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Foreword

In 1954 the Hungarian Ministry of Agriculture established a new institute that was to be the direct predecessor of the Research Institute of Agricultural Economics (AKI), although several reorganisations would take place over the intervening 60 years.

During its existence, AKI has produced numerous publications, mostly in Hungarian. However, for over 50 years, *Studies in Agricultural Economics* and its predecessor publications have played a unique role in disseminating the research results of the Institute, not just in Hungarian but also in English, French, German and Russian. Over time the content of the journal has broadened to include papers published by researchers at other institutes in Hungary and elsewhere, and editorial procedures have been tightened up such that all papers are now rigorously peer reviewed, with this task mainly falling on the shoulders of the journal's Editorial Board.

Hence, the members of the Editorial Board of *Studies in Agricultural Economics*, past and present, have made an important, and perhaps not adequately appreciated, contribution to the work of AKI over the years. The 60th anniversary of AKI provides the opportunity to redress this oversight with the publication of an issue of the journal composed only of papers authored or co-authored by members of the Editorial Board.

The areas of expertise of the Board members are many and varied, reflecting the range of topics covered by the journal. The authors were free to choose the subjects of their submitted papers and, as a consequence, this issue of *Studies in Agricultural Economics* includes research results that are likely to of interest of a broad cross-section of its readership.

As if to illustrate this point, Dax describes the rationale behind the development and implementation of the ERA-NET RURAGRI. Three interrelated dimensions (agricultural, ecological and spatial development) need to be addressed in rural development research, but so far they have only partly been explored jointly. Research commissioned by RURAGRI will help to fill that gap.

Tocco, Davidova and Bailey identify the determinants of labour adjustments with respect to the agricultural sector in the post-transition period in Romania. The low levels of mobility out of agriculture point to the need for investments in human capital, specifically in education, and for creating alternative sources of income from non-agricultural activities in rural areas.

Tourism is often suggested as a driver of rural regeneration but the study by Székely of four tourism cluster initiatives in the Slovak Republic shows that, according to a set of economic indicators, their economic impact since establishment has not been as big as had been hoped. Such initiatives are not appropriate for all rural areas.

The next three papers explore aspects of international agri-food trade. Using constant market share analysis, Bojnec and Fertő show that, while the structural effect is mostly positive for all European Union (EU) Member States, the residual and second order effects are more often positive for the Eastern EU Member States and, after the EU enlargements, more often negative for the EU-15.

Hegedüs and Kiss develop this theme by analysing the impact of EU membership on Hungarian agricultural trade with the EU-27 in the period 2003-2013. While trade has grown dynamically over this period, the Hungarian export commodity structure is dominated by raw materials and semi-processed goods, while the import structure, although diversified, is processed goods oriented.

The study by Tóth and Gál seeks to explain the success of the New World wine producing countries by focusing on the macroeconomic elements that affect technical efficiency. Inefficiency is related to factors such as the development of the financial system, the quality of human capital and per capita wine consumption.

Hubbard, Luca, Luca and Alexandri analyse the volume and composition of national and EU agricultural financial support in Romania between 2002 and 2012. Whilst EU funds have become more important since accession, support from the Romanian national budget remains significant. The main beneficiaries are the large-scale commercial holdings.

Finally, Eleki, Cruse, Rogovska, Fodor, Szabó and Holló demonstrate that the removal of crop residues for uses such as biofuels can threaten soil quality and long term farming economics due to depletion of soil organic matter. Some form of above ground biomass should be returned to the soil, especially with monocultures of maize.

As Editor-in-Chief of *Studies in Agricultural Economics*, I would like to extend my own grateful thanks to the members of the Editorial Board for all their hard work and support.

Andrew Fieldsend
Budapest, July 2014

Thomas DAX*

Shaping rural development research in Europe: acknowledging the interrelationships between agriculture, regional and ecological development

An enhanced research strategy supported by the ERA-NET RURAGRI

In a context of significant changes and increasing complexity of economic and social systems, new challenges arise for rural research. It is commonplace that many research issues cannot any more be understood by regional or national studies alone but have to be framed in their international setting. A recent ERA-NET, the RURAGRI network, addressed the gap in European research organisation for providing a common research agenda on rural development research. It highlighted that this research field can be covered sufficiently only if the interrelationships between agricultural, ecological and spatial development are addressed appropriately and taken up as core research questions. The Strategic Research Agenda elaborated through the partners of this network, representing research organisations in 20 European countries, indicates the wide scope of issues for respective international research. Some of those aspects, and particularly the aim of increasing our understanding of these interrelationships, are taken up in a first set of selected international studies resulting from the ERA-NET's call. The intensive discussion on research collaboration and the high status of rural development policy on the political agenda within the European Union also underpins the need for future international collaboration on research organisation of rural development research.

Keywords: research organisation, European Research Area, rural development, regional systems, interdisciplinarity

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Introduction

With the substantive changes in our resource use systems and increasing interrelationships of economies and societies at the various geographical scales, the need for systemic approaches in research organisation has increased. These global trends particularly relate to land use dynamics and impacts on rural development. The reorientation of agriculture towards improved ecological practices, the economic viability of rural areas and their contribution to sustainable development have set new issues for both policy making and research. In this context the research framework for rural development analysis changes significantly and a new sphere of research questions has to be elaborated. It will be particularly inspired by the major trends and driving forces identified by the state of the art of research in this field at the international level and foresight studies addressing specifically the perspectives and needs of future research and policy development.

This paper focuses on considerations for research organisation addressing the interrelated aspects of agriculture and sustainable development in the context of rural regions. It draws particularly on the work of the ERA-NET RURAGRI (2009-2014) which takes up the long-term discussion on rural research organisation in Europe. By addressing current challenges and acknowledging the interrelations between land use, regional economy, ecological changes, societal drivers and governance issues it provides a comprehensive framework for rural development research that aims to take account of the increasing complexity of development in rural areas. Research in this field started during the 1980s with rising awareness of environmental, structural and socio-economic problems in rural areas. During that period, the need for a rural policy and a more integrated approach to deal with the increasingly complex situation was formulated for the first time at the international level in Europe. The document *The future of rural society* (EC, 1988), which outlined a vision for a genuinely territorial rural development policy, can be seen as the starting point of this process.

Since then, the integration of rural development policy activities in the Common Agricultural Policy (CAP) and at various stages in the Structural Funds programmes has taken place. Policy elaboration was significantly accompanied or, at least at times, significantly influenced by, rural development research (Dax, 2014). Soon it became clear that international analysis and comparative approaches were needed to address the European dimension and the diversity of rural regions across Europe. A growing research community focusing on rural issues established in European countries and networking was facilitated through targeted projects within the European Union's (EU) Framework Programmes (FP), commissioned studies and transnational cooperation (Dax, 2002). In particular, networking activities, such as the REAPER programme (the European Rural Studies Action Network; Arkleton Centre, 1997), the COST activity A12 Rural Innovation (Blanc, 2003) and the synthesis work of the Standing Committee for Agricultural Research (SCAR; Blanc, 1996) raised commitment for comparative research perspectives. Finally the intensive discussions on opportunities for European research cooperation of two SCAR Collaborative Working Groups (Agriculture and Sustainable Development, and Rural Development Research) and the recognition of the need to enhance cooperation among rural researchers and to contribute to a more explicated European perspective stimulated the European Commission (EC) to establish an ERA-NET under the FP7 call KBBE-2008-1-4-10 focusing on 'Agriculture and sustainable development in a rural development context'. Since 2002 more than 100 collaborative activities of national research programmes, so-called ERA-NETs, have been established to contribute to the strategy of a European

Research Area (ERA). While 19 thematic ERA-NETs had already started within the FP6 programme, the idea to focus on the interrelationships of the various drivers and aspects of rural development was only realised with this FP7 call.

The ERA-NET RURAGRI (www.ruragri-era.net) that was set up in response to the FP7 call explores emerging topics for research and aims at research not yet envisaged in the field of agriculture and sustainable development in the context of rural development. With its full project title 'Facing sustainability: new relationships between rural areas and agriculture in Europe' it highlights the three interrelated dimensions (agricultural, ecological and spatial development) that are particularly required to be addressed in present research, but so far have only partly been explored jointly. The network assembles 24 partners from 20 countries (including the non-EU countries Turkey, Switzerland and Israel) and thus extends to a large part of European rural research. Hence it represents an important contribution to the discussion of European research priorities and its concept and activities are of influence to the current FP (Horizon 2020) and the establishment of the ERA.

The paper focuses on the need to adopt such a comprehensive view of the different dimensions that influence agricultural and rural action and have an impact on developments in rural regions to address societal challenges and take sufficient account of the complex interrelationships. With regard to existing literature it will highlight the need to realise the scope of complexity linked to the new dynamics of land use systems and rural development issues (Rogers *et al*., 2013). The next section therefore provides a brief introduction to the debate on the conceptual changes of rural development that are fundamental to an appropriate, up-to-date research design and support for policy reform. The extent to which existing European rural research activities address the current challenges is then presented. This is followed by a summary of RURAGRI's strategic considerations, laid down in the Strategic Research Agenda (SRA). Following to the common research framework, the relevance and the need for further research and enhancement are discussed before conclusions on issues and organisation of European rural research are drawn.

The assessment presented in this paper benefits not only from the personal involvement of the author in the organisation of the RURAGRI call, but also reflects experiences from participation in many FP projects and international debate on rural research at EU level and within OECD working groups.

A new concept of rural development

Along with the changes in rural society and economy, rural research has shifted its main concerns over recent decades. Whereas in the 1980s it was targeted to a large degree towards agricultural activities, its main research priorities are now much wider in scope. However, the new research focus is only partially reflected in the evolution of rural development policy. Although policy analysts such as Pezzini (2001) were tempted to state that "today *rural is not synonymous with agriculture* and even that agriculture is no more the backbone of rural areas" (p.136, emphasis in the original quote), the policy programme labelled and widely referred to as the 'rural policy' programme in the EU is Pillar 2 of the CAP. Acknowledging the evolution in objectives, reiterated policy intentions and numerous initiatives for rural development practices, particularly at local level (Marsden, 2006), OECD pointed to the need to enhance the 'New Rural Paradigm' (OECD, 2006). This new conceptual framework for rural development strives to present rural areas not as merely 'dependent' peripheral regions and to overcome the prevailing defensive policy perceptions. It includes a cross-sectoral approach that calls for the integration of all levels of government and regional and local actors. This integrated perspective addresses a broad scope of relevant policies, going well beyond the previous focus on almost exclusively agricultural activities, a new vision of rural regions as areas with substantive assets; and a focus on investment measures, instead of compensation payments.

According to this conceptual outline, rural policies have to abandon their previously defensive strategies and traditional mantra of 'rural areas as problem regions with hardly any alternatives and future options' except for the agricultural production potential, limiting its perspectives to land use issues. In contrast, proactive strategies would tap the full potential of the regions and pay attention to including actors from all sectors (Lowe *et al*., 1999). Such a perspective recognises modernisation and innovation aspects as core driving forces, but at the same time takes account of the spatial diversity of rural regions.

To provide adequate responses to the diversity and increasing complexity of spatial development, research has to grasp the full set of relevant factors, the evolution of institutional settings and actors' participation, the place-specific variations in the regional context situations and the policy framework impacting on rural development. In policy terms, such a comprehensive perspective points to a rationale for a 'Rural Cohesion Policy' (Copus *et al*., 2011). For rural development research the new conceptual views highlight a number of important requirements (RURAGRI, 2009):

- An assessment of the spatial dynamics that are changing agriculture is crucial for the understanding of the spatial dimension of sustainable development within the diverse EU regions and between them at the European scale. Sectoral approaches only considering agricultural activities fail to take account of new spatial trends and to tap place-specific development opportunities. European research should build on spatial assessment and studies (such as the European Spatial Planning Observatory Network – ESPON programme) to understand trends taking into account economic and social activities for further regional development.
- In parallel to the territorial dimension, activities to promote social inclusion and poverty reduction (like those expressed with priority 6 of the Rural Development Programmes 2014-2020) have to be nurtured as integral parts of development. Research has to respond adequately to the heterogeneity of distribution of natural, human and economic resources across European rural areas.
- In addition to providing diverse development opportunities, heterogeneity may reduce risk vulnerability and enhance adaptation capacity to climate change impacts, prices variability and more generally changes in societal demand.

- As for other parts of the world, throughout Europe the strong urbanisation trends require increased attention for connectivity between urban and rural areas. The geographic, economic and human dynamics of rural areas are increasingly influenced by urban development (i.e. urban or semi-urban economic activities, infrastructure and habitat, patterns of human and material flows).
- Following these spatial trends the European geographical area has to be analysed as a whole and cannot be assessed for its parts in isolation. Research has to foster the integration of activities and programmes at different governance levels and across geographical regions.
- As revealed already in many programmes and research activities, the current set of challenges can only be addressed by interdisciplinary approaches and transdisciplinary activities are crucial to achieve dissemination of research findings within the rural regions.
- Research can turn out to be influential only if it addresses the objectives and challenges of the European policy agenda (e.g. CAP, environment, regional policy, transregional cooperation etc.).

In order to understand better the links between agriculture and rural development, the ERA-NET RURAGRI aims at reflecting these research requirements and addresses two main questions (RURAGRI, 2009):

- What are the main challenges ahead of rural development in Europe and their interaction with agriculture?
- How can agriculture contribute to sustainable rural development?

The analysis of these two questions within the RURAGRI network led to a set of general issues for rural development research. Common research programmes at the European level would have to tackle the following key topics as main aspects: (a) the role of European rural areas in the context of increasing urbanisation, (b) the new challenges and opportunities increasingly experienced and assessed by revaluation of European agriculture's features, and (c) the mix of policies and emerging governance systems facing sustainability demands. In this regard the relevance of the rural context for farming systems are shaped and influenced by evolving governance arrangements at different scales (multi-level governance) that are crucial to meeting the challenges of sustainable development.

A European view of rural research activities

The numerous challenges of our societies for rural development have been discussed widely in recent European research (Dargan and Shucksmith, 2008; van der Ploeg *et al*., 2008; Ward and Brown 2009; Copus *et al*., 2011; Hubbard and Gorton, 2011; Woods and McDonagh, 2011; Torre and Wallet, 2014 etc.). There is not space here to elaborate the full assessment of themes and main results of international studies. However, the mapping of European research activities by the ERA-NET RURAGRI provides a useful overview. It highlights the increase in rural research and addresses the main trends in research topics and orientation. The search for relevant research involved three action lines:

- The mapping of the national framework for relevant research activities and national reports on main programmes and influential projects. The synthesis of these reports by the 20 RURAGRI partner countries (Brouwer and Sas-Paszt, 2011) provides an important assessment of respective research activities, their specific focus and common views and research topics, at national level.
- An expert workshop of high-level European researchers addressing the main challenges within the fields of agriculture, rural areas and sustainability, and arising future research needs (Den Haag, The Netherlands, March 2011).
- The collection of international research activities in the EU over the past decade, including the EU's FPs (particularly FP6 and FP7), the relevant ERA-NETs, other international studies commissioned by the EC and activities of other programmes (e.g. ESPON and Interreg), achieved primarily through the analysis of *Cordis*, the EU's research documentation website (http://cordis.europa.eu/projects/home_en.html), and the websites of relevant projects (Baumgartner and Dax, 2012; Dax *et al*., 2012).

In the RURAGRI network countries the diverse research topics and detailed issues of rural research were identified, with several countries disposing of focused research programmes that include investigations of interrelationships between ecology, economy, social and institutional dimensions. The most relevant national programmes with regard to addressing these interrelationships are (Brouwer and Sas-Paszt, 2011) the programmes 'Agriculture and Sustainable Development' (ADD), 'Ecosystems, Territories, Living Resources and Agriculture' (Systerra) and 'Joint calls on agricultural and rural development and partnerships' (CAS-DAR) in France, 'Sustainable Land Management' and 'REFINA – Research for the Reduction of Land Consumption and for Sustainable Land Management' in Germany, 'The Green Development and Demonstration Programme' (GUDP) in Denmark, the 'Research Programme of the Ministry of Agriculture' (PFEIL 15) in Austria, with the other partners focusing their research activities of relevant institutions on important elements of the scope of RURAGRI's research. Moreover, other national research programmes such as the 'Rural Economy and Land Use Programme' (RELU) in England are interesting examples of interdisciplinary activities. Beyond the discussion of national views a visualisation of the gaps in addressing the interrelationships of the three dimensions turned out to be extremely useful to underline the need for interdisciplinary approaches. The EU analysis revealed that many initiatives of FP6 and FP7 programmes address core issues for research priorities in the scope of RURAGRI. Information for about 80 relevant international FP projects, 105 other international projects and studies (commissioned either directly by EC tenders

or carried out within thematic programmes) and networking activities in at least 18 ERA-NETs, European Technology Platforms (ETPs) and Joint Programming Initiatives (JPIs) were collected as relevant EU research activities. The research focus within the three dimensions of RURAGRI is presented as a triangle (Figure 1). While many programmes and network activities are mainly driven by one or two of the underlying dimensions, some projects worked more intensively towards an integrated analysis as required by the new conceptual considerations (e.g. MULTAGRI, TOP-MARD, RUFUS). Nevertheless the central area of highest exchange of the three dimensions is populated rather sparsely, indicating the scope for intensifying research that much more strongly addresses the interrelationships.

The main findings of mapping research activities underpin an increasingly active uptake of relevant issues. While the scope of analysis is extended to 'new' fields of investigation, there is a lack in current research on addressing the various drivers and interrelationships of different systems on rural development. RURAGRI analysis highlighted that the majority of projects tend to focus on a specific issue and neglect the systemic inter-linkages and implications from various influencing aspects. However, with an increasing demand for policy relevance more studies are commissioned that contribute to rural development or regional programmes. On the other hand, the aspects of sustainability (and a series of further concepts related to nature relationships and resource use assessment; see Copus and Dax, 2010) have become a specific focus for rural research. The general impression from the ERA-NETs collective debate is confirmed by a recent systematic search of trends in rural development research within English language publications (Evans *et al*., 2013) which classifies research publications by type, region and engagement with sustainability over three time periods (1988/89 – 1998/99 – 2008/09) across the world. Findings reveal the shift of research towards developed countries and sustainability issues, reflecting the political uptake of the concept in this part of the world.

At the same time, the future perspective of research needs has persisted as a major task of research organisation at the European level. SCAR, which had already acted as inspiration to stimulate the process towards building the ERA-NET RURAGRI, summarised in its Foresight studies core issues of current research demands for the EU. They highlight the crucial role of enhancing knowledge systems in rural regions (Brunori *et al*., 2008) and the impacts of resource constraints for sustainable production and consumption (Freibauer *et al*., 2011). Farming systems research has underscored the crucial aspect of learning and knowledge systems for rural development research (Hubert *et al*., 2012, Katona Kovács, 2014). As a consequence of these foresight studies on rural research the increasing connectivity of (rural) spaces affects also research issues and organisation. Framing rural research has to be understood therefore more and more in an interdisciplinary field where a multitude of influencing relationships (Juvancic *et al*., 2011) has to be assessed for their relevance. In a system of high path-dependence the demand to understand and act in a complex field of interrelationships becomes an important research task, necessitating a specific concern for reflexivity in local action.

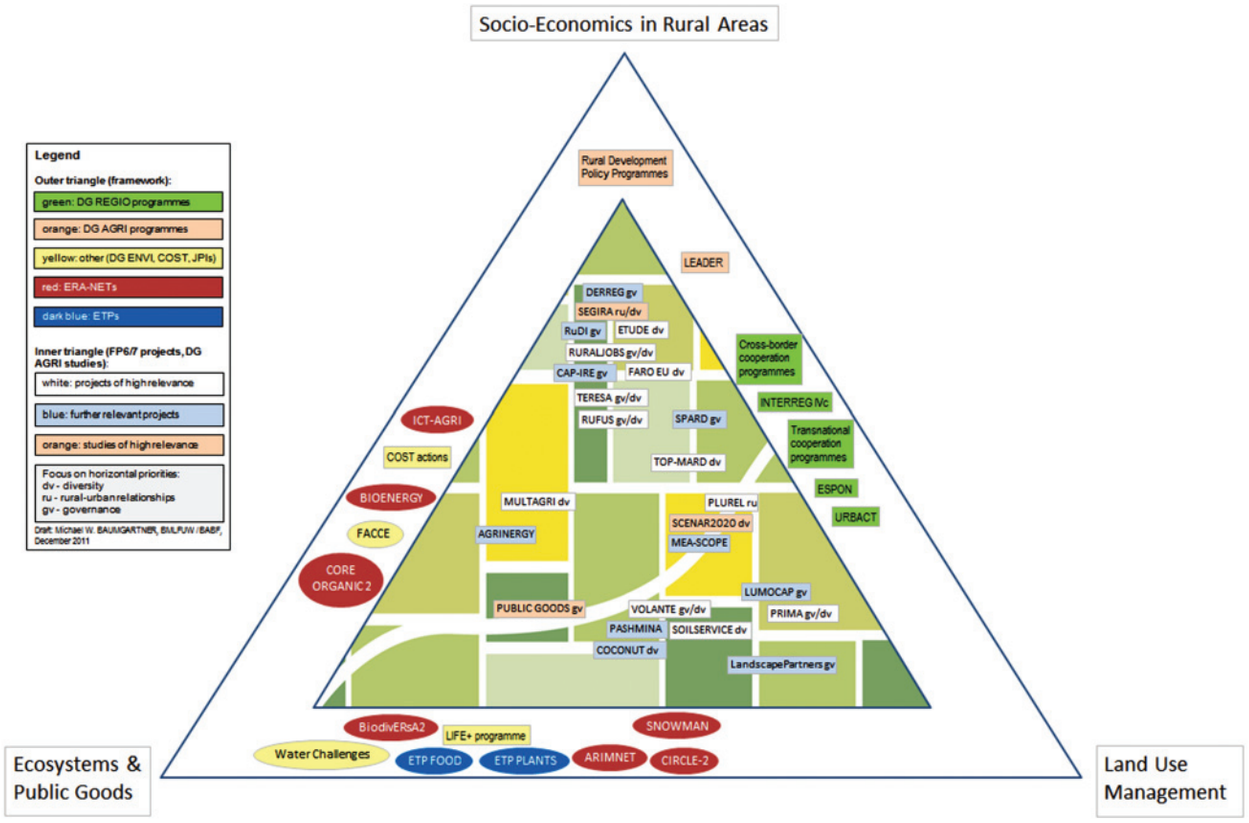

Figure 1: Relationships between relevant EU research activities and the three research priorities of the RURAGRI Strategic Research Agenda.
Source: Baumgartner and Dax (2012)

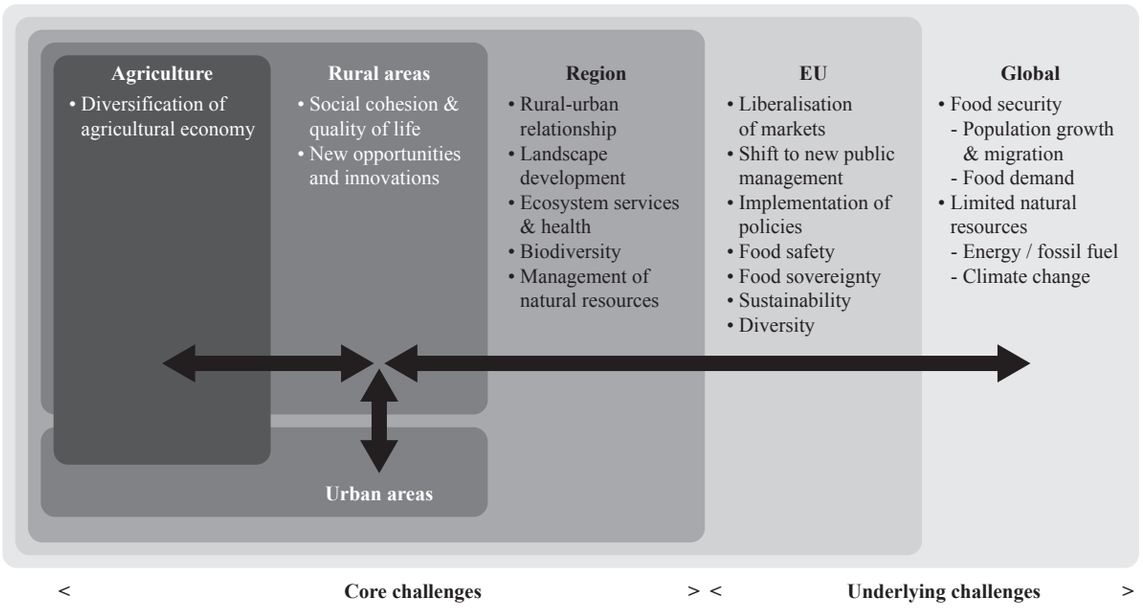

Figure 2: Core and underlying challenges for the sustainable development of agriculture and rural areas.
Source: Johansson *et al.* (2012)

Development challenges and research priorities

The above research activities can be interpreted as a (partial) reaction to problem patterns and changes in agriculture and rural areas. In conceiving future research orientation driving forces for agricultural, environmental and regional development have to be sorted out. As rural change is an extremely complex and nuanced phenomenon that is full of generalisations and stereotypes, Copus *et al*. (2011) highlight the negative connotations of the main persistent rural stereotypes and indicate the difficulties to overcome the social and institutional processes perpetuating its reception in the general public. All the more, it seems important to address the full range of drivers impacting on rural development. Building on the rising understanding for the complexity of regional and rural development processes challenges for development are manifold. They operate across different spatial scales and can result in different outcomes in different types of areas, e.g. rural vs. urban, diversified vs. non-diversified and accumulating vs. depleting regions.

