can be described by comparison. (See *Figure 1*)

– The *Hungarian hog cycle – in spite of some experts' will and belief – still exists.* The model to be introduced here demonstrates that the present system of pig production has a strong inclination to cyclical fluctuations. However, for some time periods it is possible to postpone the cyclical recessions.

– Beyond the particular agricultural aspects, the issue is related to more general problems. In the past thirty years the cyclical behaviour of Hungarian hog production has emerged in the framework of national economic planning. It is not yet clear whether the existence of different cycles in centrally planned economies is inevitable or not. By all means planners would like to stop all cycles in advance to ensure stability of the socialist economy. The study of hog cycles may lead to conclusions of more general applicability.

The cobweb model*

The model of the Hungarian hog cycle can be easily derived from the following simple cycle model. The cobweb theory is concerned with the relation of supply and demand on *the market of a single commodity.* We use altogether three variables, namely the supplied and demanded quantities and the price of the product.

Demand D for the commodity depends on its price P through a function D(P). Since the amount that consumers buy decreases as price increases, D(P) decreases as P increases. For the sake of simplicity, we assume that the *demand function is linear:*

$$D(P) = d - aP,$$

where d and a are positive constants. Likewise, the amount S that will be *supplied* by producers also depends on the price P through a function S(P). Usually, S(P) increases as P increases. We assume the *specific linear form:*

$$S(P) = s + bP,$$

where b is positive, s may have any value, but is usually negative.

Showing the straight lines of supply (of positive slope) and demand (of negative slope) together in a system of co-ordinates, the intersection of the two lines corresponds to the *point of equilibrium.* Since producers and buyers do not have any *a priori* information concerning the equilibrium price, that can be attained only after a series of peculiar alignments – so-called "lagged adjustments". Each adjustment corresponds to movement along the appropriate demand or supply line. It is the *dynamics* of this adjustment process that we wish to describe.

We assume that in period t there is a prevailing price P_t. The production of the producer is based in period t on this price; however, due to the time lag in the production process the resulting supply is not available until the next period $t + 1$. When that supply is available, its price will be determined by the demand function. The price will adjust so that all of the available supply will be sold. This price at $t + 1$ is observed by the producers who then initiate production for the next period according to this new price. The supply in any period adjusts to the price on period before. The equation

$$S_{t+1} = s + bP_t$$

expresses the fact that supply in period $t + 1$ is determined by the price in period t. Also,

$$D_{t+1} = d - aP_{t+1}$$

*This presentation is based on the works of M. *Ezekiel* [8] and D. G. *Luenberger* [14]. A paper of A. A. *Harlow* [10] directed my attention to the cobweb-approach of the Hungarian hog cycle.

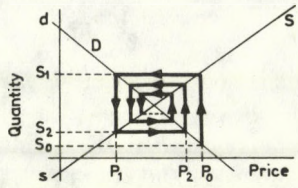

Fig. 2.

states the fact that demand in period $t+1$ is determined by the price in the same period. Finally, exploiting that at the equilibrium point supply must equal demand the dynamic equation

$$s + bP_t = d - aP_{t+1}$$

is arrived at which can be restated in the standard form for difference equations:

$$P_{t+1} = -\frac{b}{a} P_t + \frac{d-s}{a}$$

The *equilibrium price* can be found by setting condition $P_t = P_{t+1}$ leading to

$$P = \frac{d-s}{a+b}$$

This price, if once established, would persist indefinitely. The question arises, however, whether this price will ever be established or even whether the price will tend toward this equilibrium price over successive periods, rather than diverging away from it. Using the general solution of the first order difference equation above we find

$$P_t = \left(-\frac{b}{a}\right)^t P_0 + \frac{1-(-b/a)^t}{a+b} (d-s)$$

If $b < a$, it follows that as t tends to infinity, the solution will tend toward the equilibrium value since the $(-b/a)^t$ terms all go to zero. Equilibrium will be attained (at least at the limit) no matter what the initial price P_0 was. Obviously, $b < a$ is both necessary and sufficient for this convergence property to hold.

Let us trace the path of supply and demand over successive periods on the graph in *Figure 2.*

Let us assume, that producers supply the less-than-equilibrium quantity S_0 of hogs. This quantity is absorbed by the market at a higher-than-equilibrium price P_0. The high

price will induce farmers to breed more pigs, and thus they will supply S_1 hogs in the next period. This higher-than-equilibrium quantity can be sold at a lower-than-equilibrium price P_1, in the next period supply then drops to S_2 followed by a price P_2, and so on. The diagram resulting from this analysis resembles a cobweb, and this is responsible for the model's name.

Besides the converging cobweb in Figure 1, the process can diverge outward, or it may neither diverge outward nor converge inward. It depends on the slopes a and b of the demand and supply lines whether the adjustment process described by the model will converge, diverge or will consist of only one square endlessly repeated through oscillations. In other words, a and b are the elasticities of demand and supply with respect to price. If $b < a$, the spiral will converge toward equilibrium, if $b > a$ it will diverge outward, and if $b = a$ the distance from the equilibrium value remains always constant. The production of our commodity – say pig – will remain always cyclical. The cycle ceases to exist only if equilibrium is attained.

When constructing the cobweb model we made some assumptions – limiting the validity of the model – without explicitly declaring them all:

– It is only the market of a *single commodity* the model can describe. That is why this theory is incapable of modelling aggregated categories, say sectors or a whole economy.

– The supply and demand functions are not only *constant* through the whole period of observations but also *linear.* In reality both functions vary frequently both in their analytical form and concerning their coefficients.

– On the peculiar market of the cobweb model both supply and demand *depend on price.* This price is determined by a market where the number of suppliers and buyers is great, and it is of no importance who sells to whom and from whom one will buy. The market *price is given* for all agents and none of them can alter it by intention. *Competition* of sellers and buyers leads to a uniform price for any given period. One can never find a market of this "purity" in reality – just think of the monopolies or of state interventions.

– To develop such mechanism of cycles described by the cobweb model it is necessary that demand should decrease while supply should increase as price increases. Naturally, the cycle would emerge in case of inversely defined functions as well, but one might hardly find a supply function of negative slope. However, it may happen that the demand curve of a commodity turns out to be increasing in a certain price domain. In the case of these so-called Giffen commodities an entirely new situation arises: the cyclical alteration of excess supply and demand characterizing the cobweb phenomena ceases to exist: price will tend toward equilibrium or will diverge from it monotonically.

– It is a very important condition for the cobweb process to emerge that the level of supply cannot be altered after the production process has started. This restriction generally holds in the case of pigs, where the production process begins with the insemination of sows. After this the *future* supply of piglets can only be reduced by slaughtering sows in farrow, but supply cannot be increased.

The above assumptions of the cobweb theory reduce reality to a theoretically "pure" model. However, by easing the restrictions and by applying the functions to pig farming, a general system of pig farming equations can be arrived at that may be considered a schematic picture of reality.

The model of pig farming

The modelling of pig farming – and especially the hog cycle – has a history of about fifty years. The elaborators of cobweb theory interpreted the cycle-forming phenomenon of "lagged adjustment" with the help of such examples as the pig-livestock's fluctuations. On the basis of the fundamental works of M. Ezekiel [8] and J. *Tinbergen* [15] many practical livestock models have been estimated and applied. (The econometric livestock sector models of *Griffith* [9], *Budde* [4], *Boutwell* et al. [5], *Crom* [7], *Wilson* and *Kulshreshtha* [16] as well as the cobweb approach to the hog cycle by Harlow [10] provided inspiration for my research.)

The agents on the markets described in these models are generally private farms and enterprises (e.g. slaughterhouses, canning and packing plants, etc.) of the same rank. The role of the state – if it plays any – is usually limited to ensuring the "undisturbed" operation of the market. But the market price is given for the government, too. Nonetheless, none of these models can be applied directly to the peculiar Hungarian conditions.

The Hungarian hog-"market" – as one can call the sphere of turnover for lack of a better expression – is not at all "undisturbed". Central economic policy controls this market heavily. Its participants are not at all of more or less the same weight. Besides the gap in technology and the extreme differences in size between large and household-plot farms even the market itself is divided. The turnover of piglets takes place substantially on the so-called "free-market", while the trade in hogs for slaughter is practically monopolized by the central or state procurement agencies.

The behaviour of the market agents is influenced by different effects depending on the sectoral position and the type of production activity* of the individual farms. One can state that the free-market of hogs is fairly similar to the theoretically "pure" market of the cobweb model. The piglets – giving the overwhelming majority of the free-market turnover – are sold by the mass of economically separated and rather specialized individual sow-keepers. The usual buyers on the free-market are also household-plot farmers specialized in the production – fattening – of hogs for slaughter. We can assume that the free-market is regulated by the effects of supply and demand. In the original cobweb model supply and demand depend only on the price of the product, the pig. But in the case of pig production the prices of different inputs – especially the price of the feedstuff used – are also having a substantial effect on the free-market conditions.

*This expression combines such – at least theoretically – separated activities as the piglet production (or sow-keeping) and the hog-production for slaughter (or hog-fattening).

Supposing that the phenomenon of lagged adjustment described by the cobweb model is valid for the Hungarian system of pig production we get the following simplified functions to start with:

$$\text{PIGLET SUPPLY}_t = f_1\ (\text{PIGLET PRICE}_{t-k};\ \text{FEEDSTUFF PRICE}_{t-k})$$

$$\text{PIGLET DEMAND}_t = f_2\ (\text{PIGLET PRICE}_t;\ \text{FEEDSTUFF PRICE}_t)$$

where the time-lag k is determined by the technology used, (i.e. the sows are inseminated at time t, piglets are separated from the sows at time $t + k$).

For the application of the cobweb model in the form of the above functions we have to formulate some further – mostly simplifying – assumptions:

– The young pig husbandry at the household-plot farms is *always* producing *for the market.* In reality with a certain proportion of the household piglets are produced for own consumption only. As the number of these farms proved to be nearly constant, one can assume that their activity is not influenced by supply and demand on the free-market – and *vice versa.*

– The household-plot young pig husbandry and the hog production for slaughter are perfectly separated from each other and are two specialized activities. In reality many household-plot farms produce both piglets and hogs. But even these households have to decide whether to sell the piglets or to fatten them.

– Household-plot farmers are influenced by their *expectations.* The expected price of inputs and outputs – for the time $t + k$ – is determined by the current prices at time t.

– We assume that no other substantial *economic* effects influence production that shown in the function f_1 above. We disregard such non-recurrent expenditures as the building costs of pigsties or such current inputs as the (non-priced) costs of labour, animal health care, etc. Nonetheless, demand and supply are affected by a number of *non-economic* factors such as laws, traditions, weather, epizootics, etc. These factors were not yet included in the above theoretical functions but will be quantified in the estimation procedure.

Though one can also sell fattened hogs on the free-market, the quantity traded there is so small that it does not make much sense to define supply or demand functions for it. 90–95 percent of hogs produced for selling are bought up directly by the state. For this *procuring segment* of the Hungarian pig market we assume a special demand function:

$$\text{PROCUREMENT}_t = f_3\ (\text{HOG SUPPLY}_t)$$

The organs of central procurement have to buy all swine offered to them. This means that the demand of procurement is infinite in the mathematical sense; it is constrained only by the number of hogs produced. The total supply of fattened hogs is given by an identity:

$$\text{HOG SUPPLY}_t = \text{HOG SUPPLY}_t^{(H)} + \text{HOG SUPPLY}_t^{(L)}$$

where (H) and (L) denote household-plot and large farms.

The hog supply of household-plot farms depends on two main economic factors. Supply is a decreasing function of the input prices and an increasing function of the output price:

$$\text{HOG SUPPLY}_t^{(H)} = f_4\ (\text{PIGLET PRICE}_{t-j};\ \text{FEEDSTUFF PRICE}_{t-j};\ \text{PROCUREMENT PRICE}_{t-j})$$

where j denotes the time lag from the fattening to the sale of the hogs.

Though *large farms* are more or less homogeneous in size, concerning the form of ownership and their financial interestedness there are some differences between state and cooperative large farms. *The state-owned fattening farms* do not depend very much on the input price level, and parallel to this any change in the output prices does not lead directly to changes in the level of production. The work of *cooperative fattening farms* is assumed to be effectively controlled by the relation of costs to incomes – at least in the long run. The function ,describing the large farms' hog supply does not show this difference. The function f_5 below assumes the homogenous "cooperative-like" behaviour of large farms:

$$\text{HOG SUPPLY}_t^{(H)} = f_5\ (\text{INPUT PRICES}_{t-i};\ \text{PROCUREMENT PRICE}_{t-i})$$

where i denotes the time lag from the *decision* concerning the level of production to the *slaughter* (or buying up) of hogs. The vector of input prices in f_5 is theoretical. It consists of investment costs of hogsties, wage costs, expenditures on feedstuffs and the price of piglets bought for fattening, etc.

The supply functions (f_1, f_4 and f_5) cover only the main *economic* processes of hog production. The total supply can be described only with the help of some technological functions. The statistical identity of the sector is the following:

$$\text{SWINESTOCK}_t = \text{SOWS}_t^* + \text{PIGLETS}_t + \text{PORKLINGS}_t + \text{PORKERS}_t$$

There is a *one-way motion* "along" this identity from one time period to the other: piglets become porklings, porklings become porkers and porkers will be slaughtered. Setting up the model on a *quarterly* basis there is only a limited motion from the "younger" subsets of the above identity to the "older" ones. These motions can be described by the following technological functions, which agree with the average Hungarian technology of pig farming:

*SOWS stands for the whole breeding stock since boars give only 3–4 per cent of it.

$$(1) \quad \text{SOWS}_t = a_1 \, \text{SOWS}_{t-1} \qquad (0 < a_1 < 1)$$

$$(2) \quad \text{PIGLETS}_1 = a_2 \, \text{SOWS}_t \qquad (a_2 > 1)$$

$$(3) \quad \text{PORKLINGS} = a_3 \, \text{PIGLETS}_{t-1} + a_4 \, \text{PORKLINGS}_{t-1} \qquad (0 < a_3, a_4 < 1)$$

$$(4) \quad \text{PORKERS}_t = a_5 \, \text{PORKLINGS}_{t-1} + a_6 \, \text{PORKERS}_{t-1} \qquad (0 < a_5, a_6 < 1)$$

Equation (2) embodies a very important condition for a cobweb-type model: the level of production cannot be altered after the production process has started. The technological functions (1)–(4) were not estimated in the above form but were combined with the supply functions f_1, f_4 and f_5 of the model.

Estimation of the model

For the estimation of the simple model f_1–f_5 relying on quarterly observations I used – as I have mentioned before – some additional variables. For filtering out the interim seasonal flucutations dummy variables were used. In the functions below Q1 denotes the dummy for the first quarter Q2 for the second, Q3 for the third. For the representation of long-term tendencies I used linear trend-variables.

The linear regression coefficients were estimated by ordinary least squares method, by single equations, for the period of 1961–1978, which means 71 quarterly observations per variable. (Numbers in parentheses below the coefficients of the following estimated functions are the Student t-values.)

Household-plot farm sector

$$\begin{aligned}(i)\ \text{SOWS}_t^{(H)} = {} & \underset{(4.1)}{105.7} + \underset{(0.4)}{2.57}\,\text{Q1} + \underset{(4.7)}{36.5}\,\text{Q2} + \underset{(6.8)}{41.2}\,\text{Q3} + \underset{(18.8)}{0.79}\,\text{SOWS}_{t-1}^{(H)} + \\ & + \underset{(3.6)}{0.133}\,\text{PIGLET PRICE}_{t-2} - \underset{(-3.7)}{0.21}\,\text{CORN PRICE}_{t-2}\end{aligned}$$

$R^2 = 0.929$; $DW = 2.04$; Percentual error = 5.7%.

