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on the occasion of his 70th birthday*

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markets, crises, and our models

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on the position of central banks

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Essay

CHANGES IN FINANCIAL EDUCATION OVER THE LAST 50 YEARS

An interview with János Száz on the occasion of his 70th birthday

Ágnes Vidovics-Dancs¹



Á. V-D.: The interview published in the last issue of *Public Finance Quarterly* mentioned the International Training Centre for Bankers, the Budapest Stock Exchange, and the National Bank of Hungary, but relatively little was said about the university, specifically about the University of Economics, where you have been climbing the stairs every day for 52 years, since 1971. What has been the biggest change at the university over this period?

¹ *Ágnes Vidovics-Dancs* associate professor, Corvinus University of Budapest, director of the Economic and Financial Mathematical Analysis (undivided master-degree) Program. E-mail: agnes.dancs@uni-corvinus.hu.

J. Sz.: I really prefer climbing the stairs to using the lifts. I am planning to continue teaching my subjects as a professor emeritus in the *Numerical Finance* subject series. There were no similar subjects at the University of Economics in the 1970s, either in Hungary or other countries. But, of course, this is far from the biggest change. It is probably more important that *short Power Point-type notes have replaced textbooks*, and the role of the library has largely been taken over by the *Internet*.

I think the problem with this is that, despite the fact that pieces of information have become quickly and easily available, carrying out research on the Internet does not replace the slow and tedious work that allows you to see the structure as a whole and delve into the details at the same time. In spite of being able to find the meaning of certain combinations of letters and desirable threshold values in my lab results on the Internet within minutes, I have not become a qualified doctor who can see the relationships. There is no royal road to mathematics either.

Another significant change is that more and more *spoilt* generations sit in the classrooms (the reasons for this have deep roots, and it is not sure that this trend makes life easier for today's children). - On the contrary, it is good if they sit in the classroom at all and do not work somewhere for 6-8 hours a day, already from the first year. This working lifestyle is often against in-depth, focused learning. The world has opened up for students, there are plenty of opportunities. I think this is clearly positive, but it does not make the life of today's young people easier either.

A few years ago, I met one of my students at breakfast in a hotel's restaurant in Brussels. She told me that she interpreted every Tuesday in Brussels. Punctually at 9:40 a.m. the next day, she was sitting in my seminar. Just like on Wednesdays of the following weeks. With the difference that I did not have to fly to Brussels every Tuesday.

The world has expanded. I taught with some of my colleagues in Mexico a few years ago. One morning, I read an email request sent from New Zealand by one of my students. A few weeks later, we were both sitting in computer laboratory No. 250 in Fővám Square. It seems that professors and their students can occasionally have quite a long distance between each other.

Á. V-D.: In 1971, you became a national economic planning analysis major, specialising in calculus for business and economics, which was the successor of the former mathematics for planning course at the time. Later, you yourself became one of the main organizers of financial education, introducing topics and founding workshops. How did it all start? Why education and finance?

J. Sz.: Both my parents and my sister graduated from the University of Economics as teachers of accounting. However, it was not enough for me to consider apply-

ing to the University of Economics. The decisive incentive was when I obtained professor *Denkinger's* textbook entitled *Probability Theory* when I was an eighth grader, and I really liked it. Moreover, I wondered what it would be like teaching maths at the University of Economics. As a result, I already applied to an academic grammar school with mathematics specialization, even though the subject called arithmetic had not attracted me at all previously.

When I was a university student, I taught programming at the Department of Information Technology from 1974. Imre Kiss, who had a very good sense of humour, was the head of that department. One of his famous sayings, which I sometimes crack as a joke, was the following: “*I was born 10 minutes later, and I have not been able to make up for it since then...*”. Another saying of his often comes to mind, as well: “*If there is a huge mess in the yard of the ironworks in Csepel, it may be easier and faster to manufacture an iron pipe again than finding it.*” I have rewritten quite a few programmes, because I was not able to find the previous version... The first student I discovered was *Juli Király*, who was still a freshman at the time. She also gave a great short lecture on the block diagrams of Leibniz. But that happened about 50 years ago.

Finance was not my own choice. *István Hagelmayer* invited me to the Department of Finance, therefore I ended up teaching financial mathematical models with *Márti Sulyok Pap*. It was the idea of *Kálmán Szabó*, who was the rector of the university in the mid-1960s), that the departments should also employ students who graduated as mathematics for planning majors to promote the integration of mathematical applications into several branches of education. That was how Márti got to the Department of Finance - and I joined her as an apprentice a few years later.

At that time, nobody mentioned *bond pricing* or *option pricing* (because Black and Scholes's significant article, which laid the foundation for this topic and has become world famous, was only then accepted for publication with great difficulty by an American journal. And the journal accepted it only due to the intervention of a Nobel laureate. Even in America, it was only a decade later that they began to realize the importance of the topic.) In the beginning, Márti and I taught *profit maximization* models and, among other things, the *Balance of Cash-Flow Relations* (BCR) created by *Mária Augusztinovics*. This was a financial application of Leontyev's *input-output analysis*: summarising the essence of the *credit money system* in a multi-sector model. Mathematically, it was a standard model - and in those decades, every student at the University of Economics had to study 4 semesters of mathematics: analysis, probability theory, linear algebra and operations research (linear programming). Therefore, it was a basic task of the university exam to calculate how much gross output each sector had to produce for a given

amount of net output, taking into account the consumption of each sector (input-output analysis). The BCR's financial interpretation was even bolder at that time. The Soviets and the Bulgarians were still taught, following *Marx*, that money was gold, and banknotes were only its substitutes. At the Department of Finance headed by *Miklós Riesz*, there was no question that the forint was *credit money* – i.e. it was generated by granting loans (or buying foreign currency) by banks and ended with the repayment of the loan. In the middle of the socialist era, claiming that socialist money is created out of nothing (with an accounting operation) and has no gold cover behind it...

Well, it was one of the things in which Hungary was far ahead of the other countries of the socialist block. At the university (then known as the Karl Marx University of Economics - MKKE), subjects like

- (the deeply undervalued) *political economy*,
- a subject called the *History of Economic Theories* taught by professor *Antal Mátyás*, where in essence, we learned about the essential basic concepts and connections of modern economics, in addition to *Smith*, *Ricardo*, *Keynes* and *Friedman*,
- and *Finance*, which was absolutely modern in terms of macrofinance, coexisted peacefully.

Due to his pragmatism, finance was highly respected within the university. Primarily thanks to István Hagelmayer, Miklós Riesz, *Tamás Bácskai*, *Tamás Bánfi*, but perhaps also to the nature of the topic. There were three significant financial workshops in Hungary at the time: the *National Bank of Hungary*, the *Financial Research Plc.* led by Hagelmayer, and the *Department of Finance*. The prestige of the National Bank of Hungary abroad was also significant compared to the size of the country. After the Soviets' adventure in Afghanistan, only the National Bank of Hungary was able to obtain foreign loans in the Eastern bloc.

I will never forget that when the arbitration department led by *Imre Boros* received a brand new dealing room, from which they managed the centralised foreign exchange transactions of the National Bank of Hungary (and thus those of the entire country), the National Bank of Hungary's currency trading partners came to the handover ceremony from London, Zurich, Frankfurt, and by a special charter flight from New York, *János Fekete*, the Vice President of the National Bank of Hungary, concluded his toast on the eve of 7 November with the following sentence: "*Let us toast to the anniversary of the victory of the Great October Socialist Revolution!*" The initial shock was replaced by general grin, and the bankers who came here drank heavily. Budapest was a special place on this occasion. These international bankers rarely visited places where 7 November was

celebrated, and where they went, it would have been considered the worst joke to drink to that event.

Well, that is where we started.

Later, “*the planning office was replaced by the stock exchange*”. In university mathematics education, this would have meant that the emphasis would be shifted from matrix calculus to probability theory and stochastic processes. At least this should have happened, if mathematics and statistics education had not shrunk to a third or a quarter due to the pressure of the college lobby (and to the Western „best practice” business school models) during the transition to the Bologna system. Not only did mathematics and statistics education have a long tradition at the University of Economics, but the legal predecessor of the MKKE had a pioneering role at the European level, as well.²

The static, multi-sector equilibrium calculations of socialist planning were replaced by the need for dynamic stochastic analysis – if only for the purpose of the simplest stock price analysis. The foundations of this disappeared from domestic higher economics education during the transition to the Bologna system. Clicking on the icons of today’s trendy data analysis software (Big data, machine learning) does not replace this method at all. There would be an even greater need for a more thorough understanding right now.

Á. V-D.: For nearly 5 decades, the university, and within that teaching finance, has been the axis of your professional activity without interruption. But there were also longer and shorter detours: National Bank of Hungary, International Training Centre for Bankers, Training Centre for Brokers, the stock exchange, a six-month IMF course in Washington, and an honorary professorship at the University of Cluj Napoca. In addition, you are the author/co-author of several textbooks and professional books. Was there any connection between your writings and your roles outside the university?

J. Sz.: Yes, there definitely was. But this was mostly realised later, with a long delay.

I wrote my thesis on *stochastic processes* under the supervision Margit Ziermann in 1976. It did not include an iota of finance. The fact that I got into the Department of Finance made it seem like an unnecessary dead end. Then, nearly a decade and

² Károly Jordán started teaching probability theory at the legal predecessor of our university in 1920. It was unique as an independent subject in economic education, all over Europe at the time. “There was no country other than Hungary in continental Europe, where there was systematic teaching of probability and statistics as early as 1920.” In: https://link.springer.com/chapter/10.1007%2F978-1-4613-0179-0_63 (encyclopediaofmath.org.)

a half later, I started dealing with options and the analysis of the value change of stock portfolios - an activity that required exactly this kind of math. Later, when analysing extremely large price changes, I found the stochastic process (Poisson process) on which I wrote my thesis. Until 1975, I did computer simulations, not on stock market data, but on the breakdown and repair data of the blue buses in Budapest. *Gábor Kepecs*, with whom we examined the statistical data of buses, attended the same course two years below me. Gábor and I sat together on the stock exchange board 15 years later, and then he was the Eastern European executive of *Aegon* for a long time. The insurance profession is also about stochastic processes, and the Poisson process is a good entry into this field, as well.

Looking back, the biggest benefit of the six-month IMF course for me was that it was a *project-based course*: We had to create a financial program for Kenya in groups of 12 people, based on the same data and perspectives the IMF delegation was working on in Nairobi. The participants of our course were various central bank and finance ministry officials from 36 countries - it was a real-life project. Today, the management of the university expects this kind of innovative courses, which I had a taste of 35 years ago, from the university lecturers (as opposed to simple lectures).

Á. V-D.: Together with Tamás Bánfi and Márta Sulyok Pap, you were the authors of the book entitled „The bond” in 1986, which was the first book written by Hungarian authors about securities and the stock market after a break of nearly 40 years.

J. Sz.: Yes, today this book is considered to be a literary rarity in this respect.

After a course on the London stock exchange (LIFFE) in 1982 and based on my subsequent readings in this field, it was relatively easy for me to write chapters on the *securities arithmetic*. The difficulty was caused by the calculation of bond yields. Today, calculating the internal rate of return from the exchange rate and the bond's cash flow requires only entering the three letters *IRR()* in EXCEL. At the time when the book was written, EXCEL did not exist, and still printed tables were used for market bond trading, even in America. In Hungary, everyone tried to calculate something, but even the professional weekly at the time published exchange rates and yields based on the wrong algorithm. For want of a better computer, a Commodore 64 computer (brought from Western tourist trips) was needed for the calculation, which in principle had a memory of 64 K, of which 38 KB was available for the programmer.³ However, in order to use it, you had to be

³ Today, a single phone photo requires approx. a hundred times more storage space if it is only 3-4 MB in size.

able to program and know some numerical approximation method (e.g. Newton's method of tangent), which, if you applied it, you were one of the very few who could calculate bond yields. There were no electronic databases, everything had to be typed on paper into the C64, once you found the data source...

Our knowledge in this field proved to be a good source of income for a while: we constituted the *Portfolio Specialist Team*, within the small cooperative called *Economix*, which operated within the university. We were the first financial consulting company in Hungary. If we had continued our activities in this direction, we could have made a nice fortune. But we had more exciting challenges. Márti, Tamás Bánfi and me as a trio have done several things together since then. Among other things, new subjects, specializations and majors have been created due to our cooperation over the years. The first really far-reaching project was the organization of the International Training Centre for Bankers. *Erzsébet Könczöl*, who also taught at the university, but with a significant corporate background behind her, joined us, as well.

Á. V-D.: You were the first professional director and later the president of the International Training Centre for Bankers for many years. Are you still teaching here?

J. Sz.: The International Training Centre for Bankers was established in 1988, in the framework of a World Bank project, from the cooperation of nearly 3 dozen banks (including 6 large banks). It was the first such institution in Central and Eastern Europe. This project belonged to *Judit Tóth* at the National Bank of Hungary.

Currently, the International Training Centre for Bankers operates not only as an educational institution, but also as a consulting company. Degree programmes, such as CEFA, are still in demand today. CEFA is a *European investment analysis degree*: with independent modules such as *bonds, equity analysis, options, securities law, monetary policy, accounting analysis, corporate finance*, etc. This degree is the European rival of the American *CFA*, but not only in Europe, but also in Japan, China, and South America, more and more potential employees of the investment and risk management market are obtaining it.

It is a great pleasure for me to meet a new class again this year, and together we will be able to unravel the mysteries of stochastic dynamics, without which there is no financial risk management.

The C64, on the other hand, keeps its price well: for the price you can buy it today (but it is a rarity), you can buy a brand new 5 GB computer with a 500 GB hard drive!

Á. V-D.: 49 years in education. A very long period. What has been the most beautiful moment, if you can highlight one at all? Have you ever thought about quitting?

J. Sz.: I do not consider it to be long, actually. Even recently, I have regarded myself a beginner in many ways. It is enough to mention the weeks when we suddenly had to cope with online education due to Covid a few years ago. We had no idea on Wednesday that we would be teaching outside the classroom for a long time. We did not have much time to acquire the secrets of *Teams*. The biggest challenge was the organisation of fair and meaningful exams under the new conditions.

I did not think that I would exchange the university chair for anything. I received very appealing offers, but I said no even to the position of vice-president of the National Bank of Hungary light-heartedly.

Only once has it happened to me that after an hour and a half I realised that “Jesus Christ, I have to teach for another 2 hours...” It was a very bad feeling. Thank God, I always have the opposite feeling: the class is over and I have not gotten to the end of the material yet... But what should I do when finance is so colourful and diverse? And now, not only one of my classes, but also my career as a full-time professor is over, but the situation is the same: I do not feel like I have reached the end. My last book could have been written better, with different highlights, in a different structure...

There are always interested, smart and enthusiastic students. You just have to find them in time and help them by creating certain „fast tracks”. Such fast tracks are colleges for advanced studies, but also the *SPM program*, for example, which is an abbreviation of the name *Special Finance Mathematics*, and otherwise, the monogram of Márty Sulyok Pap, who died early, and with whom financial mathematics education began at the University of Economics. However, the *GPME* (a 5-year program in economic and financial analysis, also known as undivided training) offers unique opportunities for ambitious students. In today’s conditions, this corresponds to the once-legendary planning mathematics major.

Á. V-D.: Many students like you, but lately, there seem to be more people who think your lectures are too rhapsodic.

J. Sz.: It is partly true. Well, those who prefer linear trains of thought, where we get from A to B step-by-step, should read my textbooks instead of listening to my lectures. In the classroom, I assume that they have already learnt certain things from previous subjects and read the textbook. In class, our task is to connect things that seem far apart but are actually close or identical. For example, the T-product in finance, is a homogeneous diff. equation in differential equations. But for this, you need to know what the T-product is and what the homogeneous and

inhomogeneous diff. equations are. If you do not have the pieces of the puzzle, you cannot put together the picture.

The other thing is that taking notes has gone out of fashion. Based on our own notes, we followed e.g. the trains of thought a one and a half hour lecture by *Iván Berend T.* Power Point notes which are handed out make this unnecessary. Recently, I taught a group of French students, and none of the 20 students had a pen or pencil to sign the attendance register.) But, the most important is **what the brain of each generation is hooked on**. Let me quote *Tamás Vekerdy*:

“By the time 3,5-year-old children are taken to kindergarten, many of them can no longer listen to fairy tales.

They simply cannot pay attention to them, they are not interested - because until that age, they had only been watching fairy tales. Or video clips. Or commercials. These tickle the surface of the brain quickly, in a vibrating way, therefore, the children could not even get to know the experience of lowering themselves into the world under the crust (like in a well) or into the world of images of the right hemisphere, where the flow of successive images evoked by the story they listened to causes pleasure. We have moved the experience out of the regions below the cortex to the surface of the cortex, that is, it no longer means presence and immersion that mobilizes emotions, but only the visual, intellectual monitoring of constantly changing stimuli. At this level, only brief impressions can be grasped, and if these do not change with sufficient speed, they become uninteresting because there is no empathy in the experience. And if children get used to this constant scratching on the surface of the brain, then this is what they need all the time. Then they are no longer able to listen to a story attentively, they constantly demand only fast flashing video clips, because they long for this intense stimulation. If they do not get it, they will get bored. However, those three-, four-, or five-year-old children who are not spoiled in this respect can play the same infinitely simple game with pleasure for an impressively long time: for example, they climb up a sandy hillside and slide down. They climb up, they slide down. When I, the adult, - perhaps incorrectly - tell them: “You have already slipped five times, it is enough. Your clothes will be dirty! What do you already look like?!” After all, this is the perfect pastime for a child!”⁴

At university, they should be able to listen to stories about the characteristic function of normal distribution. They should imagine. Then play with it with pleasure.