Figure 2 draws a distinction between general 'underlying' challenges and 'core' challenges, attributing various features of drivers to the different spatial scales, from land use through agricultural production to global influencing aspects. While the global and EU challenges are associated with the overarching patterns of our economic and social systems and can hardly be influenced by national, regional and local action, the latter levels are the target areas for research considerations (e.g. of international European projects that are in the scope of calls of FPs and ERA-NETs).

In order to respond to these challenges and address the rural potential, with the objective to achieve balanced sustainable development, research is to be focused on main priorities. The partners in the ERA-NET RURAGRI established a strategic perspective, the SRA, which provides a framework for priorities for future research concerning agricultural and rural development in three key areas (Figure 3). There were 14 research topics within the three research priorities of RURAGRI (Table 1).

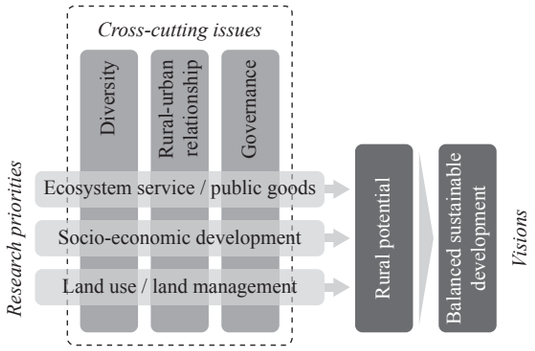

Figure 3: The RURAGRI Strategic Research Agenda.
Source: Johansson *et al.* (2012)

In addition to the research themes themselves it is essential to understand the core influences of contextual aspects on the formulation and framing of these themes. They are presented as 'cross-cutting issues' that exert effects on all three groups of research priorities and should be taken into account in the design of all relevant projects. The three aspects of cross-cutting issues required within RURAGRI are:

- The need to address and reflect the *diversity* of (rural) European regions, their potential, challenges and opportunities as an essential precondition to position and compare place-specific research proposals (that are characteristic for types of rural regions across Europe);
- The assessment that rural areas, communities and economies do not exist in a vacuum but, rather, are integrated into networks or circuits of capital, knowledge and material flows that are particularly shaped by *rural-urban relationships*;

- The firm belief that innovations in *governance* are crucial to enable current and future transition of rural areas in order to achieve balanced regional development.

As RURAGRI is a comparably big ERA-NET it combines research perspectives from 20 countries and mirrors the high interest of EU Member States in supporting rural development policy by targeted rural research. The high diversity of regional contexts and the complex interrelationships extend the scope of interest for research topics. In the preparation of joint research activities of the RURAGRI network which culminated in a common call it was agreed to enable projects on all topics of the SRA. Instead of limiting the research themes to a few specific issues of highest priority, as is the case for FP research themes, the main focus was on the requirements for project design. It was a core need of proposals to address the interrelationship of land use, ecosystem development and the regional context, to put proposals into the framework of European spatial typologies and to refer explicitly to at least one of the three cross-cutting issues (diversity, rural-urban relationship and governance). Furthermore project proposals answering the RURAGRI call published in September 2012 had to apply interdisciplinary research methods and include transdisciplinary action. The resulting projects hence aimed to link diverse aspects of ecosystem assessment, land use management and socio-economic development within specific a framework of rural regions (Dax *et al*., 2013).

Table 1: Topics grouped according to the three research priorities of the RURAGRI Strategic Research Agenda.

Research priorities and topics
(a) Ecosystem services / public goods
• Identify the various types and quality of ecosystem goods and services in different rural areas and improve monitoring systems of goods and services to ensure their sustainability;
• Enhance methods measuring the value of goods and services on spatial and temporal scales for monitoring, including indicators for follow-up and impact assessment. Research could consider the development of governance systems, procedures and tools managing ecosystem goods and services in a regional perspective;
• Increase understanding of how to achieve mutual benefits between economic development in rural areas and the delivery of public goods. Define tools for marketing these values to the general public and to decision makers. Assess the influence of production and consumption patterns on the use of ecosystem goods and services in different rural areas. Identify best practices, innovative solutions and system innovation suitable for use in rural areas.
(b) Socio-economic development
• Explore economic activities, public and private services, provision of infrastructure and technology to enhance sustainability and identify best practices supporting vibrant rural areas;
• Identify barriers that hinder innovation and evaluate novel mechanisms and socio-economic structures (networks) which encourage innovation in rural areas;
• Identify and evaluate agricultural development trajectories in different rural areas, paying particular attention to the potential for specialisation and/or diversification;
• Assess the reasons for migration and the impacts on the quality of life, culture and social identity for different types of rural areas. This should include studies on the potential of migration on the capacity for innovation in different types of rural areas;
• Assess and evaluate the implications of mobility and commuting on the quality of life, culture and social identity for the potential and sustainable development of different types of rural areas;
• Identify the diversity of urban-rural relationships and evaluate their potential to contribute to sustainable rural development, assessing best practices in the management of rural-urban relationships. Research in this area might also consider issues related to the use of ecosystem services;
• Identify the mechanisms of interaction between sectoral policies and their intended and unintended territorial impacts. Formulate recommendations for the coordination of sectoral policies fostering synergies. Research in this area might also consider issues related to land use and/or ecosystem services.
(c) Land use / land management
• Explore and evaluate innovative land use and management practices to overcome conflicting demands on land and identify best practices;
• Evaluate those economic networks utilising natural resources that result in increasing demands on land use; identify and explore novel resource efficient networks. This research could include consumer perspectives;
• Assess multifunctionality of agriculture and how this concept could overcome land use conflicts and contribute to diversification of rural economies. Research linking the concepts of multifunctionality, ecosystem services and public goods is also of interest;
• Assess land use implications of new paradigms (e.g. green growth).

Source: Johansson *et al.* (2012)

Core aspects for rural development research

The RURAGRI call highlighted a number of common research aspects that have been addressed in previous network activities on research collaboration, and scoping discussions on research priorities in response to current challenges. In this perspective it could point to the wide scope of relevant topics for rural research and policy. It is clear that international research programmes only can manage to focus on a few priority topics. ERA-NETs are a good vehicle to underpin the need for an enlarged European preoccupation and more in-depth investigation as well as combined research efforts that give additional attention to studies that could not be commissioned by national programmes alone. Raising commitment for such issues at the international level is reflected in common issues of the RURAGRI call, targeting on novelty approaches, the requirement of an inter- and transdisciplinary method and the realisation of activities aiming at European added value.

The nature of rural development calls for a research framework that is both open to new thematic inquiries and useful for policy assessment and development. Research management in this field is therefore closely linked to institutional development and evolving governance arrangements, and cannot be restricted to a debate on selecting research topics and methods. This requirement is increasingly understood within rural research, but still a strong European incentive and international consensus was missing. International debates, such as those animated by RURAGRI, scoping studies and international conferences might induce greater commitment for analysis of interrelations of rural development topics. The implications of such a research agenda is particularly seen in concerns for creating/enabling effective networks at the local level (Stimson *et al*., 2009). Recently Shucksmith (2013) concluded that "[i]nvestment in the capacity to act of local communities in this way should be a priority, even in an age of austerity" (p.29). At a mid-term perspective it seems important to provide an organisational structure for continuously supporting this research field. The thematic support is deemed useful as activities of different programmes, at dif-

ferent levels, carried out by different research sectors and involving different methodological approaches have to be included in an analytical survey of research activities. This interdisciplinary field is characterised by very strong policy relevance and thus an increased concern for targeted and adapted research strategies that take account of a European vision would be of significant added value.

Conclusions

The increasing interest and uptake of research themes related to rural development issues and its interrelations to land use and ecosystem development is revealed in an increasing amount and scope of relevant research activities. SCAR and European research debate have repeatedly highlighted the need to intensify and shape rural research according to current societal challenges. Following the stronger commitment for targeted research on rural issues in recent FPs, the ERA-NET RURAGRI provided an overview on the European activities in this research field and established a common SRA. The research priorities addressed by that research framework underpin the wide range of topics that are of concern for analysing the system of interrelations (Hedberg and do Carmo, 2012) impacting on rural development, land use and ecological development across European regions. In line with the aims of the ERA-NET approach RURAGRI provided a sound basis for enhanced cooperation of research programmes and enabled exemplary research projects that endeavour to analyse the set of interrelations most relevant for land use and rural development issues. By addressing specific aspects of interrelationships and rethinking the nature of rural development innovative contributions to the discussion of rural development research are expected.

As the scoping activities of RURAGRI underpinned that beyond the EU's FP activities relevant research is commissioned by transnational programmes, specific tenders, networking schemes, activities of international organisations etc. the networking activities initiated by the RURAGRI work should be continued in the future by international collaboration on research organisation of rural development research issues. A multitude of national programmes with relevant research focus should be taken into account as an important input to those considerations. Many of those research activities resulting from international and national programmes are of relevance for an assessment of international developments of driving forces, challenges and opportunities for rural development. In the analysis of interrelations it seems crucial to address current research questions by addressing an international framework of spatial types that could yield findings that are applicable to specific regions and comparable at the European level.

Acknowledgements

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Labour adjustments in agriculture: evidence from Romania

This paper explores the slow pace of structural change which has characterised the post-transition period in Romania and sheds light on the dynamics of labour adjustments. A multinomial logit is employed to investigate the determinants of inter-sectoral labour movements in the period 2003-06. The high share of farm employment in Romania, mostly characterised by family workers and self-employed, suggests that agriculture serves as a buffer against unemployment. Whereas the main channel of farm labour outflows is closely related to retirement, movements to other sectoral employment are significantly hindered by the low levels of education. The findings are important from a policy point of view, suggesting the need for investments in human capital, specifically in education of the rural population with the purpose of enhancing the mobility of labour and facilitating a smooth transition across activities. At the same time, priority should be placed on rural development to encourage the diversification of the rural economy and the creation of alternative sources of income from non-agricultural activities.

Keywords: labour adjustments, inter-sectoral movements, agriculture, multinomial logit, Romania

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Introduction

The collapse of the communist system in 1989 and the transition from a centrally planned to a market economy has had a deep influence on the labour markets in Central and Eastern European countries (CEECs). In Romania, the land reform and the privatisation of non-land assets created more than 4 million individual farm households and small family farms which, in terms of the number of farms, became the predominant type of farming. Although many of these small-scale semi-subsistence farms are expected to disappear as a consequence of economic growth, in the last decade the process of structural change has been relatively slow.

One of the roles of agriculture in economic development is traditionally seen as releasing labour for the rest of the economy. This can provide the double benefit of supplying hard-working self-reliant workers for rapid economic growth in the non-agricultural sectors while at the same time spurring agriculture to improve its labour productivity and raise rural living standards. Romania seemed perfectly poised to offer these developments after the collapse of the centrally planned system. It had one of the largest agricultural sectors in the CEECs, and incipient manufacturing and service sectors which had great potential to be invigorated by joining the European Union (EU) single market. This seemed to offer an opportunity to see classic labour market interactions between agriculture and the rest of the economy.

Motivated by this opportunity, the objective of this paper is to identify the determinants of labour adjustments with respect to the agricultural sector which have characterised the post-transition period. In particular, the paper examines both supply and demand side characteristics which explain inter-sectoral movements of labour. The focus on Romania is deliberate and stems from the significant role of its agricultural sector in the national economy. One of the striking features is the pronounced share of employment in the agricultural sector. In 2010, agriculture accounted for 30 per cent of total employment with more than 2.7 million people engaged in the sector. The 2010 Farm Structure Survey (FSS) recorded 3,859 thousand agricultural holdings in Romania with 71 per cent of these holdings having 2 ha or less. A unique characteristic, even in comparison to other CEECs, is the unfavourable production structure: the heavy reliance of people on subsistence and semi-subsistence agriculture (more than 90 per cent of the total number of holdings use more than 50 per cent of the agricultural production for its own final consumption rather than sales to the market), and the very low labour productivity of farming, at less than 25 per cent of the EU average. Outmigration from agriculture has been very slow and this suggests that more attention should be given to the supply side of the labour market with emphasis on the causes of labour immobility (Lianos, 1971).

Allocation of labour in rural areas

The empirical investigation of inter-sectoral movements of labour relies upon the classic two-sector model of rural-urban migration developed by Todaro (1969) and Harris and Todaro (1970). This assumes that the migration decisions of individuals are based upon the expected income differential between the rural and the urban sector. Migration will occur if the expected income exceeds the migration costs, as well as the transaction costs, such as the search costs of finding employment, the inter-sectoral relocation costs and the costs of physical relocation. Therefore, the integration of rural factor markets in the general economy is important as it reduces the labour market constraints, facilitating the shift to other sectors. However, the information on the location and availability of jobs may not be perfect, so that imperfect and asymmetric information creates mobility costs (Sadoulet and de Janvry, 1995).

Moreover, the decision to migrate or not is also influenced by non-pecuniary benefits associated with the job attributes of a particular sector: working in agriculture may be associated with tradition and cultural reasons, or because farmers enjoy the autonomy of self-employment rather than working in a company (Bojnec and Dries, 2005), and this also creates labour immobility. Other non-monetary attributes refer to the residence where the individuals live, commuting time, transport facilities and other amenities (Zanni *et al*., 2008). Furthermore, changes in policies, institutions and administrative regulations (such as price and trade liberalisation, privatisation, restructuring, etc.) also affect the opportunity cost of labour and therefore have an impact upon labour adjustments (Swinnen *et al*., 2005).

The costs of switching jobs as well as the probability of finding another job depend on the individual human capital characteristics, such as age and education of the individuals, as well as on regional and economic conditions, such as the degree of urbanisation and local employment conditions. The human capital theory represents an important contribution to the labour reallocation literature, as it predicts that the younger and the more educated individuals are those more inclined to migrate. The young will be more mobile as they can reap the benefits over a longer period of time, and the better-educated have more transferrable skills and more access to information, and they face lower transaction costs in switching jobs and moving from one region to another. As supported by a large body of literature, education is one of the most important variables for entry in the non-farm economy: schooling, which is often used as a proxy for knowledge and skills, is positively and significantly associated with participation in rural non-agricultural wage employment (Huffman, 1980; Sumner, 1982; Kimhi, 1994; Corsi and Findeis, 2000; Goodwin and Holt, 2002; Juvančič and Erjavec, 2005; Benjamin and Kimhi, 2006), and decreases participation in agricultural activities (Lopez, 1984; Fall and Magnac, 2004; Rizov and Swinnen, 2004).

As human capital is a key factor for the quality, mobility and flexibility of labour, it is thus crucial for an efficient allocation of labour at both micro and sector level (Bojnec and Dries, 2005). Overall, inadequate human capital represents an important constraint for the reallocation of agricultural labour and for economic activities in rural areas in general (Rizov and Swinnen, 2004). For a comprehensive review of major studies and key issues on agriculture and rural labour markets see Tocco *et al*. (2012).

The remainder of the paper is structured as follows: the next section sets out the empirical specification, data and variables employed. This is followed by a discussion of the estimation results in the context of the previously published literature, and conclusions, including policy implications.

Methodology

Empirical specification

Labour adjustments in agriculture are modelled by an occupational choice model exploring the determinants of labour flows out of the agricultural sector. The methodology used follows Bojnec and Dries (2005). The analytical framework employed differentiates between labour movements from the agricultural sector to the industrial or services sector on the one hand, and into unemployment or out of the labour force on the other[1]. Hence, the categorical dependent variable can take three mutually exclusive unordered outcomes: agriculture, industry/services, non-employment. The model employed is a multinomial logit (Greene, 2003), which can be specified as:

$$Prob(Y_i = j) = \frac{e^{\beta_j' x_i}}{\sum_{k=0}^{m} e^{\beta_k' x_i}}, \; for \; j = 0, \ldots, m \tag{1}$$

The estimated equations provide a set of probabilities for the m occupational choices for a decision maker with characteristics x_i, i.e. to stay in the same occupation or to flow to one of the j alternatives. The model is unidentified since there are many parameter values that lead to the same probabilities: a convenient normalisation that solves the problem is to set $\beta_0 = 0$. The probabilities sum to one, which implies that only $m-1$ parameter vectors need to be estimated to determine the m probabilities. This means that the remaining coefficients β_j measure the change relative to the reference group $Y=0$. Thus, the probabilities are:

$$\begin{aligned} Prob(Y_i = j) &= \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{m} e^{\beta_k' x_i}}, \; for \; j = 0, \ldots, m \\ Prob(Y_i = 0) &= \frac{1}{1 + \sum_{k=1}^{m} e^{\beta_k' x_i}} \end{aligned} \tag{2}$$

Therefore, each outcome, or occupational choice (j), is compared with the base category ($Y=0$) of individuals who do not change sector between two periods or in other words who are still engaged in agriculture in the second period[2]. Hence, the coefficients of the multinomial model are interpreted in comparison to the base category so that a positive coefficient means that, as the regressor increases, individuals are more likely to choose alternative j than alternative 0.

For simplicity, we will also report the results as odds ratios or relative-risk ratios (Cameron and Trivedi, 2009). The odds ratio of choosing alternative j rather than alternative 0 is given by:

$$\frac{Prob(Y_i = j)}{Prob(Y_i = 0)} = \exp(\beta_j' x_i) \tag{3}$$

so that $e^{\beta j}$ gives the proportionate change in the relative risk of choosing alternative j rather than alternative 0 when x_i changes by one unit. Thus, if the coefficient is positive, the odds ratio will be greater than 1, and if negative it will be less than 1.

Data and variables

The main data set is provided by the EU Labour Force Survey (EU-LFS). Since the household numbers are randomised it is not possible to track individuals across different waves. Nonetheless, the analysis exploits the presence of retrospective questions, as the interviewed individuals at each period (t) provide information in regards to their employment status one year prior to the survey ($t-1$). Therefore, the changes in labour outcomes for the same individuals across two consecutive years could be observed. The sample comprises pooled cross-sections of people employed in agriculture in $t-1$ for the period 2003-06 and consists of 71,862 individuals. The categorical dependent variable represents

[1] In order to gain a better understanding of the importance of agriculture in Romania a second model has been estimated, focussing on the movements of labour into agriculture. Since our main interest is to examine the determinants of labour moving out of agriculture, the first model constitutes the core of this paper.

[2] One of the limitations of such methodology is that the sample of the population is non-random, i.e. those employed in agriculture in $t-1$. The modelling of a selection mechanism to control for the initial condition problem is beyond the scope of this study. It has been addressed in Tocco *et al*. (2013).

three mutually exclusive outcomes according to the main occupational choice in period *t*: employment in the agricultural sector (=1), employment in the industrial or services sector (=2), and non-employment, i.e. combining unemployment and inactivity into a single group (=3)[3]. Owing to data limitations the period of study is quite short for a dynamic analysis of structural change. However, the results still prove to be insightful when looking at the determinants of inter-sectoral labour movements.

The first set of independent variables relate to the personal characteristics of individuals. Dummies are used to capture the gender effect (female=1) and the marital status (married=1). As a proxy for the individual's stock of human capital the highest level of educational attainment is included: low education (educlow=1) if the individual has only received lower secondary education, medium education (educmedium=1) if the individual has received upper secondary education, and high education (educhigh=1) if the individual has received tertiary education. In order to disentangle the different effects of education and control for specific agricultural human capital a dummy for those who have received agricultural education (agriedu=1) is included.

The age variable is used to investigate the life-cycle decisions of individuals. The variable is not a continuous one and six different age bands have been created: 15-24, 25-34, 35-44, 45-54, 55-64, 65 and over. Individuals aged less than 15 are not of interest for the age variable, as they are not part of the labour force. The upper age limit is not restricted, since a large number of people engaged in agricultural activities have passed the retirement age. Lastly, a dummy for the presence of children under 15 in the household is included (children=1) as well as an interaction dummy for capturing the effect of children on the occupational choice decisions of women (female_children=1).

The second set of variables relate to the specific employment characteristics in *t*-1, classifying the individual according to the status in employment, namely whether the individual was self-employed with or without employees (selfempl=1), a family-worker (familywork=1) or an employee (employee=1) receiving any form of compensation, i.e. wages, salaries, payment in kind and so forth.

Additional available information concerns the region at the European NUTS 2 level where the individual was residing in the previous period. Further variables were incorporated from the EU New Cronos Database online to control for the labour market conditions at the regional level. These include the regional population density[4] (popdensity), expressed in inhabitants per km^2, and the region employment growth outside agriculture (emplgrowthnonagr). Following Dries and Swinnen (2002), a proxy for the reservation wage is included, measured by the ratio of the average wage per region over the national wage (regwagelag). Owing to potential endogeneity, as the outflow of agricultural labour affects the off-farm labour supply and thus may itself affect the wages paid in the region, this variable is included by its lagged value. Lastly, year dummies for each of the pooled cross-section yr2004_5 and yr2005_6 are included and yr2003_4 is omitted as a base year. Some descriptive statistics of the variables employed are presented in Table 1.

Table 1: Descriptive statistics of a sample of 71,862 people engaged in agriculture in Romania at t-1 for the period 2003-06.