As 75 percent of the feedstuff used is corn, I substituted the corn price for the unobservable "feedstuff" price. It is shown in the technological equation (2) that household-plot farmers adjust the stock of sows to their price-expectation instead of adjusting the number of piglets to it. That is why the function f_1 of piglet supply was reduced to the technological relationship:

$$\text{(ii)}\quad \underset{}{\text{PIGLETS}_t^{(H)}} = \underset{(-12.0)}{-247.0\ \text{Q1}} \underset{(-5.2)}{-\ 108.8\ \text{Q2}} \underset{(-9.6)}{-\ 211.0\ \text{Q3}} \underset{(32.7)}{+\ 2.51\ \text{SOWS}_t^{(H)}} +$$

$$\underset{(4.2)}{+\ 1.81\ \text{TREND}^*}$$

$R^2 = 0.912$; $DW = 1.86$; Percentual error = 9.5%.

$$\text{(iii)}\quad \text{PORKLINGS}_t^{(H)} = \underset{(5.6)}{680.0\ \text{Q1}} \underset{(13.2)}{+\ 1051.3\ \text{Q2}} \underset{(10.3)}{+\ 821.2\ \text{Q3}} \underset{(4.2)}{+\ 0.74\ \text{PIGLETS}_{t-1}^{(H)}} +$$

$$\underset{(8.9)}{+\ 0.635\ \text{PORKLINGS}_{t-1}^{(H)}} \underset{(1.1)}{+\ 14.75\ \text{PROCUREMENT PRICE}_{t-2}} -$$

$$\underset{(-2.9)}{-\ 1.28\ \text{CORN PRICE}_{t-2}} \underset{(-1.8)}{-\ 6.65\ \text{TREND}}$$

$R^2 = 0.916$; $DW = 1.71$; Percentual error = 7.1%.

$$\text{(iv)}\quad \text{PORKERS}_t^{(H)} = \underset{(3.5)}{731.6} \underset{(-8.6)}{-\ 1083.6\ \text{Q1}} \underset{(-19.7)}{-\ 1386.6\ \text{Q2}} \underset{(-18.0)}{-\ 994.6\ \text{Q3}} +$$

$$\underset{(4.6)}{+\ 0.196\ \text{PORKLINGS}_{t-1}^{(H)}} \underset{(4.1)}{+\ 0.297\ \text{PORKERS}_{t-1}^{(H)}} +$$

$$\underset{(3.6)}{+\ 23.62\ \text{PROCUREMENT PRICE}_{t-2}}$$

$R^2 = 0.976$; $DW = 1.77$; Percentual error = 11.7%.

In functions (i) – (iv) of the household-plot farms' swine supply the twice lagged price variables proved to be significant. This verifies the assumption, that *farmers adjust the level of future production at the beginning of the production process.* One can consider this time lag of two quarters as a good approximation of the time actually needed for the different activities of the real pig farming. (E.g. the breeding process takes 30 days for insemination + 115 days for the sows in farrow + about 35 days of suckling time = 180 days. Fattening takes about 5–7 months to complete.)

The function of household farms' piglet demand was estimated to explain the piglet price explicitly:

*The TREND variable in equation (ii) begins in the first quarter of 1960.

$$\text{(v) PIGLET PRICE}_t = \underset{(4.3)}{273.1} + \underset{(2.9)}{50.9}\,Q1 - \underset{(-0.5)}{7.5}\,Q2 - \underset{(-7.1)}{112.5}\,Q3 - \underset{(-5.8)}{0.189}\,\text{PIGLETS}_t^{(H)} -$$

$$- \underset{(-2.1)}{0.247}\,\text{CORN PRICE}_{t-1} + \underset{(9.0)}{0.677}\,\text{PIGLET PRICE}_{t-1} +$$

$$+ \underset{(5.6)}{2.86}\,\text{TREND}$$

$R^2 = 0.941$; $DW = 1.97$; Percentual error = 8.6%.

As it is shown in (v), piglet price has a strong autoregressive character. This means that sudden and extreme changes rarely occur even on the free market. The influence of corn price on piglet price turned out to be lagged. It seems that the free market is not willing to notice random changes in feedstuff prices.

Large farm sector (L)

$$\text{(vi) SOWS}_t^{(L)} = \underset{(4,2)}{40.9} - \underset{(-1.2)}{2.21}\,Q1 - \underset{(-2.5)}{4.38}\,Q2 + \underset{(3.1)}{5.51}\,Q3 + \underset{(29.8)}{0.864}\,\text{SOWS}_{t-1}^{(L)} +$$

$$+ \underset{(3.8)}{0.986}\,\text{PROCUREMENT PRICE}_{t-2} - \underset{(-3.8)}{0.049}\,\text{CORN PRICE}_{t-2} +$$

$$+ \underset{(4.9)}{11.97}\,\text{PLAN DIRECTIVES}_t$$

$R^2 = 0.980$; $DW = 2.22$; Percentual error = 1.7%.

The dummy variable "PLAN DIRECTIVES" shows whether there are central directives or not. As it might be known to the reader, up to 1966 the Hungarian agriculture was centrally "commanded" ($\text{PLAN DIRECTIVES}_{1961-1966} = 1$). In the era of the so-called new system of economic control and management – since 1967 in the agriculture – there have been no such commanding plans ($\text{PLAN DIRECTIVES}_{1967-1978} = 0$). The estimated coefficient of this variable shows that abandonment of the compulsory plan directives cut short the unprofitable production forced before.*

*With the introduction of the new system of economic control and management large farms slaughtered a great number of sows which proved or were thought to be "uneconomical". This sudden slaughter of sows – which could be carried out in days – retarded the development of livestock for a long time.

Similarly to equation (ii) we get the pure technological function of

$$\text{(vii)}\quad \underset{}{\text{PIGLETS}_t^{(L)}} = \underset{(-6.5)}{-133.4\,\text{Q1}} \underset{(-2.8)}{-60.3\,\text{Q2}} \underset{(-3.3)}{-70.2\,\text{Q3}} + \underset{(17.4)}{2.08\,\text{SOWS}_t^{(L)}} + \underset{(11.1)}{4.58\,\text{TREND}}$$

$R^2 = 0.944$; $DW = 1.50$; Percentual error = 6.2%.

According to the large farms' technology – where piglets become porkers at once instead of becoming porklings first – I combined the two stocks. Moreover, a certain portion of household piglets go to large farms *via* state procurement:

$$\begin{aligned}\text{(viii)}\quad \text{PORKLINGS}_t^{(L)} + \text{PORKERS}_t^{(L)} = {} & \underset{(2.0)}{152.7} \underset{(-5.9)}{-170.4\,\text{Q1}} \underset{(-0.7)}{-23.7\,\text{Q2}} \underset{(-2.0)}{-52.5\,\text{Q3}} + \\ & + \underset{(3.7)}{0.237\,\text{PIGLETS}_{t-1}^{(H)}} + \underset{(4.0)}{0.582\,\text{PIGLETS}_{t-1}^{(L)}} + \\ & + \underset{(10.5)}{0.67\,[\text{PORKLINGS}_{t-1}^{(L)} + \text{PORKERS}_{t-1}^{(L)}]} + \\ & + \underset{(3.9)}{113.0\,\text{PLAN DIRECTIVES}}\end{aligned}$$

$R^2 = 0.938$; $DW = 1.85$; Percentual error = 3.8%.

from equations (vii)-(viii) it appears that there are no economic effects influencing large farms' fattening activities. This suggests that *large farms strive to fatten every pig they can – independently of costs and incomes.*

The estimated function of the state's procurement – as was supposed – proves to be supply-determined:

$$\begin{aligned}\text{(ix)}\quad \text{PROCUREMENT}_t = {} & \underset{(-12.9)}{-2052.3} + \underset{(0.9)}{66.3\,\text{Q1}} + \underset{(5.2)}{635.9\,\text{Q2}} + \underset{(5.0)}{461.6\,\text{Q3}} + \\ & + \underset{(3.0)}{0.12\,\text{PORKLINGS}_t^{(H)}} + \underset{(7.1)}{0.51\,\text{PORKERS}_t^{(H)}} + \\ & + \underset{(6.4)}{0.417\,[\text{PORKLINGS}_t^{(L)} + \text{PORKERS}_t^{(L)}]} + \\ & + \underset{(7.1)}{38.54\,\text{PROCUREMENT PRICE}_t}\end{aligned}$$

$R^2 = 0.944$; $DW = 1.44$; Percentual error = 10.2%.

In the equations (i)-(ix) the exogenous procurement price is set by the government, according to the suggestions of the central procurement organs. The endogenous free market piglet price is described by equation (v). We cannot consider the price of corn to be independent of the swine-sector since the volume of the livestock consuming feedstuff influences the relationship between the supply and demand of feedstuffs:

$$\text{(x) CORN PRICE}_t = \underset{(2.4)}{24.6\ Q1} + \underset{(6.2)}{61.7\ Q2} + \underset{(7.3)}{64.7\ Q3} + \underset{(4.2)}{0.0261\ \text{SWINESTOCK}_t^{(H)}} +$$

$$+ \underset{(2.7)}{0.003\ \text{POULTRY STOCK}_t} - \underset{(-3.8)}{0.046\ \text{CORN PRODUCTION}_t^{(H)}} +$$

$$+ \underset{(8.0)}{0.547\ \text{CORN PRICE}_{t-1}}$$

$R^2 = 0.755$; $DW = 2.14$; Percentual error = 7.1%.

The reader has surely noticed some significant differences between the theoretical equations $f_1 - f_5$ and the empirical model (i) – (x). On the one hand the two models differ because of the – sometimes compelling – lack of data. (E.g. it proved impossible to collect satisfactory time series of taxes and/or taxation rules.) Secondly, some set of variables turned out to be insignificant and they were neglected during the estimation procedure. (E.g. the time series of animal diseases.) The third portion of the differences can be explained by some unsuccessful experiments with estimation. E.g. all price variables of the (i) – (x) model are direct, absolute prices. The explanatory power of the model might have been greater if estimation could have been performed with relative prices. But it has turned out to be rather arbitrary to select a price for numeraire. E.g. the pork-sector competes with the beef-sector (in meat-production), with the poultry-sector (in feedstuff consumption), with feedstuff-production (competition of the raw material with the finished product). Moreover, there is a competition in the model itself, between breeding and fattening. To test all of these versions we should have performed hundreds of single estimations for each equation. After a series of efforts it has turned out that the significancy gained for the regression is not worth the time spent on correcting the basic model.

Solving the estimated system of equations for the whole period observed, the simulation gives significant results (see *Figure 3*).

This simple model of ten stochastic equations is sufficiently significant to use it at least for policy simulations, but forecasts can also be made with its help. Thus the model can be used for the analysis of the pig cycle mechanism.

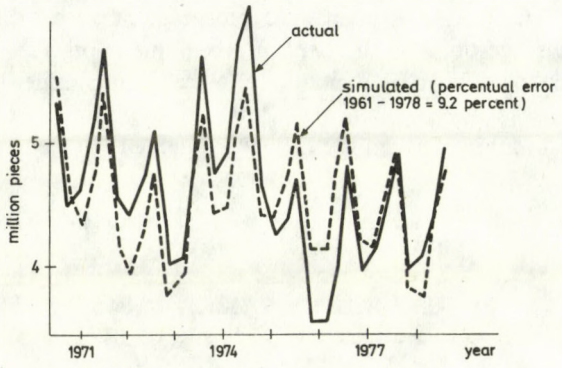

Fig. 3.

The pig cycle in the model

The cycles of capitalist economies have been known and studied by economists for more than a century. The fact that cyclical phenomena may, and subject to certain conditions will inevitably occur even in the framework of socialist planned economies has been proved recently. The fundamental works of A. *Bródy* [3] and T. *Bauer* [1] gave a new inspiration to the analysis of these cycles. Besides such well-known macroeconomic oscillations as the investment cycle is, there are a number of interesting "micro-cycles", or product cycles emerging in the economy. One of these – and probably the most strikingly marked one – is the *hog cycle.*

The first scientific description and analysis of pig-price fluctuations was given by A. *Hanau* in 1927 (see [15]). While at that time researchers traced the reasons *why* the regular fluctuations in pig livestock took shape, today the main question is *how* the hog cycle can be damped.

It is not indifferent for the theory of business cycles whether one finds the reason for the cycle in genetic, biological, *technological factors, or in the "behaviour"*, expectations, reactions of pig farmers. E.g. *Larson* [13] and *Jelavich* [12] deny that the amplitude and periodicity of pig cycles are determined by economic effects, by "behavioural" characteristics. Though I describe and test the latter, the "economic" mechanism of the cycle, I must admit that my model does not refute the "technological" cycle theory: they are both possible alternatives.

In the system described by equations (i) – (x) there is a "built-in" cycle. Its presence can be verified logically: using the *"ceteris paribus"* principle to an extreme extent, two "subcycles" can be traced. Let us first consider the feedstuff-price, the sows and the piglet price exogenous or given in period $t-1$. Substituting equation (i) into (ii) and expressing equation (v) in terms of the stock of piglets and the disregarding all variables considered as exogenous we get

$$\text{PIGLET SUPPLY}_{t+2} = 0.334\ \text{PIGLET PRICE}_t$$
$$\text{PIGLET DEMAND}_{t+2} = -5.29\ \text{PIGLET PRICE}_{t+2}$$

which correspond directly to the functions S(P) and D(P) of the original cobweb model. (See page 371) In this case the cycle is damped – or the cobweb converges towards equilibrium – since $b = 0.334 < a = 5.29$. This "subcycle" is associated with the household-plot sector's propagation process.

In the second place we consider the PIGLET PRICE$_t$ and all variables corresponding to perod $t-1$ exogenous. Utilizing the identity

$$\text{SWINESTOCK}_t = \text{SOWS}_t + \text{PIGLETS}_t + \text{PORKLINGS}_t + \text{PORKERS}_t$$

we get

$$\text{SWINE SUPPLY}_{t+2} = -2.01\ \text{FEEDSTUFF PRICE}_t$$
$$\text{SWINE DEMAND}_{t+2} = 38.5\ \text{FEEDSTUFF PRICE}_{t+2}$$

Knowing that the feedstuff price is a cost both for the supplier and for the buyer of hogs, we get $b = 2.01 < a = 38.5$; which refers to another damped "subcycle" associated with the whole system of household pig farming. In the model (i) – (x) these two "subcycles" are interwoven with each other, they are *interdependent.* Besides the above reasoning the existence of a cycle can be proven by applying exact mathmatical tools*: the length of the analytical hog cycle is precisely 4 years. Assuming that the model (i) – (x) describes the present system of the Hungarian pig farming well, the above results prove the overall cyclical character of this system.

This cycle – as in the case of the cobweb model – can be of three types: damped or constant or explosive. The "built-in" pig cycle would practically become damped within a 7–8 year long period – provided that there are no external shocks perturbing the system in the meantime. Knowing that the real pig cycle has not shown any evidence of getting smoother in the past 30 years, there must be some *external shocks* reawakening the cyclical oscillations. (See *Figure 1*).

This can be illustrated by *simulations.* The model (i) – (x) is a recursive system of second order linear difference equations. E.g. giving *any* initial value to the variables in equation (i), one can determine the stock of piglets by equation (ii), then – by giving initial values to all variables with no value hitherto – a hypothetical solution of the model can be derived step by step. It is sufficient to determine the starting values for the first two consecutive perods, say, t and $t+1$, and from that time on the model itself generates the livestock depending only on the chosen initial values. (Naturally, the exogenous feedstuff supply, procurement price and poultry stock variables ought to be given from

*See *Chow* [6]

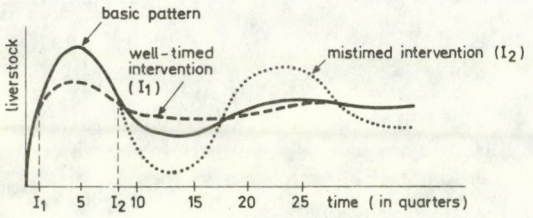

Fig. 4.