My classes can provide students with quite a *retro* experience. Their mobile cannot even be on the desk, so that they will not be able to pick up the phone and go out to make calls during class... In fact, I do not ask more from them than any cinema

4 DR. TAMÁS VEKERDY (2017): Belső szabadság [Inner freedom]. Budapest: Kulcslyuk, http://bit.ly/belso_szabadsag.

or theatre asks. Students do not come to a class to wait for me until I have read and answered my e-mails during the lecture. My favourite computer laboratory has a glass bookcase in the background. Therefore, I can see all the screens. And the students know that I can. You can work in this way. (The university also has long computer labs with glass walls. Walking down the hall, I sometimes see as many different screenshots as there are students sitting inside. Only the poor teacher speaking in front of the class cannot see what anyone from the outside can.)

I really want to give my students the same experience that teacher *Peták's* math classes at Verseggy High School gave in Szolnok 50 years ago: how can we figure out step by step how to solve a specific construction task? By focusing on the given task. I have never seen Federer using his mobile while serving. But not even when they sit down for 1-2 minutes to have a rest. Even though they can play tennis with one hand...

In the case of geometrical construction tasks, it was important to realize that what we did was correct. Nowadays, how to *convince* someone of something (e.g., to buy this or that) plays a much bigger role in business education than how to *convince* them of the fact that our statement or argument (e.g., our geometrical construction) is correct. In the 1940s, my parents as would-be accountancy teachers, studied mathematics for 10 semesters. Two of these semesters were about geometry. Obviously, it was not decided on the basis of similar triangles whether an item to be accounted should go to the asset or liability side. However, the goal was to acquire the ability to express and prove things clearly. They studied from *Farkas Heller* for three semesters: *Economics, Finance, History of Economic Theories*. None of these is directly required for accounting tasks. But these subjects make the university a university. Proving is badly needed in today's business education.

At the end of the 1970s, the University of Economics had 40 students in finance: 20 of them majored in corporate finance, 20 in macrofinance. According to the current regulations, these numbers do not reach the minimum required to start the course. In view of such low numbers, 5 students entered Tamás Bánfi's Theory of Finance exam at 8 a.m. and they left at 12:30 p.m. Until that time, they had to argue for and against certain statements – and to listen to the others and react to them. Nowadays, there are very few oral exams. Lectures could only be given in a suit. Today, some instructors appear in shorts in the final exam. On the other hand, for the graduation ceremony, everyone dresses up in black ceremonial uniforms rented from clothes rental companies and takes pictures in square caps, much to the delight of the parents.

Á. V-D.: Who do you consider to be the most influential domestic financial economists from the past decades?

J. Sz.: More than 30 years ago, Hungary was the first country to have a two-level banking system, a stock exchange, an International Training Centre for Bankers and a Training Centre for Brokers. We were the first to become members of international professional organizations such as the *European Federation of Financial Analysts Societies (EFFAS)* or *CEMS* (association of business schools of European universities). Owing to the former, it is possible to obtain an international degree valid in 30 countries here, in Hungary, and through the latter, several thousands of our students have already had the opportunity to study for a semester at the most prestigious European business schools. All this did not happen overnight, as a kind of velvet revolution. István Hagelmayer already wrote about the need for a two-tier banking system at the end of the 1960s. The responsibility and influence of good teachers is enormous. We heard this in *Katalin Karikó's* heartfelt commemoration, in which she recalled the teachers who started her career. Another influential name that is hardly ever mentioned today is Miklós Riesz. What he taught determined the views of many economists who have made a brilliant career since then. Therefore his influence, if not directly referenced in footnotes, is still clearly perceptible to the initiated eye. Like a warming sunray filtered by the foliage of trees.

NAVIGARE NECESSE EST: MARKETS, CRISES, AND OUR MODELS¹

István P. Székely²

ABSTRACT

The events of the past decade and a half have posed unprecedented challenges to macroeconomic policymaking. Modern policymaking has long been relying on a spectrum of models both at national and supranational levels. However, none of the standard models have predicted any of the major crises of the past decade and a half, nor could they capture the dynamics of the ensuing readjustment processes well. In general, standard workhorse models make several assumptions that may not hold in the economies they are applied to. Moreover, they perform particularly poorly during crisis episodes. This short article reviews the issues surrounding these models and proposes a simple modelling strategy to be applied in the face of such large model uncertainty.

JEL codes: E10, E17, E27, E47

Keywords: macroeconomic, models, model misspecification, crises

1 INTRODUCTION

“We rely on past regularities to understand the distribution of shocks we are likely to face, how they will transmit through the economy, and how policies can best respond to them. But if we are in a new age, past regularities may no longer be a good guide for how the economy works.”

Christine Lagarde (2023)

The events of the past decade and a half have posed unprecedented challenges to economic policymaking. First, the global financial crisis hit. It originated in the US financial system but quickly spread to Europe because of a massive failure of

1 The views expressed are solely those of the author and do not necessarily represent the official views of the European Commission. The author would like to thank János Szász, Júlia Király, and other participants of the conference held at the International Banking School in Budapest on 1 June 2023, for their helpful comments. Any remaining errors are the sole responsibility of the author.

2 István P. Székely, European Commission and Corvinus University of Budapest. E-mail: Istvan-Pal.SZEKELY@ec.europa.eu.

corporate governance in many European banks. It was followed by a sovereign credit crisis in Europe, which besides a policy coordination failure reflected a fundamental change of views on the growth potential of some European economies (*Van den Noord–Székely, 2011, Costello et al., 2009*).

In the background, much less visible for most, major reforms were reversed in some of the former command economies in Central and Eastern European countries, not predicted by any of the standard political economy models (*Székely–Ward–Warmedinger, 2018*).

As the European economy was settling on a moderate path of recovery, the prospect and eventually the reality of Brexit emerged, fundamentally testing again the capacity of our models to predict such major events and the way their impacts unfold. Finally, the COVID-19 pandemic triggered a major global crisis. It was soon followed by an energy crisis triggered by the Russian war of aggression in Ukraine and the subsequent globally imposed economic sanctions against Russia. After a long period of low (below target) inflation, high inflation is back, testing the models central banks use to formulate their policy responses.

Modern policymaking has long been relying on a spectrum of models both at national and supranational levels. However, none of the standard models have predicted any of the major crises of the past decade and a half, nor could they capture the dynamics of the ensuing readjustment processes well. Moreover, the crisis revealed many of their fundamental problems that had been there before but had not been revealed during the period of great moderation.

The workhorse model of policymaking, the New Keynesian DSGE model could not capture the interaction between real economy and finance and the financial system, simply because it was built on the assumption that the interaction was broadly irrelevant. As some put it, DSGE models crashed when the crisis hit, that is, when they were needed the most. However, it was not the only problem with the models, and challenges did not end with the financing link, albeit it did play a major role throughout the crisis (*Székely, 2017*).

In the recent crisis triggered by the Russian war of aggression in Ukraine, inflation shot up in an unpredicted manner. The workhorse models of central banks, which were seriously questioned but not much changed following the 2010–2013 double crisis in Europe (*Blanchard, 2016; Caballero, 2010; Stiglitz, 2011*), apparently failed to capture the way the shocks transmitted through economies (*Lagarde, 2023*).

2 OUR MODELS AND REALITY

Our standard macroeconomic and financial models suffer from a host of misspecifications (Stiglitz, 2018; 2023; Romer, 2016). Models, by their very nature, simplify the complex reality they describe. This is justified based on the assumption that the different aspects of the complex reality are separable and hence one can disregard their interactions. Moreover, many of the simplifications are driven by the desire to keep our models within our technical capabilities, that is, to work with models that we can explicitly solve using the available mathematical methods. The fact that most of our models are linear is very much attributable to this motivation.

As mentioned above, a usual feature of standard macroeconomic (DSGE) models before the turn of the century was that they did not have money or banks explicitly in them. There were no banks or financial systems in the models, while the interactions between financial systems and real economies was perhaps the one factor that led to the Great Financial Crisis in the previous decade. This made them unhelpful when the 2008-2010 financial crisis hit, and the balance sheet weaknesses of banks drove developments in the world economy. Similarly, to the situation today with models with heterogeneous firms, the models including an explicitly described banking sector were available but not used in major national or European policymaking centres (Christiano et al., 2010).

The heterogeneity of households and firms is another major area where macroeconomic models have developed significantly but they are still far from fully capturing economic reality. For long, most macroeconomic (DSGE) models entailed a single type of household, which made it impossible for them to capture the difference between the reactions of households with financial savings and access to bank loans and of those of cash-constrained ones.

Incorporating different types of households increased significantly the capacity of policymaking centres to model the behaviour of the economy and help good policy design (Roeger et al., 2011, Roeger et al., 2012). Nonetheless, the most widely used macroeconomic (DSGE) models still have only one type of firm that never dies. An essential feature of the green transition will be the emergence of disruptive new technologies, such as the electric vehicle that is likely to drive out traditional vehicles and many of their producers. Therefore, it is difficult to see how models with homogeneous firms can capture the process and help design policies that can promote green transition. Models with homogeneous firms are equally unfit for capturing the process of innovation and its implications for the economy, particularly disruptive innovation and firms. As both areas will be at the forefront of economic policies in Europe, this is a particularly hindering weakness of these models.

Understanding the role of economic and social inequality in economic development is another important area where most macroeconomic models perform poorly. They do not explicitly model distributional features and assume that the growth path of an economy is not impacted by inequalities. There are satellite models that can determine the distributional consequences of certain growth paths but there is no feedback from them to the core model.

More generally, the vital interactions among the different dimensions of development may render our standard models focusing entirely on the economic dimension unhelpful, or even fatally misspecified.³ Besides the distributional aspects mentioned above, the quality of institutions is another aspect neglected by these models.

Stiglitz (2023) gives an exhaustive list of the misspecifications our standard macroeconomic models still suffer from.

3 CRISES

Shocks to the economy are inherent parts of the growth process. Nevertheless, when an economy and society is hit by a series of large shocks it cannot respond to fast enough, the normal adjustment process to shocks turns into a crisis. Therefore, crises are special periods when the behaviour of economic agents and that of economic policymakers and politicians differ significantly from their behaviour during “normal times”.

While some of the simplifications of our models may be perfectly admissible during normal times, many tend to turn out fatal during crisis periods (Székely, 2017). By nature, the inadequate specification of the dynamic structure of our models significantly reduces their predictive capacity during a crisis when economies are subject to multiple large shocks.

Most importantly, the level of uncertainty in the economy jumps during crisis episodes significantly modifying economic agents’ behaviour (Bloom, 2009). Moreover, the heterogeneity of agents, an important feature of a modern economy, which, as we mentioned above, is almost fully neglected by most of our standard models, becomes more important for describing how economies respond to major shocks (Seiler, 2021; Muellbauer, 2016). Moreover, in crisis periods, trust

3 SZÉKELY (2024) identifies four dimensions of development i.e., economic, social, institutional, and environmental. We have discussed the former three above, but it is also evident that the environmentally unsustainable nature of economic development will make it critical in the future to include the latter dimension in our standard models explicitly.

in government also tends to be severely damaged, especially when policy performance is poor (Aksoy et al., 2020; 2023).

As also mentioned above, standard macroeconomic models, without exception, fail to explicitly model institutions and hence cannot capture the impact of weak institutions (e.g., widespread corruption). Institutional quality, like other fundamentals, changes slowly and has a relatively smooth effect on the functioning of the economy. Hence, most macroeconomic models can somehow capture its effect, for example in the total factor of productivity in the production function or the fiscal multiplier. However, when an economy is hit by major shocks and needs to adjust in a major way, weak institutions may have a devastating effect. Frequently, it is the dominant factor that turns the episode into a full-blown crisis.

Our standard models have not been built to predict crises, nor to capture the way an economy works during a crisis. Hence, it is not surprising that they cannot predict crises or capture major developments during crises (Fawcett, 2015).

Crisis episodes have a major impact on the reliability of our models not only during the crisis but also afterwards. The way an economy adjusts to a major crisis and the way economic policy handles it may have long-lasting implications on the growth of and convergence among regions and countries in a regional integration such as the EU (Ratto–Székely, 2023). None of the standard macroeconomic models predicted the strong divergence among EU countries that we experienced following the recovery from the 2008–2013 double crisis in the EU. An important aspect of these developments was the renationalization of the banking sectors and the lack of credit in many of the southern European EU economies.

Some periods are not crises, nonetheless, economies are exposed to major shocks. One such important episode for Central and East European economies was the accession to the European Union.⁴ Unlike crises, it was a foreseeable event. The likelihood of accession continuously increased after the turn of the century. Moreover, some of the impacts of accession, such as improved market access to the European single market, were speeded up as part of the accession process. Nevertheless, EU accession gave rise to a major change in economic fundamentals (Landesmann–Székely, 2021). Globally, the liberalization of capital flows in the early 1990s and the subsequent wave of globalization resulted in similar effects. Looking forward, our models are not well suited to describe economic de-

4 Economic transition in the former centrally planned economies in Central and Eastern Europe was similar albeit it changed the way the economy worked in those countries more fundamentally than EU accession. Not surprisingly, it led to a breakdown in formerly relatively well-behaving economic relationships in those economies, such as the aggregate consumption function (SZÉKELY, 1993).

velopments during the next wave of EU enlargement or to support policymaking in this area.

4 HOW SHOULD WE USE OUR MODELS?

The fact that our models are misspecified and may fail in certain episodes does not mean that they are not useful tools for policymaking. Despite all their weaknesses, they do a better job of showing the implications of our numerous assumptions about the behaviour of economic agents than most human minds. However, when using them, we should start by accepting the fact that our standard macro-economic models are misspecified. Most of the misspecifications do not render them useless in normal times when the economy is moving along its potential and no major shocks hit it.

Nonetheless, even in normal times, when fundamentals evolve slowly, we should continuously watch out for signs of lethal misspecifications in the models we use, particularly when we use them to formulate public policies. Our models need to be regularly re-estimated and retested to see whether their continued use is justified.

Even if slowly, the profession is developing new, better models, albeit many remain largely untested. While it is essential to incorporate the new models into our toolkit, doing so too fast without learning their characteristics and fully understanding their new features is equally dangerous. Our standard small and mostly linear models are admittedly oversimplified but very intuitive, which is not necessarily true for new, more complex models.

In crisis periods, when an economy is exposed to a variety of major shocks and the level of uncertainty economic agents and policymakers face is high, much more vigilance is needed. As we argued before, during crisis periods many of the factors that cause misspecifications get more pronounced and thus their impact on model predictions gets magnified. We should be open to the possibility of regime change in the behaviour of economic agents and recall the results of empirical analyses of previous crisis episodes (*Kóbor–Székely, 2004*).

Ultimately, we should be prepared for the eventuality that we have to abandon our models temporarily in crisis periods and rely on our (and on policymakers') instincts. Flying at night without (reliable) instruments is inherently dangerous but once one is up in the air, the alternative of abandoning the cockpit is infinitely more dangerous, almost surely fatal. Pretending that policy makers know more than what they do does not nurture their credibility, because economic agents can spot the increased level of uncertainty and know that it is very difficult to predict the behaviour of an economy in such a situation. Instead, what could make eco-

conomic policymakers more credible in such times is admitting the weaknesses of their models (toolkit) and indicating the need for a vigilant and cautious attitude.⁵ Sticking to failing models and policies calibrated on them during crises is a sure way of diminishing policy credibility.

Following crisis periods, it is essential to reflect on the performance of work-horse policy models and learn as much as possible from the crises in this regard, too (Fawcett, 2015). This is a sure way to repair the inevitable damage to policy credibility during a crisis. The more open and systematic the process, the more helpful it is.

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US BANK FAILURES SPRING 2023

Part One: Banking stories for seventy-year-old János Száz¹

Júlia Király – András Mikolasek²

ABSTRACT

In the first part of our two-part study, we summarize the parallel history of the four failed US banks, carefully analysing financial data from the pre- and post-COVID periods. The banks were unable to adequately manage the liquidity shocks caused monetary cycles (first easing, then brutal tightening). Their distorted business model, i.e., their reliance on closely affiliated customers and in particular uninsured deposits, left them vulnerable. But the panic itself was triggered by misinterpretation of HTM portfolios. Second part of the paper, on one hand deals with the in-depth analysis of risks and failures in risk management, on the other hand, discusses some widespread (mis)diagnoses and remedies.

JEL codes: E4, E5, G21, G28, G33

Keywords: bank crises, bank failures, bank panic, Silicon Valley Bank, Silvergate Bank, First Republic Bank

¹ Both of us have to thank *János Száz* for attracting us into the banking world. *János Száz* was *Júlia Király*'s university professor and then invited her to join the International Training Centre for Bankers established in 1989 and entrusted her with teaching liquidity management. He was also university professor to *András Mikolasek* and entrusted him with the translation of *BREALY-MYERS* and then lecturing. They have been working at the same chair ever since.