Variable	Range	Mean	Std. Dev.
Individual and family characteristics			
female	0 − 1	0.48	0.50
married	0 − 1	0.70	0.46
low education	0 − 1	0.61	0.49
medium education	0 − 1	0.38	0.48
high education	0 − 1	0.01	0.11
agricultural education	0 − 1	0.05	0.22
age 15-24	0 − 1	0.09	0.28
age 25-34	0 − 1	0.17	0.37
age 35-44	0 − 1	0.18	0.39
age 45-54	0 − 1	0.20	0.40
age 55-64	0 − 1	0.19	0.39
age 65-99	0 − 1	0.17	0.38
children	0 − 1	0.32	0.47
Job related characteristics			
self-employed	0 − 1	0.53	0.50
family worker	0 − 1	0.40	0.49
employee	0 − 1	0.07	0.25
Labour market conditions at regional level			
population density	61 − 1,259	97.67	90.35
wage ratio	0.6 − 2.3	0.82	0.18
employment growth	-5.2 − 9.8	1.97	4.47

Results and discussion

Probabilities and labour movements

The probabilities of labour flowing from the agricultural sector in period *t*-1 to other occupational choices (industry and services) and to non-employment (unemployment and inactivity) in time *t* are summarised in Table 2. During the years 2003-06, there was little mobility in agricultural labour from one period to the next. The low mobility of agricultural labour suggests that structural change has not been particularly significant during this period of analysis. In fact, only 2.3 per cent of agricultural labour moved to other sectors to seek other employment opportunities, equivalent to 1,653 people. The slow pace of the out farm migration of labour may suggest the presence of mobility constraints and structural impediments which have hindered a smooth adjustment across activities. A much larger outflow was associated with non-employment, representing 6.2 per cent of the sample. Thus, the main channel of farm exit is closely related to retirement.

Table 2: Predicted probabilities of labour choices of a sample of 71,862 people engaged in agriculture in Romania, 2003-06.

		Status in period *t*	
Status in period *t*-1	Stay	Other employment	Non-employment
Agriculture	65,743 (91.49)	1,653 (2.30)	4,466 (6.21)

Note: numbers in brackets represent percentages of the total sample

[3] The classification of the labour force status, i.e. whether the individual is employed, unemployed or inactive, follows the International Labour Organization guidelines.

[4] Population density should ideally be measured at a more local level (municipality/district level) – the EU-LFS contains a variable for the degree of urbanisation for an area (a group of contiguous 'local areas') classified as densely populated area, intermediate area, thinly-populated area. Unfortunately this variable was not available for the Romania dataset.

Table 3: Labour movements from agriculture: importance of having a second job amongst the 67,396 employed people in Romania shown in Table 2.

	Economic sector of second job		
Status in period *t*	Agriculture	Industry and services	None
Agriculture	592 (0.90)	127 (0.19)	65,024 (98.91)
Industry and services	330 (19.96)	1 (0.06)	1,322 (79.98)

Note: numbers in brackets represent percentages of the total sample

Additionally, it is possible to investigate the extent to which, in period *t*, employed people have had a second job and the economic sector of this. Almost 20 per cent of those individuals who are estimated to have moved from agriculture to industry and services still worked in agriculture as a second job (Table 3). This implies that Romanian households were still very reliant on agriculture and possibly due to household food security and social capital considerations individuals were reluctant to quit agriculture altogether. This also suggests that agriculture might be perceived as a risk-reducing strategy for those individuals who are willing and able to find other employment opportunities outside the agricultural sector.

Determinants of flows out of agriculture

The estimation results are reported in Table 4. The likelihood ratio chi-square test is significant at the 1 per cent level, with the Wald test and likelihood ratio test providing support for the model. The Hausman and Small-Hsiao tests confirm that the IIA (independence of irrelevant alternatives) assumption has not been violated.

The results are generally in line with previous studies. The significant gender effect on the labour occupational choices suggests that women have a lower likelihood of switching to industry and services rather than staying in agriculture and that, at the same time, they are more likely to become unemployed or to leave the labour force altogether.

Table 4: Determinants of labour flows out of agriculture of a sample of 71,862 people engaged in agriculture in Romania, 2003-06.

Variable	Industry and services			Non-employment		
	Coefficient	Odds ratio	Marginal effect	Coefficient	Odds ratio	Marginal effect
female	-0.356*** (0.078)	0.701	-0.005***	0.330*** (0.042)	1.390	0.013***
married	-0.076 (0.069)	0.927	-0.001	-0.485*** (0.038)	0.616	-0.021***
educmedium	0.677*** (0.059)	1.969	0.011***	0.102** (0.045)	1.108	0.004**
educhigh	1.126*** (0.159)	3.083	0.03***	-0.116 (0.199)	0.891	-0.005
agriedu	0.060 (0.088)	1.062	0.001	-0.253** (0.109)	0.776	-0.009***
age15_24	1.028*** (0.103)	2.796	0.022***	0.985*** (0.078)	2.678	0.056***
age25_34	0.575*** (0.085)	1.777	0.011***	-0.111 (0.079)	0.895	-0.005
age35_44	0.398*** (0.082)	1.489	0.007***	-0.013 (0.076)	0.987	-0.001
age55_64	-0.560*** (0.111)	0.571	-0.007***	0.271*** (0.070)	1.311	0.012***
age65_99	-1.322*** (0.182)	0.267	-0.015***	2.104*** (0.059)	8.197	0.170***
children	0.158** (0.071)	1.171	0.002**	0.092 (0.063)	1.096	0.004
female_children	-0.170 (0.110)	0.843	-0.002*	0.148* (0.078)	1.159	0.006*
selfempl	-0.416*** (0.083)	0.659	-0.006***	-0.381*** (0.093)	0.683	-0.015***
familywork	-0.241*** (0.090)	0.786	-0.004***	0.042 (0.094)	1.042	0.002
popdensity	-0.001*** (0.000)	0.999	-0.000***	0.000 (0.000)	1.000	0.000
regwagelag	0.646*** (0.154)	1.909	0.009***	0.161 (0.102)	1.175	0.006
emplgrowthnonagr	0.053*** (0.011)	1.054	0.001***	0.0613*** (0.007)	1.063	0.002***
yr2004_5	-0.666*** (0.126)	0.514	-0.01***	0.203** (0.097)	1.225	0.009**
yr2005_6	-0.167** (0.082)	0.846	-0.003***	0.953*** (0.074)	2.593	0.042***
Constant	-3.992*** (0.185)	0.018		-4.036*** (0.154)	0.018	
Likelihood ratio	5593.58***					

Note: standard errors in parentheses; levels of significance: ***1%; **5%: *10%

This would confirm that men play a more active role in the labour market (Bojnec and Dries, 2005) and that they are on average more mobile in terms of sectoral adjustments. In contrast to some previous studies which found that married individuals engaged in farming activities are less mobile (Weiss, 1999; Bojnec *et al*., 2003; Bojnec and Dries, 2005; Van Herck, 2009) in this study the marital status does not play a significant role for the occupational switch to industry/services. However, it has a significant and negative effect on the likelihood of flowing to non-employment.

Consistent with the human capital literature, the highly statistically significant education variables imply that individuals with higher levels of education are more likely to leave agriculture to work in other sectors. Medium education is also positively associated with the probability of flowing to non-employment, which may be due to frictional unemployment while waiting for better employment opportunities. It could be asserted that agricultural specific human capital is associated with a higher expectation of continuing farming (Weiss, 1999). However, the results here suggest that agricultural specific education only reduces the likelihood of exiting to non-employment.

The expected non-linear age function is confirmed in this analysis, so that younger individuals are those who have a longer period to reap the benefits of migrating for better employment opportunities, and are thus associated with a higher likelihood of leaving agriculture for industry and services, up to a point where this probability diminishes so that older individuals are more likely to stay in agriculture (Sumner, 1982; Corsi and Findeis, 2000; Ahituv and Kimhi, 2002; Bojnec and Dries, 2005; Breustedt and Glauben, 2007). The turning point is somewhere between 45 and 54 years, chosen as the reference category. Moreover, individuals between 15 and 24 years are also positively associated with the probability of flowing to non-employment, which could be also due to frictional unemployment. On the other hand, the positive coefficients in the non-employment outcome for those over 55 and even higher for those over 65 are associated with the retirement of these individuals.

Whereas the presence of children under 15 in the household is associated with a higher likelihood of switching to industry and services, which may be connected with the need for higher income and better living standards for the family, the probability of individuals of flowing to non-employment would only concern women, due to the fact that women play a more active role in the family unit, in terms of child bearing, housework and other household-related tasks.

The job-related characteristics also confirm the expected direction of relationships, so that family workers and self-employed individuals in the agricultural sector have a lower likelihood of flowing to industry and services in comparison to employees. At a first glance it seems that being a family-worker or self-employed are important non-pecuniary attributes related to the pride, autonomy and sense of responsibility associated with farming activities (Van Herck, 2009). In this respect, looking at the magnitude of the parameters, it would seem that self-employment has even a larger effect than being a family worker. On the other hand, as shown in the descriptive statistics, the Romanian agricultural sector is mainly characterised by self-employed individuals, followed by family workers, and lastly by a small percentage of employees. Thus, the results may simply reflect the different shares and instead confirm the very low mobility of agricultural labour. In general, it seems plausible to conclude that employees represent the most mobile segment of the labour force, since these individuals are more responsive to market prices and to better employment opportunities.

Lastly, individuals' decisions to move across sectors appear to be associated with the labour market conditions at the regional level, so that higher employment growth in the non-agricultural sector would result in a higher likelihood of leaving agriculture, to both industry and services and to non-employment (frictional unemployment). This would imply that individuals' migration decisions are highly responsive to job opportunities and therefore that job creation, particularly in rural areas, would represent an important determinant for the outflows of agricultural labour. The highly statistically significant coefficient of the reservation wage on the likelihood of labour flowing out of agriculture to industry and services also confirms that relative growth results in a strong pull effect of other sectors on agricultural labour. Hence, regional economic growth is an important demand-side determinant of labour movements which would trigger the process of structural change.

The negative sign of the regional population density is opposite to prior expectations as the higher the density the lower is the likelihood of agricultural labour flowing to industry and services. In the literature this variable has often been used to proxy job opportunities, suggesting that less populated rural areas would exhibit fewer off-farm opportunities for agricultural labour (Juvančič and Erjavec, 2005) whereas more densely populated regions are generally associated with higher exit rates from agriculture, also suggesting higher opportunity cost of land in these areas (Goetz and Debertin, 2001; Breustedt and Glauben, 2007; Van Herck, 2009). In contrast, other studies have found that a high population density is likely to reduce farm exit rates. As argued by Glauben *et al*. (2006), the findings may simply suggest that urban areas have undergone greater structural change in the past than rural areas. Nonetheless, our results might be a consequence of greater competition which is prevailing in more urban areas and which may thus prevent individuals in finding other employment outside agriculture.

The time dummies, mainly included to control for different year effects in the pooled sample, indicate that the main outflows of agricultural labour towards industry and services occurred during the first years of analysis, i.e. between 2003 and 2004, and seem to have decreased in the subsequent years (from 2004 to 2006), whereas movements to non-employment have progressively increased with major flows occurring in the final period of analysis, i.e. between 2005 and 2006, most probably associated with an increased share of retired farmers.

The empirical analysis has also examined the determinants of labour movements from industry and services towards agriculture[5]. Although these flows are small in relative terms when compared to the movements out of agriculture, they are still important to consider. For example, in absolute terms, 1,421 people moved to the agricultural sector

[5] These estimation results are not included in the paper but are available upon request.

in the period 2003-06 in comparison to 1,653 who moved from agriculture to industry and services. This suggests that agriculture still represented an important source of additional income, especially for those less educated, and a retirement choice that can top-up the low pensions for the elderly.

Conclusions

By looking at the post-transition period in Romania, this paper examined the determinants of inter-sectoral labour movements and focussed on the facilitators of, and barriers to, farm labour mobility. The following conclusions can be drawn:

- First of all, population ageing has a strong influence on the observed outflow of agricultural labour. Retirement represents the main farm outflow channel – the majority of agricultural labour movements concern people aged 64 and over. Secondly, the slow pace of the out farm migration may suggest the presence of mobility and structural impediments which prevent labour adjustments.
- Overall, male, younger and better educated individuals are found to be more mobile and more likely to leave agriculture and flow to industry and services. The predominant share of family workers and self-employed in the farm sector is negatively associated with exiting agriculture. In comparison to employees, these workers appear to have lower incentives to flow to other sectoral employment and thus contribute to the surplus of labour in the farm sector. In line with previous studies, the reservation wage and employment growth outside agriculture are important pull-factors for facilitating the movement of labour to non-farm activities.
- In the other direction, the movements of labour from industry and services to agriculture are associated with the retirement of people and with unemployment, so that an old age and low levels of education would constitute positive determinants. In this respect, agriculture could become a sink for the less-skilled and unemployed persons, and provide a source of income for the elderly.

The policy implications of these findings point to the need for investments in human capital specifically in education, with the purpose of enhancing the mobility of labour and thus facilitating a more efficient labour allocation. By the same token, demand-side conditions must be not be neglected, as improving the supply side of labour alone would only result in a surplus of labour in the off-farm market with little scope for switching employment sector. Whereas favourable labour market conditions need to be in place to sustain a smooth transition across activities, priority should be placed on creating alternative sources of income from non-agricultural activities in rural areas.

The large share of people engaged in farming activities in Romania despite the very low levels of productivity clearly suggests that agriculture provides a source of minimum income for many rural households and mitigates rural poverty. In order to pull these households out of the poverty trap, rural development is essential. The National Rural Development Programme of Romania for the period 2007-2013 amounted to approximately EUR 9 billion. However, only 27.6 per cent of this amount was spent on Axis 3, which aimed at the economic diversification and quality of life in rural areas, compared to 44.2 per cent of total expenditure for Axis 1 – competitiveness of agriculture and forestry sectors (Redman, 2008). Furthermore, if the Axis 3 measure on village renewal and basic rural services absorbed 17.2 per cent of all rural development expenditure, the measure with a high potential to create rural jobs – support for the creation and development of rural enterprises – was allocated only 4.3 per cent.

Looking forward, Pillar 2 of the Common Agricultural Policy for the period 2014-2020 gives more flexibility to the EU Member States to tackle some specific issues of their rural areas and decide which measures to choose without the 'straitjacket' of Axes and minimum spending, but with targets set against six broad objectives. One of these objectives is 'Promoting social inclusion, poverty reduction and economic development in rural areas', which is important to facilitate labour mobility. However, as stated by Davidova *et al.* (2013), the simple fact that more appropriate and more flexible measures are included in the menu for Pillar 2 for the period 2014-2020 does not necessary guarantee their adoption by the individual EU Member States. A proper emphasis on rural development and the creation of rural non-farm jobs, together with the accelerated exit of farmers of retirement age will help the flow of labour out of agriculture and the acceleration of structural change in Romanian agriculture.

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Vladimír SZÉKELY*

From enthusiasm to scepticism: tourism cluster initiatives and rural development in Slovakia

Rural regeneration is usually accompanied by diversification of the economy and creation of new employment opportunities. The cluster concept, introduced by Michael Porter at the beginning of the 1990s, and cluster initiatives are generally and uncritically offered as an adequate tool for the fulfilment of these objectives. This study describes the functioning of four tourism cluster initiatives from rural areas of Slovakia using the experience and knowledge from field work (supported by content analysis of newspapers and the Internet) and their (in)direct impact on selected regional indicators (net migration of population, number of tourists, overnight stays and unemployed persons). The data indicate the efforts of the tourism cluster founders in the initial years of activity are not automatically associated with broadly interpreted local and regional success. This result shows that cluster initiatives in tourism are not appropriate for all rural areas, economies and/or communities.

Keywords: tourism clusters, regional competitiveness, rural development, indicators of regional change, Slovakia

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Introduction

In response to dissatisfaction with existing rural development strategies, experiments with new approaches built on "flexible networks of interactive, trust-based relations that are thought to facilitate innovation" have appeared (Murdoch, 2000, p.414). Formation of networks and cooperation between the representatives of the public (e.g. local and regional self-governments) and private (e.g. entrepreneurs) sectors is perceived as a *conditio sine qua non* in order to achieve regional competitive advantage (Czernek, 2013). A strategy making use of cluster theory, according to which a geographically localised grouping of interlinked businesses (cluster) can increase competitiveness, improve productivity and consequently increase the economic well-being of the population living in the concerned territories (Porter, 1990), is based on the benefit of networking local and regional development actors.

Numerous studies point to the possibilities for improvement of the living standards of the rural population through the development of tourism, especially in countries and regions with economies characterised by a lack of capital and a poor employment situation (e.g. Jordan, 1992; Baum, 2011; Partalidou and Koutsou, 2012; Moric, 2013). On the other hand, the dangers of overexpansion of tourism include the high degree of seasonality (instability of employment and time-limited emigration) and negative impacts on the environment.

The topic of rural tourism clusters based on networking and active participation of the individual actors (Novelli *et al*., 2006) has received much attention (Nordin, 2003; Jackson and Murphy, 2006; Baum, 2011; Belešová, 2012; Partalidou and Koutsou, 2012; Schejbal, 2012; Gonda and Csapó, 2012; Moric, 2013). The primary aim of networking (cluster initiatives and foundation of clusters) is the targeted, joint formation and marketing of a tourism destination brand designed to secure higher numbers of tourists and nights spent in accommodation facilities, and economic prosperity of the members (Rapacz, 2008; Belešová, 2012; Štetič, 2012; Moric, 2013). Tourists should be given a more comprehensive and more varied offer of services at attractive prices. Theoretically, the region profiting from tourists should generate new jobs and attract new in-migrants. Are these ideas reality or myth?

Tourism development in Slovakia lags behind other European Union (EU) Member States, contributing only 2.4-2.7 per cent to national GDP compared to an EU-wide figure of 4-5 per cent. Rural regions of Slovakia have attractive landscapes and traditions and the development of clusters in tourism is a new challenge for them in pursuit of economic success and/or sustainable development (Székely, 2010; Kleinová and Neománi, 2011; Lušnáková and Šajbidorová, 2011; Belešová, 2012). The first such cluster in Slovakia (Liptov) covers a territory of about 2,000 km^2, and its functional philosophy was established in 2008 following lengthy negotiations during which the attitudes and opinions of the actors concerned were presented (Székely, 2010). The original intention of the regional self-government unit was to establish one functional tourism cluster in the whole territory of the administrative region of Žilina, an area of more than 6,800 km^2. This plan was inconsistent not only with the document 'Regionalisation of Tourism in the Slovak Republic' (MH, 2005), as the territory is composed of five natural regions (Liptov, Orava, Turiec, Kysuce and Horné Považie), but also with the aspirations of the local public and private tourism actors, who were willing to cooperate only at the level of natural, old historic regions.

This study quantifies the possible effect of new institutional forms ('clusters', or 'organisations of destination management') of rural tourism on the socio-economic development of four regions in Slovakia. Three of the clusters (Liptov, Orava and Turiec) are located in the administrative region of Žilina while the fourth (Balnea) is from a small town of Dudince in the territory of district Krupina which is part of the administrative region of Banská Bystrica.

Tourism clusters in rural regions of Slovakia – territorial comparison and indicators

The territories of the three clusters in the Žilina region are similar in geography (mountainous territory with valleys where economic activities are concentrated, occurrence of hot mineral springs), character and economic orientation,

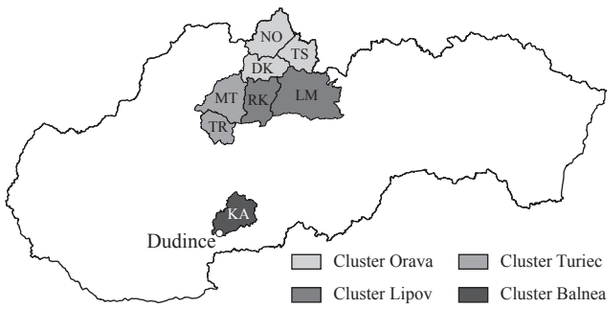

Figure 1: Geographical position of the rural regions and (rural) tourism clusters investigated in this study.

Cluster Orava - districts Námestovo (NO), Dolný Kubín (DK), Tvrdošín (TS)
Cluster Turiec - districts Martin (MT), Turčianske Teplice (TR)
Cluster Lipov - districts Liptovský Mikuláš (LM), Ružomberok (RK)
Cluster Balnea - districts Krupina (KA)

Table 1: Indicators of the territories represented by the clusters investigated in this study.

Indicator	Regions of rural tourism clusters			
	Liptov	Orava	Turiec	Krupina district
Area (km²)	1988	1661	1128	585
Population (2011)	130,641	134,889	113,489	22,927
Population density, persons/km² (2011)	65.7	81.2	100.6	39.2
Share of rural population, % (2011)	48.0	67.1	36.9	58.5

Source: Central Statistical Office of the Slovak Republic and own calculations

and have common borders (Figure 1), but differ primarily in their capacities for tourism. These differences reflect the objective ranking of individual mountain ranges in terms of potential for skiing but also their subjective perception and popularity among actual and potential visitors. All three clusters offer similar tourism products. The character of their public and private actors is practically the same and their marketing activities are aimed at the same target group of potential tourists: young, active visitors whose priority is sports activities. The Balnea spa cluster is completely different. It is not only situated outside the main tourist regions of Slovakia but it is formed only by actors from a small town (in a rural region) and focuses on a different clientele (mainly spa guests and wellness clients) with its specific ideas about recreation time and particular demands.

The importance of tourism nationally and for those regional economies influenced by tourism cluster initiatives is different. Enterprises related to tourism (defined as 'Accommodation and food service activities' and 'Arts, entertainment and recreation') accounted for 4.58 per cent of all enterprises in Slovakia in 2008 and 4.85 per cent in 2013, according to data from the Central Statistical Office of the Slovak Republic. By contrast, in 2008 Liptov´s tourism enterprises represented 7.85 per cent of the total number of enterprises, although this proportion decreased slightly to 7.55 per cent in 2013. During the period from 2008 to 2013, the share of tourism enterprises in the Orava region declined from 4.74 per cent to 4:46 per cent, and in the district of Krupina from 5.83 per cent to 5.15 per cent. Only the Turiec region registered an increase in the proportion of enterprises in the tourism sector (from 3.80 per cent to 3.99 per cent) and these figures could indicate a weaker position of tourism in the regional economy. Regional data are cited here because data on the contribution of tourism to Gross Domestic Product are not available at district (LAU1) level.

The four territories also differ in spatial size and population (Table 1). According to the OECD classification of rural areas based on the percentage of the population of a NUTS 2 or NUTS 3 region living in rural municipalities (OECD, 1994), the territory of Liptov with three towns is 'significantly rural', as 48.0 per cent of the population lives in rural municipalities. Orava, with four small towns and a 67.0 per cent share of rural population, is 'predominantly rural'. The territory of Turiec is 'significantly rural' (36.9 per cent of rural population), and Krupina district with two small towns (one of them, the geographically 'artificial' town Dudince, which is the centre of cluster Balnea, has only 1,500 inhabitants) is 'predominantly rural' (58.5 per cent of rural population).

To understand how the establishment of tourism clusters has influenced the situation in the region in the first years of their existence, the periods before and after their formation were compared using four indicators of regional development (number of visitors in accommodation facilities, number of tourist nights in accommodation facilities, number of unemployed persons, and net migration of population). Based on the stated aims of individual tourism clusters, the hypothesis of this study was that clusters would be able at least to maintain, or even improve, the values of these indicators. Improvement was interpreted (again in the sense of the stated aims of the clusters) as increased number of tourists, more nights spent, reduced number of unemployed and improved net population migration in the form of reduced regional outmigration or increase of regional in-migration. These indicators were not selected at random. The founders of the clusters emphasised the quantitative increase in the number of tourists and nights spent in the region as specific aims.