"outside" the model all the time.) Simulations can be carried out for a variety of different initial values and exogenous variables assumed.*

Utilizing the model we can illustrate the hypothetical case, when there are no "external" effects produced on the pig farming, that is all exogenous variables are set to zero. The curve "Basic pattern" of *Figure 4* demonstrates the changes constructed this way, as well as the damped cycle with a periodicity of 4 years.

This simulation proves – and I think it is an interesting result of my model – that *the pig cycle is an inevitable, unavoidable process of adjustment and regulation in the present system of the Hungarian household pig farming.* This cycle is the aftermath of a series of (lagged and very extreme) adjustments to a merely theoretical "equilibrium" level. This cyclical character of the present Hungarian pig farming exists independently of the fact that recently there may not be found any statistically identifiable cyclical recessions.

The pig cycle and the anticyclical "control policy"

By solving the model according to different simulated conditions we can analyze some typical anticyclical "control" measures taken by the central economic policy.

As a consequence of the pig livestock's fluctuations there are alternating capacity surpluses and exaggerated exploitation of labour and fixed assets. These phenomena spread through the whole vertical system of meat production. This shows beyond doubt that the pig cycle is harmful, so it is worth trying to ease, to mitigate its aftermath.

The central economic policy – in terms of my model – has a choice from three types of measures (or their combinations):

1. *It may alter the historically shaped "behavioural" patterns* reflected in the numerical value of the estimated model parameters. E.g. the central policy may manage somehow to get the household-plot farmers not to react too sharply to free market price changes; or may accelerate the process of lagged adjustment. These types of interventions may invalidate the model (i) – (x) or some of its equations.

*The actual data of 1961 – as initial values – and the realized 1961–1978 time-series of the exogenous variables were used for the simulation shown partially in *Figure 3.*

2. *It may exploit the historically shaped "behavioural" patterns.* E.g. by assuring a sufficient quantity of feedstuff the government may damp the oscillations of feedstuff prices; may stabilize the piglet price by well-timed free market procurement and sales of porklings; or may induce farmers to produce on a steady level by setting appropriate procurement prices.

3. *It may ease the multiplying effects of the cycle* without intervening in the mechanism of the cycle. E.g. import or export of hogs for slaughter in the proper period may moderate the fluctuations in meat processing and consumption.

Any selection of the above alternatives is related to many factors. The measures taken – or to be taken – are not always derived from "economic" but also from short and long-term political reasons. One could find a handful of "control" measures introduced in the past twenty years which fit into the three main types mentioned above. Though, glancing at the time series of the Hungarian pig-livestock it is unambiguous that none of the measures taken could smooth the pig cycle. Within the bounds of this paper it is not possible to analyze every economic or production policy concept realized before. This time I focus only on two types of "measures", namely the consequences of the so-called *free market interventions* and the effects of *farmers' attitude* to household pig production.

The specific practice of free-market interventions came to existence in the early '70s. These "open market operations" of the central procurement organs aim at protecting the profitability of household-plot pig breeding by draining the periodical excess supply of piglets off the market. The piglets bought up from the free-market first had been given to slaughterhouses, later to large fattening farms. The interventions (in the short run) transmit the fluctuations reduced at household-plot farms to the large farms' sector, since the total amount of pigs remains constant through these redistributions. However, in the long run the household sector's hog cycle may become less effective, since the free-market might be protected from a fatal decline in piglet prices. On the occasion of an intervention the central organs invalidate the equation (ii) of piglet supply – even if only for a single period –, and this way stabilize the pig price by exploiting the historically shaped "behavioural" patterns.

Excess supplies can be drained by interventions, but during "recession" when excess demand for piglets rules the market, piglet price may increase even through speculation. For breaking down this speculation the central procurement agents would have to sell sometimes a great number of piglets. However, it is not possible to perform these two-way interventions since the large farms' stock of piglets – since there cannot be any real inventory carry-over of live animals – is not even sufficient to meet the large farms' demand for piglets. It is essential even for successful buying-type interventions to have some spare fattening pens in large farms as well as some feedstuff reserves. However, fulfilling the above conditions would not automatically lead to the mitigation of the cycle. For this purpose it is necessary *to time the interventions punctually.* The free market intervention can be represented in the model as follows. Let us assume, that the central procurement takes away,

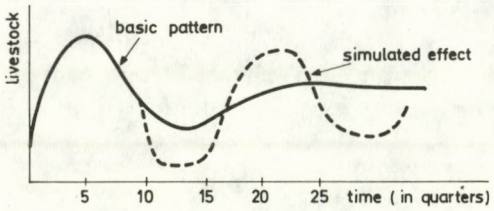

Fig. 5.

say, 10 percent of the piglet supply. Thus, in the intervention period, supply is given by a modified version of equation (ii):

$$\text{PIGLETS}_I^{(H)} = 0.9\,[2.51\,\text{SOWS}_I^{(H)}]$$

where I denotes the intervention period.

Timing the intervention for the "prosperity" period leads to a quicker smoothing of the cycle than in the case of the "Basic pattern", while mistiming it may double the recession *(Figure 4).*

As I have mentioned before, some important factors – such as the effect of farmers' attitude to production – could not be incorporated into the model. The different taxes and dues may significantly change the profitability of pig farming. An increase in taxes generally keeps back production while tax reduction leads to the buoyancy of pig farming. In consequence of the important role played by expectations not only the existing taxation system, but also *expected taxes and measures – moreover, alarms and false rumours spreading among the farmers – alter the producers' behaviour.* Assume, that a responsible person says some misunderstandable or double-meaning words accidentally altering the farmers' behaviour. The fear from prevailing uncertainty makes farmers *decimate* the livestock of sows.*

For simulating this situation we must revise equation (i) of "sows" for a single period. For the successive periods the stock of sows remains at this new level, emphasising the difference between the seemingly analogous cases of interventions and changes in attitude. *(Figure 5)*

The rate of sows' slaughter may happen to be considerably higher than 10 percent. E.g. on hearing the rumour of limiting the number of breeding animals to one per farm, more than 30 percent of the sows would be slaughtered. Slaughtering a sow is a matter of minutes while *the reproduction of the pig livestock may last for years.* Though the discussed relationship between farmers' behaviour and production is in fact a hypothesis very difficult to test statistically, it is rather well known that Hungarian farmers are

*This corresponds to the situation of slaughtering one sow at each farm having 3 or more breeding animals.

extremely "sensitive". Some events of the past thirty years – such as elimination of the kulaks and the sometimes forced consolidation of cooperative farms in the early 1950s, later the frequent feedstuff shortages and the sometimes rhapsodically changing procurement policy – could easily make farmers "neurotic".

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Finally I would like to draw attention to one more phenomenon. The hog cycle in Hungary leaves its mark not only in the sphere of production. One might understand, that national planning and politics cannot be neutral concerning this problem. Planners and agricultural economists perform a cycle of behaviour to the hog cycle, too. E.g. if the livestock begins to grow following a cyclical recession, every expert is happy believing that the "recent necessary measures" were good: the cycle is over for ever (or, at least will soon be over). Since these high growth rates can be extrapolated, next years' growth will be overstimated. Following a short peak-period, the livestock usually begins to grow more slowly, and a bit later even to decrease. New plans and measures come – and growth is on its way again. The loop starts again . . .

Although the Hungarian hog cycle was said to have passed away several times in the past decade, planers are optimistic again: they think the cycle is over now for ever. Maybe, it was possible *to postpone a single forthcoming recession,* but I must emphasize that the present system of Hungarian pig farming is still having a very strong endogenous inclination to cyclical fluctuations. As a result of different interventions *cycles may become as well damped as intensified.* For levelling the cycle central organs have to take quick, efficient and steadfast measures, understanding that the slightest shock – or even a mere rumour about it – may ruin the transitory equilibrium.

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ПРЕКРАТИЛАСЬ ЛИ ЦИКЛИЧНОСТЬ СВИНОВОДСТВА? (ЭКОНОМЕТРИЧЕСКАЯ МОДЕЛЬ СВИНОВОДСТВА В ВЕНГРИИ)

Г. КОРНАИ

Цикличность производства убойных свиней в Венгрии приводит к значительным трудностям в полной вертикали мясопроизводства. Автор описывает поведение свиноводов при помощи эконометрической модели, состоящей из десяти стохастических уравнений.

Коэффициенты экономической модели, построенной на основе теории паутинной сети, автор определяет при помощи линейной регрессии. Полученная таким образом система уравнений подтверждает, что причиной цикличности свиноводства в Венгрии являются «повреждения» свиноводств приусадебных хозяйств, их запоздалое приспособление к изменяющимся экономическим условиям.

Анализ системы уравнений выявляет и то обстоятельство, что цикличность вызывается эгзогенными — с точки зрения модели — выявлениями случайного характера, как раз имеющими рещающее воздействие на поведение свиноводов. Из числа таких воздействий окружающей обстановки автор более подробно останавливается на двух, а именно: на «интервенциях» на свободном рынке и на «изменениях настроения продуцентов», представляя, как они усиливают цикличность.

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INTERVIEWS

ECONOMICS AND PSYCHOLOGY: AN INTERVIEW WITH JÁNOS KORNAI ABOUT HIS BOOK "ECONOMICS OF SHORTAGE"

The Hungarian periodical "Pszichológia" (Psychology) has published an interview with Professor János *Kornai* on some of the common problems of economics and psychology. On the part of the periodical Tibor *Engländer* and László *Halász* took part in the conversation.

In the last ten years János Kornai has published two comprehensive books which have a message far beyond the economic contents. *"Anti-equilibrium"** discussed the foundations of economics, while raising a number of questions interesting also from the psychological aspect. Here are a few examples: conflict and compromise, decision process, preference and utility, aspiration level, adaptation and selection, selling and buying intention, etc. An organic continuation of that book is *"Economics of Shortage"*** which has for main subject the description and analysis of the regularities of the Eastern-European socialist economy. The following interview is concerned primarily with the latter book.

The buyers's and the seller's attitude

Question. To which of the ideas raised in your book "Economics of Shortage" would you call the attention of psychologists?

Answer. It would be perhaps better if a psychologist answered that question, after reading my book. I cannot help seeing things with an economist's eyes and cannot enter into the psychologist's ideas, his examination methods and way of asking questions. Yet I shall try to answer.

I would start with what is most closely connected to the subject of the book: how buyers and sellers of goods and services are affected by chronic shortage. In traditional economic theory the market is usually presented as the scene of equal exchange between

**Anti-equilibrium* (in English: North-Holland Publishing Company, Amsterdam 1971, in German: Springer Verlag, Berlin–Heidelberg-New York, jointly with the Publishing House of the Hungarian Academy of Sciences, Budapest, 1975)

***Economics of Shortage* (in English: North Holland Publishing Company, Amsterdam, 1980)

buyer and seller. The buyer is willing to pay only as much for the goods as they are worth him; and the seller will give the goods only if he feels the price paid is reasonable. That is to say, the relationship between them is based on *equal terms.* Although it happens once or twice that one of the parties gets the worse of the bargain, this is balanced on the average of the many transactions. The market of the chronic shortage economy presents, however, quite a different picture: the buyer and seller are not equally strong. We say that it is the *sellers' market* that is dominating here; the sellers are ruling and the buyers are forced to obey. Since the phenomenon is not individual or exceptional, but constant and massive, the *unequal position* strongly marks the *attitude* of both the seller and the buyer.

Question. At this point – talking about the attitude of the buyer and of the seller – your book uses a psychological category. What do you mean by it, in this context?

Answer. I mean the *constant* disposition and behavioural pattern manifest in the formation of the seller's or the buyer's intentions, in their way of collecting information, in their decisions and actions. In a shortage economy the buyer feels himself defenceless and subordinated, while the seller develops a consciousness of power and superordination. (I would note here that by "buyer" I do not mean – here and in the following – just the housewife or other members of the household doing shopping, but also the purchaser of a firm or of non-profit institution, or an executive buying machines, ordering a building or taking acceptance of it, etc.). Well, the buyer – using the word in this wider sense – tries to be friendly to the seller. He makes efforts to win the latter's favours, so that he should be served and not the competing buyer. This can happen in many different forms: for example, by reciprocating services, or even through bribing. The buyer tries to please the seller not only by what he gives him, but also by what he will not demand. He will be humble and submissive, so as not to annoy the seller by dissatisfaction, let alone by any complaint. If the housewife quarrels with the butcher or even makes a note in the complaint-book – available in every state-owned or cooperative shop in Hungary – because the latter cheated her in weighing or in billing, she may achieve in that case a redress of her complaint. But in the future the butcher can "punish" her: from now on he will give her less good meat: within the limits of legality he can put her in many different ways into a disadvantageous position. A similar thing can pass in the relationship between the firm ordering the construction of a factory and the firm contracting for the work. If the investor is too demanding, the building contractor can retaliate in many ways: next time he does not accept an order, or puts the order further down the list, etc. It is unnecessary to mention further examples, since all of us are closely acquainted with these phenomena.

Question. How much are, in your opinion, these traits of the seller's and of the buyer's attitude to be called general?

Answer. They are certainly not the same everywhere, but depend on the intensity of shortage on the market of the goods or services in question. And, of course, they depend also on the personality, that is, individual character of the economic actor; the buyer or the seller. There are people who will now and then make a scandal even without

the hope of success; and there are even people who often make protests and complaints. As for me, in my quality as economist-investigator of the question, I do not analyse the individual cases, but the *mass phenomenon:* what is common in the many different individual attitudes. A certain situation – the power relation determined by shortage economy between seller and buyer – will produce a certain type of attitude. The role the individual will play in this situation forms his attitude. This is, by the way, clearly confirmed by the well-known fact that the same person in his role as buyer will be submissive, while in his other role, as seller, will be peremptory with his own buyers.

Question. The psychologist would say that for the frustration suffered in his role as buyer he compensates himself to some extent by aggression in his role as seller. In this context the question arises: how intensive are frustration experiences?

Answer. I think that the intensity of such experiences shows a wide dispersion. There are petty annoyances – such as one cannot buy coupler plugs, or shoe-polish – which we soon forget. But there are experiences with shortage that affect one's whole life: let me mention the young people who wait for long years in vain for the allocation of a council flat, or who try to build one themselves, making huge sacrifices. Or let us think of the patient who is defenceless because of the lack of assistant personnel at the hospitals. It may be not the physical lack of the goods or of the service that hurts, but the human experience connected with the shortage phenomenon: a rude tone, or the feeling of useless efforts. Besides, it is not only grievances that are involved, but a kind of permanent stress. Let us think of the foreman in the factory, the purchase agent, the chief engineer, and the managing director, who have constantly to fight for the acquisition of materials and parts, in Hungary lately also for labour; they live in constant worry, whether all production factors are at disposal.

All that shows that the effect – since it is of a wide range and constantly recurring – is rather deep. But how deep – that ought to be answered not by the economist but by the psychologist. This is certainly a question that would be worth investigating jointly by economists and psychologists.

I would, however, add: the problem is not full and total defencelessness and frustration. On the one side, because – though shortage is frequent with a lot of articles – it is not there permanently and with everything. And, on the other side, the buyer – affected by shortage – can effectuate *forced adjustment* in various forms.

Question. What do you call here forced adjustment?