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1 INTRODUCTION

On Wednesday March 8, 2023, the tiny Californian *Silvergate Bank* (total assets \$11 billion) decided to sell its assets and close down its banking operations.

On Friday March 10, 2023, the Silicon Valley Bank (total assets more than \$200 billion, the 16th largest banking group in the United States) was closed by the California Department of Financial Protection and Innovation, and the Federal Deposit Insurance Corporation (FDIC) was appointed as receiver.

Two days later *on Sunday March 12* Signature Bank (total assets more than \$100 billion, the 29th largest bank in the US) was closed by the New York State Department of Financial Services, which appointed the FDIC as receiver.

A week later, *on Sunday March 19* in the last minutes of a long week-end of negotiations the Swiss authorities announced that UBS, the number one Swiss megabank, would take over the number two Swiss megabank the Credit Suisse (total assets more than CHF700 billion) for CHF3 billion in UBS stock.

Finally, *on May 1, 2023*, First Republic Bank (total assets more than \$200 billion, 14th largest bank in the US) was closed by the California Department of Financial Protection and Innovation, which appointed the FDIC as receiver.³

The five bank failures caused a panic on the financial markets. Bank share prices that had been ailing for some time started to plummet in spring 2023; major bank market indices such as S&P/TSX Composite Index Banks, the Dow Jones U.S: Banks Index or the MSCI World Bank Index fell by 10 to 15 percent on average. According to different blogs and media news, many analysts envisaged further major bank failures, a financial breakdown similar to the global financial crisis triggering a deep crisis in the real economy. The panic, however, was quickly over, share prices stabilised albeit not at the high level of early 2022 previous to the Ukraine-Russia war. At the time this study is completed, at the end of the summer of 2023, it looks as if - unlike the global financial crisis - the spring of 2023 was not the beginning of another global banking crisis but a short-lived panic that, however, offers some lessons.

The story of Credit Suisse (CS) was quite different from that of the four failed US banks. Its difficulties did not begin in 2023 or one or two years earlier than the miseries of the US banks, but much longer ago. The bank's name popped up in all major bank scandals of the ten years preceding the failure (*Walker-Morris, 2023*).

3 It is ironic that FRB had already been sold once during its history. Merrill Lynch acquired it in 2007 (in phase one of the global financial crisis), then in 2010, when Merrill Lynch was acquired by Bank of America, First Republic was sold to a group of private investors including chairman James Herbert. The bank once again became a public company via an initial public offering in 2010.

With its Russian partner, CS was the underwriter of the Mozambique tuna bonds for a commission much higher than the market rate (but the money received from the bonds had disappeared in the maze of the Mozambican political life). CS organized the securitisation of the receivables of the Greensill banking group specialising in financing value-chains (but in fact executing highly risky factoring transactions), then following the collapse of the bank, it had to compensate its clients for the impairment of the ABS-type bonds sold to them. CS happened to be one of the financiers of Archegos Capital specialised in the management of family funds operating with extreme leverage and had to book billions of losses after its failure. The CS was even involved in a money-laundering scandal in Bulgaria.

In the 2010s the bank's risk management was subordinated to business interests, there was no risk management culture or risk defence lines worth mentioning. A full change of management in 2022 when *Ulrich Körner* became CEO and *Alex Lehmann* bank president came too late. Although a radical refurbishment of the bank started, the spread of the panic appearing on the US banking market in March 2023 wiped out one of the oldest institutions of Europe with a history of over a hundred and fifty years. The bank's share price fell to its lowest level, its shareholders refused further capital increase and in the end, fearing a further spread of the panic and to avoid a repetition of the Lehman case in 2008, the government decided to merge Credit Suisse to UBS. The failure was the result of a distorted business model, a weak corporate management and the lack of risk management. The panic was simply the last bit triggering its failure. As a matter of fact, for professionals the bank's "death" seemed to be more interesting than the collapse itself (enforced merger by the government, i.e. a kind of bail out, certain CS contingent securities ('cocos') treated by regulators as Alternative Tier 1 Equity (AT1), were wiped out, while equity shareholders retained CHF3 billion... *Katalin MÉRŐ* described all that in details in an earlier issue of *Economy and Finance* (MÉRŐ, 2023).

We are rather focusing on the bank failures in the US. Our study is published in two parts. *In Section two of Part One* the pre-COVID period is described, and the financial indicators of the banks are analysed via a 2019' snapshot. *In Section three* the "Big Bang", i.e., the period from 2020 to 2022 as well as the path leading up to the bank failures is analysed.

In Part Two of the study to be published in the next issue of *Economy and Finance* we are going to analyse the risks and the different diagnoses and solution models devised in connection with the failures.

2 BANKS PRIOR TO COVID

The history of the four US banks is quite similar. Three of them were established in California in the 1980s (SVB 1983, FRB 1985 and Silvergate 1986), while Signature was founded much later in 2001 with its head office in New York. The first three banks developed slowly in the first 25-30 years of their history; their growth speeded up in 2008 after the global financial crisis. Signature, however, followed a dynamic growth path right from the start. It proudly reported in 2019 it had grown from a bank of a 50 million bank to a 50 billion bank. During its development, SVB was transformed into a financial group (SVB Financial Group, SVBGF), but the Californian bank remained the decisive entity in the group providing different financial services and having a British subsidiary too. Silvergate Bank operated a crypto exchange (Silvergate Exchange Network, SEN). FRB, on the other hand, was proud of its quite simple structure saying it was not a bank holding but a simple bank specialising in California.

Silvergate is the least interesting of the four banks. Not only because it is a miniature bank by American standards, but because its operations were quite one-sided; it specialised exclusively on the market of digital instruments. The crisis of the crypto market in the second half of 2022 was the core reason of Silvergate's failure. We will omit its detailed financial analysis.

The target segments of the other three banks were different. Prior to 2017, Signature mainly financed commercial real estate in a narrow geographical location. A radical change of its business strategy occurred in 2018, and the bank had gradually become the bank of venture capital funds and the tech industry, of companies mainly involved in the market of digital, particularly of crypto assets (*Shay, 2023*). Signature shares were one of the best performing bank shares in 2022 (!) because the bank had got deeply involved in the world of crypto markets, and as a result of a blockchain-based payment system it had developed, its clients could make business with each other in 24/7, even in cryptocurrency.

The profile of SVB was wider: it provided financial services to entrepreneurs and clients of all sizes and stages throughout their life cycles, primarily in the technology, life science/healthcare, private equity/venture capital and premium wine industries. Over 50 percent of SVB loans financed venture capital funds, i.e., it helped emerging companies indirectly by financing their capital investors. Over half of tech and healthcare enterprises supported by venture capital funds were client of SVB (*Becker, 2023*). The share of personal and mortgage loans was about 10 percent, provided mainly to the shareholders and executives of its client companies. Unlike Silvergate and Signature, only 2 percent of its clients were linked to the crypto world.

The business strategy of FRB was entirely different. Its business loans only amounted to barely 10 percent. It mostly targeted high-income families on the west coast, for whom it provided full scale services from preferential market-rate deposits through private banking services to preferential, low interest rate mortgage loans. The strategy of “low margins - high turnover” devised for the period of low interest rates caused the bank difficulties later when interest rates started to rise.

All the banks had a closed, concentrated and connected clientele network in the sense that in 90 percent the same people and companies were its deposit holders as its borrowers. The total number of their clients was a couple ten thousand, while European banks of a similar size have a couple of hundred thousand or even several million clients.

All three banks seemed to be really stable and successful. You should have a look at them in 2019 (*Table 1*).

Table 1
Key financial indicators of SVB, FRB and Signature Bank (2019-2022)

	SVB				FRB				Signature			
	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
	Volumes (USD billion)				Volumes (USD billion)				Volumes (USD billion)			
Total assets	71.0	115.5	211.3	211.8	116.2	142.5	181.1	212.6	50.6	73.9	118.5	110.4
Liquid assets	6.8	17.7	14.6	13.8	1.7	5.1	13.0	4.3	0.8	12.3	29.6	6.0
AFS securities	14.0	30.9	27.2	26.1	1.3	1.9	3.4	3.3	7.1	8.7	18.6	17.2
HTM securities	13.9	16.6	98.2	91.3	17.2	16.7	22.3	28.3	2.1	2.3	5.0	7.8
Securities	27.9	47.5	125.4	117.4	18.5	18.6	25.7	31.6	9.2	11.0	23.6	25.0
Loans	33.2	45.2	65.9	73.7	90.8	112.6	134.3	166.0	39.1	48.8	64.9	74.3
Deposits	61.8	102.0	189.2	173.1	90.1	114.9	156.4	176.4	40.4	63.3	106.1	88.6
Uninsured deposits*			166.0	151.0			116.7	119.5				
Equity	6.5	8.2	16.2	16.0	9.5	11.4	15.9	17.4	4.7	5.8	7.8	8.0
Net interest income	2.10	2.20	3.20	4.50	2.76	3.30	4.40	5.70	1.28	1.27	1.83	2.46
Profit after taxation	1.20	1.30	2.10	1.60	0.93	1.06	1.50	1.70	0.82	0.73	1.20	1.80
	Ratios (percentage)											
Non-deposit funding / liabilities	4%	5%	3%	12%	16%	12%	5%	10%	12%	7%	4%	13%
Liquid assets / TA	9.6%	15.3%	6.9%	6.5%	1.5%	3.6%	7.2%	2.0%	1.6%	16.6%	25.0%	5.4%
Securities / TA	39%	41%	59%	55%	16%	13%	14%	15%	18%	15%	20%	23%
AFS / securities	50%	65%	22%	22%	7%	10%	13%	10%	77%	79%	79%	69%
Deposits growth rate		65%	85%	-9%		28%	36%	13%		57%	68%	-16%
Loans growth rate		36%	46%	12%		24%	19%	24%		25%	33%	14%
Loan to deposit ratio	54%	44%	35%	43%	101%	98%	86%	94%	97%	77%	61%	84%
CET1 capital adequacy ratio	12.6%	11.0%	12.1%	12.1%	9.9%	9.7%	9.7%	9.2%	11.6%	9.9%	9.6%	10.4%
Return on assets (ROA)	1.80%	1.39%	0.84%	0.76%	0.88%	0.82%	0.89%	0.85%	1.20%	0.87%	0.95%	1.15%
Return on equity (ROE)	20.0%	16.7%	17.1%	10.0%	10.6%	10.6%	12.2%	11.6%	12.8%	10.8%	13.8%	17.6%
Net interest margin (NIM)	3.51%	2.67%	2.02%	2.35%	2.83%	2.72%	2.67%	2.65%	2.71%	2.55%	1.97%	2.23%

Note: * For SVB: uninsured deposits recorded in US institutions only

Source: Banks' Annual Reports

In 2019, the interest margin of all three banks was high, that of SVB was extremely high at 3.51 percent. It seems quite absurd in hindsight that in 2019 the market “punished” SVB with share price cut because its interest margin stagnated rather than increased in a low interest rate environment.

All three banks had excellent profitability indicators too; ROA at around 1 percent is considered very good on developed bank markets. Their financing structure was also proper: the loan to deposit ratio was usually below 100 percent with FRB and Signature (the two banks with a high ratio of loans) although FRB surpassed it slightly from time to time. The indicator of SVB was much better at 54 percent.

All three banks primarily financed their operations from deposits. Wholesale funding ratio was 16 percent for FRB, 12 percent for Signature and a mere 4 percent for SVB, in other words, none of them was characterised by funding exposure to the financial markets or excessive lending prior to the global financial crisis. However, their deposit structure was specific because of the closed and concentrated clientele: the ratio of uninsured deposits significantly exceeded the average of banks belonging to a similar group (for instance, 85 to 90 percentage in SVB and Signature Bank).

Remember: before the global financial crisis banks’ portfolios were full of low credit quality CDOs. On the contrary, in all three banks, security portfolio it mainly included treasuries, agency papers and MBS of actually zero credit risk, i.e., it was a safe portfolio. Both the analysts and the Supervision regarded the security portfolios of these banks to be an example of stable banking operations.

As far as the asset structure of SVB was an outlier with high share of securities and low share of loans, that of Signature Bank was mostly and that of FRB fully equal to the structure of the peer group (Fed, 2023). All three banks had excellent loan portfolios, the volume of non-performing loans and risk expenses remained below 1 percent for each. Their clients delivered repayments reliably and stably even during the COVID crisis. Although both Signature and SVB did offer their clients risky loan products from time to time, no major credit risk incident can be found in the history of the banks. All in all, the loan portfolios were clean, credit risk was low. It is true despite the fact that after their failure the buyers heavily devalued the loan portfolios of the banks, but it happened because of the lack of special client knowledge and the market situation rather than due to any fact of credit risk to be seen in the figures.

The capital position of the banks was stable, their CET1 ratio was 10 percent (above the peer group), while their leverage ratio was high (8-10 percent).

Riskless securities, riskless and profitable loan portfolio, stable financing structure relying on customer deposits, excellent marks by the Supervisors. These were the merits *Greg Becker* the visionary CEO of SVB referred to in his presentation

on 8 March 2023, one day before the collapse of the bank. However, the CEO described in vain how SVB as “*a trusted financial partner of the global innovation economy*” would break out of the crisis of the moment (SVB 2023). Not only his shareholders punished the bank by pushing its market price close to zero, but also its deposit-holders by withdrawing \$42 billion, one-third of the total deposit portfolio on 9 March 2023. How could it happen that not only SVB but also Signature and FRB appeared on the market in March 2023 as risky loss-making businesses with their share price plummeting, which drove their clients to withdraw 20-30-40 percent of deposits, one-third of the whole portfolio, in the time frame of a few days? How could those banks fail in almost a matter of minutes?

3 THE BIG BANG: 2020-2022

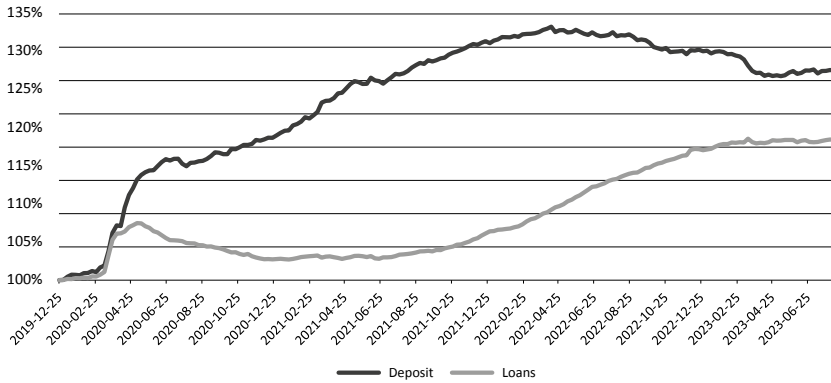
The life of banks basically changed in 2020. The change was not directly triggered by COVID but the response of economic policy makers to the COVID, i.e., fiscal and monetary easing. The evident macro-consequences of easing policy was the accelerating inflation, which proved to be not a temporary, but a persistent phenomenon. The Fed reacted with a sharp increase of interest rates, which cooled the economy and caused an immediate recession in the most dynamic sectors, in particular in the tech industry. Digital asset related companies and other tech enterprises first enjoyed the overwhelming subsidies of the COVID-era, then suffered of the restrictive policies. These three main factors are analysed in *Section 3.1*, then their effects on the investigated banks are presented in *Section 3.2*.

3.1 Changes in the economic environment

The first factor was the American fiscal and monetary easing because of the COVID, which surpassed European measures by far, as a result of which liquidity in the economy expanded by 30 percent per year (measured by the M4 Divisia index, *Goodman*, 2021). Not surprisingly, the total deposits of US banks dynamically increased in parallel, by 21.8 percent in 2020 and 11.4 percent in 2021. Deposit increase halted in April 2022 when the Fed started to tighten. Till Q12023 the average decrease of deposits was 1 percent (*Figure 1*). In Europe the fluctuation was much more moderate with less sharp increase.⁴

4 <https://www.euro-area-statistics.org/banks-balance-sheet-deposits?cr=eur&lg=en>

Figure 1
Deposits and Loans of US commercial banks (2019 = 100)



Source: Fed

<https://fred.stlouisfed.org/series/DPSACBW027SBOG#0>

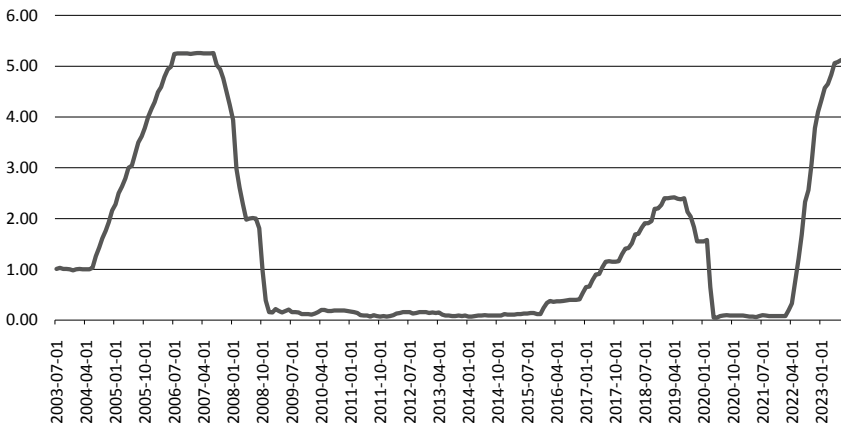
<https://fred.stlouisfed.org/series/TOTLL>

When the Fed started to tighten, and the abundant liquidity disappeared, a “shadow central bank” acted as the lender of last resort of the squeezed banking sector: the FHLB. The network of Federal Home Loan Bank (FHLB) was established in 1932 after the big crisis to make mortgage lending more secure. It is a government sponsored enterprise (GSE) similar to Fannie Mae and Ginnie Mae with an assumed implicit government guarantee. The FHLB collects funds from the wholesale market and provides wholesale loans to its members. In the event that the borrowing member becomes insolvent and goes into receivership, the lending FHLB has a (statutory-based) super-lien on the borrower’s assets — and thereby subordinates all other claimants. Originally, members were savings and loan institutions, however, later due to relaxed regulations any financial institution could join. Thus, there were almost 6500 members in early 2023 that had easy and cheap wholesale funding through the FHLB. The volume of mostly short-term FHLB loans increased from less than \$400 billion in March 2022 to \$1045 billion in a year (Acharya et al., 2023:193). It really looked as if a second, shadow-central bank had been operating in the country. However, while “the Federal Reserve plays a critical role in financial stabilisation as the lender of last resort, in contrast, the FHLB system ... plays a destabilising role, keeping dying institutions artificially alive and increasing the ultimate costs of their failures” (Cecchetti et al., 2023).