Rural tourism clusters and changes in selected regional indicators

The founders of the four clusters are listed in Table 2.

Table 2: Founders of the clusters investigated in this study.

Cluster	Founders
Liptov	The towns: Liptovský Mikuláš, Liptovský Hrádok and Ružomberok, and the private companies: *Thermal Park Bešeňová*, *Aquapark Tatraland*ia and ski resorts *Jasná Nízke Tatry*, *Skipark Ružomberok*.
Orava	The rural municipality Zuberec and ten regional tourism subjects such as Orava ski resorts, aquapark, hotels etc.
Turiec	The towns: Martin and Vrútky, and the private companies: travel agency *Fatra Ski* and ski resorts *Snowland* in Valčianska dolina, Jasenská dolina and *Winterpark Martinky*.
Balnea	The town of Dudince, *Dudince Spa* and the Dudince hotels.

Liptov cluster

The assessment of the effects of the Liptov tourism cluster differs slightly from that of the other three clusters, as one of the measurable founding objectives was to double the number of visitors and nights spent in the region between

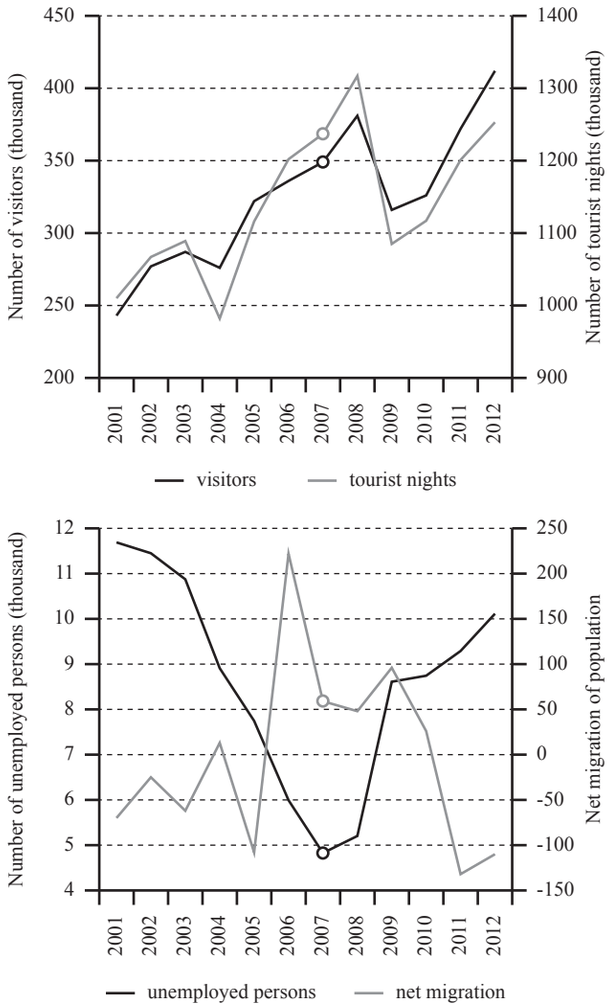

Figure 2: Liptov cluster and dynamics of regional indicators.
Markers indicate the year of formation of the cluster
Source: Central Statistical Office of the Slovak Republic and own calculations

2007 and 2013. Hence, 2007 was chosen as the base year for time comparisons (Figure 2).

Almost 350,000 overnight tourists visited Liptov in 2007, but in 2012 this number had increased by only slightly over 18 per cent to almost 412,000 and the declared aim of the cluster will most probably not be achieved. The number of tourist nights in accommodation facilities increased only by 1.3 per cent. It means that the overall average length of a person stay fell from 3.61 days to 3.04 days; this is a relatively short stay. Short-term stays and weekend stays together with stays without accommodation help to make full use of the existing capacities. Along with the economic position and solvency of the potential clientele together with its potential ability for recreation expressed by the number of its free days, the number of tourists and nights spent in the region may also be determined by the length of the season, which in turn depends on the regional weather conditions.

Liptov, where the most important business entities of the Slovak economy active in the branch of tourist infrastructure invest, is among the most visited tourist regions of the country. High numbers of tourists represent a huge potential for profits, not only for the participating members of the cluster but also for the associated branches of the economy. Small and medium entrepreneurs can provide the missing services and thus create jobs. However, these theoretical reflections depend on the specific conditions of the region on the one hand and on the concrete time period on the other. Data about the number of unemployed in the region of the Liptov cluster activity show this. In spite of the fact that the number of visitors and nights spent increased in individual years, as did the importance of tourism, the number of registered job seekers also increased, meaning that tourism and the related services were not capable of generating sufficient jobs for the local population. The cause may partly lie in the strictly economic behaviour of entrepreneurs who try to minimise their labour costs and maximise labour productivity, especially during the years of the global economic crisis that were characterised by a high level of uncertainty in all markets.

Liptov as a region did not become attractive for migrants either. The perception of it as a space worth moving into with the aim to improve one's quality of life is not widespread in spite of the uniqueness of its natural setting. Although the mechanical population movement is balanced, in the period 2007-2012 the number of people who moved out of the region was higher than that of those who moved in. The causes are various but the scarce offer of suitable jobs is probably the decisive factor.

Orava cluster

Orava cluster was founded in a territory that is considered a long-term source of labour in Slovakia. The region has one of the top birth rates, but also has one of the top emigration rates because investors are not interested in locating or relocating their companies here and it suffers from lack of jobs. This peripheral, mountainous and cool region of Slovakia with its traditional culture has invested great expectations but fewer funds in the development of tourism. In the opinion of the regional visionaries tourism is expected to become the 'engine' of economic growth, a branch the region "should live off". The plans of the founders of the Orava cluster were very ambitious. They planned to include Orava among the three most visited regions of Slovakia before 2015 but the statistics (Figure 3) show that the first years of the cluster did not bring any great changes in the number of visitors to the region and the nights spent in accommodation facilities.

In terms of the number of accommodated visitors, 2012 was worse than 2001. With the exception of 2008, the number did not surpass 80,000 and the proportion of 2.50 per cent of the overall number of overnight guests in Slovakia from 2001 was never repeated. When the cluster was founded (2009), this proportion was 2.04 per cent while the activities of the cluster contributed only 2.06 per cent to this proportion in 2012, with an increase of tourists of almost 8,000. An even greater slump occurred in terms of the number of tourist nights in accommodation facilities. While in 2001 there were more than 283,000 tourist nights, in 2009 there were little more than 204,000. At the national level, the proportion of the overall number of overnight guests in Slovakia fell further from 1.97 per cent in the year when the cluster was founded (2009) to 1.87 per cent after three years of its activity (2012). Continuous shrinkage of the mean length of stay, which dropped from 3.59 days in 2001 to 2.62 days in

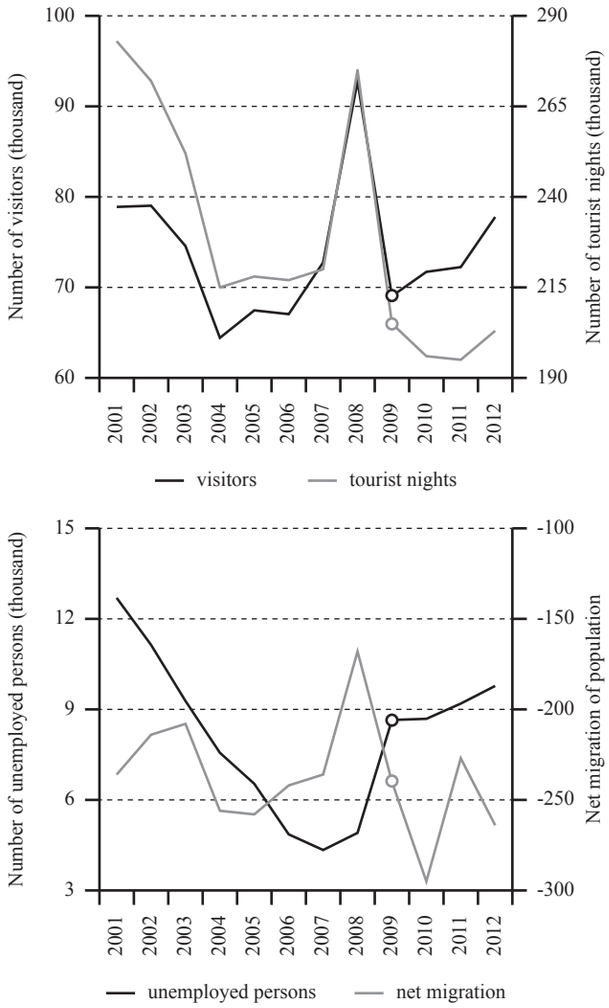

Figure 3: Orava cluster and dynamics of regional indicators.
Markers indicate the year of formation of the cluster
Source: Central Statistical Office of the Slovak Republic and own calculations

2012, has contributed to this situation. This value is very low and its increase is the biggest challenge for all participating members of the cluster. The problem is the competition of the neighbouring Liptov region, whose tourism offer is very similar to that of the Orava cluster: attractions for winter sports and swimming in thermal waters.

The *Roháče-Spálená* ski resort and other ski resorts in Orava (*Ski park Kubínska hoľa*, *Orava snow – Oravská Lesná* and others) are not amongst the top ski resorts of Slovakia. The categorisation of ski centres, which is the product of a multi-criterion assessment by a Commission, is not only a question of prestige contributing to a positive image of the resort concerned but also a direct promotion with an impact on the overall number of visitors and nights spent. It is very important in terms of competition for clients and their direct or indirect financial contributions to the development of localities and regions via various leisure activities and taxes. Comparison of the more poorly equipped and lower category ski resorts of Orava with those of neighbouring Liptov and its top resorts is adverse for Orava, which consequently loses in competition for clients and profit. The water parks of both Orava and Liptov also compete for a share of the clients in the market in the same way with the same result.

Despite the high natural population increase, there was a reduction in unemployment in Orava of more than 8,000 between 2001 and 2007, but since 2007 the number of unemployed has increased. Although this trend has slowed since the foundation of the Orava cluster, the activities of the cluster clearly have not generated the number or type of jobs that would meet local needs. The wages of people employed in tourism and in supporting services that employ mostly women are among the lowest. The generation of suitable, well-paid, attractive jobs for the male population in the region is a problem solved by many via out-migration to economically more advanced regions and better remunerated branches of the economy (e.g. construction).

The mechanical population movement data confirm that Orava is not attractive for permanent residence. In the period from 2001 to 2012 Orava lost 3,000 inhabitants through net migration. The establishment of the tourism cluster does not appear to have altered the perception of Orava as a desirable place to live and the dream about tourism as the 'engine' of social and economic development has not yet been fulfilled.

Turiec cluster

The foundation of clusters is based on cooperation between the local municipalities and entrepreneurs where a high level of mutual trust is presumed. Negotiations aimed at achieving a consensus between all participating actors are sometimes very complicated. Falťan (2005), who mentions only inter-municipal cooperation, asserts that the start of such cooperation is not simple at all: "Inherently there must be willingness and readiness to cooperate, but … also the aptitude and power to overcome distrust to potential partners. It requires the capacity to cooperate, seek compromises, respect the partners and overcoming of historical stereotypes and loads often carried over to presence" (pp.285-286).

The process of founding the Turiec cluster confirms Falťan's words. After the initial negotiations between the potential members in 2009, problems concerning the decision-making mechanism (and the power of individual voices) emerged as the big 'actors' in terms of population size, i.e. the big urban self-governments, were preferred. For this reason the deputies of the district town of Turčianske Teplice (population 6,700 in 2011, c.f. 57,400 in Martin) initially did not agree to join the cluster. They requested a change to its statutes, arguing that a great proportion of guests coming to the town seek balneotherapy, and for a greater weight for Turčianske Teplice's vote. Prior to the negotiations the biggest private company in tourism in the southern district of Turiec, the spa *Slovenské liečebné kúpele Turčianske Teplice*, was also uninterested in joining the cluster and the lobbying of its representative regarding the inconveniences of the decision-making mechanism was probably the reason why the municipal deputies did not approve the membership.

An analysis of the numbers of visitors (accommodation tourism) justifies the arguments of the concerned entities in Turčianske Teplice district. While in 2001-2012 the number of accommodated guests in Turiec declined by more than 10 per cent (Figure 4), in its northern part (Martin district) it fell by almost 23 per cent and in the south (Turčianske Teplice district) it increased by more than 20 per cent. While at

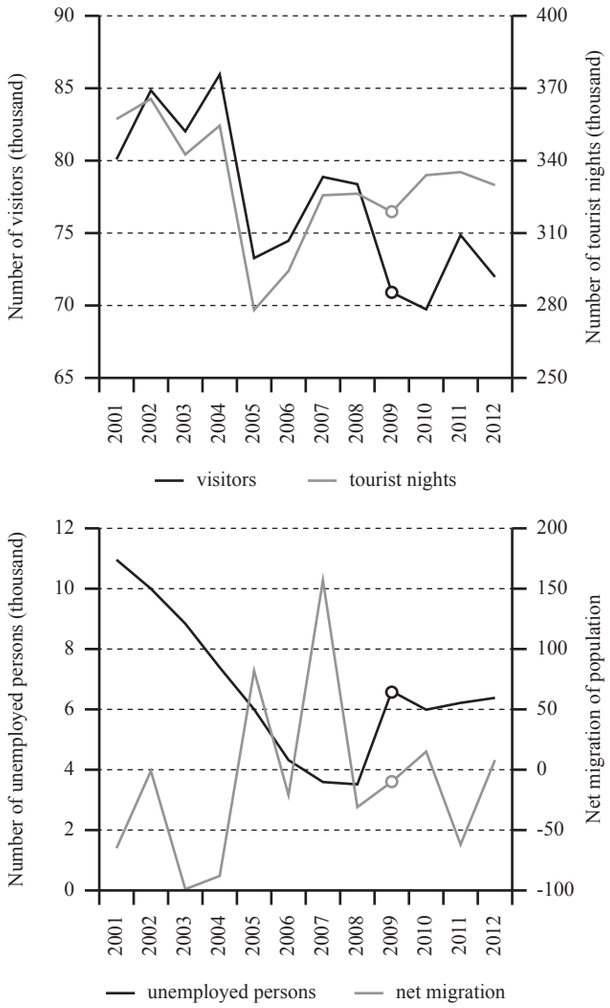

Figure 4: Turiec cluster and dynamics of regional indicators.
Markers indicate the year of formation of the cluster
Source: Central Statistical Office of the Slovak Republic and own calculations

the time of the 2011 Census there were 46 overnight tourists per 100 inhabitants of Martin district, in Turčianske Teplice district there were 186. In terms of the total overnight stays per 100 inhabitants this intraregional differentiation is even more evident: in Martin there were 107 and in Turčianske Teplice 1411 in 2011. These big disparities were caused by differences in the character of tourism in individual parts of Turiec. While in Martin the stress is on skiing and winter sports and a great part of the clientele are locals and short-term visitors with no need to stay overnight, Turčianske Teplice district profits from spa tourism throughout the year and also attracts people from other regions and from abroad and their accommodation is essential.

Since 2009 the annual number of overnight tourists in Turiec has increased by only 1.5 per cent, and the increase was differentiated. In Martin district the number of tourists increased by only 0.4 per cent while Turčianske Teplice district achieved an increase of 3.3 per cent. It means that the activities of the cluster and their accompanying promotion did not bring any significant increase in the number of overnight tourists. Simultaneously the total number of tourist nights in accommodation facilities in Turiec increased only slightly, i.e. by 0.6 per cent, while the difference between the northern and southern parts of Turiec is even more marked. While in Martin district there was a 6.2 per cent decrease in the number of tourist nights, in Turčianske Teplice district the number increased by 8.4 per cent. These intraregional disparities contribute to ambivalent assessment of the impact of the Turiec cluster on strengthening tourism and its function in the regional economy.

While the number of unemployed had continuously dropped during the eight years prior to 2009 and the number of registered jobseekers fell by almost 7,500, in 2009 it increased by more than 3,000 and has since remained broadly unchanged. The activities of the cluster have been unable to generate large numbers of jobs in the region and the development of tourism, in spite of its potential, has not been an adequate compensation for the regional recession in the primary and secondary economic sectors.

The attractiveness of Turiec region as a place of residence was seriously impaired by the post-transition depression and transformation of the engineering (defence) industry which was previously the important provider of jobs in the region (Kiss, 2000). It also is the reason why the interregional mechanical population movement is relatively balanced. Increases of migrants alternate with falls. Intraregional short-distance changes in the place of residence dominate and no long-term, unified trend in interregional mechanical population movement can be seen. The existing interregional differentiation of population migration is mainly the result of the imbalanced movement between the two parts of Turiec (Jurčová, 2010) and the tourism activities that were connected with the promotion of ski resorts in Turiec cluster have had no visible impact on increasing the attractiveness of Turiec as a place of residence.

Balnea cluster

The Internet site of Balnea cluster (www.kupeledudince.sk/en/spa-treatment) provides information about the unifying element (water) which contributed to the origins of Dudince as a spa, as a town with its infrastructure, and also as a relatively important tourism destination. This water gave birth to spa residences, hotels and swimming pools and made Dudince the centre of what is referred to as medical tourism.

After 2008, when the Balnea cluster was officially founded, Krupina district suffered a comparatively large drop in the number of visitors which was also reflected in a fall in the number of tourist nights in accommodation facilities (Figure 5). 2009, the year when, with the introduction of the Euro on 1 January, Slovakia might no longer have been perceived as a cheap destination by foreign guests, is when the number of visitors started to continuously increase in Krupina district. Comparing 2001 and 2012, Krupina's 73 per cent increase in the number of visitors is the most dynamic among the four regions. Spa tourism in Dudince, latterly spurred by the promotion activities of the Balnea cluster, played a major role in this increase. Some of these 'tourists' do not represent the classic tourist but rather a special clientele: the costs of their stay and treatments are reimbursed by health insurance companies. However, there has been long-term fall in the number of tourist nights in accommodation facilities connected with the shortened stays. While a mean

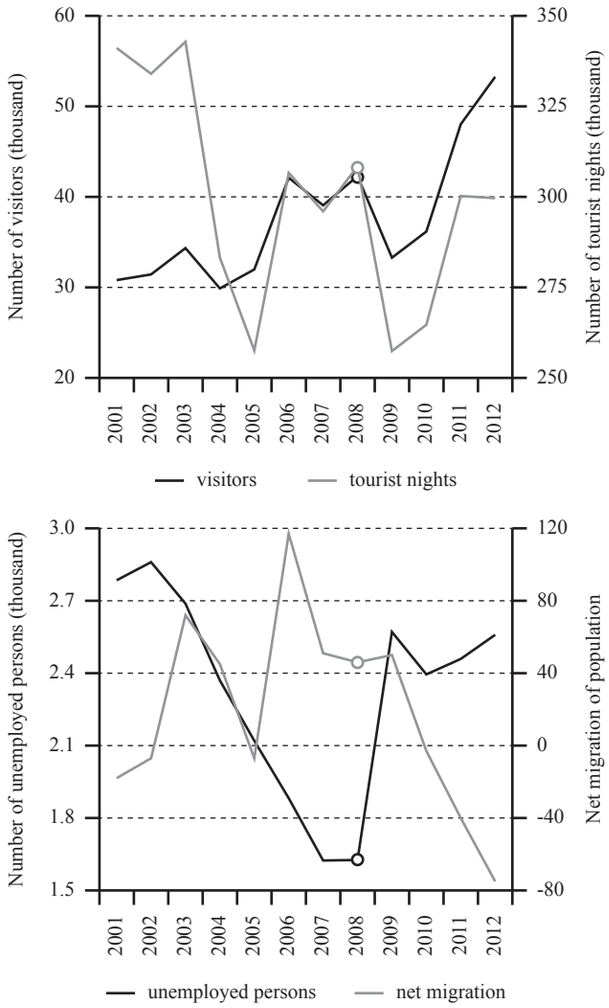

Figure 5: Balnea cluster (Krupina district) and dynamics of regional indicators.

Markers indicate the year of formation of the cluster
Source: Central Statistical Office of the Slovak Republic and own calculations

stay in 2001 was about 11 days, in 2012 it had fallen to less than six days. The causes of such a dramatic drop can be various: from economic ones to the changed length of spa stays.

Clusters and their activities should theoretically contribute to the economic prosperity of all participating, competing and cooperating members. Economic prosperity is closely connected with job creation and an improvement of the regional labour market situation. While the number of registered jobseekers in the five years before the Balnea cluster was formed dropped continuously (about 247 persons a year), its 58 per cent (945 persons) increase between 2008 and 2009 shows that the cluster was not able to change the deteriorating labour market situation in Krupina district. Not even the following three years of activity had any positive effect. Therefore the questions of who (entrepreneurs and the local economy, local self-governments, local people and/or visitors) can profit from the existence of a tourism cluster in rural peripheral region and how are legitimate ones.

The data about the mechanical movement of population in the region show that before the foundation of the tourism cluster Krupina district was rather active in terms of migration. Gains or losses of population, results of the mechanical movement, were not extremely high – the district was balanced as far as migration is concerned. The prevailing migration movement took place in the territory of the district. The situation is approximately the same after the foundation of the Balnea cluster. The only difference is the higher, but not dramatic, population losses because of the prevailing outmigration from the district.

Rural development under cluster initiatives: from enthusiasm to scepticism?

The activities of the four tourism clusters did not lead to dramatic increases in the attractiveness of their rural regions (Figures 2-5). Even an increase in the number of tourists accommodated (2011 and 2012) does not always mean an increase in the number of overnight stays (especially Orava, and district Krupina – cluster Balnea). Population changes due to the positive balance of mechanical interregional movement are very low and for several years they have not reached the level of the year when clusters were founded. The probable cause is the missing direct effect of tourism development on employment in rural regions. The number of unemployed even increased in some years. In any region where tourism clusters are active, with the exception of Turiec, since the institutionalisation of the cooperation between public and private actors in tourism, jobs were not generated in sufficient number and quality to have any measurable impact on recorded unemployment. Thus the high hopes attached to the solution of the unemployment situation in regional labour markets were not fulfilled.

But clearly the decisive effect (especially in the case of a negative assessment) does not have to be the 'institutionalisation' of the activities of the founding members (business persons who invested in the development of tourism) who, expecting a continuous, problem-free increase in visitor numbers, publicly declared highly ambitious aims. The newly created tourism clusters had to face problems arising from changes in the behaviour of tourists caused by the global economic and financial crisis. Potential clients, in an effort to economise, do not fully use the available lodgings or indeed only visit, rather than stay, in the tourist region (Eugenio-Martin and Campos-Soria, 2014). The introduction of the Euro also played an important role: on 1 January 2009 Slovakia became an expensive country for foreign guests. The efficiency of the common marketing strategy, appropriate timing and most of all focus on a suitable target group was determined not only by the active perception of tourist regions but also by financial possibilities, while transport accessibility (Więckowski *et al*., 2012) remained an open question.

Thus the question as to whether tourism clusters in Slovakia positively affect the social and economic development of rural regions in which they operate is one without clear answers, particularly in view of the complexity of the topic and the relatively short periods of existence of the clusters described in this study. The basic idea behind their incep-

tion was the more efficient use of the existing landscape potential for the economic benefit of the participating actors. The broader perception and understanding of regional development, together with any declared effort to find practical solutions to specific regional problems, did not enter into the strategic consideration of key cluster players – entrepreneurs in tourism. At the same time and during the euphoria of this specific period of economic boom the cluster founders were not able to correctly evaluate the potential for regional attendance and the future spatial behaviour of tourist clientele. They calculated without the extended mobility of tourists in the era of global economic crisis and the negative impact of introducing the Euro.