Answer. The buyer – either the household, or the firm in its buyer's role – would like to buy a definite article. Since he cannot get it, he will buy something else instead: the substituting product may not be more expensive, but it is of a poorer quality, or it is of the same quality but more expensive.Thus the buyer is not left unsatisfied, yet, because of the *forced adjustment,* he suffered a loss. Another possibility: if he does not find the wanted article in the first shop, he will go trying all the other shops, in the hope of finding it. Or he postpones the purchase and makes another try later on. The latter case may be connected with forced saving: the buyer does not spend the money intended for purchase, because he cannot find goods which he would like – even in forced

substitution – to buy. *Search, postponement, forced saving* – these are further forms of forced adjustment.

Important components of the buyer's attitude are the *propensity* to forced substitution, search, and forced saving. It can be said again: this may vary, depending on the personality of the buyer. There are some who search and wait patiently; there are others who get fed up sooner and prefer to effectuate forced substitution. As for the mass of buyers, however (on the market of a certain product or groups of products), buyers' attitudes show more or less a constant distribution.

The components of the buyer's attitude – let us now stick to this subject – are empirically observable and measurable magnitudes. They are parametres whose joint effect can also be analysed theoretically, for example, with the aid of a mathematical model.

What is expressed in the parameters of the propensity to forced adjustment is, in the last resort, that the buyer *adjusts himself* to the chronic shortage situation. We might say: these are the touchstone of the buyer's disposition to compromise and to conform. There are many reasons why shortage will become chronic. One important factor is certainly habit, resignation to the frequency of shortage events, and massive forced adjustment.

Question. It seems that the various forms of forced adjustment are not found only in the economic sphere, but in other spheres of life as well.

Answer. Development of the conceptual system and theoretical models concerned with forced adjustment was suggested to me by experiences in our own life. However, I think that in the end we have arrived at categories apt to describe not only the market of the shortage economy, but also numerous other phenomena.

To clarify what I have to say, let me draw a comparison with the traditional model of decision theory. This model assumes that the decision-maker has alternatives *at his disposal,* from which he can make his choice. He has only to consider, which is the best to satisfy his needs, or what he has to give in exchange. Although it is now used as a *general* model of choice, the construction of the traditional model was inspired originally by the typical situation of the choice made on the free market. The buyer can make his choice as he pleases: he must only consider which goods suit best his taste as well as his purse. On the supply side alternatives are available for him without limits. In the course of a forced adjustment the decision-maker undergoes a different kind of psychological experience: he is *deprived of* certain alternatives. Such alternatives of which he knows that they exist, which others (or in the past, at more lucky times, himself too) can get but are now not available to him. He makes his choice with this feeling of deprivation and shortage. He cannot even think of the "best", but from the beginning looks for the "second-best". It is worth thinking over, in how many situations of choice we effectuate such a forced adjustment; the search for the "second-best": from the choice of a school, a job, a partner in life, friends, and company, to political and social decisions.

The aspect presented here does not contradict logically the traditional decision-model, but rather completes it. The latter considers what is *included* in the set of

alternatives, the former calls attention to what is *excluded* from it. The traditional model analyses, in what way the acceptance and effectuation of one or another alternative affects the decision-marker. The completion suggested asks the question: what is the effect of the *lack* of one or another alternative on the decision-maker? Certainly, psychology knows a lot about this; it has studied the feeling of want. By all means, examination of the Hungarian socio-economic system could supply further data.

Question. Forced adaptation or the "second-best" does not necessarily entail the sensation of a loss. With the aid of processes of dissonance reduction we may quickly explain it to ourselves, that it is very good what we have done.

Answer. This, however, does not change the basic consequences of the narrowing down of the alternatives of choice, namely, the ingrained reaction that there are a lot of things in which we need not make a decision, because they have been decided somehow already. The choice has been made without us. Shortage keeps on making a choice *instead of us.* If there is one possibility, you need not hesitate – and this is comfortable in a certain sense. The university student for example has not to study various schools to choose between them, for he gets acquainted only with one. The narrowing down of choice accustoms us to move along the forced paths of narrow possibilities.

Question. Let us revert once more to the frustration caused by shortage. In your book you mention "tolerance limits". This is related to the category we call "frustration threshold".

Answer. I think it is, though there is an important difference. If I am right, "frustration threshold" is to be interpreted in relation to the *individual.* We all "get upset" sometimes, for example, because of a distressing failure in buying something. My book, however, alludes to the social limits of tolerance. Of course, the limits of individual and social tolerance are correlated, yet this correlation is rather complex. A number of important questions arise in this context. One sphere of questions: how frequent and how intensive are "upsets"? Do they come out isolated and thus in the form of a lot of small "bursts"? Or do they interact, intensifying one another in a chain-reaction, leading to a major explosion? Do they spoil only the public feeling, or do they affect also people's initiative and zeal to work? The other sphere of questions: do economic control and management organs perceive that there are tolerance limits and, if so, do they know where they are? Will they hear small "bursts", or react only on the warning of an explosion already of social dimensions? On account of the traditions of his profession, the economist deals a lot with *signal systems* and centers his research most on *price,* which is the most "economic" signal. It is emphasised in my book that in an economic system in which prices are not active enough signals, a number of other signals are functioning. "Grumbling", complaints, protests also serve as a signal system.

The role of tolerance limits can be demonstrated also by the development of investments in the socialist economy. Several scientists, among them Hungarian economists – András *Bródy,* Tamás *Bauer,* Attila K. *Soós* and Mária *Lackó* – have studied the *cyclical* development of investments. I would stress just one point. The growth of investments is sometimes extremely accelerated, which will sooner or later impair the

population's consumption. Living standards stop rising or even fall, supply gets worse. If that lasts, public feeling may become increasingly tense. In such a case we can say: the forcing of investments hits the social tolerance limits of living standards. This is usually followed by a sudden slowing down of investment activities. First acceleration, then a sudden slowing down: that is what generates the cyclical movement.

The phrase: "hits the social tolerance limits of living standards" can indicate that control organs perceive that the situation is stretched to the breaking point, and apply the brake right then. But it may also happen that first the collision takes place in fact, and investment is slowed down only afterwards.

It has always been clear to economists that economic growth has *physical* limits, available resources impose limits, and there are also *financial* constraints. I wished to call attention, relying upon the East European experience, to a further type of constraint: the tolerance limits imposed by the *socially acceptable public feeling.*

Behaviour and motivation of economic managers

Question. Let us now turn to another psychological aspect of "Economics of Shortage", that is, to the questions of the behaviour and motivation of economic managers.

Answer. The view is held widely among economists that managers are motivated primarily by their financial interests. Therefore, their actions are easily influenced by determining the economic indicators upon which their salaries and bonuses are to depend.

I do not in the least underestimate the effect of the direct material incentive. In my opinion, however, there exist some deeper-lying motives, which have a stronger and more lasting influence on the behaviour of economic managers. Among them I underline first that most people *identify themselves with their job* and feel its importance. If, in addition, a person is in a leading post, he identifies himself with the section in his charge. This applies to the foreman of the lowest grade as well as to the minister responsible for a whole sector of the national economy. "I am the workshop, the factory, the sector" – the well-known words could be thus modernised. This is one of the most important reasons, why the shopforeman or factory manager – stimulated by bonuses – and the senior civil servant of a ministry, the minister, the hospital manager and the rector of a university – all with fixed incomes – behave in a very similar way in economic matters.

Question. What does the similarity consist in?

Answer. In many things; we shall revert to one or another later on in this interview. For the time being, let us first see a problem which I think is extremely important for understanding the functional regularities of the socialist economy, and that is the *expansion drive,* which strongly affects managers. This is, in my experience, to be found in every manager; both in those who have financial interest in increasing the section in their charge, and also in those who have no direct financial interest in it. The manager of the firm would like to increase production through investment. But the minister would also like to increase the sector in his charge by means of investment, though it is certain

that his own salary will not be any bigger for it. The school director would like to have new or better equipment, more classrooms and larger teaching staff, the general would like more arms and more modern ones, those in charge of the protection of monuments want more resources for that purpose, and so on.

Question. It is conspicuous that this is called a "natural instinct" in "Economics of Shortage". Psychologists would doubt, if this is really a natural instinct. In the animal world no expansion efforts are observed; using an economist's expression, animals strive more after "simple reproduction", after their own and their species' preservation, those living in hordes after maintaining the community and to preserve the area necessary for it – but they do not strive after ever further expansion.

Answer. It is indeed possible that, in talking about a "natural" instinct, I used here such a "colourful" expression, which is not exact. The phenomenon meant is not a real natural instinct shared with the animal world, but a typically human inclination developed by social conditioning. I only wished to point out that it is to be found not only in one or another existing social system, but in the motivations of leaders of *every* modern, achievement-orientated society. The manager's function itself will inevitably lead to that inclination. If it is true what I have been saying about the manager's identification, that is, the feeling of "becoming one" with the section in his charge, it follows logically that he feels important the activities of this section. And, if it is that important, it should also be enlarged: the hospital should be able to look after more patients, the university to educate more students, the factory to manufacture more products, and all with better and more up-to-date equipment.

This is further completed by the fact that even though such expansion drive cannot be found in every man, it is exactly those having it strongly that will be most probably selected for leading positions; those with a "drive" and who would like to have the largest possible unit under their control.

Question. One form of identification is incorporation: you dump the person or object (institution) in question into you and it will become one with you. It is interesting, how much "infantilism" and "cannibalism" is in this. "I like it so much I shall swallow it, or at least I clutch it strongly, lest someone take it from me."

What you have outlined here refers at the same time to some kind of "latifundium experience". As if what happens in the manager were the feeling that the thing is his "latifundium". Permanent expansion is thus well understandable, since it is the expansion only of one's own organism.

Answer. The feeling of "incorporation" is found regularly. It is also expressed in the language used by the manager, when he talks in the first person singular, and says such things at a conference as "I shall produce those 10.000 tons."

Question. If expansion drive among managers is that general, what is system-specific in it?

Answer. The *inhibitions* that may, expansion drive notwithstanding, keep back the manager from investment. I do not think of the case when the state or the bank denies support or credit, that is, the firm or the non-profit institution does not *get* the

investment. The real question is, what inhibitions may lead to a situation that, in certain cases, the manager *should not ask for credit* at all, that he should show self-restraint.

I think that the use of the word "inhibition" is justified here. It is fear from financial failure that keeps the capitalist entrepreneur from easily deciding on investment. If the owner himself decides on investment, he knows that his own money is at stake. Or if – in case of a joint stock company – the managers employed by the company make the decision, though it may not be their own money at stake, a wrong decision would jeopardise their prestige in the trade and thereby their whole career. If prospects are uncertain, investment spirit will fade. This kind of inhibition is conditioned by social experience. Although not an everyday phenomenon, bankruptcy is not exceptional: in a number of advanced capitalist countries 2 to 6 per cent of the enterprises go bankrupt every year. There is no absolute need to have one's own experience to develop this inhibition, that is, the prudence with investment. You do not need to have your own experience of a grave road accident to be afraid of the fatal consequences of careless driving or walking in the streets. If sufficiently impressive, or let us say dramatic, indirect experience is enough to develop the sense of danger.

And it is at this point that I can pass to what we find in the Hungarian economy. *That kind* of inhibition has not developed in the Hungarian economy.

Question. You cannot say, though, that a Hungarian economic manager, such as the managing director of a firm, has nothing to be afraid of.

Answer. Of course he has. To mention just one, to which it will be worth reverting later on: he has every reason to be afraid of the disapproval and sanctions of the higher authorities. He certainly need not fear, however, that the firm will go bankrupt as a consequence of an unprofitable investment action. If the firm has financial difficulties, it will be somehow helped out of them: it will allowed to raise the price thus adjusting it to the unfavourable turn in costs, or it will be granted subsidy, or tax allowance, cheap credit, and so on.

Question. Or, the kind of failure the manager is not afraid of is exactly that which is extremely important in appraising his performance.

Answer. If I may say so, he will not hurt himself in falling. If he mismanaged things, this will not entail tragic consequences for him. He cannot come out very high, but he cannot fall very low, either. If all goes well, he will earn 15 to 18.000 forints monthly instead of 10.000, he will get a state award and will be interviewed by the television three times. This is about the peak of the career of a managing director of a firm. If on the other side, he makes stupidities, the only thing that may happen is that he will be transferred to another institution and put into another position, not much lower than the previous one.

Question. Is it then the two ends in the distribution of potential losses and gains that are cut off?

Answer. That is it, if we consider the gains and losses of the whole career. It can move only within a rather narrow zone, and within this zone it is not worth experimenting with too many things.

All that leads to the situation that investment hunger and expansion drive are *unrestrained.* And, since investment demand is almost limitless, while available resources are limited, there is a constant tension in the investment sphere. The almost insatiable investment hunger "sucks" away resources from the economy. This is one basic reason for chronic shortage.

Reverting now to the psychological aspect of the question: an economic system is characterised not only by the motives driving decision-makers in their actions, but also by the fears, anxieties and inhibitions keeping them back. I am rather inclined to say that the latter might be even more important and more characteristic. That is again a subject that would be worth a joint examination by economists, sociologists and psychologists.

Question. It seems that anxieties do not work, either, when the investor submits his estimates of expected costs. He will be always under-estimating them. Although he will cheat himself as well as others, his behaviour seems to suggest something else, to put it sharply, a lack of inhibition in asserting his interests. "In this way I shall certainly get the amount indispensable for a start and then come what may, we shall finish it somehow."

Answer. I think this is a standard phenomenon and not only in the field of investment. Everywhere, if somebody asks for soemthing, it is worth underestimating inputs and overestimating outputs. He will indeed increase his objective chances (the money will in fact more easily be given), and at the same time reassures and encourages himself. It is also remarkable that this is a Janus-faced behaviour. If the former distributor becomes applicant, the roles will change. As a distributor, he tried to press down demands, as an applicant, he will try to increase them.

Question. In addition to the above-said, we must take into consideration a few other, generally characteristic features of information processing. In every uncertain situation we underestimate the total risk of the event, if the event is made up of a large number of details. And we see the risk in perspective: the closer a partial event, the larger the risk will appear, and the more distant the partial event, the smaller the risk connected with it will seem.

Answer. That is why in medium- and long-range planning the belief is common that the optimistic outcome will develop at the end of the plan period.

Question. We may have serious difficulties now, but they will somehow dissipate by the time we finish. But, is irony in place here? After all, even though with delay, with a lot of pain, and miscalculated, but output is there.

Answer. True, but we cannot just accept it. The investment tension mentioned is one of the gravest consequences. And this has not only direct economic impacts: that demands for machines, foreign exchange, and building capacity will be always bigger than what is available. It has also disadvantageous psychological concomitants: rush, and nervous tension. These will themselves generate confusion and work counter to the plans.

Question. In the preceding we have discussed the sub- and superordination in economic control and management. This must also have its psychological projection.

Answer. Characteristic behavioural regularities develop in a hierarchical organisation. A part of them is general, to be found in every hierarchical organisation, another part is characteristic only of one or another existing hierarchy.

In Hungary, in the mechanism before 1968, the upper level controlled the lower level first of all by *instructions* (commands). This inevitably developed a "military" mentality or at least acted toward developing such attitude. The superordinate leader was to show a commandant's virtues: an iron will, relentlessness in questions of discipline, a readiness to retaliate for opposition, etc. The most important virtue of the subordinate is obedience. A hierarchy based upon sub- and superordination will not tolerate an individual raising objections, having a critical eye as well as his own ideas. The two kinds of attitude are "compatible" within one personality: he will command "downwards", and obey "upwards",

Therefore, the mechanism built upon instructions has a far-reaching pedagogical and character-moulding effect; it will bring under this quasi-military discipline the rebellious person. As a matter of fact, the process starts earlier, with the selection. A person able to command as well as to obey has a greater chance to play a leading part in economic management, and particularly to advance faster within the hierarchy. One must add to all this that here such a socio-psychological group of phenomena is involved which did not show up only in the framework of the old economic mechanism, but is present – frequently even much more conspicuously – in every hierarchy based on command and obedience, such as in strongly centralised political or religious organisations.