The second factor from April 2022 has been the brutal tightening of the Fed, unprecedented in the past twenty years. Before the GFC in 2004-2006 the Fed increased the policy rate gradually from 1 percent to 5.25 percent. During the GFC

the interest rates rapidly fall to 0.25 percent and did not change till December 2015. Then, during the previous tightening cycle 2015-2018 the policy rate was increased gradually up to 2.5 percent. In March 2020 the Fed started to loosen the monetary conditions, and the target rate fall to 0.25 percent. During the second, actual tightening cycle of 12 months from 2022 March – 2023 March policy rate increased from 0,25 percent to 450 percent, i.e., by 425 basis points⁵ (Figure 2). So, the three cycles of interest rate increase are spectacularly different: 425 basis point in the span of 2 years before the global financial crisis, 200 basis points in the span of 3 years after the crisis beginning from 2015 and 450 basis points a year currently (unfinished). Nothing like this has happened since the famous *Volcker* shock. One of the consequences of the tightening was the sharp decrease of fixed rate bond prices and repeated disturbances on the treasury market.

Figure 2
Interest rate cycles of the Fed 2003–2023



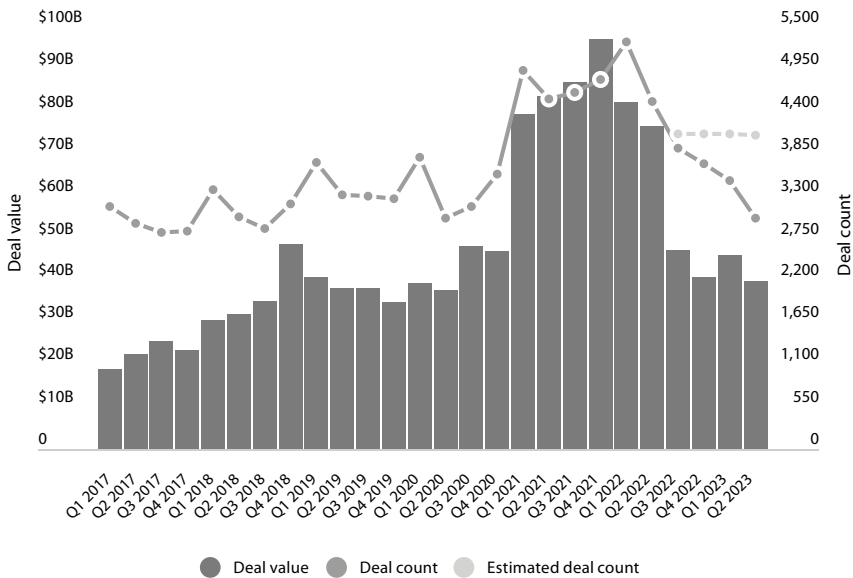
Source: Fed
<https://fred.stlouisfed.org/series/DFEDTARU#o>

The third factor the banks had to deal with was the sudden rise and then fall of the investments made by venture capital funds, which closely followed the fluctuations of the tech market, of digital instruments and the start-ups (*Thorne, 2023*). The fluctuation of the investments had a direct impact on their target market;

⁵ The increase has continued after the failure, the Fed fund target rate was 5,5% in early September 2023.

the liquidity and profitability of tech companies, start-ups and the enterprises of digital assets fluctuated similarly.

Figure 3
Venture capital investments 2017-2023



Source: <https://pitchbook.com/news/articles/venture-monitor-first-look-q2-2023>

3.2 Banks in the Big Bang

All the three macroeconomic factors analysed above impacted the investigated banks albeit to different degrees as it is clear from the financial statements (Table 1).

Liquidity boom and boom of the tech industry during the COVID discussed above resulted in a much higher than average deposit inflow both in SVB (65 percent growth of deposits in 2020, and 85 percent in 2021) and Signature (57 percent and 69 percent respectively) and a slightly higher than average in FRB (28 percent and 26 percent, respectively). A real boom occurred in tiny Silvergate bank not discussed in detail yet. Its deposits increased from \$1.8 billion to \$14.3 billion from 2019 to 2021, which illustrates well the extreme expansion of banks close to the tech industry. The increase of deposits was due to existing corporate and retail clients concentrated both by sector and geographically. They deposited

in the banks their surplus liquidity, which significantly increased as a result of fiscal easing 2020-2021 (Becker, 2023). The banks regarded the inflow of deposits as long-term sources and failed to prepare themselves for a possible rapid withdraw of funds. The high risk of rapid increase of uninsured deposits was neglected, as well. The share of uninsured deposits was 93.8 percent in SVB, 89.3 percent in Signature and 67.3 percent in FRB at the end of 2022, which catapulted them to the front in the ranking of uninsured deposits. However, a high ratio of uninsured deposits was not characteristic of regional banks only. For instance, FRB was preceded by Citibank (73.7 percent), State Street (91.2 percent) and several other large banks (S&P 2023). That particular risk, however, was not presented as a risk factor in the annual reports of the banks, what is more, uninsured deposit portfolios had not been published at all before 2021 (that is why they are not included in our Table). European banks' annual reports do not provide that information, either. At his Parliament hearing, the head of the European Banking Supervision simply said for reassurance the average ratio of uninsured deposits was lower in Europe (Enria, 2023).

Lending could not expand at the rate deposit did, since due to the monetary and fiscal tightening both corporate and retail sectors expanded without relying on loans. Loans in the commercial banking sector expanded by 3 percent in 2020 and 4 percent in 2021 lagging far behind the growth of deposits (cf. *Figure 1*). Thus, loan/deposit ratio declined, share of cash and securities increased in the balance sheets. In 2020-2021 to invest in treasuries or agency papers seemed to be a very cautious, riskless strategy on the part of banks (Kinder et al., 2023). The extra risk of the rapid growth of deposits did not appear either in the internal analyses of the banks or in the supervisory reviews.

Everything changed after the Fed first tightening decision in March 2022. In Silvergate, the miniature bank, deposit outflow was 60 percent (!) in 2022, which pushed the bank close to insolvency. The reduction of deposits was more moderate in larger banks: 16 percent in Signature and 9 percent in SVB while in FRB, which was not so close to the tech industry, deposits still increased by 13 percent in 2022.

The banks losing their deposits resorted to their usual form of defence: mitigating lending, gradually cutting back credit lines, reducing the size of their securities portfolio and involving wholesale funds. FRB – being far away from the digital market scandals - was the only one which had a growing deposit portfolio even in 2022, it could also increase its lending and was not forced to downsize its securities' portfolio, while the share of wholesale funding declined. On the other hand, the rate of lending expansion radically slowed down in SVB and Signature, and SVB significantly cut back its credit lines. Wholesale funds slightly increased in

Signature and radically in SVB. The wholesale funds were mainly provided by the “shadow central bank”, FHLB.

Although the ratio of non-interest-bearing demand deposits declined in all three banks in 2022, the moderate increase of interest rates on the liabilities side in Signature and SVB was offset with the dynamically increasing interest income from floating rate loans. In the SVB the other reason of interest income increase was that SVB rearranged its securities portfolio into longer-maturity, higher-interest bonds realising in that way some loss unrealised earlier (at the beginning of 2022 the market accepted it without the reduction of share prices). The business policy of FRB resulted in stagnating interest margins since most of its loans were fixed-rate mortgage loans while non-interest-bearing deposits made up 30 percent of all deposits. Its interest income moderately increased but not at the rate as that of the other two banks. So, interest income increased in all three banks due to rising interest rates.

No matter how nicely profitability indicators evolved, the market solely focused on the so called non-realised losses. Securities are classified whether they are hold to maturity (HTM) or available for sale (AFS) ones. *AFS securities* should be booked at market value, however, the unrealised loss is part of the other comprehensive income (OCI) and does not modify the regulatory capital. *HTM securities* on the other hand need not be revalued, they are accounted at amortised value. Thus, increase in interest rates reduces the value of the AFS portfolio but not that of an HTM portfolio, and unrealised losses do not affect the regulatory capital in either case. This accounting rule is based on a logical economic reasoning: deposits are not revalued if interest rates change, they are accounted at nominal value. It would be worthwhile to compare banks and investment funds: assets of investment funds are accounted at market value, however, their liabilities, the investment-units (often considered as liquid as bank deposits) are accounted at market value, as well. If banks' deposits are to be marked to market, then all assets should be marked to market. Bank deposits, however, always pay their nominal value since they are considered as private money. That is why HTM securities are not marked to market either. On the other hand, if - for any reason - a bank is forced to sell HTM securities, the whole portfolio must be reclassified into AFS, and marked to market. This asymmetry is the peculiar feature of financial institutions.

Signature Bank classified 80 percent of its bonds into AFS all along, so its non-realised loss settled in OCI quickly grew, nevertheless, it was much less than the banks equity. FRB kept a mere 10-15 percent AFS ratio, so it hardly had any loss according to accounting rules. SVB reclassified its AFS securities into HTM when deposits flew in fast in January 2021, so the ratio of AFS fell back from 60-70

percent to 22 percent. Its high HTM ratio protected the bank from a fast change in the value of its securities portfolio at the time interest rates increased quickly.

All in all, in the financial statements of the banks (Table 1), no mortal wounds or the signs of an unavoidable failure can be detected. Their capital position did not deteriorate in 2020-2022. All three banks were profitable. The profitability of FRB remained stable, that of Signature, in fact, improved, while that of SVB declined but still remained relatively high. Following a slight decline, the interest margin of all three banks increased to above 2 percent. The ratio of liquid assets was higher than before the big boom. All three continued to build up a secure portfolio.

Nevertheless, the reason why the panic occurred was not the relatively weak risk management culture of the banks - to be analysed in Part Two of our study - but because of a newspaper article that blurred the difference between AFS and HTM portfolios. Considering the extremely fast interest rate increase by the Fed as well as the size of deposit outflows from the banks, investors did not only analyse the losses realised on the sale of securities or the non-realised loss reported in OSI on the AFS portfolio, but they also contemplated the joint latent change in value of AFS and HTM bonds irrespective of the nature and purpose of the investment. According to an analysis published in *Financial Times* on 22 February 2023: “But that also meant that at the end of last year the “held-to-maturity” assets were valued at their purchase price of \$91bn on SVB’s balance sheet, rather than their \$76bn market value. The unrealised \$15bn loss disclosed by SVB is almost as much as the group’s \$17bn market capitalisation, and greater than the total profits reported by the bank over three decades.” (Kinder et al., 2023). Authors have not justified why should unrealized losses on HTM portfolios be compared to equity, why did they assume that a bank should sell its HTM portfolio and realize the loss. Markets were not looking for sophisticated explanations, “higher than equity unrealised loss” was the market rumour which started to destroy the SVB. Nevertheless, the potential loss for SVB was really extremely high, since the average duration of its HTM portfolio was 6.2 years.

According to the Fed report made after the failure (Fed 2023), that article in *Financial Times* was the “spark” that ignited the series of events peaking in the evolution of the bank run. It should be noted that FRB was mentioned in the same article as a *positive* example, as a bank with a much smaller securities portfolio compared to its balance sheet, one which should be more secure at the time interest rates were drastically raised. Not a month later, market analysts already described FRB as one of the vulnerable banks not only because its uninsured deposits but also due to its fixed-rate mortgage loans, on which non-realised billions of losses were posted just as on bonds. From then onwards, there were no sensible analyses on the market: everything that had fixed-rate assets (loans, securities, anything) was considered to be loss-making.

The events gained momentum in March 2023. The fall of share prices and the outflow of deposits was ongoing stronger and stronger. Due to the deficiencies of its risk management system, SVB was unable to implement its contingency funding plan (CFP), either. The concentrated clientele, basically holders of uninsured deposits, who often communicated with each other on the social media, was fleeing. As many analysts emphasised, the perfect digitalisation of the banks contributed to the bank run, as you did not need to queue outside bank branches for a long time, you only had to push a few buttons on your mobile (Tett 2023). Not all deposit holders of all US financial institutions were fleeing, as deposits only declined by 2-3 percent on average, but the deposit holders of banks with a closed clientele group connected to each other did. It included the shareholders and members of the same sector, the same group of people, who made business with the key player banks only. They could move together: they did not only read the papers but kept close contact with each other too, so a bad piece of market news drove all of them to make the same step: save what you can!

In early March 2023, SVB - advised by Goldman Sachs (Becker, 2023) - decided on a strange move. On the one hand, it reported it had sold three-quarters of its AFS portfolio realising immediately a loss of \$1.8 billion, and also reported to carry out a capital increase via a share issue of \$2.25 billion (SVB 2023). Greg Becker outlined the measures in his presentation held on 8 March, in which he said he thought the bank's position was not desperate at all and offered a way for breakout. His announcement, however, had an impact contrary to his purpose of reassuring the market. Moody's immediately downgraded the shares of SVB. What's more, the tiny Silvergate Bank announced the final suspension of its operations on the same day.

The next day, Thursday 9 March Becker tried to reassure the bank's clients via a conference call, but the withdrawal of deposits accelerated. \$42 billion, a quarter of the deposits, was withdrawn in one day and the withdrawal of another \$100 billion was expected for the day after (Fed 2023). A decision was made that night. SVB was closed and the FDIC was appointed as receiver. Nevertheless, the bank panic continued to spread and seemed unstoppable.

On Friday, 10 March crowds of investors made efforts to get rid of the shares of similar banks - Signature Bank was the worst hit victim of the attack and it was decided to be closed down the following day despite the fact that the deposit holders fleeing on the day of the bank run partly transferred their deposits to Signature Bank or FRB (Roffler, 2023; Shay, 2023).

On Sunday 12 March, to prevent a further panic, *Janet Yellen*, the secretary of Treasury announced a temporary 100 percent deposit insurance for the failed banks. The Fed announced a new lending scheme, the Bank Term Funding Pro-

gram (BTFP) to provide liquidity to U.S. depository institutions, with a collateral valuation at par value. The panic seemed to be subsiding.

FRB was still alive. On Thursday 16 March, a bank consortium led by JPMorgan provided FRB with liquidity of \$30 billion. It stabilised the bank for some time, but when it published its Q1 report on 24 April (FRB 8k 2023 Q1), it had become clear the bank had become quite weak financially. All income items declined by 23-30 percent, profitability ratios fell back, e.g., its interest margin had been reduced to below 2 percent and its CET1 capital adequacy ratio had also declined to below 10 percent. The report also made it clear 60 percent of the bank's end-of-year deposits were withdrawn in Q1 by its non-bank deposit holders and, at the same time, its external market funding had grown from \$10-15 billion to nearly \$100 billion. Equity holders and deposit holders panicked alike, so both the volume of deposits and its share price plummeted. On 1 May the bank was closed, and the FDIC was appointed as receiver.

Are the banks innocent victims to a market panic, as they stated at their Congress hearing (Becker, 2023; Roffler, 2023; Shay, 2023)? The answer is a clear no. The business model of the banks, which was built on a concentrated and interconnected group of customers with uninsured deposits failed. There had been grave mistakes of corporate governance and risk management we are going to discuss in the next part of the study. All three banks had over expanded during the COVID boom and had failed to adjust their business policies and risk management systems accordingly. Are they the only banks to be blamed for such mistakes? Not at all. A peculiar random effect presents in a panic at any time had a part to play in their failure. But it was not an accident that they had been hit.

Further investigation and drawing the lessons will be the topic of the next part of the banking story in the next issue of *Economy and Finance* to commemorate the 70th birthday of János Száz.

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HEURISTICS IN THE CORPORATE CREDIT PROCESS A BEHAVIOURAL ANALYSIS OF RISK MANAGERS AND CREDIT OFFICERS

Béla Kádár– Dorisz Romanoczki– Erika Jáki¹

ABSTRACT

We investigate and compare the cognitive thinking of two key actors involved in the corporate lending process: business-side credit officers and risk analysts. We investigated four different heuristics – risk aversion, overconfidence, overoptimism and representativeness bias – through a questionnaire survey based on a previous experiment by psychologists. The eight banks included in the study are among the 12 largest banks in Hungary in terms of balance sheet total, and they are also active in the financing of the large corporate segment. The respondents are relationship managers and risk analysts working in the large corporate segment. The research is exploratory and comparative and uses qualitative research methods. Based on this research, we confirmed in a banking context that the decisions of relationship managers and risk analysts are characterised by cognitive biases. One of the limitations of the research is that the decision-making process was examined in fictitious situations rather than through a real credit assessment process. The research is novel because cognitive biases have not been studied in a bank lending context specifically for credit officers and risk analysts. The results are useful for optimising decision-making processes in banks.