All four cluster initiatives were meant to build an image for the rural regions with a single aim: a quantitative increase in tourists. The ways to achieve such increase are mostly extensive and therefore can be referred to as 'Fordist tourism' and/or 'mass tourism' (e.g. Torres, 2002). Private partners of rural tourism clusters with their entrepreneurial activities (spa, ski resorts and water parks with their products) aim to increase the number of tourists consuming highly standardised, packaged and inflexible products. The close cooperation with public local governments with a preference for extensive socio-economic development contributes to the image of rural areas as not only a commodity but also as destination of mass tourism. The consequent risk of negative environmental effects (there is a real danger that the development of mass tourism may degrade the natural and landscape potential of the region with simultaneous reduction of its tourist attraction) together with the unclear role of tourism clusters in solving regional social and economic problems are the key reasons why the initial enthusiasm which presented tourism as a universal cure for the problems in the region is now replaced by scepticism and warnings against the negative impact of developers' activities in the most attractive territories of protected landscapes.

The main, real and not formally stated reason for clustering (institutional networking) is still questionable. It seems that the foundation of clusters and similar institutional forms depends on opportunities to obtain supporting funds. After the adoption of new legislation for support to tourism in Slovakia (*Act on Support to Tourism from 2010*), all clusters were transformed into *Oblastné organizácie cestovného ruchu* (Local Organisations of Tourism, hereafter LOT). Under the new rules it is possible to obtain a governmental subsidy which corresponds to the sum of the membership fees collected. For each LOT the latter is established according to the decision of the members. The share in the total sum of fees is as a rule also a criterion for the weight of the vote in the decision making on the use of the funds obtained. The differentiated weight of votes of the members of clusters represents a potential and real danger of a conflict between the big and small actors and the resignation of some members from the cluster. The questions for rural local governments and small entrepreneurs are, why actually be in a cluster, how can the advantages of cluster membership for the rural municipality and/or for own entrepreneurial benefit be quantified? The cause of these questions is the limited financial options of the rural self-governments and economic subjects which are interested in membership and active participation in tourism cluster (common marketing) on the one side, and the direct or indirect marginalisation of interests of small members in important decisions on the other.

From the annual reports of the Liptov cluster it is evident that the representatives of the cluster are nowadays satisfied with the slower growth of tourism attendance and profits. This is the satisfaction of entrepreneurs who are supported by state funds while exploiting the favourable physical-geographical conditions of the region and contributing, by negative environmental effects, to its selective degradation. This activity could have a very negative long-term impact on the overall socio-economic development of the region. Hence, when the preference for exclusive economic development, supported by a select group of the most powerful actors interlocked with financial groups on the one side, and the sustainable development sought by the majority of powerless regional actors on the other are in permanent conflict, and the accepted cluster and regional development trajectories depend on the professional status and the value scale of assessors and national, regional and local decision-makers, the activities of clusters (or LOTs) are ambivalently perceived.

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Agri-food exports from European Union Member States using constant market share analysis

The 27 European Union (EU) Member States increased their total agri-food exports during the period 2000-2011. However, despite agri-food exports having grown, the shares of the world agri-food markets of 13 EU Member States and the EU-27 as a whole have declined. Those with increasing market share are mainly among the Eastern EU Member States. Constant market share analysis by 27 EU Member States suggests that the structural effects in agri-food and dairy exports are more important than the residual and second order effects. The declining market share is largely associated with negative residual and second order effects. Large positive structural effects cannot compensate for the impact of negative residual and second order effects and this results in declining agri-food market shares.

Keywords: export shares, constant market share, European Union

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Introduction

Previous research has investigated different aspects of agri-food trade in Central and Eastern European (CEE) countries and in the European Union (EU) Member States. For example, Bojnec (2001) investigated trade and revealed comparative advantage measures in the agricultural trade of CEE countries, while Fertő and Hubbard (2003) studied revealed comparative advantage and competitiveness in Hungarian agri-food sectors with the EU. In addition, in a series of articles these authors investigated EU enlargement and agri-food trade (Bojnec and Fertő, 2008, 2009a, 2012a) and price and quality competitiveness (Bojnec and Fertő, 2009b, 2012b).

This paper focuses on agri-food trade shares and constant market share (CMS) in the 27 EU Member States. The CMS model is one approach to identifying the causes of changes in exports (Ahmadi-Esfahani, 2006). The CMS model was first applied to trade in manufactured commodities by Tyszinski (1951), and then Rigaux (1971) gave an early example of its application to agricultural trade. It has again became popular for agricultural trade analysis in recent decades (e.g. Ahmadi-Esfahani, 1995; Ahmadi-Esfahani and Jensen, 1994; Ongsritrakul and Hubbard, 1996; Chen and Duan, 2001; Fertő 2004; Fogarasi, 2008).

The basic presumption underlying the CMS model is that the share of a country in a market should remain constant given the same level of competitiveness. Hence, any difference between the actual change in exports of the particular ('focus') country and the sum of the market competitors should be caused by a change in export composition or competitiveness (Chen and Duan, 2001).

The objective of this paper is to account for the sources of changes in the agri-food (in general) and dairy (specifically) exports of the EU-27 to the global markets. A sector level analysis for dairy exports is conducted to compare national agri-food exports with possible sector differences for dairy exports, which is still one of the most important agri-food and export sectors in most of the 27 EU Member States. The period 2000-2011 is firstly analysed by comparing data for 2000-2002 and 2009-2011 (i.e. three year averages), and is then divided into two sub-periods 2000-2002/2004-2006 and 2004-2006/2009-2011, i.e. before and after the 2004 EU enlargement.

Methodology

The EU Member State agri-food export share in total global agri-food exports is calculated as:

$$Xi\% = \left(Xi / \sum_{i=1}^{n} Xi \right) 100$$

where $X_i\%$ is the share (in per cent) of the value of agri-food exports X_i of the EU Member State i in total global value of agri-food exports $\sum_{i=1}^{n} Xi$, where n is the number of countries in the world.

In the traditional CMS models, there are only two effects to explain the changes in export growth: the structural effect and the residual effect. The former describes the hypothetical change in expected exports, while the latter is the difference between the actual and the expected change. One can derive these effects more formally (Ahmadi-Esfahani, 1995). Market share can be defined as follows:

$$S = q/Q \tag{1}$$

where S is the particular country's share of the reference market, q is the particular country's exports and Q is the exports of the reference. Manipulating equation (1) yields: $q = SQ$. Differentiating with respect to time one can obtain:

$$\Delta q = S\Delta Q + Q\Delta S \tag{2}$$

where Δ is the change in the variable over time. The first expression on the right hand side is the structural effect and second is the residual effect. Equation (2) is valid only for an infinitely short time period. If the CMS model is applied at discrete intervals, the equation may be written in several ways utilising start and end of period variables. However, some applications (e.g. Ahmadi-Esfahani, 1995; Ahmadi-Esfahani and Jensen, 1994; Chen and Duan, 2001) offered the following specification:

$$\Delta q = \underbrace{S^0 Q}_{\text{structural effect}} + \underbrace{\Delta S Q^0}_{\text{residual effect}} + \underbrace{\Delta S \Delta Q}_{\text{second-order effect}} \tag{3}$$

where 0 is starting period.

Disaggregating the export values into flows of various commodities and flows to various markets, equation (3) becomes:

$$\Delta q = \underbrace{\sum_i \sum_j S_{ij}^0 \Delta Q_{ij}}_{\text{structural effect}} + \underbrace{\sum_i \sum_j \Delta S_{ij} Q_{ij}^0}_{\text{residual effect}} + \underbrace{\sum_i \sum_j \Delta S_{ij} \Delta Q_{ij}}_{\text{second-order effect}} \quad (3a)$$

where Q_{ij} is the reference's exports of commodity i to market j.

The three structural components of the market share are calculated with this expression. Firstly, the size of the market or structural effect refers to the change in quantity of exports of the reference. If this grows (falls), then even with a constant market share S^0, a given country's exports will increase (decrease) in quantity by $S^0\Delta Q$. The other two components have different implications for the sources of export growth. The residual effect also can be called the competitive effect (Chen and Duan, 2001). It means that the change in exports occurs due to a change in the exporting country's competitiveness. The second-order effect can be interpreted as a change in exports due to the interaction of the change in exporting country's competitiveness and the change in the exports of the reference.

The CMS models, as represented in equations (3) and (3a) are applied to the change in EU-27 agri-food (in general) and dairy (specifically) exports to the global market over the period 2000-2011. CMS analysis has been carried out separately for each EU Member State. To avoid the bias of CMS estimations due to sensitivity of the base year, the base period is the average of 2000-2002 for the whole analysed period and for the first period and the average of 2004-2006 is used for the second period.

The CMS models are calculated for the 27 EU Member States using detailed trade data at the six-digit World Customs Organization's Harmonized System (HS-6) level for the years 2000-2011. The United Nations International Trade Statistics UN Comtrade database (UNSD, 2013) is used as data source. Intra-EU trade is included in the CMS analysis for the individual Member States.

It should be noted that agri-food trade between the prospective Member States and the established (EU-15) Member States was already liberalised, except for certain sensitive agri-food products, before the former's accession to the EU. The second sub-period includes also the effects of the global financial and economic crisis of 2008 onwards, which is not analysed.

Results

Agri-food export shares in the 27 EU Member States in global agri-food exports and CMS analysis for agri-food exports and separately for dairy exports are employed to analyse how the Member States performed in global markets in association with the EU enlargements in the period 2000-2011.

EU-27 shares in global agri-food exports

According to the agri-food export shares (USD equivalent) in the world markets, the EU-27's overall share in global agri-food exports declined from 47.22 per cent in 2000 to 41.32 per cent in 2011. However the EU-27 as a whole and some of its Member States have remained important players in global agri-food exports (Figure 1). The focus of our analysis here is a comparison of the global market shares of individual Member States between the periods 2000-2002 and 2009-2011. The first interesting result is that the market shares of 13 Member States (as well as to a lesser extent

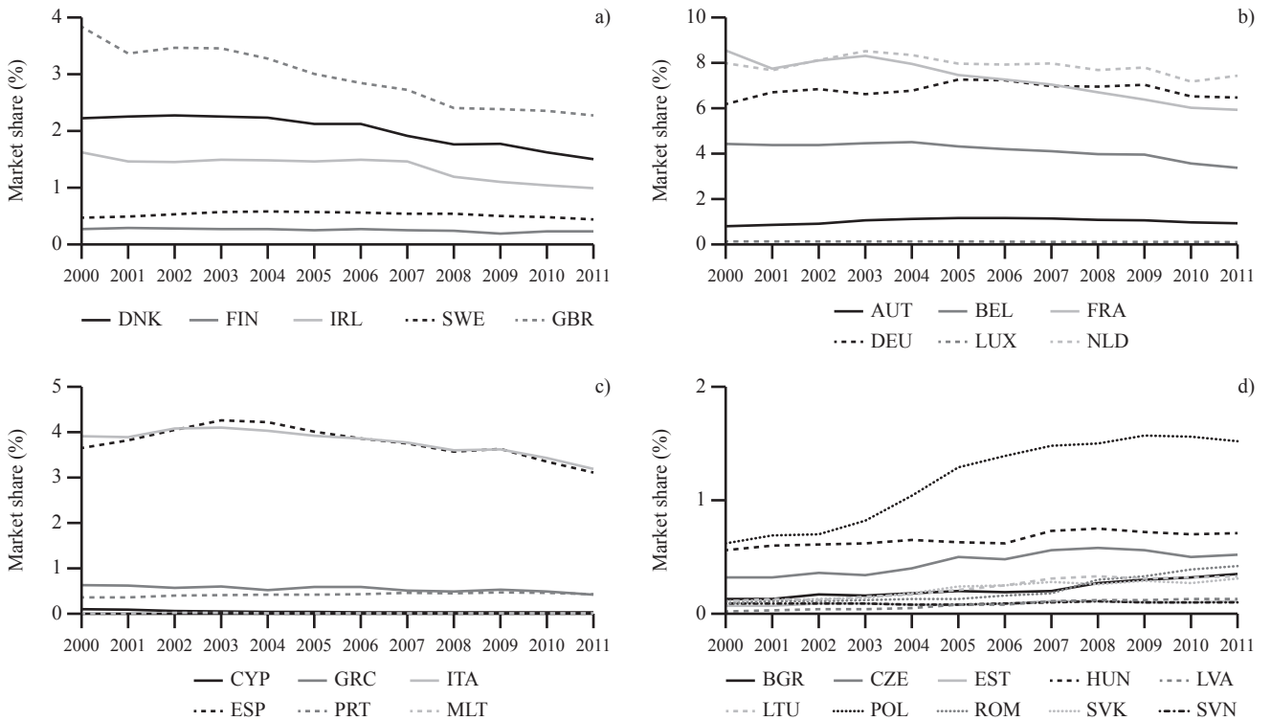

Figure 1: Market shares of (a) northern, (b) central, (c) southern and (d) eastern EU Member States in global agri-food exports, 2000-2011.
Source: Own calculations based on UNSD (2013) Comtrade database with World Trade Integration Solution (WITS) software

Malta) have declined over time. The Netherlands, Germany, France, Belgium (Figure 1b), Spain and Italy (Figure 1c) have recorded the highest export shares but some EU Member States with strong agri-food sectors, including Denmark (Figure 1a), France, Netherlands (Figure 1b) and Spain (Figure 1c), have performed poorly in terms of maintaining their market shares over this period.

The second finding is that 10 of the 13 countries with increasing market share are the Eastern EU Member States (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia) (Figure 1d). The additional three are the established EU Member States Austria, Germany and Portugal. However these 13 Member States accounted for only 29 per cent of the total EU-27 share in the global market in the period 2009-2011. Amongst the Eastern EU Member States, Poland, Hungary and the Czech Republic have had the highest export shares.

Constant market share analysis for agri-food exports

The CMS models highlight some important components to explain changing market shares (Table 1). The EU-27 agri-food export performance can be explained mainly by the structural effects. In other words the growth of agri-food exports is based on the increase in global demand. However, both residual and second order effects are negative, implying a fall in competitiveness. The negative second order effects suggest that the influence of the interaction of the change in EU-27's competitiveness and the change in the global imports has been unfavourable.

The results suggest that the impact of various components of the CMS estimations considerably differ by EU Member State. The structural effects dominate the CMS models in 21 of 27 Member States. Interestingly, those Member States where the impact of structural effects is less than the positive residual and second order effects, for example Bulgaria, Latvia, Lithuania, Poland, Romania and the Slovak Republic, were able to increase their market share. Furthermore, Member States with declining market share report negative residual and second order effects. In other words, large structural effects cannot compensate for the impact of negative residual and second order effects, resulting in a fall in market shares.

The crucial role of the structural effect, except for Cyprus, which is negative, and to a lesser extent of smaller values for some Eastern EU Member States such as Latvia, Lithuania, Poland and the Slovak Republic, can be seen in the middle part of Table 1 for the 2000-2002/2004-2006 sub-period. The residual and second order effects are particularly important for the above-mentioned Eastern EU Member States.

During the 2004-2006/2009-2011 sub-period the size of the structural effect has become greater for most of the

Table 1: Constant market share model for agri-food exports of 27 EU Member States.

	CMS component (per cent)								
	2000-2002/2009-2011			2000-2002/2004-2006			2004-2006/2009-2011		
	Structural	Residual	Second order	Structural	Residual	Second order	Structural	Residual	Second order
Austria	80	8	12	51	31	18	192	-65	-27
Belgium	139	-15	-24	104	-2	-1	228	-91	-37
Bulgaria	33	26	42	51	32	18	29	50	20
Cyprus	-3717	1443	2373	-179	179	101	257	-112	-46
Czech Republic	52	18	30	49	33	18	67	23	10
Denmark	179	-30	-49	113	-8	-5	608	-360	-147
Estonia	64	14	22	78	14	8	56	31	13
Finland	152	-20	-32	115	-9	-5	250	-106	-44
France	166	-25	-41	124	-15	-9	294	-137	-56
Germany	98	1	1	82	11	6	125	-18	-7
Greece	152	-20	-32	124	-16	-9	212	-79	-32
Hungary	75	9	16	83	11	6	70	21	9
Ireland	199	-37	-62	106	-4	-2	-7193	5175	2118
Italy	128	-11	-18	101	-1	-1	184	-60	-24
Latvia	17	31	51	23	49	28	27	52	21
Lithuania	28	27	45	34	42	24	36	46	19
Luxemburg	142	-16	-26	106	-4	-2	239	-98	-40
Malta	243	-54	-89	140	-26	-15	-10386	7441	3045
Netherlands	110	-4	-6	95	3	2	135	-25	-10
Poland	32	26	42	30	45	25	54	32	13
Portugal	74	10	16	73	17	10	79	15	6
Romania	19	31	50	50	32	18	15	61	25
Slovak Republic	29	27	44	28	46	26	50	36	15
Slovenia	86	5	9	118	-11	-6	63	26	11
Spain	125	-10	-16	88	8	4	233	-95	-39
Sweden	110	-4	-6	72	18	10	244	-102	-42
United Kingdom	223	-47	-77	167	-43	-24	496	-281	-115
EU-27	118	-7	-11	95	3	2	162	-44	-18

Note: The components of the CMS analysed are normalised to sum to 100
Source: own calculations based on WITS database

27 EU Member States. Among outliers with extreme negative values for the structural effect are Ireland and Malta. The residual and second order effects are more often negative for the EU-15 Member States and positive for the Eastern EU Member States.

Constant market share analysis for dairy exports

The CMS models for dairy exports largely highlight similarities in components to explain changing market shares (Table 2). The structural effect, which is caused by the increase in global demand, dominates the CMS models for dairy exports of the EU Member States. The impact of the positive structural effect is consistently less than the positive residual and second order effects only for Bulgaria, Latvia and Romania.

Both residual and second order effects are negative for Belgium, Denmark, Finland, France, Ireland, Malta, the Netherlands, Spain, and particularly for the UK, implying a fall in competitiveness and the unfavourable change in the global imports for dairy exports from these countries. The results for Austria, Germany and Sweden are mixed. Eastern EU Member States, e.g. Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia, have positive residual and second order effects, implying an increase in competitiveness and the favourable change in the global imports for dairy exports from these countries. Hungary has improved competitiveness and the global trading conditions since the EU enlargement in dairy exports as both residual and second order effects have shifted from negative to positive values.

Discussion and conclusions

The paper analyses the evolution of market shares in the global agri-food and dairy exports during the period 2000-2011. The agri-food global market shares have declined in thirteen EU Member States and have remained at similar levels for Malta. Most of the countries with an increasing agri-food market share are Eastern EU Member States. This finding is largely consistent with previous findings using different methodological approaches. The EU enlargement has encouraged agri-food exports of Eastern EU Member States to both intra-EU (Bojnec and Fertő, 2008, 2009a, 2010, 2012a) and extra-EU global markets.

The CMS analysis suggests that the structural effects are more important than residual and second order effects in the structure of agri-food and dairy exports. While the structural effect is mostly positive for all EU Member States, the residual and second order effects are more often positive for the Eastern EU Member States and after the EU enlargements more often negative for the EU-15 Member States. This finding provides some new optimism for the agri-food sector in the

Table 2: Constant market share model for dairy product exports of 27 EU Member States.

	CMS component (per cent)								
	2000-2002/2009-2011			2000-2002/2004-2006			2004-2006/2009-2011		
	Structural	Residual	Second order	Structural	Residual	Second order	Structural	Residual	Second order
Austria	67	21	12	67	21	12	173	-54	-19
Belgium	155	-35	-20	155	-35	-20	132	-24	-8
Bulgaria	41	38	22	41	38	22	38	46	16
Cyprus	54	30	17	54	30	17	40	45	15
Czech Republic	43	36	21	43	36	21	66	25	9
Denmark	132	-20	-12	132	-20	-12	209	-82	-28
Estonia	92	5	3	92	5	3	70	22	8
Finland	123	-15	-8	123	-15	-8	102	-1	0
France	136	-23	-13	136	-23	-13	154	-40	-14
Germany	99	1	0	99	1	0	156	-42	-14
Greece	55	29	16	55	29	16	62	29	10
Hungary	201	-64	-37	201	-64	-37	45	41	14
Ireland	121	-13	-8	121	-13	-8	175	-56	-19
Italy	82	12	7	82	12	7	85	11	4
Latvia	30	45	26	30	45	26	40	45	15
Lithuania	56	28	16	56	28	16	64	27	9
Luxemburg	69	19	11	69	19	11	74	19	7
Malta	211	-71	-40	211	-71	-40	230	-97	-33
Netherlands	122	-14	-8	122	-14	-8	123	-17	-6
Poland	29	45	26	29	45	26	82	13	5
Portugal	97	2	1	97	2	1	76	18	6
Romania	41	38	21	41	38	21	27	55	19
Slovak Republic	23	49	28	23	49	28	92	6	2
Slovenia	62	24	14	62	24	14	47	39	13
Spain	108	-5	-3	108	-5	-3	281	-135	-46
Sweden	68	20	12	68	20	12	121	-16	-5
United Kingdom	135	-22	-13	135	-22	-13	1880	-1328	-452
EU-27	105	-3	-2	105	-3	-2	134	-25	-9

Note: The components of the CMS analysed are normalised to sum to 100
Source: own calculations based on WITS database

Eastern EU Member States, which after the initial transitional downturn have recovered and are catching up with their agri-food and dairy exports to the intra-EU and the global markets.

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HEGEDÜS Zsuzsanna* and KISS Judit*

The impact of ten years of European Union membership on Hungarian agricultural trade

The main objective of this paper is to analyse the impact of European Union (EU) membership on Hungarian agricultural trade with the EU-27 in the period 2003-2013, based on our own calculations using the latest statistical data. We concluded that the agricultural orientation of Hungarian foreign trade and the export orientation of the agricultural sector have strengthened during these ten years. Hungarian agricultural trade with the EU-27 grew dynamically, with expansion of exports being accompanied by increasing import penetration. As a result of the three-fold export and import value growth, the EU-27 became the leading market for Hungarian export products (with an 80 per cent share) and the main source of imports (with a 91 per cent share). While, owing to low competitiveness, the Hungarian export commodity structure is dominated by raw materials and semi-processed goods, the import structure is rather diversified, though processed goods oriented. The share of the Member States that joined the EU from 2004 onwards has increased to almost 40 per cent in Hungary's intra-EU agricultural trade, at the expense of the EU-15. Following a post EU accession deterioration, the balance of Hungary's agricultural trade with the EU had improved to a record of EUR 2.7 billion by 2012.

Keywords: EU accession, Hungarian agricultural trade, trade balance, commodity structure, geographical structure

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Introduction

Hungary, together with nine other countries, joined the European Union (EU) in May 2004. Owing to its importance in the economies of the newly acceded Member States (its contribution to GDP, trade, consumption, employment and rural livelihoods is above the EU average), and the fact that agriculture and rural development is still the biggest item of expenditure in the EU budget, agriculture was one of the most hotly debated and negotiated parts of the accession process (Vajda, 2014). The agricultural productivity and competitiveness of the new entrants lagged behind those of the EU-15 (Csáki and Jámbor, 2012) and they had great expectations concerning EU accession.