Question. From this point of view, what changes has the 1968 reform brought?

Answer. The system of direct instructions has in most part ceased, and thus today the above-mentioned "military virtues" are less sought after. According to its declared purpose, the reform ought to have led to a situation where the managers of the producer firm display a much more "market-oriented" attitude: they should be enterprising, initiating, and trading. Several elements of such behaviour have indeed appeared, yet rather inconsistently, not in the last place because of the mentioned effects of the shortage economy. The "command-obedience" relationship has not disappeared, but has been transferred in part into the relationship between buyer and seller. Besides, sub- and superordination has remained between the upper and lower levels of economic control, though its contents, as well as forms and "tone" have changed greatly. In Hungary today the higher authority does not issue commands, but rather suggests something or asks for something emphatically.

Question. In your book you use the word "paternalism" in this context. What does it mean, and has this phenomenon also a psychological aspect?

Answer. Higher authorities, though they do not give orders to the managing director of the firm, they patronise him. Like the parent who is unable to recognise that his child has grown up and keeps on interfering with his affairs – sometimes, of course, exactly in the latter's interest –, the different higher authorities interfere, in many different ways, with the affairs of the managers of firms. Therefore – just as it is the case with bringing up a child – a great number of managers are also unable to really grow up. The analogy well reflects in many points what we see in economic life. The over-patronised child, while protesting against the parents' frequent interventions, gets used to it and in fact wants it. He will exploit its favourable sides: protection and security. If the

managing director used to paternalism has difficulties, for example, external conditions take a turn for the worse, he feels it is self-evident to appeal to the higher authorities for help. And, since he gets it in most cases, this develops the feeling of full protection and practically disaccustoms him to fight against external difficulties with his own means. Why should he, when there is the good father, the higher authority, the state that will always help him out of trouble. The representatives of the higher authority usually "grumble" on such occasions – just as the overpatronising parents do – that the firms are unable to act independently. At the same time, however, I think, the sense of indispensability is stronger: look, firms are independent, and yet they cannot do without us.

I hope that the rough outlines drawn here are apt to make it clear that in the new economic mechanism of Hungary, and together with it, under the new sub- and superordination conditions lacking instructions, other kinds of human characteristics and behavioural patterns have become conspicuous than in the old one. That is one more reason why one should not work with over-simplified patterns. Many different hierarchies exist. Each type of hierarchy has its own rules of the game, entailing certain consequences both in selection and in shaping behaviour.

And, at this point we might take up once more the thread dropped before: we could return to the question of material incentive. I have already stressed that the behaviour of managers profiting from direct material incentive and that of managers not profiting from it can be similar in many ways. Now I wish to repeat this statement in the context of all the phenomena that I have tried to present about the behaviour of people acting within hierarchical organisations.

Let us take, for example, the old economic control and management system. The behaviour of the managing director of the firm was influenced by the bonus system, while his direct superior: the head of the industrial directorate was paid no bonus. And the superior of the superior: the deputy minister had no direct material incentive, either. Notwithstanding, the connection between the managing director of the firm and the head of the industrial directorate (bonus "below", no bonus "above") was very similar to the connection between the head of the industrial directorate and the deputy minister (no bonus "below" or "above"). The *situation* itself, that is, any actual form of sub- or superordination proves to be a stronger factor in developing an attitude and in moulding a character at every level of the hierarchy, than does the special material incentive completing (or not completing) it.

General methodological problems

Question. During our conversation we have touched upon a number of overlapping questions of economics and psychology. How much is economics unanimous in judging the questions of psychology?

Answer. It is not at all unanimous. Our discipline is divided into various trends or schools just as much as psychology. These schools do not usually state their standpoint

from the psychological aspect, but it can be demonstrated, through adequate analysis, which are the psychological assumptions of the theory it represents.

I shall quote just one example: that of the neo-classical theory. It is not exclusive but predominant in the West. The best and most thoroughly elaborated works of this school present the theory in an axiomatic form. They postulate in it, as an axiom, the existence of a *homo oeconomicus,* that is a rational decision-maker. The decision-maker is „optimising": he chooses an action that will bring him maximum utility. This assumption is equivalent to the following stipulation: the decision-maker has a complete preference ordering over the set of alternatives. He is able to decide unambiguously in regard of any pair of alternatives, which one he will prefer, or that he is indifferent in his choice between the two. This preference ordering strictly satisfies a few postulates (transitivity, etc). This expresses, in the final account, that the decision-maker chooses consistently: that there is no contradiction between his various decisions.

The typical neo-classical commentary on this model is as follows: it is the utility function or its equivalent: the preference ordering that is expressive of the "psyche" and "taste" of the decision-maker. To study its coming about is not the economist's task but that of the psychologist's – the latter may co-operate with other disciplines. In any case, preference ordering is "given" for the economist.

Question. In your former book, "Anti-Equilibrium", you polemised with the theory of preference ordering.

Answer. Yes, I led there detailed polemics, but "Economics of Shortage" also touches upon the problem several times.

One objection is obvious, and has been more than once confirmed by modern psychology: that a real person is not strictly and consistently rational, he is no *"homo oeconomicus"*, but is full of inner conflicts and contradictions. Because of this, his actions are often inconsistent; his preferences are changeable and often improvised.

Another – and much more important – objection is that the model of preference ordering is not productive enough. On hearing the objections, advocates of the neo-classical theory would be willing to expand the structure of the original model. For example, they suggest that, instead of a preference ordering constant in time, a preference ordering changing in time, or not deterministically specified but stochastic preferences should be postulated, and so on. Thus, finally, all kinds of human action "fit into" this model, only it will have no explanatory power, but will be tautological. It says: "A person will always do what he thinks or feels is good for him. If he had not thought or felt like that, he would have acted otherwise". This is a "true" but a totally meaningless statement.

In my opinion, in modelling the decision process, emphasis must be laid on the *explanation* of the decision: on clarifying, *why* the decision-maker prefers some alternative to another one. In the course of our conversation, I have tried to clarify, in connection with several subjects, how the *permanent conditions* (social conditions, institutional framework, relative power position, function filled in the economy) of the economic actor can be used to explain the *permanent features of* the actor's *attitude.*

Economics is inclined to simplify the motivation background of economic behaviour: the capitalist owner maximizes profit, the manager of a socialist firm maximizes bonus, the board of directors of the Yugoslavian autonomous firm maximize gross income, etc. This kind of description, I think, goes too far in simplifying the description of motivation. There are many kinds of motives, and they exert their effect jointly, perhaps conflicting with one another, causing conflict within the person who has to make a decision.

Question. This corresponds to the psychological conception in which "clusters of motives" are mentioned. It seems surprising to us that such questions are still disputed in economics. Another question arises in this context. In accordance with the theoretical standpoint explained above, in "Economics of Shortage" the word "optimum", much liked by economists, is not used. On the other side, we often find the word "normal". The use of this word has somewhat puzzled us. The different schools of psychologists and psychiatrists are not unanimous in defining "normality". Doubt has arisen, whether it is at all definable.

Answer. First of all, I would like to clear up a misunderstanding. The concept of normality I use in my book has nothing to do with the psychopathological problem. For example, I speak about "normal queuing time". This does not mean that if someone is unwilling to accept this usual queuing time, he is "not normal" in the everyday sense of the word, and should be perhaps given treatment.

The concept of "normality" is used by several disciplines, and not in exactly identical interpretations. In looking for an analogy my interpretation may be closest to that of physiology. Relying upon a large number of observations, the normal values of the different variables of the human organism can be stated: the normal body temperature, the normal leukocyte- and erythro-count, the normal blood-pressure, etc. These normal values are *average values,* and in a double sense: cross-sectionally (average of many men), and intertemporally (average of a long period). Some of the normal values are constant, other ones depend on further variables (for example, age, body weight, etc). As a rule, these normal values are not described by a single figure with many decimals; rather, they indicate an interval, either narrow or wide. To each of such a normal value there belongs a *regulatory mechanism.* The actual value of the variable in question (such as body temperature, or blood-pressure) may fluctuate about its own norm, affected by various factors. There exists, however, such feedback regulation which will always drive the actual value back to the neighbourhood of the normal value.

This is the kind of normality concept I use. It is, therefore, a descriptive category free from value judgement, which always points to the mean value of a variable. In my book I emphasise that one can speak about the norm or normal value of an economic variable only if a regulatory mechanism works in society which drives the variable deviating from the norm back to the neighbourhood of the norm.

It is in this sense, for example, that I consider shortage as a normal concomitant of a certain economic system, and not a deviation. And this implies that to queue up, to go

in search of a missing article from one shop to the next and so on are part and parcel of the normal behaviour of a person living in a shortage economy.

Most of the norms are system-specific. As long as the institutional framework is given, along with them are given norms, that is, normal values of the economic variables. These play an important role in conditioning the behavioural patterns characteristic of the economic system in question, as well as in the constant reproduction of the important features of the system. Then, at the beginning of a new era, a change in the institutional framework will sooner or later also change the normal values of the economic variables, that is, the norms of economic attitude.

Question. At the end of our conversation, the usual question must not be omitted: what ought to be done, in your opinion, with a view to a closer link between economics and psychology?

Answer. I should like to begin with a negative statement. I do not think that the usual formal ways would be a good solution: such as to found a joint committee of economists and psychologists, or to sign contracts on joint research between economic and psychological institutes or departments. I do not really expect anything of reiterating the empty phrases about "multidisciplinarity", either.

A few conversations between psychologists and economists, lectures held for the representatives of the other discipline, or the reading of some of their important articles or books might be, in a lucky case, very inspiring. On my part, I am grateful to several fellow-sciences. At many points – sometimes as a flash – they showed me connections which I could perhaps have less understood, had I remained within the world of my usual ideas in my own discipline. I am sure that I as well as my colleagues in economics are open to the intellectual experience coming to us from psychology. I am grateful to the editors of "Pszichológia" that, by means of this interview, they have provided an opportunity to reconsider some of the economic problems having a psychological aspect.

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REVIEWS

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NEW WAYS AND MEANS IN ECONOMETRICS*

Operations research as an independent discipline and within it operations research and mathematical methods, in general, cover a much wider sphere of problems than dealt with in the present lecture.

Firstly, we would like to speak about principled questions of the applicability of stochastic methods to planning, analysing and forecasting economic processes, in general, then about new trends taking shape in the field of econometric modelling procedures and becoming more and more perceptible and urging nowadays.

The denomination "econometric" methods is a collective term; both its broader and narrower interpretations may be found. According to the broadest interpretation all mathematical methods and models applied to economic problems and filled with actual data connected with these problems belong here. But we do not intend to start terminological debates, nor do we wish to give cause for misunderstanding. Therefore, we define the sphere we are thinking of when speaking about econometric modelling already at the very beginning.

We shall speak about the – though narrower – sphere of econometric procedures whose real bases are provided by *empirical time series of economic categories, while its methods consist of exact terms and procedures of mathematical statistics having established in probability theory.*

This kind of modelling is thus closely connected with methods of up-to-date time series theory, consequently, also with the theory of stochastic processes with discrete parameters. It is, therefore, understandable that judging its place among models of economic, and especially of planning processes, i.e. its "status" cannot be separated from the position of stochastic modelling within the same circle, nor from general phenomena characterizing the economic application of mathematical methods – according to our judgement – even today. Therefore, we would like to deal briefly with this subject at first.

*The present paper contains the lecture read at the Conference on Operations Research of the János Bolyai Mathematic Association held in Győr from 22nd to 25th August, 1979. When writing the lecture the authors often relied on their article entitled "Sztochasztikus módszerek a népgazdaság tervezésében" ("Stochastic methods in national economic planning.") published in a volume edited on the occasion of the 10th anniversary of the Computer Centre of the National Planning Office.

The economic application of mathematical methods is characterized in Hungary – apart from certain obviously existing exceptions – by its being "method oriented" instead of "problem oriented".

Various mathematical methods become prevailing for about 10 years from the moment of their presentation and spreading among researchers. If we take into consideration that there is an about 10-year lag also between the domestic "discovery" of the methods and the real date of their birth (usually abroad), then it is no exaggeration to say that the methodological backwardness with which researchers investigate economic problems – as compared with the potentially existing mathematical apparatus – amounts, in general, to at least 20 years (not to speak about the practice, of course). Several concrete examples could be mentioned in support of this statement, let us only think of the Hungarian "career" of linear programming.

Application of mathematics and mathematical methods to the merits of the matter is a much more complicated mechanism than the one developed by the practice of economic researchers ever more powerfully in the last decade, namely, that certain, already elaborated mathematical methods are given, on the one hand, and economic reality, on the other, thus all a user has to do is so to say just to apply the selected (favoured or mastered) method to reality.

This phenomenon is, to some extent, an understandable concomitant of progress in common marginal fields (intersections) of mathematics and other sciences.

Sciences which, for lack of conceptual exactness and quantifiable phenomena, had been averse for a long time to making acquaintance with the nature of approach to problems and solution processes usual in mathematics, obtained certain ready-to-use methods and these methods could be successfully applied for a rather considerable part of problems cumulated until then. However, progress does not stop either in mathematics or in the given science. If, therefore, a method previously known and undoubtedly excellent in itself is not applied to the adequate problem, meaningless solutions and results will be soon obtained. For new problems raised by development also new ideas, eventually new methods are required.

Economic application of mathematics (and here we do not think of certain mathematical methods, but of MATHEMATICS as an integral whole) means a *way of thinking, a process of problem solving through* creative thinking and close cooperation between mathematicians and economists. Of course, for this partners familiar with the conceptual system, logics and methods of both sciences are required. Since it is unlikely or at least rare that all this can be found in one researcher, team-work is and would be of outstanding importance in this field.

We believe that the above holds to a greater extent for stochastic methods whose application and a correct interpretation of the results obtained could hardly be imagined *without proper skill in probability theory thinking and modelling.* It may be attributed perhaps to this fact that rather great scepticism, what is more, reservation may be often experienced towards the applicability of stochastic methods in economics and especially

in planning even among economists familiar with the application of other, deterministic, methods of mathematics.

This latter is the less understandable since also planners are reasoning in terms of a "probability model" (even if they do not realize this) when requiring from target-figures not so much their exact fulfilment, but rather the enforcement of certain expected trends.

The economic life of a country may be regarded as a production system whose elements are labourers, machines, institutions, etc. The elements are interrelated; the output of the system is the resultant of the activity of elements.

It can be easily seen that there may arise random fluctuations in the functioning of several elements of the economy. Thus, for example, the daily working performance of individual labourers is fluctuating, people may get sick, machines may break down. Duration of transport and repair may in many cases also be regarded as random factors. Functioning of the system is also influenced by external, unforeseeable factors (foreign economic relations).

Random fluctuations appearing in the functioning of individual elements and spreading over various levels of the system may cause fluctuations also in the resultant activity.

With the above argumentation we wished to make perceptible that aggregates of varying size of economic life behave as stochastic systems. Therefore, first of all stochastic methods are suitable also for their mathematical description. It may be said, in general, that the more contracted an aggregate, the better its most relevant indicators and interrelations may be characterized in terms of probability theory.

All scientific investigations are aimed, after all, at a better cognition of reality and in possession of this cognition at developing and influencing phenomena conforming to our goals and concepts.

Natural phenomena are usually divided into two major groups. There are phenomena strictly obeying some known law (e.g. theoretical computations concerning lunar eclipse made for millennia show full coincidence with empirical data), and there are others seemingly not following any strict rule at the given level of our cognition possibilities (e.g. moments of nuclear disintegration in a radioactive preparation).