JEL-codes: D81, G40, G21

Keywords: behavioural finance, bank, risk, credit

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1 INTRODUCTION

Theories of behavioural economics are gaining more and more importance in both business and science. Psychological studies help us understand the cognitive processes behind individual decision-making. Behaviouralists analyse economic decisions from a more realistic view of people and behaviour, in contrast to the '*Homo economicus*' of neoclassical economics. Emotional and cognitive biases have a significant impact on individual decisions, which differ from the rational choice defined by mainstream economics. These systematic biases, which typically occur in similar or identical situations, are the result of the limited cognitive abilities of the individual.

Mistaken decisions resulting from systematic cognitive thinking have also been proven to occur in financial markets. While the study of investor behaviour and the efficiency of financial markets is a popular area of research, the impact of behavioural biases on the credit decision process has attracted less attention. The investigation of the cognitive abilities of risk analysts and credit officers, which are of key importance in credit decision making, helps us understand the factors that influence the credit process.

The behavioural analysis of the credit process is a new approach that can reveal human cognitive errors that can be eliminated to make the bank credit process more efficient and reliable, which can improve the quality of the credit provided and so the profitability of the banks. The presence of the heuristics under investigation may be of great importance in credit decision making.

This study investigates corporate lending in banks from a behavioural perspective. It examines and compares the behaviour of the two key actors: credit officers (also known as relationship managers) on the business side and risk analysts on the risk management side. The research is exploratory and comparative and uses qualitative research methods. To investigate the prevalence of heuristics, experiments developed by psychologists were conducted.

The main research question is: *can heuristics such as risk aversion, overconfidence, overoptimism and representativeness bias be identified in the behaviour of credit officers and risk analysts? On the other hand, are there significant behavioural differences between the two actors, and which actor is more likely to exhibit the various heuristics?* Our research aims to answer the question of what differences in behaviour can be observed between the two groups and what might be the reasons for these differences. We did not investigate real credit process decisions, which is a limitation of our research. Another important limitation of the study is that it examines a narrow and segmented population. A snowball sampling approach was used to reach the respondents, which raises the question whether

the sample can be considered representative. On the other hand, the sample size limits the scope for drawing general conclusions.

2 BEHAVIOURAL SCIENCES IN THE CONTEXT OF LENDING

Behavioural economics examines the economic decision-making and behaviour of individuals from a psychological perspective, looking for patterns of cognitive thinking behind decisions (Kőszegi, 2014; Rajczy, 2020; Szántó, 2011; Cohen-Dickens, 2002). The economic man in neoclassical economics is the ‘Homo economicus’, who is rational, self-interested, perfectly informed, strives to make optimal decisions, is not biased by anything and always makes the best economic decision within his/her means in order to maximise his/her utility (Ogaki-Tanaka, 2017; Brzezicka-Wiśniewski, 2014; Golovics, 2015; Neszveda, 2018). However, there are psychological factors that might constrain an individual’s rational decision-making. These factors exist independently of the discipline and thus fundamentally define the scope of behavioural economics (Rabin, 2001). Instead of *Homo Oeconomicus*, *Homo Sapiens* is the focus of the investigation: the anomalies in the decisions of individuals as economic decision-makers, their consequences and their links to various economic phenomena (Kovács, 2018). A real human being, ‘Homo Sapiens’, is not always self-interested or fully rational and is often influenced by emotions in his/her economic decisions (Ogaki-Tanaka, 2017). The outcome of his/her decisions is influenced by social and other contexts. People may have different cognitive abilities and do not perform cost-benefit analyses before each decision. Their preferences are not fixed and usually depend on some reference point. Individuals are often unable to correctly predict their own future preferences, and they are not necessarily consistent over time but are biased towards the present. These anomalies cause biases in supposedly rational decisions (Rabin, 2001, Rajczy, 2020). Behaviourists believe that credible assumptions about human behaviour are a good starting point for analysing various economic issues (Kőszegi, 2014). Behavioural economics mainly analyses human behaviour in three areas and detects decision anomalies: how individuals evaluate possible outcomes of risky decisions, how they evaluate outcomes when they occur at different times, and how they evaluate when the outcomes of decisions affect others (Cohen-Dickens, 2002). Various psychological experiments have found biases in human behaviour. Under uncertain circumstances, individuals do not follow the principle of expected utility, but instead apply basic rules of thumb (Hámori, 2003; Neszveda, 2018).

Heuristics are simplifications, predictions or general rules that most often lead to an acceptable result in a given decision situation. Humans tend to rely on heu-

ristics to make decisions, i.e., they reduce complex evaluation tasks such as probability calculations or predicting values to simpler judgements. In the majority of cases, these heuristics prove to be quite useful, but sometimes they lead to serious and systematic errors (*Tversky-Kahneman, 1974*). Heuristics are also called mental operations or ‘shortcuts’ in literature (*Hámori, 2003*). These, the *cognitive biases* or *systematic cognitive errors* that characterise human decision-making, lead to decisions that are contrary to logic and rationality. A common characteristic of these anomalies is that they are systematic, i.e., the decision-maker always falls prey to the same situation and in the same way (*Tversky-Kahneman, 1974*). The most common cause of simplifications is the limited, inadequate level of cognitive ability, i.e., it is unrealistic to assume that the decision-maker is capable of solving complex optimisation problems (*Kahneman, 2003*).

The heuristics and framing biases already identified in the study of financial markets, especially investor behaviour, may also be relevant in commercial credit markets, as they are all emotional and cognitive biases that can occur in all people. These cognitive biases can have a potentially large impact on the amount of credit or the terms on which banks extend credit to companies (*Peón-Calvo, 2013*). In addition to carrying out a complex and professional lending process, there are also a number of conflicts of interest and distortions that bank employees have to deal with when lending. One example is information asymmetries between the customer and the bank (*Walter, 2019*). In the credit market, credit officers have a critical role in assessing credit demand. Working together with risk analysts, they decide who can and cannot receive credit, and furthermore, they decide on the amount and terms of credit to be provided to a particular company. The amount and terms of the loan a company receives are determined based on their assessment. The analysis of the rationality of corporate banking raises the question of whether the people involved in the selection process have emotional or cognitive biases and, if so, how this might affect the final credit decision (*Peón-Calvo, 2013*).

2.1 The bank lending process

The lending decision process requires the cooperation of two areas of the bank: the business area, also called the Client Relationship Managers or credit officers, and the risk management or risk/credit analysts. The joint approval and agreement of the representatives of both areas is required for a positive decision on a loan application (*Walter, 2019*). Decision-making authority can differ considerably among banks. The riskier a transaction, the higher the level of the ultimate decision-maker in the banking hierarchy. In the case of corporate lending, depending on the amount of the loan, the final decision is usually made by a

committee (Kovács–Marsi, 2018, Walter, 2019). The credit officer submits the loan proposal to the risk analyst, who reviews and may complete it. Risk analysts can only have a limited influence on pricing at a later stage, but they have the right to impose substantial changes to the loan amount, maturity and guarantees (Kovács–Marsi, 2018; Walter, 2019).

There is a natural conflict of interest and information asymmetry between a credit officer and a risk analyst. The conflict of interest arises from the fact that it is in the credit officer's interest to make the deal. The information asymmetry is because the credit officer is in contact with the client and so has more information. Risk analysts play a neutral role and are responsible for an accurate and systematic analysis of potential risks (Walter, 2019). In rating the performance of credit officers, the identified indicators are linked to positive credit decisions, which may lead to underestimating risk. An organisational culture that encourages credit extension has a negative impact on the quality of credit extended and thus on the performance of the financial institution. One solution is to keep the credit officer and the risk analysis departments separate in the banks' organisation (Peón–Calvo, 2013). In the credit decision process, there are various ways to make the two areas work together. In the case of smaller transactions, the credit officer usually has the autonomy to approve the extension of credit. In the case of larger loans, the degree of separation of the risk analyst from the client varies. Sometimes, contact with the loan applicant is strictly prohibited, while in other cases it is explicitly encouraged so that the risk analyst can get a more comprehensive picture of the client (Walter, 2016). Essentially, risk analysts are in a separate, neutral department whose function is to analyse the risk of a loan. In doing so, they basically evaluate the transaction along two dimensions: 1) the client's expected solvency and willingness to pay, and 2) the expected return on collateral.

For a corporate loan application, banks analyse the credit market at two levels. At the macro level, they analyse the economy, estimating the growth rate of the sector and its sustainability, as well as the potential level of future demand for credit. At the micro level, the client and the transaction are assessed (Peón–Calvo, 2013). The result of micro-level customer rating is the classification of companies into risk classes, usually on a 7+1 scale. The *scoring systems* are typically debt rating models developed for rating micro and small enterprises, which are based solely on objective financial data and statements to avoid subjectivity. They score the credit risk of the client by using different quantitative ratios and evaluating financial data. For medium-sized and large companies and project lending, *more complex rating systems* are used, which are supplemented by subjective assessment, to rate the credit risk of the client, and finally classify it into a homogeneous risk category (Kovács–Marsi, 2018; Béza et al., 2013; Walter, 2016).

In the large corporate segment, the lending process is less standardised. The complexity results from larger loan amounts and thus higher bank exposure, the lower homogeneity of transactions, and specific characteristics of the clients, e.g. the diverse and complex range of operations, mixed corporate form and specific needs. The credit and debtor risk assessment in this segment is an in-depth company evaluation. However, it is not only the risk that is higher, but also the return that can be realised on the transaction. Therefore, the analysis of these individual transactions requires more sophisticated methods and may take longer (Virág et al., 2013; Walter, 2016; Kovács–Marsi, 2018).

Table 1
Functions, tasks and motivation of the credit officer and the risk analyst

Credit Officer	Risk analyst
Functions	
Sales	Risk assessment and management
Main tasks	
<ul style="list-style-type: none"> – Acquisition (Customer acquisition) – Portfolio Management – Needs evaluation during face-to-face client meetings – Preliminary client risk assessment – Preparation of a proposal – Preparation of indicative offer – Loan pricing 	<ul style="list-style-type: none"> – Risk analysis (credit, market, operational and liquidity risk) – Risk measurement – Risk exposure decision – Risk monitoring – Risk reporting
Main motivation	
<ul style="list-style-type: none"> – Increase the number of accredited clients or extend loans and maximise client profitability where possible 	<ul style="list-style-type: none"> – To assess risks as objectively as possible for the clients managed and to keep credit risk at an appropriate level

Source: own edition

The task descriptions also show that risk analysts have an objective and independent role, while the credit officer may be influenced by many other external factors, such as customer relationships, personal experience, and emotions. The on-site visit and personal meetings allow the credit officer to form an opinion about the company based on his/her own impressions. Credit risk assessment is based on quantitative and qualitative analyses, with the aim of providing a completely objective valuation (Kovács–Marsi, 2018). Because of their different tasks and pieces

of information, the two departments may evaluate a client differently and have different opinions about the transaction.

2.2 Behavioural issues in the lending process

Approached from a microeconomic perspective, the decision to extend or refuse credit to applicants depends on the assessment of credit officers and risk analysts (Peón–Calvo, 2013). Applying traditional economic theories to the banking context, the following can be assumed about financial institutions (Kozma et al., 2018):

1. Banks are perfectly and fully able to assess the needs of their clients and only sell them products that perfectly meet their needs and expectations, while assessing and managing their risks.
2. Banks do not take excessive business risks, i.e., they reject market transactions whose risk exceeds the bank's risk-bearing capacity or is not covered by its capital.
3. Banks aim to maximise profits in the long term and therefore do not make financial decisions in the present that would threaten this.

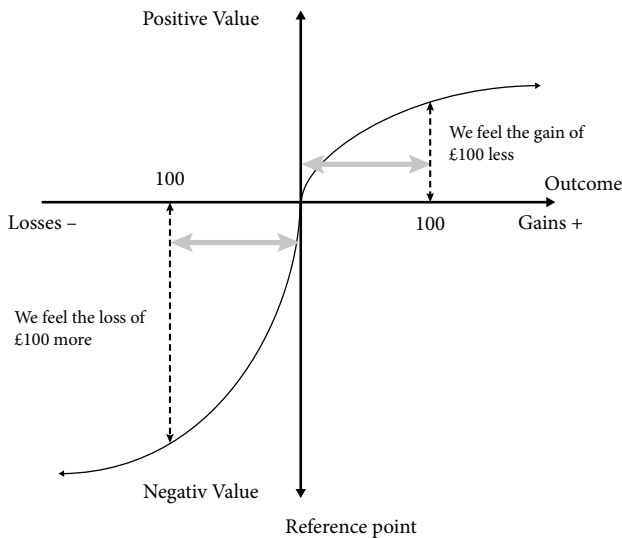
Past financial crises and the losses they have caused have made financial institutions, banks, supervisory authorities and clients aware that the financial or lending market does not work perfectly (Kozma et al., 2018). The way bank employees think and behave may also be influenced by behavioural biases when deciding whether to accept or reject a loan application (Mustilli et al., 2018). The question arose whether behavioural biases may have contributed to the 2008 financial and banking crisis. It was suggested that positive biases about loan applications resulted in an unfavourable loan portfolio, which contributed to an increase in non-performing loans (Mustilli et al., 2018; D'Angelo et al., 2018).

The biases in economic decisions are caused by cognitive limitations in information processing, especially when processing large amounts of information (D'Angelo et al., 2018). Heuristics such as *availability*, *mental accounting*, the '*illusion of money*' (ignoring the effects of inflation) and the '*anchoring effect*' influence the decisions of bank employees at both macro and micro levels (Peón–Calvo, 2013). Risk aversion and related loss aversion, overconfidence, overoptimism and representativeness bias can also influence bank lending decisions. Peón and Calvo (2013), Peón et al. (2015), Peón et al. (2016) and Hyland et al. (2021) suggest further research on the aforementioned heuristics in the field of bank lending.

Risk aversion: *Bernoulli* (1954) attempted to show why people are risk averse in general and whether risk aversion decreases with increasing wealth for decisions with financial implications. By definition, a **risk-taker** is an individual who pre-

fers to give up a sure thing in favour of a risk with a lower (or equal) expected value. In contrast, a **risk-averse person** prefers choices that have a certain payoff compared to a risk with a higher (or equal) expected value. According to Bernoulli (1954), individuals evaluate their prospects not on the basis of the financial expected value, but on the subjective expected value of each outcome. This subjective value or utility can be described by a concave function (representing risk-averse behaviour), illustrated in *Figure 1*.

Figure 1
Typical value function for risk-averse behaviour



Source: Thaler, 2015:31.

For example, the perceived difference between the utility of \$200 and \$100 in profits is greater than the nominal difference between the utility of \$1,200 and \$1,100. From the concave shape of the utility function (see *Figure 1*), it is clear that in two decision situations with identical expected outcomes, individuals prefer to choose the safe profit, i.e., the risk-averse option (Kahneman, 2011). Traditional economic theories argue that there is essentially no difference between the same amount of gain and loss, and that the time factor can be priced into decisions (using present value rules). However, behavioural economics has proved that people are more sensitive to a realised negative outcome than to a loss from inactivity. Individuals tend to delay decisions to avoid loss, even when they know for sure that a loss will occur. In the financial markets, this phenomenon can be observed

when a stock trader tends to delay the closing of an open financial position because the immediate closing will result in a loss, even if he/she expects to suffer further losses by holding the position (Kozma et al., 2018). In the field of bank lending, this phenomenon can be observed in situations where a relatively risky client acquisition is forgone by the financial institution despite the expected high net bank income. A further example could be when, in the case of an existing client, the bank does not provide additional funding, i.e., does not increase its exposure to that client, thereby risking the maintenance of the client relationship (e.g. increasing the chances of refinancing with another bank). In the case of bank lending, it is also observed that in times of recession, or in times of mistrust and loss of confidence, which are not uncommon in the financial sector, *distortions of risk aversion* and *loss aversion* may occur. In such cases, behavioural theories may explain why bank managers are more sensitive to potential losses than to realising profits from low-risk credit operations (Peón-Calvo, 2013). In prospect theory, Kahneman and Tversky (1979) described that in cases where investors are more sensitive to losses for some reason, the dispersion of returns is not an appropriate approach to estimate risk (Kahneman, 2011). However, there is no empirical evidence that risk aversion or loss aversion has any effect on lending (Peón et al., 2016).