As a country with huge agro-potential and a high degree of export orientation, Hungary was looking forward to EU accession, especially in the field of trade in agricultural products. On the one hand, significant export expansion was expected due to (a) increasing output generated by the catching up of agricultural producers' prices and by direct payments providing incentives to the expansion of production; (b) gaining free and unlimited access to the still enlarging single market of around half a billion consumers; and (c) capitalising on the intervention and export refund systems of the Common Agricultural Policy (CAP). On the other hand, there were some reservations concerning the deterioration of the agricultural trade balance as a consequence of increasing import penetration and/or sluggish export growth due to fierce competition in the single market and the low competitiveness of some Hungarian export goods. The increasing share of raw materials in the exports and that of processed goods in the imports were also expected due to the biased nature of the EU support system and the differences in competitiveness.

As ten years have now passed since EU accession and agricultural trade still plays a prominent role in the Hungarian economy, this paper assesses and analyses the impact of EU membership on Hungarian agricultural trade with the EU-27 in the period 2003-2013.

Literature review

While many studies speculating about the possible impacts of Hungary's joining the EU were made prior to EU accession, the first in-depth analyses of these impacts of course appeared only afterwards.

In several papers, Csáki and Jámbor (2009, 2010, 2012, 2013a, 2013b) concluded that for the New Member States (NMS) accession to the EU had an overall positive impact on trade, but that different Member States performed differently due to the big differences in initial conditions and to the diverse pre- and post-accession agricultural policies. EU accession provided many opportunities, but the NMS had to face increasing competition in the single market. With the exception of Hungary and Poland, EU accession resulted in increased trade deficit in agricultural products. The share of raw materials in agricultural exports increased, while agricultural imports became dominated by processed goods. Similarly, Kiss (2011) found that, though the enlarged EU provided markets for the agricultural products of the (twelve) NMS, the competition on their domestic markets increased significantly, resulting in massive import penetration. Consequently, in most of the NMS the agricultural trade balance deteriorated considerably.

Some other studies (Artan and Lubos, 2011; Bojnec and Fertő, 2012; Jámbor, 2013) analysed the agro-food trade of the four 'Visegrad' countries (the Czech Republic, Hungary, Poland and the Slovak Republic) from the point of view of their competitiveness, trade advantages and specialisation. Their results show that the intensity of V4 agro-food trade, the value and volume of export and import activities increased significantly after EU accession, but that the trade balance with the EU-15 deteriorated in most cases, and the comparative advantages of these countries decreased. Comparative advantage stability weakened.

An early study analysing the impact of EU accession on Hungarian agro-food trade (Kiss, 2007) concluded that Hungary's trade position had deteriorated after accession due not so much to insufficient export growth but rather to

a sharp rise in imports. By 2006 the country's total trade balance with the EU-24 had become negative. From an examination of Hungarian agriculture in a broader context by Kapronczai (2010), it became clear that the importance of agriculture and food industry had increased in Hungarian foreign trade, the share of the EU-27 had also grown, and the foreign trade balance had improved mainly due to trade with the NMS. Based on evidence from the last ten years, Vajda (2014) showed that despite many difficulties the Hungarian agro-food sector had successfully managed the challenges of EU accession: between 2003 and 2012 Hungarian agricultural output increased by 53 per cent, net value added by 77 per cent and agricultural exports by 183 per cent.

Jámbor (2011) analysed Hungary's post-accession agricultural trade with the EU-15 using the method of revealed comparative advantages. EU accession increased the intensity of agricultural trade, though it had a detrimental effect on trade balance due to more intense import growth. Hungary's exports became dominated by low value added raw materials (where the country had revealed comparative advantages), while imports consisted of high value added processed goods (where Hungary had comparative disadvantages). Short- and long-term stability examinations suggest increased competition in EU-15 markets. These analyses supported the need for structural reforms and increasing competitiveness.

Jámbor and Vásáry (2014) dealt with Hungary's agricultural trade in relation to all EU Member States in the period 2001-2012. Since accession the share of the EU in Hungarian agricultural trade has increased to 85-90 per cent. The main export markets have been Germany, Romania, Slovakia, Italy and Austria, while most agricultural products have been imported from Germany, Poland, the Netherlands, Slovakia and Austria. The major export products were cereals, meat, oil seeds, food industry residues and waste, and preparations of fruits and vegetables, while the main import products were residues, meat, milk, other foodstuffs and cereal preparations. The results of revealed comparative advantages showed that only three product groups (live animals, cereals and residues) out of 24 product categories had comparative advantages in all of the years analysed. Eighteen product groups experienced a decrease in comparative advantages, indicating a deterioration of competitive positions.

Many of the above papers are now becoming outdated and/or were published in the Hungarian language. Our analysis of the impact of EU accession on Hungarian agricultural trade with all (27) EU Member States covers (a) export and import performance; (b) the trade generating effect of EU accession; (c) the agricultural trade balance; (d) the changing production and geographical structure of agrarian trade; and (e) the main causes of these changes over the ten year period to 2013, and identifies some issues that require further research.

Methodology

Hungarian Central Statistical Office (KSH) datasets for the years 2003-2013, which are in full conformity with the Eurostat database, for growth rates, value indices, market shares, trade balances, geographical distributions, and export and import product structures have been compiled to cover the whole post-accession period. Analytical description methods have been applied to achieve the research objectives.

'Agricultural products' means the product categories 01-24 of the Combined Nomenclature used in both the external and the intra trade statistics of the EU. Therefore, it allows for comparison with all other EU Member States. The terms 'agricultural trade', 'agrarian trade' and 'trade in agricultural goods/products' are used interchangeably. All currency values are given in EUR.

By EU, the paper means the EU-27 as Croatia only joined in July 2013. For the sake of comparability, data for all 27 Member States have been taken into account irrespective of the year of accession. EU-15 refers to the countries that were Member States prior to 2004, while EU-12 denotes those which joined the EU either in 2004 or in 2007. Though the data are from official sources, in some cases their reliability/accuracy can be questioned. This is indicated where necessary.

Results

Total Hungarian trade

Between 2003 and 2013 total Hungarian *exports* increased from EUR 38.10 billion to EUR 81.72 billion (Figure 1). The growth was positive until the 2008 financial and economic crisis, then a significant drop occurred prior to recovery. During this period, total imports grew from EUR 42.26 billion to EUR 74.71 billion. Again, the value of *imports* increased until 2008 when the economic crisis (i.e. decreasing domestic demand) affected the import growth. After the crisis import values started to lag further behind export values, resulting in an improving trade balance. Until 2009 Hungary had a negative trade balance in its total trade. After the outbreak of the crisis trade balance started to improve mainly due to sluggish import growth. Since 2009 Hungary has had an increasingly positive trade balance and in 2013 this reached EUR 7 billion.

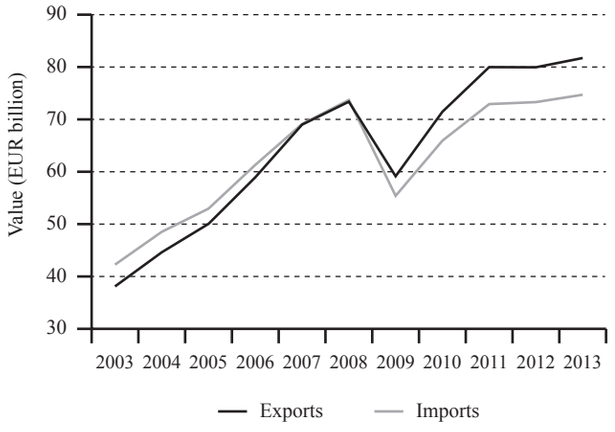

Figure 1: Hungarian total exports and imports, 2003-2013.
Source: KSH data

Total Hungarian agricultural trade

Between 2003 and 2013 Hungary's agricultural *exports* grew from EUR 2.85 billion to EUR 8.09 billion, i.e. more dynamically than Hungary's total exports. In the meantime total agricultural *imports* also grew significantly, from EUR 1.49 billion to EUR 4.43 billion, three times more intensively than Hungary's total imports and a little more dynamically than Hungarian agricultural exports (Figure 2). As in 2003 the value of agricultural exports was almost twice the value of imports while their dynamics were rather similar, Hungary managed to maintain and even improve its positive trade balance in the case of agricultural goods: in 2003 the trade balance was EUR 1.36 billion and it increased to EUR 3.60 billion by 2013.

As Hungarian agricultural trade grew more dynamically than the country's total trade, the *share of agricultural products* in overall trade increased between 2003 and 2013: in the case of imports from 3.5 per cent to 6.0 per cent, and in the case of exports from 7.5 per cent to 9.9 per cent (reaching a record of 10.1 per cent in 2012).

Hungarian trade with the EU-27

Hungary's trade with the *EU-27* also grew dynamically: the country's *total exports* to the EU-27 between 2003 and 2013 increased from EUR 32.06 billion to EUR 61.88 billion, that is a 1.9 times increase compared to the 2.1 times increase of Hungary's total export growth. Hungary's imports from the EU-27 grew from EUR 32.79 billion to EUR 53.08 billion, a 1.6 times increase compared to the 1.8 times increase of Hungary's total import growth (Figure 3). Though the value of exports and imports were almost equivalent in 2003, as export growth outpaced import increase, Hungary's trade balance with the EU-27 improved, from -0.73 billion to +8.79 billion, however, the share of the EU Member States in total Hungarian exports and imports decreased between 2003 and 2013 from 84.1 per cent to 75.7 per cent, and from 77.6 per cent to 71.0, respectively.

Hungarian agricultural trade with the EU-27

Hungary's agricultural *exports* to the EU-27 increased from EUR 2.05 billion in 2003 to EUR 6.75 billion in 2013, that is, by 3.3 times, more dynamically than Hungary's total agricultural exports and Hungary's total exports to the EU in the same period. Agricultural *imports* from the EU-27 grew from EUR 1.25 billion to EUR 4.12 billion (Figure 4), also more dynamically than Hungarian total agricultural imports and total imports from the EU, suggesting the increasing share of the EU in Hungary's total agricultural trade and the increasing share of agricultural products in Hungary's trade with the EU-27. While Hungary's agricultural trade increased moderately until the outbreak of the economic crisis, and the trade balance in the case of agricultural products deteriorated, the situation significantly improved afterwards: the trade *balance* improved from 0.81 billion EUR in 2003 to 2.63 billion in 2013. In 2013 around 30 per cent of Hungary's trade surplus with the EU-27 derived from agricultural trade.

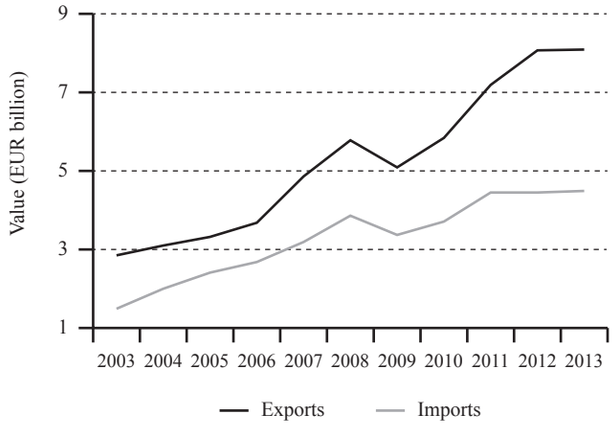

Figure 2: Hungarian total agricultural exports and imports, 2003-2013.
Source: KSH data

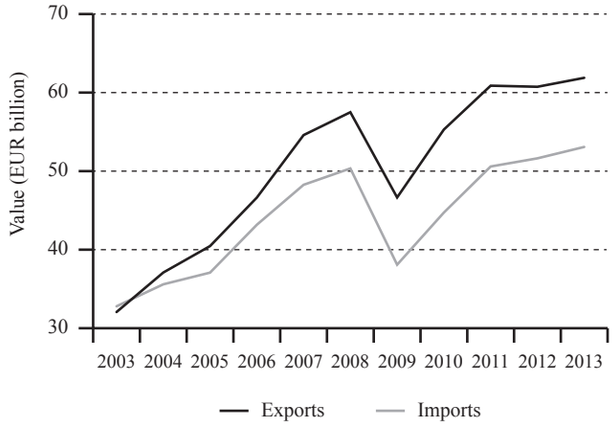

Figure 3: Hungarian total exports and imports with the EU-27, 2003-2013.
Source: KSH data

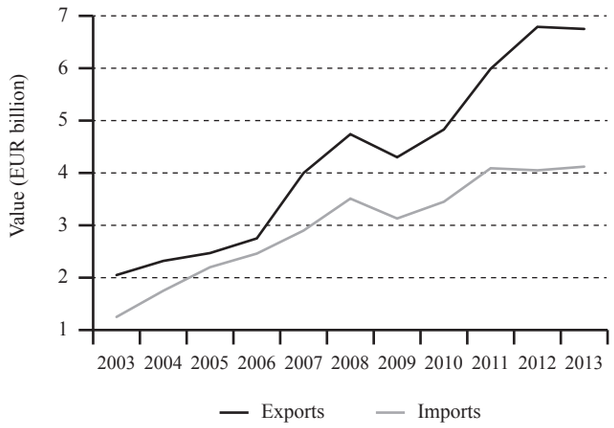

Figure 4: Hungarian agricultural exports and imports with the EU-27, 2003-2013.
Source: KSH data

As a consequence of the above changes, the *share of agricultural products* increased both in Hungary's exports to the EU-27 and in Hungary's imports from the EU-27. The share of agricultural products in exports increased from 6.4 per cent to 10.9 per cent, while the share of imports almost doubled, from 3.8 per cent to 7.8 per cent. Both figures are a little higher than in the case of total Hungarian exports and imports.

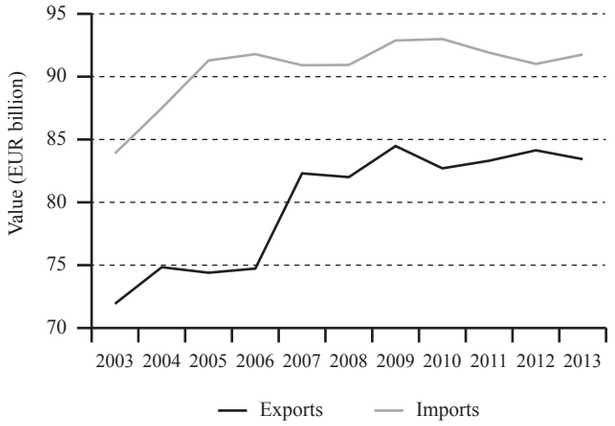

Figure 5: The share of trade with the EU-27 in Hungarian agricultural exports and imports, 2003-2013.
Source: own calculations based on KSH data

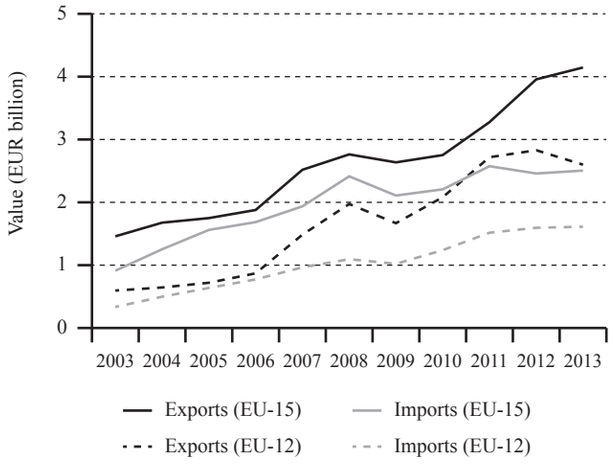

Figure 6: Hungarian agricultural exports and imports with the EU-15 and the EU-12, 2003-2013.
Source: own calculations based on KSH data

In addition, the *share of the EU-27* in Hungary's agricultural export and import trade increased significantly. In 2013 already 83.3 per cent of Hungary's agricultural exports were directed to the EU-27 (compared to 72.0 per cent prior to accession) and 91.6 per cent arrived from the EU-27 in 2013 compared to 83.4 per cent in 2003 (Figure 5).

Hungarian agricultural trade with the EU-15 and EU-12

Hungary's agricultural trade with the *EU-15* and *EU-12* performed differently. While in the former case Hungary's agricultural exports increased by 2.8 times between 2003 and 2013, in the latter case the increase was 4.4-fold, albeit from a much lower starting value (Figure 6). The equivalent figures for imports are 2.7 and 4.8 respectively. Consequently, the share of the EU-15 in Hungary's agricultural trade within the EU-27 decreased, in contrast to the share of the EU-12: while in 2003 71 per cent of Hungary's EU-27 agricultural exports were directed to the EU-15 and 29 per cent to the EU-12, by 2013 the share of the EU-15 fell to 61 per cent and the share of the EU-12 increased to 39 per cent. The respective figures in the case of imports are very similar: 73 per cent for the EU-15 in 2003 (27 per cent for the EU-12) and 61 per cent for the EU-15 in 2013 compared with 39 per cent for the EU-12.

Trade balances increased in favour of Hungary in both cases. While the agricultural trade balance with the EU-15 increased by 3.0 times, in the case of the EU-12 the increase was 3.8 times, and in 2013 almost 38 per cent of Hungary's agricultural trade balance with the EU-27 derived from its trade with the EU-12.

Product structure of Hungary's agricultural trade

In 2003 more than 30 per cent of Hungary's agricultural exports consisted of cereals and meat, and around two thirds of five additional product categories (animal fodder, preparations of vegetables, oil seeds, beverages, and fats and oils). The export commodity structure shows high concentration and relative stability (as was evidenced by Jámbor, 2011 for the period 1999-2010): in 2013 the same seven product groups covered 64 per cent of Hungary's exports to the EU-27 as ten years before, however, by 2013 cereals became the leading export product instead of meat (Figure 7).

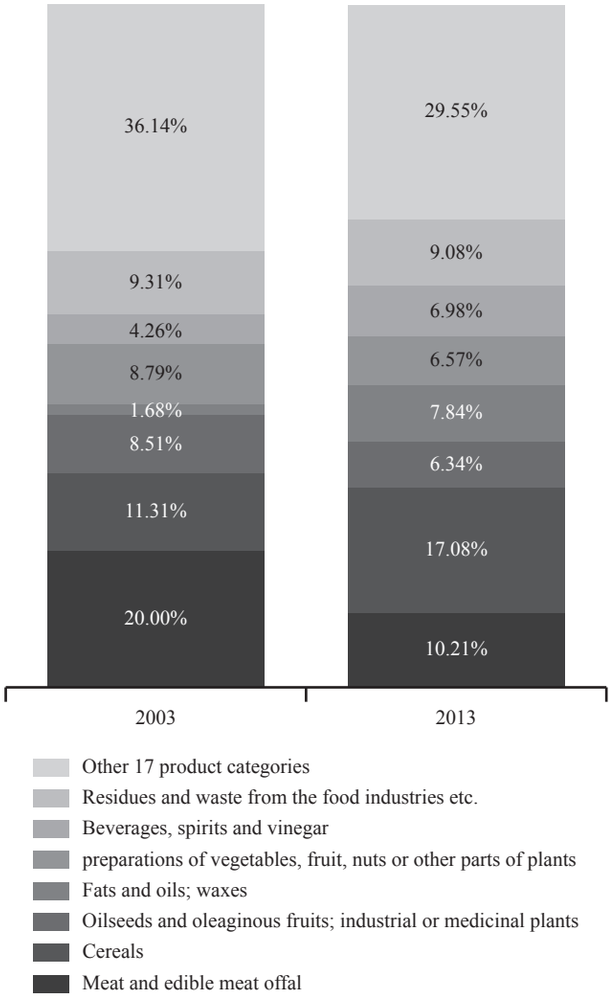

Figure 7: The changing commodity structure of Hungarian exports to the EU-27, 2003 and 2013.
Source: own calculations based on KSH data

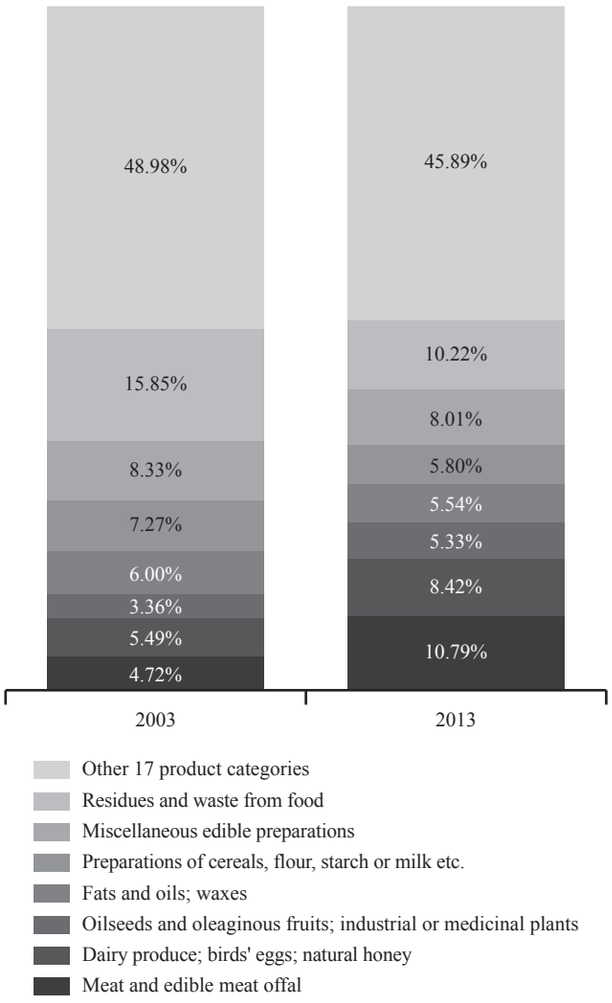

Figure 8: The changing commodity structure of Hungarian imports from the EU-27, 2003 and 2013.
Source: own calculations based on KSH data

The import structure is less concentrated: in 2013 the five most important product categories (meat, animal fodder, dairy products, fats and oils, and preparations of cereals) comprised 43 per cent of Hungary's agricultural imports from the EU-27 (Figure 8).

Hungary's main export and import partners in the EU-27

In 2003 (in decreasing order) Germany, Austria, Romania, Italy, the Netherlands and Poland were Hungary's most important *export markets* within the EU-27. These six countries provided markets for up to 67 per cent of Hungary's exports to the EU-27 prior to EU accession. By 2013 the share of the leading six markets increased to 70 per cent, and though Germany remained the main market, it was followed by Romania, Austria, Italy, the Slovak Republic and the Netherlands (Table 1).

In 2003 Hungary's main *import sources* were Germany, the Netherlands, Poland, Italy, Austria and Romania. These six countries provided 63 per cent of Hungary's imports from the EU-27. Though in 2013 Germany was still the biggest import source for Hungary, Poland became the second and the Slovak Republic the third partner, followed by the Netherlands, Austria and Italy. These six countries covered 70 per cent of Hungary's imports from the EU-27 (Table 2).