In the first case we face a necessarily determined, in other words, *deterministic* phenomenon, while in the other a *random (stochastic)* one. The totality of assumptions and knowledge concerning deterministic phenomena will result in strictly causal deterministic models containing causal relationships, while stochastic models serve for the description of random phenomena.

With random phenomena circumstances that are or may be taken into consideration do not unambiguously determine the development of phenomena.

Probability theory deals with methods and investigations allowing the cognition of regularities of random events and, in case of given conditions and circumstances, enables us even to foresee and control them. It is hardly necessary to explain in detail how much help a more precise and thorough knowledge of economic interrelations could mean in planning and control activity.

Though stochastic approach had appeared in natural sciences already in the second part of the 18th century, in social sciences this was demanded rather late, only in the 1930s. We can speak about stochastic modelling of economic phenomena more generally only since then. Namely, specialists began to deal with stochastic components of economic time series and econometric models at that time.

A frequent case of the stochastic modelling of economic phenomena is when the structure of the model is *a priori* determined (e.g. what is the nature of relations between various economic categories) and available basic data are used (almost exclusively) for the numerical evaluation of coefficients and parameters to be found in the equations of the model.

This concept of model building may be found both with pioneers of econometric modelling and in the background of several important foreign and Hungarian traditional econometric models of today. While this way of thinking and pattern of model building have, as a matter of fact, not changed, during the last 50 years, estimation procedures of mathematical statistics have considerably advanced during the same period (undoubtedly, often due precisely to estimation problems of econometric models). Sizes of models increased by leaps resulting from possibilities given by computer techniques, and this again, entailed important problems connected with time series theory, mathematical statistics and programme development as well as their solution.

All these possibilities reacted upon the structure of models, and also on the model building approach itself. The structural enrichment of models brought the necessity of the best possible and many-sided utilization of information obtained from empirical data much more to the fore. Therefore, investigations were aimed at elaborating also such methods that take into consideration the data base available (e.g. on empirical time series) in the development of model structures and also when making the basic hypotheses. Let us only briefly refer to the method of *"stepwise regression"*, to various stochastic pattern recognition procedures and to the *Box-Jenkins* method.

However, the view according to which regression equations of econometric models express (causal) relationships often impedes the changing and development of modelling approach. This standpoint is presumably rooted in a wrong gnoseological interpretation of differences between deterministic and stochastic rules. Perhaps it would not even be worth mentioning this problem if it did not imply refusal of the applicability and usability of the above modern procedures of mathematical statistics in model building itself and especially that of so-called artificial variables. Namely, by means of these procedures from categories and variables originally given with direct economic contents often transformed variants, artificial variables will be obtained, which may occasionally better help in revealing stochastic regularities between original variables, consequently, in forecasting their future development, than any other "natural" variable drawn into the examination.

Our own investigation, the so-called dynamic factor analysis is also aimed at determining such artificial variables, namely, system variables (so-called dynamic factors) so-to-say concentrating the "statical and dynamic invariance" of the given system of

empirical time series, with which original variables may be then well explained statistically and forecast.

In recent years such new trends may also be met in international professional literature which leave modelling completely to the own inner system of relations of data developed empirically by prescribing a possibly small number of "ordering" principles and parameters and by means of an adequate computation algorithm. Therefore, "computer thinking" is given an important part in the proper development of the model. These procedures have two relevant elements: "enumerating" all *combinations* of possibilities and *control.*

The basic concept of these methods may be well illustrated by a simple example of *plant breeding.*

The plant breeder is crossing plants with various hereditary genetical features with a certain purpose; in the course of this, combinations of genetical codes will become more and more complicated from generation to generation. Control (as a matter of fact, selection in this case) consists in that the plant breeder selects from each generation those plants whose features best correspond to the final objective of breeding (and continues experimentation with these plants). Selection is finished when the objective is achieved.

Generalizing the above example, the role of plants will be taken over by mathematical variables, the aim set may be, for example, the "best possible" approximation of a selected variable. To the hybridization of plants corresponds the formation of some type of a function of two variables; features of "hybridization" may be judged, for example, on the basis how good is the regression estimation of the selected variable that may be given by means of the individual functions. Then input parameters will be the following: the set of variables originally given; forms of possible functions; the selection criterion and stopping rule. Having given them, the final form of the regression function will be determined so-to-say automatically by the "computer", of course, on the basis of some mathematical algorithm.

These methods may be applied in several fields, first of all for the solution of problems of regulation, control, planning and pattern recognition. At present, we are dealing with their application for prognostical purposes – in the stage of experimentation.

In the course of the planning process concepts on the future are developed in the knowledge of the past and the present. The future may be planned with adequate safety if we have a reliable, real image of the past and the present. If this image is inexact, then the one projected for the future will be even more so. Therefore, all possibilities have to be utilized for obtaining more and more exact and comprehensive knowledge of events and regularities of the past and the present.

We think that mathematical methods could help a lot in obtaining this knowledge. Among "external" factors influencing the success of these methods – especially of stochastic ones – "statistical data culture" has an important part. It is obvious that the quantity and quality of available statistical data are of outstanding importance for the solution of a concrete problem.

By "quality" of data often only the reliability and exactness of data are meant. They are undoubtedly important, but are not the only qualitative feature. The value of data – as regards the solution of a concrete problem – is determined decisively by how much and what kind of information they contain.

According to the contemporary practice of data utilization one has to work with available data which are, from the viewpoint of the problem to be solved, of greatly varying quality. Of course, an ideal system of data supply would be that would provide the most complete information possible for the problems to be solved. Such an ideal state may be approximated only if planning itself as well as the supply with information of modelling linked to planning were planned in advance. If we take into consideration that all major economic and social processes are planned in Hungary, then this claim may not seem to be exaggerated either.

The main problem is here, of course, that for the planning of information supply it is *not enough* to know present demands of planning, but the *future of planning and connected modelling should be foreseen for at least 10–15 years.*

It must be noted that the "everyday" data demand of planning is usually considerably less than that of modelling – first of all from a qualitative viewpoint. The high level of need on data is often considered as a negative feature of modelling, though it is only one of its natural concomitants. One of the typical outward forms of data shortage is the shortness of time series.

Time series of macro-categories used in planning (at least those published by the Central Statistical Office at comparable prices) are rather short. Efforts should be made that economic time series with real economic contents and being consistent – going back to a longer past – be available both at current and at unchanged (comparable) prices. It is a one-sided and strange requirement to expect "foresight" for 15–20 years without going back at least to a period of the same length. *One of the preconditions of the "measurability" of the future is a similar "measurability" of the past.*

Our own investigations made up to now also indicate that the *trend of* economic development, of relationships between the individual macro-categories do not change and can not even be changed so rapidly as would often be desirable. The past of the system (in a given case – a time series vector) may be a dominant determinant of the future. Mathematical-statistical investigations made with longer time series often indicated that important events had a measurably perceptible effect in the individual time series even after 15–20 years.

Finally, we have to speak about our *optimism* as regards the economic utilization of stochastic methods, especially in planning, in the *more* distant future despite the concerns and problems mentioned. Our optimism is based on the recognition relying on analogies of historical development that scientific thinking and the application of corresponding mathematical methods will be sooner or later spreading in all fields where this is justified by objective needs, and the planning of the national economy – meaning practically the "handling" of a stochastic system – is undoubtedly such a field. Enforcement of this development trend may be made more difficult, but cannot be impeded. Subjective human factors do only accelerate or slow down this process.

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BOOK REVIEWS

BRÓDY, A.: *Ciklus és szabályozás – Kísérlet a klasszikus piac és cikluselmélet matematikai modelljének megfogalmazására* (Cycle and control – An attempt at constructing the mathematical model of the classical market and business cycle theory.) Budapest, 1980. Közgazdasági és Jogi Könyvkiadó. 272 p.

In our days, when a great part of economic research workers change their field of interest every one or two years, the consistency with which A. *Bródy* proceeds on the road marked out for himself is a rarity. Already 24 years have passed since his first publication on input-output analysis. Since then the imposing theoretical structure has been built further, storey by storey, with several articles, studies, and now with his third book.

The main line of Bródy's research

We have on the one hand classical economics, within it first of all the Marxian world of ideas, with its characteristic questions, conceptual framework, scientific methodology and main theorems; with a fashionable term: the "paradigm" of Marxist political economy. On the other hand we have the important stream of mathematical economics hallmarked by the names of *Leontief* and *Neumann*. The latter has a well delimitable mathematical background, mainly the theory of linear algebra and of linear dynamic systems. Bródy makes efforts – if we are allowed to express ourselves figuratively in the terminology of set theory – to exert his activities in the intersection of these two sets of ideas. It is here that he wishes to explore as much as possible. He does not undertake to "mathematize" every major idea of Marx at any price, he restricts himself to what he can formalize with the mathematical apparatus he has mastered and brilliantly handles. Nor does he undertake to apply the said apparatus indiscriminately for the examination of different economic problems. He always analyses those problems which have been traditionally in the foreground of interest of Marxist political economy: price and value, capital and profit, the circulation, tying-up and return of capital, simple and extended reproduction, crisis and cycle. The union of the Marxian idea and the Leontief–Neumann apparatus proved to be a novel and fertile approach with which Bródy attained important theoretical results.

Bródy is a pioneer of this school also on international scale. His name justly appears beside those of *Sraffa, Morishima* and Leif *Johansen*. Today this school has considerably expanded. Bródy's former book: "Prices and planning" has become a basic textbook of this school; his name is widely known and frequent references are made to his work.

The basic formula of the Marx–Neumann–Leontief–Bródy model is simple – it is so attractive and illustrative precisely because of its simplicity. The economy is divided into n sectors, inseparably linked to each other in consequence of the input-output flows. (The assumption of irreducibility.) For a unit of product each sector uses inputs in fixed proportions. (Leontief's non-substitution assumption). The system is closed; one of its sectors, the household sector reproduces, similarly to the other sectors, with inputs of fixed proportions – manpower, whose activity, labour, is used as input by the other sectors.

In addition to current inputs also investments are needed; these and the increments of capital are proportional to the increments of output. Thus, in the final analysis, the real sphere of the economy is described by the differential equation system $\mathbf{x} = \mathbf{Ax} + \mathbf{B}\dot{\mathbf{x}}$, where $\mathbf{x}$ is the vector of output, $\mathbf{A}$ and $\mathbf{B}$ are the matrices of current input coefficients and of capital or 'stock' coefficients.

With definite conditions this system has an *equilibrium growth path,* as clarified by Bródy in his earlier book. The new book relies on this previous result and considers it as starting point. We quote from the new book (p. 25) the concise definition: "The coordinates of equilibrium and the related equilibrium prices are given by the following triple definition:

– the bundle of products $\bar{\mathbf{x}} > 0$ for which $(\mathbf{A} + \bar{\lambda}\mathbf{B})\bar{\mathbf{x}} = \bar{\mathbf{x}}$, is called *equilibrium production vector.* Since with $\bar{\mathbf{x}}$ also $\rho\bar{\mathbf{x}}$ (where ρ is an arbitrary scalar) satisfies the equation, only the proportions of production are determined, its level is not;

– the elements of the price vector $\bar{\mathbf{p}} > 0$, for which $\bar{\mathbf{p}}(\mathbf{A} + \bar{\lambda}\mathbf{B}) = \bar{\mathbf{p}}$ are *called equilibrium prices of production.* Since with $\bar{\mathbf{p}}$ also $\rho\bar{\mathbf{p}}$ satisfies the equation, only the relative prices are determined, the level of the price system is not;

– the scalar $\bar{\lambda}$ which gives to the linear combination of the two matrices precisely the dominant eigenvalue of 1, is the *equilibrium growth rate,* or the *equilibrium average rate of growth.*

[1] The price system thus defined is identical with the system of prices of production as expounded by Marx, where a uniform, average rate of profit is secured on the capital invested. And the system of relative proportions of production is the system of proportions of the well-known schemes of extended reproduction going on with unchanged organic composition of capital."

Modelling of control

Bródy began to study the problems of *controlling the system* $\mathbf{x} = \mathbf{Ax} + \mathbf{B}\dot{\mathbf{x}}$ already in the book "Prices and Planning." But this was rather a first acquaintance, indicating that control aroused the interest of the author. He already pointed out there that this important problem required further investigation. The new book now available to readers is a report on how far the author advanced in clarifying this extremely difficult and ramifying subject.

Even the raising of the problem is new and important. As a matter of fact, a *genuine dynamic* model describing the whole of the economic system is rare in the literature of mathematical economics. And even if such models exist they do not comprise – apart from a few exceptions – *"built-in" control.* Since Bródy is among the first who try to cope with this difficult modelling problem, it is understandable that the result of this first approach cannot be satisfactory from every aspect. Exciting, valuable ideas, conjectures pointing in the right direction, and the ensemble of half and quarter-solutions, minor or major errors unfold before our eyes.

Bródy constructs a remarkable abstract model of control and puts it into the centre of his own investigations. The general formulae can be found on p. 94 of the book:

$$-\dot{p}_i/p_i = (x_i - \sum_j a_{ij}x_j - \sum_j b_{ij}\dot{x}_j)/\sum_j b_{ij}x_j \qquad i = 1, \ldots, n \qquad (1)$$

$$\dot{x}_k/x_k = (p_k - \sum_j a_{jk}p_j + \sum_j b_{jk}\dot{p}_j)/\sum_j b_{jk}p_j \qquad k = 1, \ldots, n. \qquad (2)$$

The economic meaning of the formulae is as follows: (1) The relative speed of price decrease is equal to the relative excess supply and (2) the relative speed of the growth of production is equal to the relative profitability. The author calls this type of control *cross-control: the quantities of output and inputs depend on prices and prices depend on the quantities.*

This description of control emphasizes and formalizes some – theoretically important – features of market control through price signals. Equation (2) is, as a matter of fact – as interpreted by the authors of the present review – nothing else but a reformulation of the *budget constraint* asserting itself in the real sphere $\mathbf{x} = \mathbf{Ax} + \mathbf{B}\dot{\mathbf{x}}$ of Bródy. This formula of Bródy expresses that every sector has to cover its ex-

penses from its receipts.* It has no monetary stock, it cannot raise credit, thus it has to cover outlays from receipts at every moment. This is thus a very strict form of the budget constraint. Let us examine formula (2) more closely. The receipt of sector k from current sales is $p_k x_k$, and the profit (or loss) caused by the re- (or de-)valuation of capital owing to price changes is $(\Sigma_j \dot{p}_j b_{jk})x_k$. This total revenue has to be equal to total outlays: the sum of $(\Sigma_j p_j a_{jk})x_k$ outlay on current input and the $\Sigma_j p_j b_{jk})\dot{x}_k$ outlay on expansion. After rearrangement we get again equation (2). We can see that this is not some arbitrary formula constructed by Bródy in a haphazard way, but a characteristic and import interrelation of the classical economic system composed of independently managed units which cover their outlays from sales revenues. The assumptions of Bródy about the real sphere, complemented with the assumption of the budget constraint, that is, with the assumption of strict self-financing asserted at every moment, logically and necessarily leads to formula (2).

Formula (1) similarly expresses a theoretically highly important interrelation: it describes such control of quantities which *relies purely and exclusively on price signals.*

We have to know at the same time that Bródy still describes a very *special* control. Ever since Keynes a growing number of economists have emphasized that in a genuine market economy the control of quantities is much affected – beside price-signals – also by non-price signals, while this is completely neglected in formula (1). Such non-price signals are e.g. informations on the momentary stocks, backlogs of unfilled orders, just arriving new orders, various quantitative expectations regarding the future etc. And if this can be told about market economies (first of all about the capitalist economy, but also about the market spheres of the socialist economy), it *a fortiori* holds for such forms of the socialist economy in which the market mechanism is less or not at all asserted. As regards the latter, the researcher has no option. He *has to* describe the control of the socialist economy in a dynamic mathematical model with the aid of such equations in which the control of production and inputs takes place mainly under the impact of non-price quantitative signals. He is even more entitled – at least in first, rough approach – to quite neglect the impact of prices, than to apply the reversed abstraction and describe quantities reacting on prices.