Overconfidence: *overconfidence* means that an individual tends to think that his/her mental and physical abilities are above average, i.e., that he/she is unreasonably confident in his/her own thoughts and abilities. When respondents' positive abilities are assessed within a given reference group, they will in most cases rate them as above average, even though, assuming a symmetric distribution, this would only be true for half of the group (Kahneman-Lovallo, 2003). Most experts also tend to overestimate their own abilities – often to an even greater extent than non-experts (Hens-Meier, 2016). The phenomenon of overconfidence among investors has also been observed in financial markets. Individuals tend to think that their own predictions are more accurate than they are (Durand et al., 2013, Pompian, 2016). Research has demonstrated that often those who are presumably better informed have slightly better predictions about certain things than those who have less information. By becoming more knowledgeable, one can develop an illusion of ability, a kind of *illusion of knowledge*, and can also become unrealistically confident (Kahneman, 2011). *Overconfident* actors can also develop an *illusion of control* in times of positive economic situations (Peón-Calvo, 2013). The essence of this is that individuals judge and see a positive outcome as a clear consequence of their actions, when in fact they were just lucky (Langer, 1975). Individuals with hard-to-define capabilities tend to have higher self-confidence, which may be reduced by assigning criteria to capabilities (Jáki, 2013b).

Overoptimism: the individual values the probability of positive events occurring in his/her lifetime higher than their objective probability, and underestimates the probability of undesirable, i.e., negative events (Krizan-Windschitl, 2007, Kozma et al., 2018). Empirical evidence has confirmed that people tend to attribute a higher probability to the occurrence of positive life events, such as a successful career, a happy marriage, or a long and healthy life, even when they are aware of objective probabilities such as divorce rates, etc. (Weinstein, 1980, Weinstein-Klein, 1995). When evaluating a company, the analyst may wrongly predict the probability of a company getting into financial difficulties or going bankrupt. The phenomenon of overoptimism can also be observed in the credit market. When repaying a loan, people tend to expect an improvement in their future income situation and an increase in their financial awareness rather than the opposite, although this can be diverted by a number of negative circumstances (Kozma et al., 2018).

The **representativeness bias** can be seen in several ways. According to the theory, individuals ignore the a priori probability of outcomes if event *A* is more like event *B* in terms of representativeness due to some independent factors. In other words, underlying frequency has no influence on probability estimation (Tversky-Kahneman, 1974). The individual also tends to ignore the size of the samples – in statistical terms: the population – in an uncertain judgment process, i.e., he/she is insensitive to the size of the samples, or consistently misinterprets probabilities closer in time. His/her judgements are more influenced by events that are happening now, or have happened recently, than by events that occurred further back in time (Hámori, 1998; 2003). The individual also ignores predictability. This phenomenon can also be observed when making a numerical prediction of the future profitability of a company. If an individual encounters a positive description of the company, he/she will rate its future profitability higher. If he/she reads a bad assessment, he/she will rate it lower. The mere form and quality of the description can have a strong influence on opinion formation, even without reviewing the evidence and the source (Tversky-Kahneman, 1974). In bank lending, this can occur when a bank employee with positive experiences with a particular industry, profession, or client's argumentation tends to give too much weight to good data and to underestimate risks when analysing a client's economic situation and creditworthiness (Peón-Calvo, 2013).

3 DATABASE

Our research investigates the decision-making of credit officers and risk analysts working in the field of corporate finance. In this field, each lending transaction is an individual company evaluation by the credit officer and the risk analyst. This requires the processing of a large amount of information, during which the decision-maker is more likely to apply heuristics in the evaluation. This study uses a questionnaire survey to investigate the willingness to use heuristics.

Respondents identified a set of eight banks as their current or former place of work, which are among the 12 largest banks in Hungary in terms of total assets and the size of their large corporate segments. The highest number of respondents per bank was 6 and the lowest was one employee. The questionnaire was completed over a period of 2 months from March 2022 and was entirely anonymous. The questionnaire was available and completable in electronic format, thus guaranteeing an independent response environment, free from the influence of the researchers themselves. The authors reached respondents partly through their personal contacts and partly through the LinkedIn social network. Out of a total of 26 respondents, 13 were bank loan officers and 13 were credit risk analysts. The gender distribution of respondents was 16 men and 10 women. The average age of respondents was 39, with the youngest being 25 and the oldest 61. The majority of respondents were active employees in their bank at the time of completing the questionnaire, with a total of 2 respondents stating that they were already working in another field or no longer working. The distribution of respondents in terms of experience is as follows: 27% are in junior, 65% are in senior, and 2 are in managerial positions. A total of 10 people have the authority to make decisions on their own, typically ranging from €1 million to €8 million, depending on the rating of the company proposed.

4 METHODOLOGY AND PROPOSITIONS

In our research, we tested four different heuristics based on experiments developed by psychologists.

In the first part, we examined risk aversion in the respondents' decision-making process. Our preliminary assumption, based on Bernoulli (1954), Kahneman (2011) and Peón-Calvo (2013), was that bank employees are risk averse. *Our first proposition was that bank employees are risk averse, and the second was that risk analysts are more risk averse than credit officers.* The experiments were based on the experimental questions formulated by Kahneman-Tversky (1984). As an example, the fourth question in the questionnaire was presented as follows: *'after*

analysing two loan transactions, they had to choose one of the following options: with a probability of 92%, the bank could realise 100 000 Euros on the transaction (with a probability of 8%, the bank would not make any profit and would not incur any loss), or with a probability of 100%, the bank could realise 80 000 Euros on the transaction. The second option results in a secure profit, while the first option has a statistically higher expected value at risk. Statistically, the expected return from the riskier credit transaction is $92\% \times 100\,000 + 8\% \times 0 = 92\,000$ Euro, which is more than the certain 80 000 Euro. In the first three questions, respondents had to choose between the outcomes of a fictional game of chance. Respondents could choose between a safe but lower prize and a riskier (more uncertain) but higher prize. For the other 4 questions, we put the fictional options into a banking context. The respondent had to consider the bank's point of view and choose between a client offering a safe return and a client offering a higher return but also a higher risk. The transaction may also expose the bank to losses in the event of a default by the borrower. We considered it important to place Kahneman and Tversky's (1984) experiment in a banking context, and to ask respondents to make decisions as bank employees that affect the bank's wealth.

In the second part of the questionnaire, we examined overconfidence. Overconfidence is a tendency to overestimate one's own positive abilities, i.e., to rate one's abilities as above average compared to a given reference group. Basically, an individual with healthy self-confidence will rate himself/herself above average within a given reference group. The main thing for him/her is to get a positive self-evaluation (Jáki, 2013b), so he/she tends not to consider that his/her abilities may be average compared to a given group. Therefore, if he/she thinks he/she is good at something, he/she rates it higher than average. Two experiments were used to investigate this phenomenon. In the first step, we created a list based on job advertisements available on the Internet summarising the skills required for a particular banking position (communication skills, results-oriented problem-solving mindset, conflict management, etc.). In order to make the two study groups comparable, we used the same list for both groups. In the first experiment, the respondent was asked to score his/her own skills on a scale of 1 to 7 in relation to other employees working in the same department. As an additional task, we also asked the respondents to rate the efficiency of each operational procedure compared to other departments involved in the lending process on a scale of 1-7. Our expectation was that respondents would over-rate those skills in particular that were expected for their position. Above-average ratings of these skills relative to their own colleagues as a reference group demonstrate overconfidence. Consistent with previous research (Pompian, 2016; Camerer–Lovallo, 1999; Weinstein, 1980), we hypothesised that overconfidence characterises both groups in

terms of their perception of their own abilities and in that they judge the processes in which they are involved to be more effective.

In the third part, we focused on the emergence of overoptimism. Evidence for overoptimism has been demonstrated by a number of empirical studies in different situations (e.g. expectations of illness, probability of divorce for oneself versus overall divorce rate). In the process of bank lending, the loan officer's expectation is that the bank financing will be problem-free, i.e., that it will be repaid according to the terms of the loan contract. In contrast, risk management is the task of highlighting risk factors, identifying problems with loan repayment, and objectively assessing the credit proposal. Respondents were asked to think of an industry they know well and estimate (i) what percentage of companies in that industry in general will be successful in 2022 (ii) in a given industry, what percentage of companies (clients) that the bank lends to will be successful (iii) within a given industry, what percentage of firms managed by the respondent will be successful. Respondents indicated what chances of success they thought the companies in the given industry had and what they thought the success rate would be of the loans approved by them for companies in the given industry. If they are overly optimistic in their decision-making, they rate the success of the companies handled by them higher than the industry average. Based on this, **our hypothesis is that overoptimism characterises both groups, and our second hypothesis is that overoptimism is higher for loan officers.**

Finally, in the **fourth chapter, we examined the representativeness heuristic**, which is based on the fact that for basic statistical questions, such as 'what is the probability that object *A* belongs to class *B*' or 'what is the probability that event *A* is a consequence of process *B*?', individuals estimate probabilities based on the extent to which *A* is representative of *B*, i.e., how similar *A* is to *B*. Individuals tend to ignore the a priori probability of outcomes. In this case, when estimating probabilities, a pre-specified baseline frequency has no effect on the response if event *A* is more similar to event *B* along some independent factor (Tversky–Kahneman, 1974). In research on the representativeness bias, we primarily investigated the disregard of the a priori, or prior probability of outcomes. In our experiment, the description of 'Adam' is one of 100 descriptions created by 70 loan officers and 30 risk analysts of themselves. Adam's description contains stereotypical traits of a risk analyst. Based on the results of Tversky and Kahneman (1974), we expect that members of both groups will ignore the baseline frequency and make their decisions based on stereotypical traits. Based on this, we formed a proposition that representativeness bias will characterise both groups when they encounter stereotypical traits. *Table 2* summarises the propositions of our study.

Table 2
Propositions

Examined heuristic	Relating propositions
Risk aversion	Credit officers and risk analysts are risk averse.
	Risk analysts are more risk averse than credit officers.
Overconfidence	The respondent considers his/her skills in his/her field to be above average.
	Respondents rate the processes of the loan application in which they are involved as more efficient than those in which they are not.
Overoptimism	Respondents rate the success of the companies the financing of which they were involved in higher than the future success of companies in the same industry.
	Credit officers are more overoptimistic.
Representativeness	Representativeness bias characterises both groups when stereotypical traits are encountered.

5 RESULTS

The risk aversion or risk appetite of risk analysts and loan officers was assessed by 7 multiple-choice questions, in which respondents chose between a certain profit and a risky investment with a higher expected reward. Our results are in line with previous research, as respondents typically chose the option with a certain outcome, thus the risk aversion heuristic prevailed. Table 3 shows the responses of credit officers and risk analysts for different questions. Respondents were risk-sensitive in 5 out of 7 questions (see 1;3;4;6;7), i.e., risk analysts and credit officers chose the event with the more certain income over the riskier one, despite the lower expected value of the certain option. The exceptions are the answers given to questions 2 and 5. For question 2, a larger proportion of risk analysts (62%) chose the riskier outcome (95% probability of a higher payout but 5% probability of a loss of 100,000 HUF), compared to credit analysts, only 38% of whom chose this option. For question 5, more than half of both risk analysts and loan officers chose the riskier option. All this suggests that, regardless of the expected value, risk appetite increases in cases where the probability of a negative event occurring is relatively lower. For questions 2 and 5 highlighted above, the probability of a negative event occurring is $\leq 5\%$, so the Bernoulli (1954) risk-value function is essentially satisfied. *The proposition that loan officers and risk analysts are risk averse is confirmed. However, the proposition that risk analysts are more risk averse than loan officers is rejected.* Consequently, if there is a disagreement between a

loan officer and a risk analyst on the approval of a loan transaction, it is not because of a difference in risk appetite between two groups.

Table 3
Results of the risk aversion multiple-choice questions*

Research questions		Distribution of responses	
Nr	Optional outcomes	Loan officer	Risk analyst
1.	<i>With a probability of 100%, you will receive a net reward of HUF 400 000 (EV: 400 000)</i>	77%	77%
	<i>With a probability of 85%, you will receive a net reward of HUF 500 000 (EV: 425 000)</i>	23%	23%
2.	<i>With a probability of 100%, you will receive a net reward of HUF 400 000 (EV: 400 000)</i>	62%	38%
	<i>With a probability of 95%, you will receive a net reward of HUF 600 000, but with a probability of 5% you will lose HUF 100 000 (EV: 565 000)</i>	38%	62%
3.	<i>With a probability of 100%, you will receive a net reward of HUF 400 000 (EV: 400 000)</i>	69%	54%
	<i>With a probability of 70%, you will receive a net reward of HUF 900 000 (EV: 630 000)</i>	31%	46%
4.	<i>With a probability of 100%, the bank can realise a net income of 80 000 Euro on the transaction (EV: 80 000)</i>	77%	69%
	<i>With a probability of 92%, the bank can realise a net income of 100 000 Euro on the transaction (EV: 92 000)</i>	23%	31%
5.	<i>With a probability of 100%, the bank can realise a certain net income of 80 000 Euro on the transaction (EV: 80 000)</i>	38%	31%
	<i>With a probability of 97%, the bank can realise a net income of 100 000 Euro on the transaction (EV: 97 000)</i>	62%	69%
6.	<i>With a probability of 100%, the bank can realise a certain net income of 50 000 EUR on the transaction (EV: 50 000)</i>	85%	62%
	<i>With a probability of 98%, the bank can realise a net income of 100 000 EUR on the transaction, but with a probability of 2%, a loss of EUR 100 000 has to be written off (in the latter case no net income is realised) (EV: 96 000)</i>	15%	38%
7.	<i>With a probability of 100%, the bank can realise a certain net income of 40 000 EUR on the transaction (EV: 40 000)</i>	54%	54%
	<i>With a probability of 99%, the bank can realise a net income of 100 000 EUR on the transaction, but with a probability of 1%, a loss of EUR 300 000 has to be written off (in the latter case no net income is realised) (EV: 96 000)</i>	46%	46%

Note: *The probability-weighted expected value of the given outcome is shown in bold in brackets.

For the examination of **overconfidence**, the respondents' first task was to rate their own abilities on a seven-point Likert scale (1-7) compared to their colleagues in their field in terms of the skills listed below. In the second task, they had to rate the efficiency of different banking processes in their own bank, also on a seven-point Likert scale (1 – least efficient, 7 – outstanding performance and efficiency compared to others).

In the first experiment, the scores obtained within the two groups were averaged and are summarised in Table 4. The results show that respondents rated their own abilities above average compared to their own immediate peers, as respondents typically rated their own abilities above average within the reference group (7-point Likert scale, centre 4). No one scored 1 or 2 (i.e., less or least able). Looking at the two groups separately, it is clear that loan officers rated themselves above average in the skills required for their job (communication and interpersonal skills, assertiveness, proactiveness, results-oriented problem-solving, complex, systematic thinking, portfolio approach). Similarly, risk analysts rated analytical skills and analytical and modelling skills as above average compared to credit officers. Regarding the 'good business mindset' competency, risk analysts rated their skills as average or below average compared to their peers, which can be explained by the fact that they are not tasked with identifying, spotting and acting on business opportunities. The majority of credit officers rated the 'business mindset' competency as above average, with an average score of 5.6, with 8 out of 13 respondents giving a score of 6 or 7 out of 13. Literature has revealed that for a skill that is difficult to define, individuals tend to rate themselves above average. This bias can be reduced by assigning criteria to the assessment of the ability (Jáki, 2013b). Our research found the same result for loan officers, but risk analysts underestimated their 'business mindset' ability even without assigning criteria.

The results confirm our hypothesis, i.e., overconfidence can be identified for both groups studied. *The study confirms the existence of overconfidence and highlights another interesting phenomenon. Comparing the results of the two groups, it can be observed that in areas more important for the position, respondents overestimate their own abilities compared to the other group.* For example, in the case of 'analytical and modelling skills', which is assumed to be a more expected (or more typical) skill for a risk analyst, this group indeed scored higher on average (mean: 5.23) compared to credit officers (mean: 4.62). Another example is that risk analysts rated their 'analytical ability' higher (mean: 5.23) than credit officers (mean: 5.15), while 'proactivity and results-oriented problem-solving ability' was rated by credit officers at an average of 6 on a scale of 7. This means that typically loan officers evaluate their 'proactivity and result-oriented problem-solving ability' significantly above average compared to other loan officers, and risk analysts

feel, even though to a lesser extent, also above average in this ability (mean: 4.85, average would be 4).

Table 4
Examining overconfidence by assessing own abilities

Abilities/Skills	Loan officer	Risk analyst
Communication and interpersonal skills, assertiveness	6.00	4.92
Proactivity, results-oriented problem-solving skills	6.00	4.85
Complex, systematic thinking, portfolio approach	5.77	5.00
Conflict management, ability to compromise	5.38	5.23
Working in a team, cooperation with colleagues	6.15	5.31
Business mindset	5.62	4.31
Critical thinking	5.54	4.62
Analytical skills (operational profile, financial data)	5.15	5.23
Risk assessment and management	5.15	5.00
Analytical and modelling skills	4.62	5.23
His/her overall work	5.46	5.00

Respondents also had to assess the efficiency of the lending process. *Our expectation was that those processes in which they are involved or which were closely related to their job would be rated above the other processes in terms of efficiency.* Loan officers rated more efficient the processes in which they are involved: acquiring, negotiating, presenting, contracting. Similarly, risk analysts rated the process of 'proposing to manage risks' as more efficient than credit officers. The 'credit decision' process, in which both groups are involved, was rated as more efficient by risk analysts (see *Table 5*). Credit officers considered to be above average not only the processes related to their job, but also, e.g., assessing and estimating risks. *Overall, it can be concluded that overconfidence is a characteristic of credit officers and risk analysts, as the average is above 4 in all cases. Both groups overestimate the processes in which they are involved in lending.*

Table 5
Examining overconfidence by assessing the effectiveness of lending processes

Lending processes	Loan officer	Risk analyst
Client acquisition	4.54	4.15
Negotiation and communication with the Client	5.85	4.85
Preparing credit applications	5.15	4.00
Risk assessment, risk estimation	5.85	5.46
Proposals to manage credit risks	5.46	5.77
Decision process	5.38	5.62
Decision administration, preparation of contracts	5.31	4.31
Contracting with the Client	5.38	4.54
Loan disbursement	5.69	4.69

Overoptimism was investigated in two experiments. In the first experiment, we asked participants to think of an industry – or companies in that industry – about which they had extensive knowledge and experience. We asked three questions to estimate future probabilities:

- Estimate the likelihood that companies in the industry will continue to operate successfully in 2022.
- Estimate the average annual percentage of loans originated in the industry that will be successful in 2022.
- Estimate the average percentage of self-managed or proposed loans that will be successful in this industry in the coming year.