Discussion

The main objective of this paper was to analyse the impact of EU accession on Hungarian agricultural trade with the EU-27 in the period 2003-2013. This paper is among the first to cover the whole ten year period since EU accession and to analyse Hungary's trade not only with the EU-15 but with all 27 Member States. It attempts to provide an overall

Table 1: Hungary's main export markets in agricultural trade with the EU-27 (%).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	11.9	11.0	10.9	11.2	8.8	9.9	9.2	9.6	10.5	11.0	10.7
Germany	24.6	23.9	20.6	19.9	17.1	18.2	18.7	16.0	16.4	16.5	18.0
Italy	8.7	10.0	11.6	12.7	13.8	11.7	13.4	11.8	10.3	10.0	10.3
Netherlands	7.0	6.9	5.9		6.8		5.8	5.3		9.0	8.2
Poland	5.0	5.7	5.0	5.6	5.9	5.9			5.3		
Romania	10.2	7.5	7.9	7.7	14.3	17.4	16.0	16.5	14.0	14.0	13.3
Slovak Republic				6.1		7.2	8.0	11.9	15.7	12.2	9.4
Total*	67.4	64.9	62.0	63.1	66.7	70.3	71.0	71.0	72.1	72.6	69.9

* for the six most important markets
Source: own calculations based on KSH data

Table 2: Hungary's main import partners in agricultural trade with the EU-27 (%).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	6.8	6.4	7.0	7.8	7.8	9.0	9.1	9.1	9.5	9.1	9.0
Germany	18.7	21.5	25.0	24.6	24.8	23.5	24.1	22.9	22.4	22.0	21.4
Italy	8.1	7.1	6.9	6.5	6.9	7.1	5.8		5.9	5.7	5.6
Netherlands	15.7	17.0	15.2	12.9	12.1	14.7	12.9	12.5	10.2	9.1	9.1
Poland	8.5	9.8	13.2	14.9	13.6	13.1	13.1	13.9	12.2	12.2	12.8
Romania	6.2										
Czech Republic		7.1						5.3			
Slovak Republic			6.7	6.8	8.1	7.3	8.4	9.1	11.4	13.0	11.7
Total*	63.9	68.8	74.0	73.6	73.4	74.6	73.3	72.8	71.6	71.1	69.5

* for the six most important markets
Source: own calculations based on KSH data

picture of Hungary's agricultural trade based on the latest statistical data.

In the last ten years the agricultural orientation of Hungarian foreign trade and the export orientation of the agricultural sector could be evidenced as export values increased by 2.8 times, having reached a record level of around EUR 8.1 billion in 2013, and the share of agricultural products was around 10 per cent in 2013 (compared to 7.5 per cent in 2003). These changes are due to the increasing agricultural production resulting in a growing share of Hungarian agriculture in the EU's total agricultural output (this increased from 1.65 per cent in 2003 to 1.96 per cent in 2011 (Vajda, 2014)) and the increasing contribution of agriculture to Hungarian GDP. The share of agriculture in Hungarian GDP started to increase noticeably following the onset of the global economic and financial crisis: in 2010 3.5 per cent, in 2011 3.9 per cent, and in 2012 and in 2013 4.0 per cent of Hungarian GDP was generated by agriculture (Agrárgazdasági Figyelő, 2014).

This trend is welcome if it stems from capitalising on Hungary's agro-potential (high abundance of land and labour) and leads to the modernisation of the economy and the rural areas. However, it is a less favourable change if it (a) derives from the slower growth or downturn of the other economic sectors, (b) is due mainly to price hikes and good weather, and (c) results only from the quantitative increase (extensification) of agricultural output without structural changes and improving competitiveness (as in fact did happen, see Jámbor, 2010; Jámbor, 2011; Juhász and Wagner, 2013; Vásáry *et al*., 2013). All the more, as the main EU supports (direct payments, intervention system, the different market regimes) favoured bulk, raw materials production. As agricultural production is rather volatile due to weather conditions and climate change, Hungary's increasing agricultural export orientation might make the country's foreign trade balance vulnerable. In 2013 more than 50 per cent of the country's foreign trade balance was generated by agricultural trade.

While the above changes are only loosely related to Hungary's joining the EU, developments in its total trade with the EU-27 are closely related to EU accession, the foreign trade effects of which, however, should not be overestimated. As a result of the Association Agreement signed by Hungary with the European Community in December 1991 (Tracy, 1994), 92 per cent of the EU's market had already been liberalised prior to accession and very few market access obstacles remained (Kiss, 2007). Consequently, the process of dismantling trade barriers could not itself have a significant trade generation effect.

However, getting access to a permanently extending market as a consequence of the enlargement of the EU provided a growing market for Hungarian goods. Nevertheless, capitalising on unlimited market access highly depended on the competitiveness of the exported products[1] and the still existing 'indirect' (hidden) trade barriers. This is the reason why though Hungary's exports to the EU-27 almost doubled between 2003 and 2013, the share of the EU-27 decreased in Hungary's overall exports from 84.1 per cent to 75.7 per cent; that is, Hungary failed to fully utilise the market opportunities provided by EU accession and enlargement.

Not only have Hungarian exports grown rather moderately, but Hungarian imports from the EU-27 have done so too. This is partly due to the fact that by the time of EU accession already 85 per cent of the Hungarian market had been liberalised as an outcome of the Association Agreement. Consequently, after EU accession the share of the EU-27 in Hungarian total imports decreased, from 77.6 in 2003 to 71.0 per cent in 2013. As a result of this moderate import penetration, Hungary's trade balance with the EU-27 increased substantially, reaching around EUR 10 billion in 2010 and 2011, thus improving the country's current account balance and balance of payments situation.

In contrast to the overall trade, Hungarian agricultural trade with the EU-27 increased dynamically. A more than three-fold growth in the value of exports implies that Hungary produced enough agricultural goods for exports and made use of the enlarging market opportunities. All the more so, as prior to EU accession more trade barriers existed in the field of agricultural trade than in the case of trade in industrial products. Hungary's increasing specialisation on agricultural goods in its trade with the EU-27 is shown by the growing and high share of agricultural products (more than 10 per cent) in its overall trade with the EU-27. Whether this type of specialisation is a desired one, inherent in the country's endowments and comparative advantages, and/or an 'enforced' one, deriving from the conditions of EU accession and motivated by the interest of the EU is a topic for further research.

However, the question is still relevant: Are we witnessing the emergence of a 'colonial' type of 'division of labour' between the EU-15 and the Eastern EU Member States? Are the latter condemned to be exporters/suppliers of raw materials and unprocessed products while the EU-15 intend to keep their positions as exporters of high value added products? The question is all the more relevant as in 2003 47 per cent of Hungary's agricultural exports to the EU-15 consisted of raw materials, and this share increased to 56 per cent by 2010 after having reached 60 per cent in 2007. This might be explained by the decline of the food processing industry after EU accession. However, a good sign is that in 2012 and in 2013 the share of processed goods (animal products, vegetable oils, food products, drinks and tobacco) began to increase while that of the raw materials and crop products decreased (Szabó, 2014). The import structure has always been dominated by processed goods: agricultural raw materials accounted for 33 per cent of imports in 1999 and 27 per cent in 2010 (Jámbor, 2011).

One of the consequences of the vigorous growth in Hungarian agricultural exports is that Hungary has become highly dependent on the EU-27 as an export market: presently more than 80 per cent of Hungary's agricultural products are directed to the EU-27. This high degree of dependence might be dangerous if it is associated with high concentration of exports on a few product categories and/or partners. This danger is immanent: after analysing Hungary's agricultural export structure it is evident that it concentrates on a hand-

[1] For an analysis of the agricultural competitiveness of the Visegrad countries see Vásáry *et al*. (2013) and for the competitiveness of the Hungarian agri-food exports see Juhász and Wagner (2013).

ful of product groups: cereals (mainly maize and wheat) and meat products (pork, duck, chicken, turkey) account for more than one quarter of Hungary's exports to the EU-27, while seven product categories generate 64 per cent of them. The high concentration of Hungary's agricultural exports was confirmed by the finding of Jámbor and Vásáry (2014) that the five major product categories (cereals, meat, oil seeds, food industry residues and waste, and preparations of fruits and vegetables) provided more than 50 per cent of Hungary's agricultural exports to the EU27.

The leading role of cereals is quite evident as Hungary is traditionally a country where maize, wheat, barley, sunflower and oilseed rape production exceeds domestic demand. While the sowing area for maize and wheat remained stagnant after EU accession at 1.2 and 1.1 million hectares respectively (Potori *et al*., 2013), the oilseed area increased as a result of the expansion of the EU biofuel industry, providing a growing market for rapeseed. Consequently, the leading role of meat in Hungarian exports has been taken over by cereals. The falling share of meat was also caused by decreasing animal stock (by the end of 2011 the number of pigs had dropped to almost 3 million, being the lowest figure since 1949; Potori *et al*., 2013) and the crisis of the Hungarian meat industry induced among others by the reorganisation of the industry and the increasing fodder prices. Not to speak of the fact that the Single Area Payment Scheme and the national top-up system gave preference to crops, especially arable crops (cereals) production. The per-hectare direct payments amounted to EUR 70.2 in 2004 and 233.0 EUR in 2013 (Potori *et al*., 2013). Consequently, during the ten years of EU membership the share of crop production in total Hungarian agricultural production increased to 70 per cent, while the share of animal breeding fell to 30 per cent. The great (around 20 per cent) export share of cereals implies high volatility in Hungarian export revenues depending on weather conditions, all the more so as one third of Hungary's agricultural trade balance is generated by cereals exports (Varga and Kruppa, 2014).

Hungarian agricultural exports also depend to a great extent on the country's main markets: the degree of concentration remained unchanged after EU accession (with the leading six countries having a 67 per cent share in 2003 and a 70 per cent share in 2013). Germany is still the biggest market for Hungarian agricultural products, though with a decreasing share (25 per cent in 2003 and 18 per cent in 2013). Romania became the second biggest market as a result of the more than four times increase of Hungarian agricultural exports between 2003 and 2013. An interesting feature is the Slovak Republic's increasing share: in 2011 it became Hungary's second largest agricultural export partner and it was the third in 2012. Whether these trade flows are real or fictitious, and what role is played by the high tax burden (the VAT rate is 20 per cent in the Slovak Republic and 27 per cent in Hungary), tax fraud, tax evasion, low tax moral, lack of transparency in the taxation system (Potori *et al*, 2014) and illegal (black) markets in Hungarian exports to Romania and the Slovak Republic[2] needs further research.

There was a major fear in Hungary at the time of accession (Kiss, 2007) that the EU would be in a position to make better use of unlimited market access and there would be large import penetration. These fears turned out to be real in the first years of EU membership, however, later on Hungary's agricultural imports from the EU-27 became counterbalanced by its agricultural exports to the EU-27. Increasing imports can be explained by the higher competitiveness of EU agricultural products due partly to traditionally high subsidies of the EU-15 (Jámbor, 2013). The share of the EU in Hungarian agricultural imports was already rather high (more than 83 per cent) at the time of EU accession, but this had even increased by 2013, the EU having become the dominant supplier of agricultural products to Hungary with its 91.6 per cent share. This high dependence is counterbalanced by the diversified commodity structure of Hungary's agricultural imports from the EU-27: none of the product groups had a share that was higher than 11 per cent in 2013, and the top five product categories provided 43 per cent of Hungary's imports.

The sources of supply are rather concentrated: in 2013, 69 per cent of Hungarian agricultural imports from the EU-27 arrived from six countries (with a 20 per cent share of Germany). However, the above-mentioned high dependence on the EU sources is a little misleading as many products imported/arrived from the EU originate from outside the EU and is handled only statistically as imports from the EU (Szabó, 2013; Vásáry *et al*., 2013): the basis for registration is no longer the country of origin, but the country that forwarded the given product. Consequently, agricultural import items originating from developing countries (such as banana, coffee, cocoa, fish etc.) statistically appear as German or Dutch imports.

The other major fear at the time of EU accession was that as a consequence of increasing import penetration (which did happen), the Hungarian agricultural trade balance would deteriorate. Looking at data from the first years of EU membership (2004-2006) this fear was not without reason. Nevertheless, thanks to the accession of Bulgaria and Romania in 2007, afterwards Hungary's agricultural exports to the EU-27 increased and Hungary's trade balance improved significantly and grew without interruption (by 2012 it had reached a record of EUR 2.7 billion). However, it should be noted that 'only' 73 per cent of Hungary's overall agricultural trade balance is generated by Hungary's agricultural trade with the EU.

A further presumption concerns the relational trade diversion effect of EU accession in intra-EU agricultural trade from the EU-15 towards the EU-12. This has also been justified: while in 2003 71 per cent of Hungary's intra-EU agricultural exports were directed to the EU-15 (and 29 per cent to the EU-12), by 2013 the share of the EU-12 had increased to 39 per cent. As in the case of imports the same share had been reached by 2013, we may state that almost 40 per cent of Hungary's intra-EU agricultural trade is conducted with the newly acceded countries. Does it mean a 'back to the CEFTA' (Central European Free Trade Agreement, signed in December 1992) with a detour?

[2] Between 2003 and 2011 Hungary's agricultural exports to Slovakia increased from EUR 54 million to a record EUR 938 million (i.e. more than 17(!) times). Fourteen per cent of Hungary's EU exports consisted of sugar and another 14 per cent of cereals.

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TÓTH József* and GÁL Péter*

Is the New Wine World more efficient? Factors influencing technical efficiency of wine production

We have experienced the emergence of New World wine producing countries (the Americas, South Africa and Oceania) in the last 10-15 years as they have successfully increased their market share in European markets. In this paper we perform a two stage model on a panel of most of the major wine producing countries over the period 1995-2007. We estimate a Cobb-Douglas production function and technical inefficiency using stochastic frontier analysis. We show that there is a significant difference between the major Old and New World countries in terms of technical efficiency in favour of the latter group. The analysis supports our hypothesis that the more efficient functioning of the sector in the New Wine World can be one of the drivers of their success. Moreover, inefficiency is related to some macroeconomic factors such as the development of the financial system, the quality of human capital and per capita wine consumption.

Keywords: efficiency gap, wine production, New World, Old World, macroeconomic drivers

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Introduction

Wine making has a long tradition in Europe. However the first decade of the current Millennium saw the rise of new wine producing countries conquering the traditional markets of European wine producers. This group of countries, the so-called 'New Wine World', consists of those where wine production was not present before the arrival of Europeans, i.e. the Americas, South Africa and Oceania. In some of these countries, vineyards and wine making have only been present for a few decades.

The increase of the wine exports of these countries has considerably exceeded[1] that of the traditional wine producers (the so-called 'Old Wine World'). According to International Organisation of Vine and Wine (OIV) data, exports in 2009 as a percentage of 1996 for five of the largest wine producing New Wine World countries were as follows: United States: 300; Argentina: 144; Australia: 665; Chile: 538 and South Africa: 556. By contrast, the figures for the three major Old Wine World producing countries were: Italy: 123; France: 109 and Spain: 233. Amongst the Old Wine World producing countries the best performances over this period were recorded by the relatively small producers Austria (353) and Georgia (274).

This success of the 'New Wine World' countries is a widely discussed phenomenon among the stakeholders in the wine sector. Anderson (2005) gives a detailed and plausible overview of the success of these countries. However the economic causes are seldom analysed quantitatively in a greater depth. In this paper we use a macroeconomic approach to explain the recent emergence of the New Wine World by showing the relationship between some instrumental variables and the growth of wine exports via technical efficiency.

Technical efficiency in the wine sector

In general, estimations and investigations of technical efficiency in the wine sector use models based on micro data. On the one hand, this raises the level of precision, but on the other it evidently limits the scope of the results. Using stochastic frontier analysis, Conradie *et al*. (2006) estimated the technical efficiency of two panels of wine grape growers (and another of organic table grape growers) in South Africa. They showed that efficiency is affected by labour quality, age and education of the farmer, location, the percentage of non-bearing vines and expenditure on electricity for irrigation.

Barros and Santos (2007) compared the efficiency of private companies and cooperatives in Portugal via data envelopment analysis. They concluded that "Portuguese wine cooperatives, on average, are more efficient than their private counterparts" (Barros and Santos, 2007, p.109). Carvalho *et al*. (2008) studied a sample of Portuguese vine growers of the Alentejo region that sell their grapes to cooperative wineries. The research was conducted over the period 2000-2005 and its aim was to estimate their technical efficiency using the stochastic production frontier method. Their results showed that "technical efficiency was time variant, there was room to improve technical efficiency of vineyard farms and technical efficiency increased with size, family entrepreneurship and farm profitability" (Carvalho *et al*., 2008, p.5). However their final conclusion was that the better performance of wine cooperatives could lead to even more improvement of the grape producers' situation.

Moriera *et al*. (2011) used stochastic frontier analysis to estimate technical efficiency of Chilean wine grape growers via a sample of 38 suppliers of an association of high quality wineries. They demonstrated a strong relationship between certain vineyard training systems and the yields per hectare. The estimated returns to scale were quasi-constant. Using a translog stochastic production function Coelli and Sanders (2013) estimated the technical efficiency of wine grape growers in the Murray-Darling Basin in Australia on an unbalanced panel including 134 producers over four years. Their study revealed a significant potential improvement of efficiency and some evidence of increasing returns to scale.

In addition to the studies presented above, we can find more macro-focused analyses. Aparicio *et al*. (2013) investigated the Spanish wineries that produce wines with PDO[2].

[1] The difference is significant at a level of 4 per cent

[2] PDO: protected designation of origin. Wines with PDO bear the name of their place of origin (which is actually *the* PDO) and show quality and characteristics essentially or exclusively due to their place of origin.

They estimated revenue inefficiency decomposed to technical and allocative inefficiencies using data envelopment analysis. Their results showed that revenue efficiency was the most in the case of PDOs with specific wine products serving niche markets and without clear competition.

The paper is structured as follows. Next we elaborate our modelling framework, including the macroeconomic reasoning behind it, then we present and explain our results. In the last section we conclude.

Methodology

We used a two stage investigation procedure to estimate the technical inefficiency and to show its relationship to certain instrumental factors. Owing to the specification of our stochastic frontier model, inefficiency was estimated instead of efficiency. Given the macroeconomic focus of our study and the use of proxies, our paper concentrates on macro-level relationships.

We used a panel of 16 major wine producing countries over a period of 13 years (1995-2007), including 11 countries of the Old and 5 of the New Wine World. We have considered a country to be a major wine producer if its average annual wine production was more than 1 million hectolitres during the first decade of the current Millennium (Table 1). Owing to lack of data, a further seven countries were excluded from the sample.

Table 1: Main wine producing countries of the world and average annual wine production, 2000-2009.

Old Wine World		New Wine World	
Country	**Production (000 hl)**	**Country**	**Production (000 hl)**
Austria	2,522	Argentina	14,223
Bulgaria*	2,012	Australia	11,889
Croatia*	1,546	Brazil*	3,184
France	50,386	Chile	7,407
Georgia*	1,108	New Zealand	1,170
Germany	9,438	Rep. S. Africa*	8,648
Greece	3,688	USA	20,411
Hungary	3,762		
Italy	47,860		
Rep. Moldova*	2,106		
Portugal	6,844		
Romania	5,250		
Russia	5,258		
Spain	37,335		
Switzerland	1,092		
Ukraine*	2,253		

* Excluded from the sample used in this study owing to lack of data
Source: http://www.oiv.int/oiv/info/frstatoivextracts2

Table 2: Descriptive statistics for 16 wine producing countries over the 13 year period 1995-2007 (i.e. N=208).

Variable	Mean	Std. Dev.	Min	Max
Openness to international trade	58.35	22.98	20.00	169.94
Development of the financial system	86.62	45.39	10.96	182.14
Quality of human capital	9.97	1.61	6.45	13.22
Wine consumption	28.27	16.07	0.84	63.13
Old Wine World (dummy)	0.69	0.46	0.00	1.00
Inefficiency term	0.18	0.11	0.03	0.79

Unless specified below, the sources of data were as follows: area of vineyards, wine production, exports and imports: StatOIV extracts (http://www.oiv.int/oiv/info/frstatoivextracts2); agricultural capital stock: FAOSTAT (http://faostat3.fao.org/faostat-gateway/go/to/download/I/CS/E); all other indicators: World Bank database (http://databank.worldbank.org/data/databases.aspx).

Estimating inefficiency

In the first stage of our model we estimated the inefficiency. We applied panel data stochastic frontier analysis based on a Cobb-Douglas production function by regressing wine production against three inputs: land (area of vineyards), capital (agricultural capital stock) and labour force (employment in agriculture). We used agricultural machinery and agricultural employment as proxies for capital stock and employment in the wine sector as more detailed data were not available. Essentially, we followed a process developed by Belotti *et al*. (2012). Assuming a half normal distribution for the inefficiency term, our stochastic frontier model showed robust results. The estimation of the inefficiency terms via $E(u|\varepsilon)$ verified our assumption on the nature of half normal scattering.

Macroeconomic factors influencing the efficiency

In the second stage, we regressed the estimated inefficiency term against some instrumental variables describing macro-economic elements that we assumed would affect it. Our choice of variables was based mostly upon Bos *et al*. (2010), who applied a latent class model on the production function of 77 countries. They identified four factors that are assumed to be growth determinants by affecting factor accumulation, efficiency change and technical change. In our model we assumed that these variables are related with technical inefficiency and regressed them against the estimated inefficiency term. However, owing to lack of data we did not investigate the role of the share of the primary sector. In addition, we introduced two new factors that are specific to the wine sector: per capita wine consumption and belonging either to the Old or the New Wine World. Table 2 shows the descriptive statistics of these variables.

Openness to international trade

One can assume that countries that are more open to international trade are more competitive and thus more efficient from the technical point of view as well. Previous studies of micro data confirm the positive relationship between technical efficiency and openness to international trade. Tybout *et al*. (1991) considered the example of the Chilean industrial sector and found that technical efficiency improved significantly following a drastic trade liberalisation in the 1970s. Gökçekuş (1995) came to the same conclusion following the study of the Turkish rubber industry in a period of a crucial change in the country's trade policy. The study of the Peruvian trade policy reforms and the plant level efficiency by Alam and Morrison (2000) confirmed these findings.

From a panel of Bangladesh manufacturing sector Hossain and Karunaratne (2004) found that involvement in competition with international supply (both export orientation

and import substitution) increased technical efficiency. Sotnikov (1998) estimated a 20 per cent decrease of technical inefficiency on average on a panel of 75 Russian agricultural regions. The results showed that efficiency gains were larger in regions with more liberalised trade while the effect of technological change was negligible.

Bos *et al*. (2010) argued that on the macro level this factor has a role in increasing allocative efficiency, contributes to adaptation to international market trends and the implementation of foreign knowledge and technology. Moreover, Edwards (1998) demonstrated that more open economies show faster total factor productivity growth. Ben-David and Loewy (1998) proved that trade liberalisation helped to close the income gap between countries and contributed to growth, while Frankel and Romer (1999) found that income correlates positively with trade.

Openness is measured as the sum of exports and imports compared to the Gross Domestic Product (GDP). Data were retrieved from the World Bank database.

Development of the financial system

The basic assumption is that the more developed the financial system is, the more efficient the allocation and use of capital will be. Bos *et al*. (2010) based this assumption on two factors: (a) the evaluation of investment decisions and (b) the increase of risk sharing (thus allowing the investment in riskier yet more productive technologies). Theory suggests that a more efficient allocation of capital presumes an efficient use of this input and thus results in higher level of technical efficiency.

This factor is measured by the amount of deposits held in the financial system compared to the GDP, and these data were retrieved from the database of Beck *et al*. (2009).

Human capital

We assume that the quality of human capital has a positive effect on technical efficiency. Briefly, the more educated people are, the better they will perform. This factor sums the potential effectiveness and learning abilities of the workforce of a given population. While Bos *et al*. (2010) advocates that human capital may be directly related to efficiency on a macro level, some other studies from the literature of agricultural economics confirm this using micro data. Bos *et al*. (2010) stipulates that human capital "can affect efficiency through absorption of existing advance technologies" (p.116). This effect is fostered by the influence of human capital on innovation, managerial decisions and the use of inputs.