The above formulae (1) and (2) are highly special also in the respect that they neglect every kind of time lag and show exclusively the simultaneous interaction of prices and quantities.

We do not object that Bródy describes precisely this form of control, not even that he pays almost exclusive attention to this formula (or its variants).** Every author is entitled to narrow down and delimit the scope of analysis performed by him. But, in our view, the author has not given proper orientation to the reader in what respects his formula is *general* and in what respects *special.* He did not provide a survey of the set of different possible, well interpretable types of control, and did not point out the place of his own formulae within this larger set. It would have been useful if he had clarified more exactly how his own abstract model serving for theoretical analysis compares to the control systems empirically observable in various historically realized systems (in earlier and later stages of capitalism, in the different forms of socialism). It seems that formulae (1) and (2) grasp some highly important elements of the operation of a decentralized market relying on price signals; features which prevail, to smaller or greater extent, in every market mechanism. Historically, these features assert themselves most clearly in the classical free-competition capitalism.

Bródy raises quite a few valuable viewpoints in connection with control. Let us emphasize only some of them:

From the viewpoint of the philosophy of science Bródy's attempt to reach the same control

*Of course, Bródy is fully aware of the importance of money stock and credit and discusses them at several places of the book. But his basic model abstracts from them.

**An important exeeption: the control formula recommended by Bródy for stabilization which, with some simplification, might be characterized by saying that prices depend on prices and quantities depend on quantities. That is, instead of "cross-control", "serial-control" prevails.

formulae in three ways is remarkable: as normative theory, descriptive explanation and causal reasoning. Unfortunately, the exactness of implementation is not proportional to the interest of the intention and its methodological importance.

Bródy offers important ideas on the "goodness" of control. It is true that the stability criteria borrowed from the mathematical theory of dynamic systems do not satisfy the economist. It is e.g., not quite reassuring that the state-variables of a system find the equilibrium (normal or desired) path somewhere in infinity, as required by the criterion of assymptotical stability. The criterion suggested by Bródy seems to be workable: *control should orientate well.* This occurs if each of the state variables monotonously approaches the equilibrium value.

On the explanation of the cycle

Although the book touches on many problems of control, the author is preoccupied from this field of problems with the cycle. This is also indicated by the title, where the first word is "cycle". Again Bródy's pioneering role has to be stressed. To our knowledge, he was the first in Hungary to observe the cyclical movements of investment in the socialist economy and published studies on the subject. A thorough empirical analysis of the problem started on his initiative. And now, in his new book, he again undertook the role of the pioneer: he attempts first in Hungary to describe the cyclical movement of the economy with the aid of mathematical models. With this striving he is not alone in the economic literature of the world, though, as a matter of fact, rather few people have tackled the problem as yet. And as regards the contemporary international literature, the cycle does not belong to the "fashionable" subjects of mathematical economics.

Bródy's conjecture is the following' *„cross-control", as has been just reviewed, necessarily leads to cyclical movements.* This form of control is *in itself* capable of explaining the birth of cyclical movement.

Let us be cautious: Bródy does not state that every kind of cyclical movement in every system is produced by this and only this kind of control. The statement is of reversed direction and conditional: *if* control is such, *then* this can itself make the system oscillate.

The conjecture is novel and remarkable. The history of economic thought has already produced many kinds of – complementary or competing – explanations of cycles. Bródy has now enriched the treasury of theory with new ideas. His reasoning touches with the Marxian ideas on the cycle at many points, he has succeeded in formalizing quite a few important Marxian ideas in the scope of the theory of cycles. He can thus justly feel to have made progress also with this book in realizing his "life program".

In the above we have always mentioned *conjecture* and not *theorem.* The following considerations have forced us to use this terminology:

On pp. 17–24 of his book Bródy summarizes with exemplary conciseness and exactitude the six initial assumptions used for the description of the *real* sphere. It is a pity that this rigour does not continue in the description of the *control* sphere. The reasoning flits among the different assumptions. It now speaks about an *n*-sector model, then about a one-sector model, but suggesting that the statements about the latter also hold for the former. This is possible, but is not sure, and at any rate requires strict proof in a formalized reasoning. From the discussion it turns out that the control mechanism described by the formulae (1) and (2) of this book does not, in itself, lead to cyclical movement. A further assumption has to be inserted into the model so as to arrive at a *necessarily cyclical* movement of the system. Such complementary assumption is the formula to be found on p. 120. It is however, mathematically deficient and not well interpretable in economic terms. Thus, precisely the equations on p. 121, describing the laws of cyclical movement are not satisfactorily proven.

The modified model on p. 127 and its mathematical analysis are significant theoretical achievements. The model, even in its highly concise form allows deep insight into the operation of economic systems. Unfortunately, however, the line of reasoning is somewhat defective. We do not see clearly: exactly what assumptions are implied by this modified model in respect of control. Bródy states: ". . . as long as the system remains near the equilibrium path – and, as we know, the path of existing economic systems

cannot be "far" from the equilibrium one – its movement will be characterized by an exponential growth in the value of output, a simultaneous fluctuation in output values and prices and by further superimposed, only approximatively periodical fluctuations in various directions." This is an interesting and important conclusion. But its deduction is not sufficiently clear, precisely the first half of the conclusion, particularly important for the subject, is doubtful. At any rate, this seems to be the track following which clearer and more comforting theoretical results could be reached.

The unsettled state of assumptions about the control sphere leads to the situation that the reader cannot establish under what conditions a statement by Bródy will hold. As a matter of fact, the main task of mathematical-economic analysis as opposed to looser verbal discussion is to make the link between premise and conclusion unambiguous.

In working out the mathematical theory of the cycle Bródy runs against the limits of his own mathematical model. Every model abstracts; nobody can blame the model-builder that he has to abstract from a host of interrelations at this extremely high level of abstraction. The question is always whether some interrelation has not been neglected which has an indispensable role precisely from the aspect of the problem to be investigated.

In verbal reasoning the book often uses the words demand and supply, and calls deviation from equilibrium precisely when there is excess demand or excess supply. But the *ex ante* and the *ex post* variables are not represented by separate variables in the model. In other words, it does not separate demand from actual use, supply from actual production, intention from realization.

Another problem is closely related to this one: the model has only stock *coefficients,* indicating how much is (or would be) needed for production. But there are no stock *variables* in the model. If there is excess supply, this is annihilated in an exogenous manner, and not added to the existing stock. And if there is excess demand, this is somehow covered exogeneously, otherwise the system could no longer function. The problem cannot be solved with a model comprising exclusively flow variables, but only with a stock-flow model. Bródy is not alone facing such difficulty: several other dynamic system models of mathematical economics are similarly one-sided.

It is also problematic that Bródy's model does not distinguish between fixed and circulating capital. As a matter of fact, almost all empirical theories of the cycle agree in that the movement of fixed capital investment has a fundamental role in the explanation of the cycle.

It was not the authors of the present review who perceived these limitations of the model and the difficulties caused by them: Bródy himself frankly and correctly calls attention to them in several places.*

It seems to be an extremely complicated and difficult task to work out the mathematical-economic theory that would explain the main causes and components of the cyclical movement of economic systems in axiomatic form. This is a fortress that cannot be taken by a single assault. The courage with which Bródy set himself to this task almost without antecedents is imposing. He has already succeeded in taking one or two strongholds. We hope he will make himself ever newer attempts and, following his example, others will join the siege and make research into this difficult but highly promising problem.

A few concluding remarks

Similarly to the mood of his earlier books, Bródy does not finish his book where the subject ends but holds out one or two subjects reaching beyond the original scope of the subject. This time we can greet the *modeling of technical progress* as such "extra". He presents an excellent

*From this aspect pp. 146–162 of the book are important where the author transgresses in a sense the limitations of his basic model and analyses the impact of the *gestation* period (implementation of investment) on the cyclical movement. At this place highly interesting statements can be found about the role of accelerating growth and of the starting of investment project; about their formalized representation.

formalizing idea for representing technological changes and, with this, for easing some rigidities of the Leontief–Neumann models, while still remaining near to the original structure of this family of models. The substance of the idea is that, instead of technological coefficients *invariant* in time, he describes technical progress with input-output ratios regularly *changing over time.* In this new model the individual sectors do not develop at identical rates, but at deviating ones – depending on technological changes. The relative proportions of sectors change and so do relative costs and prices. We see great possibilities in the application of this type of model to several fields, in growth theoretical and price theoretical investigations as well in practical planning.

Having reached the end of our comments, the reader would surely like us to qualify Bródy's book according to some scale ("very good", "good", "medium," "poor"). But this is impossible. In the book we find side by side brilliant theoretical achiemevements and theoretical obscurities. There are meticulously elaborated details and rough-and-ready parts. Some lines of reasoning are expounded by the author with exemplary rigour, others are obscured by laxity. He uses mathematical formalism wittily but, at places, in an undisciplined manner. The whole book is penetrated by consistency guiding his whole oeuvre, but, at the same time, we meet with quite a few capricious features. Thorough knowledge of several parts of literature radiates from the book, while he sovereignly neglects several works which are strictly relevant to the subject. Bródy writes in a style full of colour and easy flowing, yet at some places it is difficult to wade through a page.

The typical course of life of the scientific researcher is that with growing age the readiness to innovate declines and the inclination to repeat oneself increases, but also wisdom and thoroughness are growing. Bródy is an exception. This work of his is characterized by the spiritual freshness and extravagance of a teenager.

In the final analysis, "Cycle and control" will present many points of attack to those who look at abstract mathematical-economic theory with suspicion and mistrust. It will irritate everyone who is sensitive to clear ideas and exactness. At the same time, it will provide healthy stimulation to those who are capable of finding in a book mainly what is progressive. Many works are published which contain undebatable but boring truths, Bródy's book towers above others in the literature. Many of his ideas are open to challenge – but they are at least exciting and novel.

J. KORNAI – A. SIMONOVITS

AUGUSZTINOVICS, M. (ed.): *Népgazdasági modellek a távlati tervezésben* (Macroeconomic models in long-term planning.) Budapest, 1979. Közgadasági és Jogi Könyvkiadó. 448 p. [Forthcoming also in English (Akadémiai Kiadó)].

The book is very interesting both for planners and researchers owing to the fact that the authors describe exactly and in great detail, how they applied different models of mathematical economics in long-term planning, what kind of problems and difficulties they encountered, what their experiences and – in a somewhat concise form – their results were. As far as we know, a similar application of mathematical economics in long-term planning took place nowhere else in the world. Therefore, the work of the authors is unique in world literature and provides new information not only for Hungarian, but also for foreign economists.

In connection with the construction of five-year plans mathematical programming models were used already earlier in Hungary. Fifteen-year long-term planning was initiated, however, only in 1968. It was self-evident to try to apply the possibilities provided by mathematical economics in long-term planning. Obviously, other types of models seemed to be applicable in long-term planning than in medium-term planning.

In the *first three chapters* of the book Mária *Augustinovics* discusses the general questions of long-term planning and the conceptual problems related to the use of models. She reviews the difficulties that emerged with the statistical data basis. Long-term planning must necessarily rely more strongly on the statistical data basis than annual and five-year plnning do, as these latter types of planning have to take into consideration, in addition to the statistical data of the last year or of the last years, also the expected economic

results of the remaining part of given year or of the current five-year period and, obviously, there are no statistical data on these results. Therefore, planners are accustomed to estimate themselves the expected data to be used as a basis for the next period. This fact introduces an important element of uncertainity into the plans. In long-term planning this method cannot be used, it is necessary to start from the analysis of a longer past period and to use its statistical data. This, however, encounters the following difficulties: 1. there is no complete harmony between the system of national economic accounts (balances) and the sectoral statistics, like industrial etc. statistics, 2. the statistical data pertaining to particular years are not comparable without further ado, as statistical methods are continuously developed, 3. the system of indicators used in shorter-term planning is not completely identical with the system of statistical indicators, 4. in the long-term planning period new phenomena will play an important role, which were not observed previously by statistics. The long-term planners first tried to form a long-term data basis for 40–40 sectors from the large-size input-output tables of 1959, 1961, 1965 and 1968. But the new national economic accounting (balance) system introduced changes into some important aggregate indicators, which could not be constructed retrospectively from the earlier large-size input-output tables. Therefore the early results of Hungarian input-output statistics, which are very considerable by international comparison, were not utilized in long-term planning. On the other hand the time series of the new national economic accounting (balance) system and of the related small input-output tables were published by the Central Statistical Office retrospectively till 1960 and they are supplemented each year in a comparable form. This is a great step toward slowly developing the data basis necessary for long-term planning.

The authoress provides a summary description of the three types of models used in long-term planning: 1. the long-term SELECTING models, 2. the DYNAMIC models, 3. the LAGGED models. All these models are national economic models with many sectors, they contain intertemporal relations (between investment and production), dynamic constraints (which link the successive values of given activities in the particular years) and they can be optimized. In the practical planning calculations first of all the SELECTING models were used, the others provided mainly methodological lessons and made it possible to analyze further the domain explored by the SELECTING models.

Mária AUGUSTINOVICS points out also the deficiencies of the models. Such is first of all the fact that the development of foreign trade was handled in a very simplified way. Very few foreign trade constraints could be formulated and included into the models; therefore some solutions were unacceptable from the economic point of view. The other deficiency stems from the handling of the social interrelations of economic development: consumption is not disaggregated by social, income and residential groups; in each period only one manpower constraint is included into the models, without disaggregation by qualification and other characteristics; the distribution of personal incomes and their secondary distribution is not included into the model; interrelations between the productive sphere and the non-productive services (education, health, housing) are not adequately elaborated.

She calls attention in a very adequate way to three false illusions connected to modelling: 1. national economic modelling does not mean that long-term planning is realized, in other terms, the high standard modelling performed in some capitalist countries should not be equated to planning, 2. planning does not consist only of modelling, models will never supplement planning as it is done at present, as planning has not only a technology, but also a sociology, 3. modelling does not entail necessarily economies of time and work.

In *Chapters 4* and *5* Mrs. B. *Krekó* (Ildikó Kupa) describes the SELECTING model and the results obtained with it. The first formulation of the model was based on the conception that the development of the particular parts of the national economy would be previously planned in variants, and the task of the model was to select from the variants in a such a way that the structure and the dynamics of the partial variants should not change, only the level of realization should be slightly modfied. For lack of adequate variants, however, the model was not used in this

selecting form. She reviews in a detailed manner the handling of foreign trade. This is really one of the critical points of the model. This is illustrated, e.g., by the result of the model calculations according to which in the export into capitalist countries, it is advantageous to prefer the products of manufacturing, first of all of the engineering industry, instead of the labour and capital-intensive agricultural products. It is clear that the constraints of the model did not take into account adequately the difficulties of exporting into capitalist countries.

In *Chapter 6* Péter *Bod* reviews the DYNAMIC model. It belongs to the family of dynamic input-output planning models with several periods and several technologies. It differs from the SELECTING model in how it conceives the relationship between parts and the total economy. The planning of capacities has a decisive role. The branch variants are considered first of all as development (investment) variants. The model does not change the level of the development variants of the branches, but treats the timing of the investments planned in the branch variants as variables. In other terms, it changes the distribution of investments among the particular periods. The model maximizes objective functions expressing different social preferences, but seeks first of all solutions that optimize consumption.