The hypothesis was that the future probability of success of the loans issued was rated higher by respondents than the future success of the companies in the industry. In other words, they ignore the objective probabilities, i.e., the success rate of the industry, when making subjective judgements about the loans they managed and issued. They underestimate the probability of possible negative outcomes in the decision-making process. *Table 6* shows that our proposition seems to be true looking at the average results for both groups. The likelihood of success for self-managed/issued loans was judged to be the most certain, with an average of 95%.

Table 6
Estimating the share of successful enterprises*

Group	Loan officer	Risk analyst	Total
Successful companies in a given industry	89.00%	88.75%	88.88%
Successfully operating companies in a given industry that have received bank loans	92.69%	92.31%	92.50%
Success rate of firms managed by the respondent in a given industry	96.46%	93.77%	95.12%

Note: *By success, we mean that the company's debt service is problem-free in 2022.

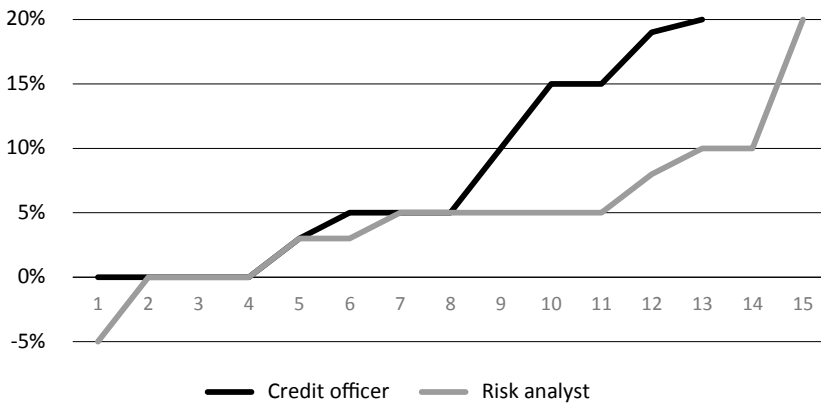
Comparing the two groups, credit officers are more optimistic, with higher average scores for all three questions compared to the risk analysts' answers. *Figure 2* shows that, compared to successful firms in the industry, credit officers rated the success of loans in the industry 7 percentage points higher on average, with a 7 percentage point deviation, while risk analysts rated the success of loans in the industry only 5 percentage points higher, with a 6 percentage point deviation. Despite both groups being characterised by overoptimism, the two lines in *Figure 2* show how much higher respondents rated the success of the firms they managed compared to the perceived proportion of successful firms in their industry. As can be seen from the line graph, risk analysts (grey line) were less overoptimistic, i.e., they perceived the clients which they managed themselves less successful than the credit officers (black line). The difference is explained by the representativeness heuristic discussed below. In short, risk analysts typically do not meet the client, so their judgment is not distorted by a subjective element. Conversely, credit officers are in contact with the client, so they may develop trust and sympathy, which can facilitate the development of an overly optimistic outlook on the future.

Figure 2
Overoptimism test results

The difference between the respondents' perceived success in the industry and the perceived success of the firms they finance in the industry

	Loan officer	Risk analyst
Average	7%	5%
Max	20%	20%
Min	0%	-5%
Deviation	7%	6%

How much higher is the perceived likelihood of success for the credited firms than the perceived likelihood of success for the industry (in ascending order of difference)



In sum, overoptimism prevails in both groups, but to a higher extent in the case of loan officers, as shown in *Table 6*, who rate the future success of their own loans higher than the average success rate for the industry. With a higher number of items, it would also be possible to examine whether the difference is statistically significant. One reason for the lower future optimism of risk analysts is that they do not meet the client, so their objective value judgements are not distorted by subjective stereotypical traits, for which the representativeness heuristic is responsible.

When testing **representativeness heuristics**, respondents were given the following information on a priori probabilities: *'In an experiment, 100 bank employees, 70 loan officers and 30 risk analysts were asked to give a short description of themselves'*. Respondents were asked to estimate the probability that the following ran-

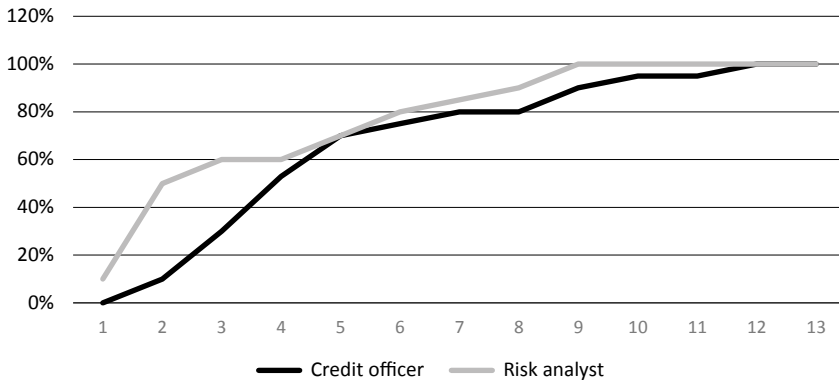
domly selected person description belonged to a loan officer or a risk analyst. The description shows the personality traits of a stereotypical risk analyst: *'Adam, 35, married with two children. He is extremely thoughtful and organised in his daily life. He analyses every situation carefully before making any decision. He is not a very sociable person, he is cautious in building relationships, but he is able to give very good advice.'* Based on Tversky–Kahneman's (1974) experiment, we expected that both groups would be more likely to attribute the person description to a risk analyst than to a credit officer, ignoring the baseline frequency given. That is, the probability is determined by the extent to which the description of 'Adam' is representative of the stereotype of the credit officer or risk analyst, the characteristics, notions and prejudices associated with the position, and objective probability, that only 30% of respondents were risk analysts, is not taken into account. The results shown in *Figure 3* confirm the representativeness heuristic for both credit officers and risk analysts. Respondents were asked to estimate the percentage probability that Adam was a loan officer or a risk analyst. The response 'definitely a risk analyst' was higher for the risk analysts surveyed than for the credit analysts, as shown in the line graph in *Figure 3*. The representativeness heuristic was more pronounced for risk analysts, with respondents being more likely to say that Adam was a risk analyst (grey line), as stereotypical risk analyst traits were present in Adam. Overall, a risk analyst is more confident (overconfident) in recognising a risk analyst's personality. Also from the line graph, it can be seen that five of the risk analysts gave a probability of 100% that the persona belongs to a risk analyst (whereas the objective probability is 30%), while only two of the credit analysts gave a probability of 100%.

Figure 3
Representativeness heuristics test results

‘Adam’ is a stereotypical risk analyst’s description.
 How likely is he to be a risk analyst/credit officer in a population
 where 30% are risk analysts and 70% are credit officers?

	Loan officer	Risk analyst
Adam is a credit officer (credit officer has a priori probability of 70%)		
Average	32%	23%
Deviation	35%	28%
Adam is a risk analyst (risk analyst has a priori probability of 30%)		
Average	68%	77%
Deviation	34%	28%

Per respondent, judgement that ‘Adam’ is likely to be
 a risk analyst (in ascending order of likelihood)



In sum, our proposition on the representativeness heuristic is confirmed because the stereotypical traits of the risk analyst in the description of ‘Adam’ distracted respondents’ attention from the baseline frequency. Tversky and Kahneman (1974) reported similar results in their experiments, so the results of our study are consistent with previous research. Both loan officers and risk analysts overlook basic frequency in case of stereotypical traits, which is more pronounced during client meetings than when merely studying documents. The results of the over-optimism and representativeness heuristics suggest that it is particularly useful and necessary to create a ‘firewall’ between risk analysts and clients to reduce representativeness heuristics and thus mitigate the overoptimistic outlook of particular clients.

A summary of our propensity score is presented in *Table 7*. Out of the seven propositions tested, six were accepted and one was rejected, as we found no difference in risk appetite between risk analysts and loan officers.

Table 7
Summary of the evaluation of the propositions

Examined heuristic	Relating propositions	Conclusion
Risk aversion	Credit officers and risk analysts are risk averse.	✓
	Risk analysts are more risk averse than credit officers.	×
Overconfidence	The respondent considers his/her skills in his/her field to be above average.	✓
	Respondents rate the processes of the loan application in which they are involved as more efficient than those in which they are not.	✓
Overoptimism	Respondents rate the success of the companies the financing of which they were involved in higher than the future success of companies in the same industry.	✓
	Credit officers are more overoptimistic.	✓
Representativeness	Representativeness bias characterises both groups when stereotypical traits are encountered.	✓

6 SUMMARY

Our questionnaire survey investigated the prevalence of 4 heuristics in the context of bank lending through experiments among loan officers and risk analysts. The four heuristics examined were *risk aversion*, *overconfidence*, *overoptimism*, and *representativeness bias*. The main findings of our research are that risk-averse behaviour characterises both credit officers and risk analysts, with both groups choosing the less risky outcome despite the lower expected value. The study suggests that risk analysts are not more risk averse than loan officers. The difference of opinion between the two groups on the evaluation of a transaction or client is not due to risk sensitivity, but rather can be explained by the different roles and the resulting different motivational factors, such as bonus targets. Overconfidence was confirmed by two experiments. On the one hand, respondents in both groups rated their abilities required for their own position, which showed that both groups were characterised by a healthy confidence, so-called ‘overcon-

fidence', in their abilities to perform the tasks in their field, as they rated their abilities as above average compared to their colleagues. On the other hand, both groups rated those bank lending processes more effective in which they were involved or which were closely related to their job. Overall, along the lines of their belief in their abilities and their assessment of the effectiveness of their work, we found, in line with the results of previous research, that two important actors in the loan appraisal process are also characterised by overconfidence. We confirmed overoptimism with two experiments. On the one hand, respondents rated, on average, the probability of success of their loans higher than the probability of success of firms in their industry. Our research also showed that loan officers' optimism about the success of loans is higher than that of risk analysts. One reason for this is that loan officers meet the client, gain personal impressions, develop sympathy and trust. This is why it is common practice in a significant number of commercial banks not to allow risk analysts to meet the client. Our next experiment examined the representativeness heuristic. Complementing the results of the previous experiment, we demonstrated that both groups can be characterised by the representativeness heuristic to almost the same extent.

In summary, our research investigated the decision-making of credit officers and risk analysts involved in corporate lending and demonstrated the presence of four heuristics in their decision-making processes. Our main findings are that the two groups are characterised by risk aversion, overconfidence, overoptimism and representativeness heuristics. Based on the results, we confirm that it is good and applicable practice for the risk analyst to be separated from the client by a 'firewall' and to be allowed to assess the credit applications based only on the data and material presented to them. A further important finding is that the conflict of interest between the loan officer and the risk analyst is not caused by a difference in risk appetite, rather it can be explained by the different incentive systems resulting from the different positions. The incentive scheme for loan officers encourages granting as many loans as possible, whereas the incentive scheme for risk analysts does not – and cannot – include this. Due to the representativeness heuristic resulting from the personal contact and the three other heuristics demonstrated in the research, the credit officer overestimates the probability of positive outcomes and underestimates the probability of negative outcomes when evaluating a loan transaction to a greater extent than the risk analyst. The research could be extended to investigate other biases such as bounded rationality, mental accounting or the framing effect, which would help us understand the biases in lending more thoroughly.

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A SELECTION OF PAPERS ON THE POSITION OF CENTRAL BANKS

Essay

Károly Attila Soós¹

ABSTRACT

The central banks of the industrialised world faced an unusual and difficult challenge in 2022-2023 when inflation, public debt in several countries and the exposure of banking systems to private debtors rocketed all at once. Thus, interest rates needed to be raised (to curb inflation) and reduced the same time (to stop the growth of public debt, usually termed fiscal dominance), and/or save banks from losses (which means financial dominance). The question arises whether central banks must accept fiscal and/or financial dominance? And, really, how could this happen? Can one blame central banks for the processes leading up to it and if they can, in what sense? What has been misunderstood about the relationship of unemployment and the rate of inflation? Has quantitative easing (QE) by a number of central banks been the right response since interest rate reduction as a means to boost the economy failed? Is it possible that forward guidance may lead to better results? Or else, should the operating modes of central banks be changed temporarily? Those seem to be the most interesting issues dealt with by experts of the IMF and former and current central bank governors and experts in the 2023 March issue of *Finance & Development*. Final answers to the questions cannot be expected in the near future, but readers can find some worthy opinions here.

JEL codes: E5, E6, F4

Keywords: monetary policy, public debt, macroeconomic fluctuations

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1 INTRODUCTION

These days the central banks of the leading market economy countries have to face complex and difficult challenges unseen for a long time. In the 1980s they applied strict measures and were successful to curb the latest wave of inflation until recent times. It was then almost forgotten during the fifteen golden years of Great Moderation followed by the financial crisis and the COVID-19 pandemic. Some have hoped this cancer of paper-based money has been overcome once and for all. But even those who did not believe it were surprised as prices started to run away in late 2021. (Consumer prices increased by an average of 2.9 percent in the current 27 Member States of the EU in 2021 – not really fast but more than over the previous two years together and, within that, by 10.1 percent compared to Q4 2020, which predicted an average of 9.9 percent for last year.)

High inflation is only partly the result of one-off factors (energy and food price increase), so it would obviously require a tightening of monetary policy (raising interest rates and reducing the money supply). However, worrisome features appear quite unusually in two areas at the same time. On the one hand, public debts have soared with their interests (yield) payable from public money, which ultimately burdens the GDP. The US public debt at the end of last year was 124 percent of the GDP while it was 32 percent in 1979 when the central bank was last forced to significantly raise interest rates.² Creditors who are aware of the USD's role as global money will not be frightened much, but the situation is more worrying elsewhere, for instance, in some member states of the eurozone. In the eurozone, the average public debt/GDP ratio was 93.6 percent in 2022, including, for instance, 144.6 percent in Italy (56.5 percent in 1979), 114.0 percent in Spain (14.3 percent in 1979), 106.2 percent in Belgium (66.2 percent in 1979) and 105.3 percent in Portugal (35.2 percent in 1979)³. Interest rate increase is a major headache for those countries.

On the other hand, there is a strong fear in the financial system (with banks and other finance areas) of the expected rise of interest rates. Looking at major banks, it first occurred at one that had taken higher risks of maturity transformation and interest rates (Silicon Valley Bank) and one weakened by major losses, loans forced to be written off over the past period (Credit Suisse). Next, some doubts have arisen regarding Deutsche Bank and other banks too. Just the fact that experts predict further spread may become its reason (and stock exchanges are pes-

2 <https://fiscaldata.treasury.gov/americas-finance-guide/national-debt>

3 https://economy-finance.ec.europa.eu/economic-research-and-databases/economic-databases/ameco-database_en

simistic too: the share prices of major international banks declined by approximately 10 percent from early to late March – *The Economist*, 2023).

Fears eased after March, but the necessity to raise and reduce interest rates at the same time remained feeding the tension between the two. Financial integration has become global; the international spread of interest rate fluctuations causes further complications and makes the management of different situations in different countries more difficult.⁴Because of it, decisions made by major central banks can result in important consequences both for them and elsewhere too, which can also become critical.

The above new special situation is the reason why the editors of *Finance & Development* published by the IMF printed papers by former and current governors of central banks and other experts (New Directions for Monetary Policy, 2023) on how we have got to where we are now and what central banks should do now or in the future in general based on their present experience.

2 HOW HAVE WE GOT HERE AND WHAT SHOULD BE DONE NOT TO REPEAT IT?

All authors underline the part played by the *pandemic* among the reasons for the current situation. *Claudio Borio*, head of the monetary and economics department of the Basel Bank of International Settlements explains the role of COVID-19 with three factors. On the one hand, as the pandemic abated in 2021, global demand suddenly increased, partly as a natural continuation of its earlier artificial dampening and partly as a result of fiscal and monetary policies of unprecedented strength to support businesses and incomes. On the other hand, a change in the composition of global demand favouring products over services has proved to be lasting, which was unexpected and caused bottlenecks. Third, global supply could not meet demand.

The *Russian invasion* of Ukraine last February was another important factor, as it pushed up energy and food prices to new levels.