One of the characteristics of the solutions obtained with the DYNAMIC model is that it reduces in general the investment, i.e. it selects, barring exceptional cases, the solution entailing smaller investment. It also provides a more optimistic view of the future possibilities of satisfying social needs, than the medium variant of the SELECTING model. Also the foreign trade balances measured in physical units are more advantageous than in the solution of the SELECTING model. Summarizing his conclusions Péter Bod considers that it would be possible to construct a programming model combining the advantages of the SELECTING and the DYNAMIC models.

Tivadar *Faur* deals in *Chapter 7* with the LAGGED model. It differs from the previously treated two types of models first of all because it takes into consideration a lag between the investment and its putting into operation. Accordingly, it is composed of one-year periods, instead of five-year ones. The realization of investments (the investment performance) and their putting into operation are stretched to several years. In addition to these relations the model contains product balances of branches, fixed assets balances, foreign trade commodity balances, constraints on the dynamics of consumption and a national economic manpower balance. The problematical point also of this model is the handling of foreign trade. The exports to and the imports from both socialist and capitalist countries have a fixed structure by branches and also the volume can change only in a narrow range. From among the results of the model calculations it ought to be mentioned that the model predicted a setback of both production and consumption in the years 1976–1977, and this influenced the results of the whole first five-year period. From 1980 on an equilibrium is achieved and the national economy develops dynamically.

In *Chapter 8* György *Boda* shows the results of the input-output analysis performed with the input-output tables belonging to the particular macro-variants. He investigates the development of foreign trade. In *Chapter 9* Ferenc *Bánhidi* studies the price-relations of the variants drawn up in terms of volume by means of a price model. He uses the actual prices of 1972 as a basic price system, and calculates the prices proportional to inputs for the following periods. In this way he seeks an answer to the question how much the actual prices of the base period express the inputs. While in the 1970's the main disproportion in the price system was still the undervaluation of agricultural inputs, in the future the undervaluation of services will become the central problem according to the model. In *Chapter 10* Magda *Ács* investigates the development since 1950 by means of the models. In Chapter 11 Katalin *Haraszti* compares the results obtained by the models with the input-output tables of eight capitalist countries.

At least, in the *Annexes,* Ferenc *Pehertz* and Béla *Székely* describe the computerized planning system, Mrs. B. *Krekó* (Ildikó Kupa), Péter *Bod* and Tivadar *Faur* provide a formal description of the decision models. This description is especially useful for those who want to get acquainted more thoroughly with the models. The reviewer can mention only some parts and problems

treated in this book very rich in contents. All the statements of the authors, – those mentioned here and those left unmentioned – would deserve a thorough discussion. Only one deficiency ought to mentioned, which, however, cannot be laid to the account of the authors. Namely the reader gets no information on the utilization of the results of the model calculations in the construction of the actually prepared long-term plan. The obvious reason for this is, however, that the changes of the world economy, unforeseen both in Hungary and in other countries at the time of the model calculations and of the planning exercise, disturbed the long-term plan itself and the whole process of long-term planning. It is clear, however, that long-term planning is necessary. Therefore, the experiences with these models are important contributions to its improvement.

R. ANDORKA

HEGEDÜS, M.–ZALAI, E.: *Fixpont és egyensúly a gazdasági modellekben* (Fixed point and equilibrium in economic models.) Budapest, 1978. Közgazdasági és Jogi Könyvkiadó. 400 p.

Miklós *Hegedüs* and Ernő *Zalai* have written one of the most significant Hungarian works in the field of mathematical economics.

The book consists of two parts. The first part, whose author is Ernő Zalai, discusses the major models of general equilibrium theory playing a central role in mathematical economics. The presentation of this fundamental theory to Hungarian readers is timely in every respect. One must not and cannot discuss seriously the equilibrium theory, either in Hungary or abroad, without an exact knowledge of its mathematical models. At the same time just in order to avoid unnecessary controversies it is a useful attempt of the author that by presenting the possibilities and limitations of the general equilibrium theory and also giving its historical and critical analysis, he points out its place in economics. The second part of the book – written by Miklós Hegedüs – discusses the fixed point theorems, a technique which plays a central role in the mathematical apparatus of the equilibrium theory. Besides presenting to the reader the basic mathematical principles and theorems, it is at the same time a monograph of pioneering character. It was a good idea to publish in one book two works which are significant by themselves. An understanding of the first part is aided by the second part and the abstract theorems of the second part are applied in the first part. This complementary character also provided a criterion to select in the literature of these two fields running into several volumes, which topics should be treated in the book and which ones should be omitted. Thus, the first part deals only with the existence of equilibrium, and questions of unicity, stability and comparative statistical analysis are missing. Among the fixed point thorems we cannot find for example the *Eilenberg–Montgomery* theorem and the theorems concerning ordered spaces. In respect of both topics and the manner of discussion the two parts reflect a uniform approach.

The part *"Models of economic equilibrium"* consists of three chapters. In the first one the author presents, through the description of an abstract economy, the basic principles of the general equilibrium theory. A detailed description is provided of the underlying abstractions and their economic implications. A description of static and deterministic basic assumptions is useful by all means, since their understanding is indispensable to grasp the most recent trends in the development of the theory. Further, the author analyses assumptions of the stationary growth models which discuss specific partial problems, then he presents models playing important role in the historical development of the equilibrium theory. The chapter ends with two rather valuable analyses: we can become acquainted with the connection between equilibrium and fixed points as well as with the conditions for the existence of the equilibrium illustrated with suggestive graphs. It is here that the close interdependence of convex analysis and the equilibrium theory becomes understandable. At the same time a detailed analysis of the economic implications of additional assumptions is necessary to explore the limitations of the models.

The second chapter requires more serious mathematical knowledge, before reading it, it is advisable to get acquainted with the first chapter the author proves first the existence of an equilibrium state of the *Walras–Wald–Kuhn* model

making use of the fixed point theorem of *Kakutani.* After this we get acquainted with the Fundamental theorem associated with names of *Gale, Debreau,* and *Nikaido* and with the relationship between the Fundamental thorem and *Brouwer*'s fixed point theorem according to Uzawa. Further on the chapter contains the major steps included in proving the existence of equilibrium in case of a simplified, so-called model economy. With the help of the technique presented here the author proves the equilibrium of the *Arrow–Debreu* model under the original conditions of Arrow and Debreu and the *McKenzie*-type resource-relatedness. In the remaining part of the chapter he proves the solvability of *Gale*'s, *Leontief*'s, and *Samuelson–Solow*'s growth models.

The third chapter contains specific applications of equilibrium analyses. Through coupling analyses made by *Morishima* and *Bródy* we learn the equilibrium theory implications of the Marxian theory of value and reproduction. The programming models of national economic planning also turn out to be rather closely related to the general equilibrium theory. Finally, in connection with a famous theorem of Arrow we can read about the connection between efficiency and equilibrium. This chapter and primarily its first two parts may claim the attention also of readers well acquainted with the literature on equilibrium theory.

The first chapter of the second part of the book discusses the fixed point theorems of the n-dimensional Euclidean space. First we get acquainted with the one-dimensional variants of the major theorems, illustrated with suggestive graphs. In view of didactics it is especially valuable that proofs underlying later generalizations are presented here in a way that contains simplified versions of more complicated proofs. In this chapter the reader can get acquainted with the structure of the n-dimensional vector space, *Minkowski*'s functional and the *Knaster–Kuratowski–Mazurkievicz* proof of the *Brouwer*-theorem. Further useful and interesting definitions are given for the distance between sets, the *Hausdorff*-metrics is presented and on its basis the continuity characteristics of point-to-set mappings are analysed in detail and various aspects. The chapter ends with the proof of Kakutani's, Neumann's and *Ky Fan*'s theorems.

In the second chapter the author discusses first the basic principles of metric and *Banach* spaces. Through the theorems of *Hausdorff, Cantor, Borel,* and *Riesz* he characterizes in detail the compact sets of metric spaces. The reader can get acquainted with the generalizations of the theorems in the first chapter; with the first and second theorems of *Schauder;* with the theorems of *Bohnenblust,* and *Karlin;* with the condensation theorem of *Sadovski.* In this chapter one can find *Tichonov*'s ,Kakutani's and Ky Fan's fixed point theorems for locally convex topologic a vector spaces, too. Their proof for normed linear space preserves the original line of reasoning. I think after the basic principles of locally convex topological vector spaces are introduced, the presentation of original proofs would not have meant a great increase in space but much more in contents. The second point contains an exhaustive description of the *Banach–Cacciopoli* principle. The generalization of the contraction-concept is rather witty and so is the detailed characterization of theorems providing an efficient tool for finding the fixed point and proving its existence and unicity. We can also learn theorems relating to point-to-set mappings, local contractions and contractive mappings as well as to the joint fixed point of these mappings. The chapter ends with theorems of Ryll–Nardzewski and Krasnoselski.

Of the theorems presented in the second part, several ones have been applied in mathematical economics, besides Brouwer's and Kakutani's theorems. A wider application is hoped to be promoted by the present work of Miklós Hegedüs and Ernő Zalai. In the end of the book the interested reader can find an extensive bibliography. It is regrettable however, that orientation is not aided by an index of subjects and names.

L. LŐVEI

PÁRNICZKY, G.: *A statisztikai informatika alapjai* (Foundations of statistical informatics.) Budapest, 1977. Statisztikai Kiadó. 190 p.

Gábor *Párniczky*'s book was published in the series "Library of Modern Informatics". This time the publisher has chosen well, the book

approaches its topic in fact in a modern manner, with an attitude corresponding to the latest standards of our days concentrating on the most important problems without unnecessary digressions.

In the first few chapters the author discusses those main basic principles which are important for statistical informatics, further those theorems and proofs the detailed examination of which is inevitable in order to understand the subsequent chapters and to ensure practical application, too. It is a useful methodological principle helping understanding in many cases and permeating the whole book that a great number of concrete, practical examples are to be found concerning the given topic whenever it comes to theoretical expositions.

The foundations of statistical informatics are constituted by concepts of set theory, various operations on sets and the algebra of logical variables. It is indispensable to know these fields in order to be able to build up consciously the solution when faced with a problem and to try to implement the most adequate method by relying on solid theoretical and logical foundations instead of intuitive methods.

Similarly to the basic principles of set theory and the elementary operations on sets the author devotes in his book much space to the algebra of logical variables and to operations with logical variables since the Boolean-algebra of logical variables is the principle foundation of the operation of statistical information systems. Here operations and concepts well known from set algebra in connection with Boolean-algebra and the associated algebraic operations are discussed: commutativity, associativity, operations with one variable, idempotent matrix, absorption, De Morgan's rules. The characteristics of all these operations are discussed in the book together with their counterpart in set algebra, pointing out identities and those advantages which are associated with the introduction of logical quantifiers in the operation on sets. Also further earlier not mentioned operations of Boolean-algebra are reviewed, which play an essential role in informatics: symmetrical differences, implication, mutual implication, Sheffer-type operations.

The second chapter clarifies precisely the relationship between set algebra and Boolean-algebra, acquainting the reader with the abstract postulates and the system of axioms of Boolean algebra as well as with concrete Boolean-algebras and the concept of isomorphism.

In the exposition of the characteristics of Boolean-algebra generated by the "atoms" of the set and of the logical function one can see, also illustrated, by an example, how a nomenclature system can be drawn up which is adequate also from the viewpoint of statistical informatics. The isomorphism of Boolean algebras is another important question, according to which two Boolean algebras are regarded as isomorph it an unambiguous and operation-keeping correspondence can be established between them.

At the end of the chapter the author discusses in detail an important Boole-algebra the judgment algebra. Naturally, judgment algebra is important first of all in formal logic, here only those characteristics are mentioned which are significant for our topic, of operations of judgment algebra and logical quantifiers. At the end of the chapter a brief description of switch algebra is to be found which plays an outstanding role in the functioning of computers, which can also be connected with the theoretical foundations of Boolean-algebra. This chapter ends with the description of the elements of switch algebras, thus of gate circuits and binary summing circuits.

"When handling statistical data and drawing up processing plans it is especially important to be familiar with the elements of relation and graph-theory. Elaboration of a classification system, creation of conceptual systems, and information structures is rather complicated and too labour consuming without a theoretical model, purely on empirical basis. When familiar with relations and graphs the complicated tasks are easy to solve." – writes Gábor Párniczky in the introduction to the third chapter. That part of the book is rather important also for practical reasons in which the author explains, relying on the foundations of Boolean-algebra and the set theory, the questions of relations and graph theories and the fields of their applications. After the operations, the homogeneous relations are discussed, the book deals with special formations that can be assigned to homogeneous relations, the graphs. He presents the major characteristics of the graphs, the methods of road enumeration

and road finding, the examination of accessibility and transitive closing. Finally one can find a description of guided trees which are of outstanding significance among graphs.

The fourth chapter deals with the theory of formalized languages and formalized grammars, further with the connection between formalized languages and automats, with various types of automats, automats of finite state understanding non-deterministic and regular languages.

The fifth chapter of the book which discusses automatic classification is perhaps the most interesting one in many respects. It is at any rate the most pioneering part of the book since the methodology of automatic classification – cluster analysis – has not yet been available in Hungarian. As a matter of fact, we have here a method which has been applied already for years – at least abroad – and which is able to provide very valuable help when analysing various social science problems.

The automatic – or in other words taxonomic – classification is a relatively "objective" method. Contrary to the traditional grouping methods here an algorithm provides the various groups along the dimensions included in the analysis. Naturally, this does not mean that the knowledge of reality of specialists in the field is not required here, since the selection of dimensions, the qualities – according to which the groups are being formed – remains their task also in the future. At the same time, this method is able in fact to generate a more objective classification since in the heterogeneous set it is rather difficult to separate adequately the elements "near" to or "far" from each other, in the traditional manner. The method of automatic classification performs this on the basis of strict mathematical conditions.

The sixth and at the same time the last chapter of the book analyses the connections between logical and physical data structures, the data storing systems and the connected problems of code construction and code control.

Finally it has to be said about the book that it belongs to those rare works which discuss clearly and understandably difficult theoretical and frequently rather complicated problems. Besides, it looks suitable to function both as a university textbook and as a practical "manual". In the introduction the author writes: "I have written this book for statisticians and economists interested in informatics and computing techniques. For these specialists today an abundant and high quality literature is available which discuss the functioning of computers and the rules of programming. To my knowledge, however, a work discussing the theoretical foundations of informatics is still missing." This work – of high quality at that – is no longer missing from our literature in Hungarian.

J. UJVÁRI

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*We acknowledge the receipt of the enlisted books. No obligation to review them is involved.

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AUTHORS

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Dr. Rudolf ANDORKA, b. 1931. Cand. of Sociological Sci. Head of department at the Hungarian Central Statistical Office. Author of "Determinants of fertility in advanced societies" London, 1978. Methuen and Co., "Long-term social development of Hungary, measured by social indicators" Social Indicators Research, 1980. Vol. 8, No. 1, and co-author of "Socio-occupational mobility in Hungary and Poland" Warszawa, 1980. The Polish Academy of Sciences, Institute of Philosophy and Sociology.

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Dr. György MESZÉNA, b. 1931. Head of section at the Institute of Mathematics and Computer Science of the Karl Marx University of Economics, formerly research worker at the Institute for Nucleus Research, Hung. Acad. Sci. Author of several books in English, German, Russian and Hungarian on auto-regressive analysis, a multi-stage stochastic inventory model, economic risk and its measuring methods, probability theory and mathematical statistics and other studies.

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Dr. Margit ZIERMANN, b. 1924. Cand. of Mathem. Sci. Head of the econometric section of the Hungarian National Planning Office. Author and co-author of "Bibliography on time series and stochastic processes" 1965 with A. Rényi, studies on probability theory and mathematical statistics, stochastic processes etc. in English and Hungarian.

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