However, in addition to one-off factors as above, *the models of our profession* should also be mentioned, in particular, the weaknesses of the models that prevented the prediction that inflation would accelerate. Borio points out the existing

4 The most striking feature of growing international financial integration is that interest rates adapt to those of “stronger” currencies, which increasingly supplements or even replaces adaptation via exchange rate fluctuation. Cf. e.g. GOURINCHAS–REY–SAUZET, 2019; PHILIP–MILESI-FERRETTI, 2018).

macroeconomic models were used for a long time under the conditions of a slow and stable inflation. Therefore, the models are prone to supposing that inflation will return, by itself, to the targeted value of around 2 percent annually. In addition, they also assume changes in the rate of inflation do not have an impact on the economic context the models are based on, including the sensitivity of wages and prices to what part of the production factors of the economy remain unused. Instead, the author is offering another approach closer to reality. In his approach there are two kinds of inflationary regimes, one with a low and one with a high inflation, and there is a self-boosting process leading from the first to the second. Inflation behaves quite differently under the two regimes.

When it settles at a low rate, what is usually measured as the rise of the general price level consists mainly of price changes in different industries that are loosely related to each other. Such changes only leave a temporary imprint on the general rate of inflation. It is also important that wages and prices being at the core of the inflationary process are only loosely linked to each other. Due to that, such low inflation does have certain self-stabilising effects.

However, a high inflation regime has no such features. Price changes carry more weight, wages and prices are much closer related and inflation is more sensitive to prices prone to frequent changes (such as food and energy prices) than currency fluctuations.

A regime shift is a self-boosting process for several reasons. One is that inflation leaves the zone of being rationally negligible, where companies or households hardly notice it, and gets into the focus of attention. In addition, it becomes more visible: price changes become similar and, more often than not, simultaneous. Thus, inflation behaves as a focal point, a kind of “tool of coordination” for business and household decisions. Therefore, the possibility of the appearance of a wage-price spiral increases.

Gita Gopinath, deputy managing director of the IMF emphasises the relationship between inflation and unemployment (also known as the *Phillips curve*). She believes the real nature of the relationship has been misunderstood and that is why the acceleration of inflation has come as a surprise.

Experience before the pandemic showed that a sudden reduction of unemployment as a result of the financial measures applied did not accelerate inflation; the Phillips curve was not very steep. The standard Phillips curve expresses the deviation of actual unemployment from the unemployment gap (non-accelerating inflation rate of unemployment – NAIRU).

However, a quick recovery of employment may have played a major role in shaping inflation recently, which indicates that “speed effects” may have a more important role than it was earlier believed. There might be some non-linear sec-

tions in the slope of the Phillips curve: the pressure exercised on prices and wages by the decline of unemployment will be stronger when the economy runs at full speed than when employment is not full. Finally, a sudden increase in the prices of goods at the time of economic boom, when the limitations of supply of and demand for services are a strong incentive to produce and market goods, underlines the importance of capacity limitations both in different industries and at an aggregate level too. That is why inflationary risks originating from an economy running at full speed may be much higher than it was thought earlier.

Gopinath also mentions another reason for the acceleration of inflation, which is discussed by other authors as well. It is an opinion used to be generally accepted, namely, a central bank, because of its credibility earned earlier for keeping inflation within boundaries, can “look over” (i.e., shun) *temporary supply shocks*, for instance, rocketing oil prices, assuming their impact on price increase will be temporary. The pandemic has proved such shocks may have wide ranging and lasting effects. Looking over temporary shocks may cause problems if the rate of inflation is high.

Over and above the answers given to the question of “what has misled us”, one should contemplate whether the state leaders responsible for macroeconomic decisions, or specifically the governors of central banks have fallen into traps they should have recognised and *should have avoided based on the information they had*. *Raguram Rajan*, a professor of Chicago University and former Governor of the Reserve Bank of India is the only one of the authors to raise the question and offer a fairly nuanced response.

He sets out from the limited nature of knowledge – no ethical responsibility there as bank leaders were fighting deflation and did not change tactics. Well, but who could have known that times were changing? And even if they knew, what could they have done?

As the author writes, “preemptive rate rises that slowed growth would have lacked public legitimacy — especially if they were successful and inflation did not rise subsequently, and even more so if they deflated the frothy financial asset prices that gave the public a sense of well-being. Central banks needed the public to see higher inflation to be able to take strong measures against it.” Central bank governors, naturally, are not engaged in election campaigns, but they need respect, credibility and acceptance to act successfully; it would have been problematic to take such a risk.

Rajan, however, thinks, this is not the end of the story. Although bank leaders can rightfully claim the latest processes have surprised them, they did have a role in limiting their playing fields, and their role was not restricted to what has been said before.

If interest rates are low and liquidity is high for a long time, it always leads to an increase of asset prices and a growth of indebtedness. And now both the government and the private sector have become indebted. It is true the pandemic and Putin's war increased government spending. But it was also increased by ultra-low long term interest rates and the fact that the bond market was made painless through central bank actions, such as quantitative easing (QE). It is true targeted government spending was necessary, which had to be funded from long term loans. However, the economists recommending increased spending failed to carefully examine its reasonable limits. Because the political environment was fragmented, increased spending could only be approved if it gave everybody something.

Central banks aggravated the problem by funding the purchase of government bonds from overnight deposits, which shortened the financial maturity of the consolidated balance sheet of the government and of the central bank. This, according to Rajan, means that government finances might become problematic as interest rates increased particularly so in countries of slow growth. Fiscal considerations already pressurise the policy of some central banks. For instance, the European Central Bank is worried because of the effect of its monetary transactions on "fragmentation"; i.e., the yield of debts drawn by fiscally weaker countries grows faster than that of stronger countries. Central banks should have at least recognised the volatile nature of the political sphere, which increased the likelihood of governments responding to the shocks with unbridled spending, even if they could not foresee those shocks. It could have made them more cautious with respect to eliminating long term interest rates and a commitment to long term low interest rates. Low interest rates and the abundance of money boosted the strong indebtedness not only of the treasuries but also of the private sector, households and enterprises.

3 DISTORTION OF THE SCOPE OF CENTRAL BANK RESPONSIBILITIES: FINANCIAL AND FISCAL DEPENDENCE SIDE-BY-SIDE WITH/INSTEAD OF ANTI-INFLATIONARY AND CONJUNCTURAL POLICY

The misguided policy of governments and central banks forces central banks to take measures which will cause minor or major disturbances in fulfilling their core task – providing stable money for the operation of the economy (and, in addition, ensuring the right level of employment). Firstly, their policies must ensure that the increase of government debt remains such that will not cause severe disturbance in the fulfilment of debt service and, with that, in government creditworthiness or in shaping and fulfilling primary (non-debt service) obligations

while taxes can also be held within reasonable limits (*fiscal dependence*). Secondly, their interest and monetary policies must prevent the operational disturbances of the (private) financial system (*financial dependence*). Finally, the demand of the private sector for liquidity, which has become high as money was abundant and is declining slowly, must be fulfilled (*liquidity dependence*, some authors regard it as an element of financial dependence).

Markus K. Brunnermeier, professor at Princeton University describes the normal situation of central banks by saying they are kind of leaders of the economy that stabilise inflation by setting interest rates; in addition, their mandate often also covers supporting the achievement and maintenance of full employment. An approach like that which can be termed monetary dominance requires a strong basis, i.e., *the independence of central banks*. *De iure* independence is there if – in a legal sense – a central bank can set interest rates independently with no government interference. However, *de facto* independence is also necessary. It is ensured if bank decision-makers need not worry whether the interest rates intended to be raised would increase government debt or the risk of the government becoming insolvent. If a government must honour high debt service because of increased interest rates, it is expected to reduce primary spending, which will cool the conjuncture and reduce inflationary pressure. In difficult times, the independence of central banks is key for them to be able to define monetary policy and control the economy.

The period following the 2008 crisis was characterised by monetary dominance. Central banks set interest rates free of fiscal policy and followed their set goals. At the time the main problem was not identified in rising prices but in declining demand, which could have led to strong deflation, therefore, they focused their attention on taking monetary policy measures to boost the economy.

Then the pandemic has shown that inflation is also influenced by fiscal policy side-by-side with monetary policy. However, the strong use of fiscal incentives led to the accumulation of high government debt and as the burden of (rigid, non-reducible) debt service grew, spending had become more difficult to be controlled. While central banks and governments could cooperate well earlier when government debt was low and growth-incentive policies were necessary, they may be confronted in the new situation.

If a central bank eases the government's burden of debt service by failing to increase interest rates, which is necessary to curb the inflation, and/or if it monetizes government debt, monetary dominance is replaced by fiscal dominance. In some cases, one may regard it to be unavoidable, or granted. Brunnermeier, in contrast to other authors of the papers, denies that. He believes a central bank cannot accept fiscal dominance. Adaptation by reducing spending and/or increasing revenues is the responsibility of the government. He thinks a central

bank must also have the right capitalisation so that it can resist pressure and can declare its intention to do so credibly.

Financial dominance is a situation often similar to and appearing together with fiscal dominance (currently true for many countries). It means the increase of interest rates aimed to curb inflation threatens the stability of the financial system, mainly of banks, because the interests of their passive operations generally increase at a faster rate than what they can apply to the interest rates of their placements. Therefore, a central bank will hesitate and will delay interest rate increases. Brunnermeier's opinion on that is more cautious and not dismissive. Probably because, contrary to fiscal dominance, there is no alternative for managing the situation. (Reducing government spending hardly helps, because it is not enough to curb inflation in itself, any other actions are no help at all.)

Financial dominance is subject to the capitalisation of the banking system (its loss-bearing ability) and also depends on the rules of bankruptcy management.

The above problems necessitate rethinking the relationship of monetary policy and financial stability. It is quite important that central banks use a gradual approach to introduce price-type signals on the markets where they have recently interfered expansively regarding quantity. One must acknowledge there always are mutual impacts between their goals of price stability and financial stability, even if tensions only surface long term. Fattening their own balance sheets leads to financial distortion and limits their future playing field. They must foresee the tension and exercise stricter macroprudential control. So, they do not only have to pay attention to the operability of individual financial institutions (which historically used to be the objective of financial control) during their regulatory activity but they also have to ensure the operability of the whole financial system.

In Brunnermeier's paper discussed here the reason for financial dominance is that in an environment of interest rates held low for a long time the financial sector (particularly the banking system) can only adapt to interest rate increases in a limited way and slowly. Other authors including Rajan mentioned above also discuss the problem of financial dominance and Rajan points out two more reasons for it. One is the sudden jump in the prices of financial assets, which – no surprise – occurs in the low interest rate period (and a potential fast reduction of which carries the risk of major disturbances). The other reason is the banking system becoming liquidity-dependent. It also occurs in the period of low interest rates, good conjuncture, particularly if monetary policy also uses quantitative easing in addition to interest rate cuts. In such times, banks are happy to grant their business partners credit lines and liquidity promises they cannot walk back on easily later on. Even if one identifies more than one reason for financial dominance, its consequences remain the same: central banks hesitate and delay to raise increase rates (to limit the amount of money). In Rajan's wording, the bank behaves asym-

metrically, since it has no grounds for such hesitation at the introduction of a lenient, growth-incentive policy.

The private sector is aware of the asymmetric behaviour of the central bank originating from financial dominance. What causes a problem is such knowledge has an impact on their expectations. Thus these days, irrespective of whether the American central bank (FED) wanted to yield to financial dominance or not, the predictions gaining momentum in the private sector (i.e., the FED will have to reduce interest rates quickly) made its task of getting rid of financial dominance more difficult. It has to raise interest rates harder and will have to keep their high level for a longer time than it should if the private sector did not have such expectations. It has grave consequences with respect to international conjuncture. It also means households, pension funds and insurance companies will book major losses when asset prices regain their new balanced level, but the losers are often not the same who have profited from the earlier rise of those prices. Thus, the rise of asset prices leads to problematic consequences of distribution the central banks are responsible for to a certain extent.

4 ZERO LOWER BOUND (ZLB) AND THREE DISPUTED INITIATIVES: QUANTITATIVE EASING (QE), FORWARD GUIDANCE (FG) AND TWO REGIMES OF CENTRAL BANK OPERATIONS ALTERNATING IN TIME

All three initiatives are the products of the past few years (the first and second are actually applied while the third is a proposal)

After the 2008 crisis following the golden age of the “great moderation”, the rate of inflation did not accelerate, it remained close to zero percent and interest rates hit the “zero lower bound” (ZLB), which could not be reduced to below zero particularly not too much below zero percent, so it has lost its role as an incentive. Therefore, economic growth also remained close to zero, which could not be changed much by introducing fiscal incentives. So, experts in some academic and practical monetary workshops started to contemplate and/or establish practical measures to lead inflation (and, naturally, economic growth) out of the impasse in such a period. They wanted to use the measures of monetary policy, measures of a kind that will have to be replaced by others when inflation does accelerate and curbing it becomes the task. Three different initiatives have been suggested; the second and third ones are practically identical.

One initiative is *quantitative easing* (QE), during which a central bank purchases instruments (mainly or exclusively sovereign debts, but in contrast to usual open-market transactions, not only short but also long-term ones) on the open market

to reduce interest rates (those of longer maturity that have remained above zero percent) and to increase the money supply. In theory, QE has many effects considered to be favourable in the financial-economic situation it is applied in. For instance, it will boost the price of financial assets, which will drive their holder business players to spending. It drives the national currency to be devalued as asset yields decline and money supply grows. It boosts credit supply. It drives investors to purchase other instruments by cutting back on the supply of sovereign debts, etc.

Empirical experience supports QE has such effects. For instance, in the US it reduced interest margins charged to borrowers by banks by 20 percent; the extent of the reduction was greater in the case of riskier loans than that of less risky ones (Shen–Wang, 2023). Nevertheless, it could only have a significantly positive impact if it could boost economic growth, the ultimate goal, by mediating such and other effects. But it is difficult to assess, because QE was quite quickly introduced in most countries when interest rates fell almost to nil, the lower boundary from the time of the 2008 financial crisis. Japan was the only exception. The problem already appeared there in 2000, but the introduction of QE intended to solve it only started much later, after 2013.

Masaaki Shirakawa the Governor of the Bank of Japan wrote about it in our collection of papers. The author emphasises there was no problem with economic growth in Japan from 2000 to 2012. The evolution of GDP per capita corresponded to the average of the G7 countries, while the growth of the GDP per working-age people was the highest within the G7. A still perceptible stagnation of the GDP, which was actually caused by structural factors (the fast rate of ageing and reduction of the population) was mistakenly explained by cyclical (conjunctural) weakness. Since Japan’s “great monetary experiment”, QE was launched in 2013, the balance sheet total of the central bank has increased from 30 to 120 percent of the GDP. Its impact on inflation or on real growth has proved to be rather modest. Based on those experiences, both Shirakawa and Rajan believe QE was an unfortunate experiment. Rajan also adds it falsifies creditworthiness, distorts asset prices and liquidity and is difficult to give up⁵.

Another initiative, *forward guidance* (FG), is in fact the communication and commitment of a central bank in a situation when the interest rates it controls get

5 Another paper by RAJAN goes into more detail regarding the difficulties of giving up. In the period of QE commercial banks opened ample credit lines and provided companies with liquidity in other ways too. They only cut back on such commitments slowly; they could not have cut back on them quickly anyway after the quantitative reduction in 2017. Thus banks, particularly those with less capital, became sensitive to potential financial shocks, so the Fed was forced to provide further liquidity support in 2019 and then in 2020. Cf., ACHARYA–CHAUHAN–RAJAN–STEFFEN, 2023).

stuck at zero percent or close to it, and they cannot / do not want to push them into the negative domain. Of major central banks, the European Central Bank and the American FED have landed in such a situation after the 2008 financial crisis. Then, as Brunnermeier writes, some affected central banks believed it was safe if, as forward guidance, they pledged to keep interest rates low until the distant future so as to boost demand and to draw inflationary expectations near their own inflationary goal (raise them). They did so, because it seemed unrealistic that such commitments would cause inflation even in the long run. However, Brunnermeier thinks such commitments cause disturbance in expectations if central banks cannot keep them later.

The third initiative was born at the Basel Bank of International Settlements (BIS). It is *the two kinds of central bank operational regimes* (Borio–Lombardi–Yetman–Zakrajšek, 2023), related to the regimes of inflation. The latter has been discussed above based on the paper by Borio, the head of the monetary and economics department of BIS.

Contrary to the traditional concept according to which a central bank must always follow one operational regime, for instance inflation targeting, the idea recommends different operating modes should be used under slow or fast inflation. In a regime of slow inflation, when the rate of inflation remains slow despite price shocks, a bank may need to be more tolerant of inflation so that it can accelerate inflation (and economic growth with it) in the short run. And via versa: in a regime of fast inflation, when every price increase triggers another one, a bank must be committed to curb inflation as fast as it can.

Rajan challenges the idea. The two commitments contradict each other, and central banks cannot switch their commitments based on regimes, as they may lose the core of commitment, its power in that way. The argument, not surprisingly, is basically identical to the one quoted above from Brunnermeier' paper on forward guidance (FG).

Rajan argues a central bank needs one operating mode, one regime, namely, it must – based on risk assessment – emphasise the fight against high inflation and apply its traditional measures, such as interest rate policy. The question here remains what to do if the rate of inflation is too slow. One may have to learn to live with it in the same way one has learnt to live with COVID-19. One need not make efforts to accelerate a slow rate of inflation until it turns into a deflation spiral. On the other hand, the scope of responsibilities of central banks should be expanded by giving them stronger mandates to promote financial stability their actions strongly affect.

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