Huffman (1977) showed that, for a sample of US Corn Belt farmers, investment in education improved allocative efficiency. Furthermore, Mathijs and Vranken (2001) estimated technical efficiency using data envelopment analysis and found that it was positively related to human capital (age and education). Davidsson and Honig (2003) show that some aspects of human capital have a positive effect on firm performance on a sample of newly established enterprises. An additional set of studies found a positive effect of human capital on total factor productivity (Engelbrecht, 1997; Maudos *et al*., 1999; Miller and Upadhyay, 2000; Del Barrio-Castro *et al*., 2002).

The quality of human capital is measured by the average years of education of the population that is at least 25 years old. Data were retrieved from the World Bank database. As data were only available for every fifth year, we estimated the missing values by interpolation, assuming that the change of the indicator was linear.

The tradition of wine

The tradition of wine is measured by the per capita consumption of wine. We assume that the permanent presence of wine in a country's culture increases the technical efficiency. Wine can only be made of grapes and grape production is only possible in a geographically limited zone. Traditionally, wine has mostly been consumed relatively close to its place of origin. In addition, the place of origin may have a significant effect on wine quality. All in all, an important portion of the vine production and wine-making know-how can inevitably be considered a "knowledge of the particular circumstances of time and place" (Hayek, 1945, p.521) that is spread mainly in traditional wine regions. Moreover, if the consumption of wine is high, so is the supply. Thus, competition is high, which results in low marginal costs. Operating in a highly competitive context presumes higher efficiency.

Evidently, the tradition of wine is higher in *traditional* wine producing countries. As a result the given variable can incorporate the factors that improve the competitiveness of Old Wine World countries.

Belonging to the Old or New Wine World

Our main hypothesis is that the New Wine World countries are more efficient than the Old Wine World countries. The belonging to one of the wine worlds is represented by a dummy variable in our models.

Results

The production function

The estimated parameters of the Cobb-Douglas production function listed in Table 3 illustrate the percentage change in the quantity of wine produced (independent variable) that would result if the independent variable were to change by 1 per cent. The quantity of wine production is significantly and positively related to the area of vineyards. However, the relationship between the production and the two other inputs (capital stock and employment) is negative. We think that these inputs were probably not used in an efficient way.

Table 3: Estimated parameters of the Cobb-Douglas production function (respective p-values are indicated in parentheses). Dependent variable: log wine production.

Vineyard area (log)	0.7271 (0.000)
Agricultural employment (log)	-0.1808 (0.036)
Net agricultural capital stock (log)	-0.6702 (0.000)

Factors affecting inefficiency

In the second step we regressed the previously estimated inefficiency terms against the instrumental variables described above (Table 4). We applied random effect (RE) and fixed effect (FE) panel regression estimations. For both type of models we have three variants: (1) all instruments are taken into consideration; (2) given that *openness to international trade* was proved not to be significant, we excluded it in the second model; and (3) because of the possible multicollinearity in the third model we did not include the *human capital* variable. Consequently we have six permutations.

The quality of human capital was ignored in model 3 due to the relatively high level of its correlation with per capita wine consumption (r = -0.6805) but the variance inflation factors (VIF) and the coefficients of these models suggested that regression coefficients are not influenced by multicollinearity to a significant extent. We assume that the reason for the correlation of these variables may be related to their actual trends: while school attainment was increasing, per capita wine consumption showed a constant decrease during the period in question (in the countries observed).

The results show that the estimated inefficiency term is significantly related to these factors – the sole exception is the openness to international trade. Additionally, we demonstrated that the direction of the relationship is as expected in all cases. The relatively low values of the coefficients are due to the range of the dependent variable.

More importantly, the Old Wine World dummy is significant (and positive) in all relevant models (dummy variables – due to model design – are omitted from fixed-effects models per definition), therefore a significant difference between the technical efficiency of Old and New Wine World countries is shown. As the mean value of the inefficiency term is 0.1766, the coefficients of the Old Wine World dummy ranging between 0.0343 and 0.0370 could represent a notable difference. This supports our hypothesis that the emergence of the New Wine World countries might be due to their higher production efficiency. However, wine traditions may decrease this difference.

Finally, the values of the different R^2 indicators suggest that our models tend to explain differences between the countries involved better rather than their internal changes.

Concluding remarks and limitation of validity

Our study focused on macroeconomic elements that affect the technical efficiency of the wine sector in the major producing countries. We learned from our analysis that the more developed financial system improves the technical efficiency. This is very much in line with the earlier empirical finding of Bos *et al*., 2010, who claimed that effective financial systems via optimal allocation of assets increase efficiency.

The literature suggests that more educated people can absorb and apply new knowledge and more complicated technologies and thus increase the technical efficiency of production. Our results underline the importance and significance of this factor. The tradition of wine – measured by wine consumption, which on average is more than two times higher in the Old Wine World countries – helps in bridging the efficiency gap between the groups.

The openness to international trade was not significant in our analysis. As previous literature suggests, firms operate at increased technical efficiency in countries that are open to international trade. Involving indices more specific to the wine sector may prove to be useful.

However, due to the partial lack of specific data we were forced to use some proxies when estimating the wine production function. In addition we had to focus on data about the *volume* of wine production instead of the *value*. These conditions limit the scope of our results; however our findings were not in contradiction with the previous empirical experiences.

This paper did not take into account the possible role of agricultural policies on inefficiency. However, in the Old Wine World wine policies are often claimed to be responsible for the decreasing competitiveness of the sector (in particular in the European Union).

Table 4: Estimated parameters of six models of factors affecting technical inefficiency (*p-values* in parenthesis).

Model type	RE-1	RE-2	RE-3	FE-1	FE-2	FE-3
Openness to international trade	-0.000118 (0.755)			0.000038 (0.964)		
Development of the financial system	-0.000315 (0.094)	-0.000266 (0.076)	-0.003905 (0.032)	-0.002552 (0.001)	-0.002548 (0.001)	-0.003259 (0.000)
Quality of human capital	-0.012645 (0.057)	-0.012729 (0.054)		-0.037970 (0.105)	-0.037414 (0.059)	
Wine consumption	-0.002207 (0.003)	-0.002186 (0.003)	-0.001295 (0.027)	-0.013977 (0.000)	-0.013985 (0.000)	-0.013299 (0.000)
Old Wine World (dummy)	0.036881 (0.084)	0.034296 (0.080)	0.036983 (0.060)	omitted	omitted	omitted
Constant	0.373845 (0.000)	0.369991 (0.000)	0.221572 (0.000)	1.169103 (0.000)	1.16571 (0.000)	0.834798 (0.000)
R^2 within	0.1551	0.1630	0.1591	0.1779	0.1779	0.1622
R^2 between	0.4689	0.4825	0.4960	0.3579	0.3564	0.3325
R^2 overall	0.0760	0.0755	0.0587	0.0491	0.0489	0.0403

The dependent variable is the estimated inefficiency term
Model types: RE: random effect and FE: fixed effect panel regression estimation; 1: all instruments taken into consideration; 2: openness to international trade excluded; 3 human capital excluded

As the wine sectors usually have a relatively small share even in the agriculture of biggest wine producing countries it is hard to collect data on the use of inputs. Moreover, the high level of product differentiation makes estimations on prices more difficult and less reliable in the wine sector. Thus, one faces substantial difficulties when trying to take the value into account instead of the volume.

We observed a high level of correlation between the quality of human capital and the per capita wine consumption (which, however, does not seem to influence regression coefficients). We assume that this is only the result of the actual set of countries investigated and would disappear if the panel was changed. Therefore the inclusion of more countries should improve our results for this reason as well.

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Romanian farm support: has European Union membership made a difference?

This paper provides an insight into the major policy measures that influenced Romanian agriculture before and after the country's accession to the European Union (EU) in January 2007. It analyses the volume and composition of national and EU agricultural financial support between 2002 and 2012, and assesses how much has been transferred between agricultural farm support (Pillar 1) and rural development (Pillar 2). The findings show that, as membership drew near, Romania increased its efforts to provide farm support. The level of support has continued to rise (in nominal terms) year on year, from EUR 242 million in 2002 to almost EUR 600 million in 2005. By 2007, over EUR 1 billion (10 per cent of the Gross Value Added of the sector) was allocated to agriculture. Moreover, preparation for accession meant also significant changes in the structure of subsidies. This was redesigned so to emulate the Common Agricultural Policy, shifting the emphasis of support on to direct farm income. Overall, Romanian agriculture benefited from EUR 16.4 billion in subsidies between 2002 and 2012, of which almost half (EUR 7.8 billion) came from the EU. With accession, the share of EU financial support has increased, particularly in the form of direct payments, whilst the national contribution has decreased. However, the latter remains much higher than prior to accession. Of EUR 13.6 billion allocated for agriculture following EU accession (2007-2012), 46 per cent was funded from the national budget. Overall, there is a rather limited volume of investment subsidies, as compared to production and income support, which may partially explain the low economic performance of the sector. EU membership has not necessarily led to farm consolidation and a gradual disappearance of small-scale (semi-subsistence) farms, which remain a dominant characteristic of Romanian agriculture.

Keywords: Romania, agricultural policies, farm support, European funds, Common Agricultural Policy

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Introduction

Romania became a member of the European Union (EU) on 1 January 2007 following a difficult and painful transition process to a market economy. Begun in the early 1990s, this was characterised by a slow pace, resistance to structural changes, inconsistent reforms and *ad-hoc* political decisions. Economic and financial instability prevailed through much of the 1990s, with a series of major economic crises. Following reform packages involving the International Monetary Fund and World Bank, the economy began to recover by early 2000, helped by politicians being forced to focus on EU accession. While, prior to 1990, agriculture was considered the poor relation of the economy, with the communist regime focusing on industrialisation, transition to a market economy has enhanced the role played by the agricultural sector. Its contribution to total Gross Domestic Product (GDP), particularly in the first decade of transition, was significant. National food security remained crucial and was often the explicit objective of Romania's agricultural policies, mainly achieved through a relatively high level of protection of its domestic production. The official opening of the negotiations for EU accession in May 2000 represented a crucial step in reshaping Romanian agricultural policy. Since then it has been geared to emulating the Common Agricultural Policy (CAP) (Hubbard and Hubbard, 2008; Hubbard *et al.,* 2014).

There is the perception that EU membership has shifted the burden of agricultural support to Brussels, but little if any research has been carried out for Romania. Indeed, overall, as an EU Member State, Romania receives more from the EU than it contributes. However, recent EU figures show that the country has difficulties in spending the money allocated from the EU budget (e.g. 21 per cent of the total in July 2013) due to a lack of administrative capacity to administer and promote such funding (EC, 2014). The largest share of the money that Romania receives from the EU budget goes to its agriculture and rural development, e.g. 62 per cent of total EU funding. However, even this sector has a slow rate of absorption, particularly when it comes to Pillar 2-type measures such as investment (Dobrescu, 2013).

This paper explores this perception by providing an insight into the major support policy measures that influenced the Romanian agricultural sector before and after the country's accession to the EU. Specifically it focuses on an analysis of the volume and composition of national and EU CAP financial support between 2002 and 2012. It also attempts to assess how much has been transferred between agricultural farm support (Pillar 1) and rural development measures (Pillar 2) following EU accession. The distinction between direct support for agriculture (mainly through Pillar 1) and the wider rural economy (Pillar 2) is significant for Romania where rural development issues lacked national prominence before the opening of EU negotiations and the adoption of SAPARD (Special Accession Programme for Agriculture and Rural Development) (Gorton *et al.*, 2009). The paper also comments on how this support is reflected in the recent economic performance and farm structure of the Romanian agricultural sector.

Methodology

To achieve the study's objectives, official data were collected from the Romanian Ministry of Agriculture, i.e. annual national agricultural budgets for 2002-2012 and the National Rural Development Programme (NRDP) for 2007-2013. Data were divided into two major groups: (a) national con-

tribution before (2002-2006) and after accession (2007-2012) and (b) EU contribution before and after accession. Data for SAPARD, one of the three pre-accession financial instruments designed to support applicant countries from Central and Eastern Europe in their preparation for EU accession, were also collected. Although SAPARD was officially included in the 2000-2006 EU financial framework, the expenses for Romania were actually incurred between 2003 and 2009. Thus, they cover both the periods before and after accession. Both SAPARD and NRDP comprise measures which are co-financed, with the EU contributing up to 80 per cent of total eligible public expenditure.

The national payments (before and after accession) were grouped into six categories which encompass the major forms of agricultural support (across both Pillar 1 and Pillar 2):

- *Income subsidies,* in the form of agricultural vouchers and/or cash transfers, provided to small and large-scale holdings, as well as the amounts received as 'life annuity'[1]. After EU accession, this category included the complementary national direct payments (CNDPs) for crop and livestock production as its major component. The *de minimis* (state) aid provided in the autumn of 2008, following the floods which affected most of the country, has also been included here as a form of direct aid for farmers;
- *Input subsidies*, such as those provided to producers of selected seeds, the National Authority of Land Reclamation (state agency) and the water users' associations (irrigation subsidies) or subsidies for diesel oil (in the form of an excise tax reduction or as subsidy *per se*);
- *Commodity/product subsidies* provided under the crop and livestock production support programmes (for glasshouse vegetables, vegetables and fruits for processing, pork, poultry and milk) but also in the form of payment to producers of raw agricultural products (e.g. pig, milk and poultry) who sold their products on the market;
- *Investment subsidies* for agricultural and irrigation equipment, improving livestock production premises and dairy farms modernisation;
- *Other subsidies*, such as access to credit (for production) at low interest rates, compensation for natural disasters (the 2007 drought and 2008 floods), crop insurance premium and expenses for waste neutralisation (included after EU accession);
- *Co-financing to the EU Programmes* (SAPARD and NRDP).

The subsidies provided by the EU include:

- Pillar 1 support measures, mainly in the form of direct payments provided under the Single Area Payment Scheme (SAPS), and other support (e.g. market interventions and other direct aid) following accession to the EU;
- Pillar 2 support for SAPARD (before and after accession) and the NRDP 2007-2013 (after EU accession).

[1] The Agricultural Life Annuity Scheme is a national measure introduced in 2005 to encourage farmers over 62 years of age, who owned up to ten hectares of agricultural land, to sell or lease out their land for a fixed sum of money (e.g. EUR 100 for selling the land or EUR 50 for leasing out) guaranteed by the state for the rest of their life.

Given the complexity of the data and the difficulty in separating the amounts of SAPARD and the NRDP funds that were actually allocated directly to farmers and how much to the wider rural economy, for the purpose of this paper SAPARD and NRDP payments are labelled as Pillar 2 (rural development) support measures. A summary of these major types of subsidy by sources is presented in Table 1.

Table 1: Types of subsidy by source in Romania before (2002-2006) and after (2007-2012) accession to the European Union.

Source	Before accession	After accession
National payments	Income subsidies, commodity subsidies, input subsidies, investment subsidies and other subsidies for farmers.	Income subsidies (including complementary national direct payments and the 2008 *de minimis* aid), commodity subsidies, input subsidies, investment subsidies and other subsidies for farmers.
	SAPARD co-financing.	SAPARD co-financing, National Rural Development Programme (NRDP) co-financing.
EU funds		
- Pillar 1		Direct payments (SAPS), market interventions and other direct aid.
- Pillar 2	SAPARD	SAPARD, NRDP.

Source: authors' construction

Results

Volume and structure of national financial support, 2002-2012

There is little doubt that the official opening of the negotiations for accession to the EU, in May 2000, significantly influenced the development of Romanian agricultural policy. Accession to the EU meant not only meeting the "commitments to democracy and a market economy" but also a "successful adjustment of administrative structures to ensure the harmonious operation of EU policies" (Gorton *et al*., 2011, pp.1306-1307). This was particularly important in the context of the adoption of the CAP. Hence, in preparation for accession, the Romanian government doubled the financial support for agriculture. By 2005, some EUR 575 million of public money were allocated to this sector as compared to EUR 242 million in 2002 (Figure 1).

Moreover, mechanisms somewhat analogous to the CAP in the form of product direct payments were also adopted. These were geared to support particularly the development of commercial farms, encourage agricultural production and stimulate market sales. Started in 2001 in the form of direct payments for crops, these subsidies were extended in 2002 to livestock products. However, to benefit from this type of support agricultural producers had to meet a set of conditions. For example, a minimum farm size was required, e.g. 110 ha or 50 ha for crop farms in the plain or hill areas; 2 ha for vegetable farms; 15 head for milk farms; 50 head for cattle farms; 100 head for pig farms; and 5,000 for poultry farms (Article 5 of Romanian Government, 2001). In addition, the use of appropriate technologies, fertilisers, certified seeds and mechanical operations was compulsory. Small individual farmers (par-

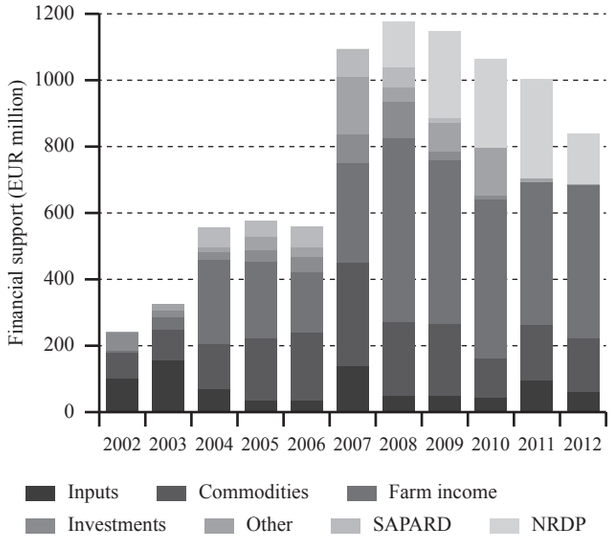

Figure 1: Volume and structure of national financial support by type of subsidies before and after European Union accession, Romania, 2002-2012 (EUR million).

Figures are in nominal terms
Source: authors' calculation based on national budgets, Ministry of Agriculture

ticularly livestock producers) were also encouraged to join together in order to have access to subsidies. The introduction of support measures that emulated the CAP meant also a change in the structure of the funding allocation. Whereas in 2002 income subsidies accounted for 3 per cent of total domestic support, by 2004 their share had increased to 46 per cent. In contrast, support for inputs and investments dropped from 41 per cent and 22 per cent in 2002, to 13 per cent and 4.4 per cent in 2004, respectively. The share of input subsidies continued to fall and by 2006 they accounted for only 6 per cent. Commodity/product support has also increased from EUR 78 million in 2002 to EUR 206 million in 2006.

As EU accession drew near, more funds were allocated to support the sector and by 2007 over EUR 1 billion (representing 10 per cent of the Gross Value Added (GVA) of the sector) was allocated to agriculture. This was distributed as follows: 13 per cent for inputs, 29 per cent for commodity support, 27 per cent for farm income support, 9 per cent for investments and the rest (16 per cent) for other subsidies (Figure 1). Additionally, 8 per cent was allocated for co-financing the SAPARD Programme.

EU membership has also brought a significant change in the structure of national funding. Clearly, between 2007 and 2012, income and commodity support are the predominant measures. By 2012, three quarters of the total national funding for agriculture was allocated for income support (55 per cent), particularly in the form of CNDPs, and commodity support measures (19 per cent). The complementary national direct payments allow for the increase in the direct support level following the phase-in of EU direct payments (EC, undated). As with most Member States that joined the EU in 2004 and 2007, the Romanian CNDPs comprise support for both livestock and crop sectors. CNDPs for arable crops are decoupled payments granted to top up the EU direct payments. In 2012 the value was around EUR 30 per ha as compared to EUR 45 per ha in 2007. Sugar beet, tobacco, flax seeds and hemp, and hops are also supported through CNDPs. Within the livestock sector, CNDPs were offered (as decoupled payments) to support the cattle sector. The value of the payment is around EUR 100 per head/year, based on the number of animals older than six months at 31 December 2008. Sheep and goats sectors are also eligible for CNDPs, but as coupled payments. The value of the payment is around EUR 9 per head and based on the number of animals over one year old in March of the year of application. Until the end of the previous financial framework some positive effects (reflected in an increase in the number of animals and production) of the application of CNDPs are seen in the sheep and goat, sugar beet and crop sectors (personal communication with an expert from the Romanian Ministry of Agriculture).

In contrast, the share of investment subsidies within the total national budget has declined dramatically. This may be explained by the fact that this type of subsidy is supposed to be co-financed, which makes application for such funds more difficult. Indeed, after having to implement SAPARD-type measures and Pillar 2 measures following the adoption of the CAP, the Romanian government has started to allocate more funds for rural development. However, their contribution to the national budget varies considerably from year to year, for example from 6 per cent in 2008, 30 per cent in 2011 and 18 per cent in 2012. Overall, total national support for agriculture accounted for EUR 8.1 billion between 2002 and 2012, of which almost two thirds (65 per cent) went directly to farmers in the form of income (direct payments) and commodity support.

Volume and structure of EU funds before and after EU accession

Figure 2 shows the volume and structure of EU financial contribution to Romanian agriculture before (2002-2006) and after (2007-2012) accession. In preparation for accession, the EU assisted Romania to undertake structural changes and implement the EU *acquis communautaire* through specific measures financed under SAPARD. However, due to delays in setting up the appropriate institutions (e.g. the SAPARD paying agency) to implement such CAP-type measures, the programme did not start to function until 2003, when Romania received EUR 4.5 million. The support continued to increase and by 2007, funding for SAPARD accounted for just over EUR 260 million.

Following EU accession, Romanian farmers were eligible for direct payments under Pillar 1. These were paid from 2008. As with most Member States that joined the EU in 2004 and 2007, Romania agreed to apply the SAPS, a simplified version of the Single Payment Scheme, that was introduced by the 2003 CAP reform for 'established' EU Member States. This was mainly due to the fact "that none of these states handled CAP-type direct payments prior to accession, as well as for avoiding the requirements of a … sophisticated administration" [i.e. insufficient institutional background to deal with the EU Integrated Administration and Control System] (Cionga *et al*., 2009, p.9).

Romania set its minimum threshold for farm eligibility at one hectare (made up of parcels of 0.3 ha), both for farm efficiency considerations as well as for avoiding additional administrative burdens given the very large number of very

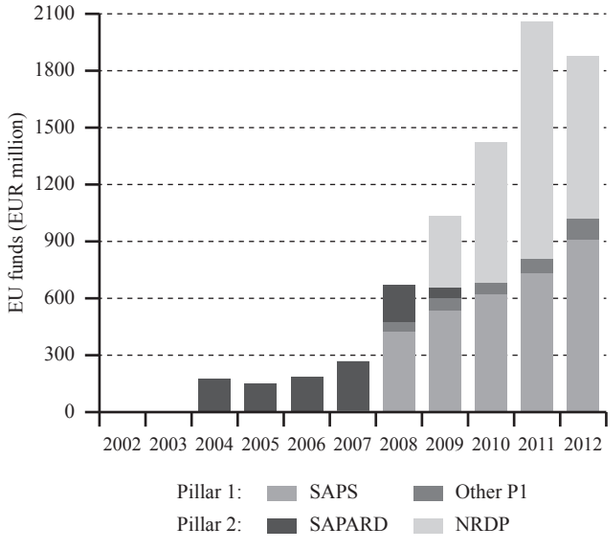

Figure 2: Volume and structure of European Union funds before and after EU accession, Romania, 2002-2012 (EUR million).

SAPS: Single Area Payment Scheme (Pillar 1); Other P1: other Pillar 1 payments including market measures; NRDP: National Rural Development Programme (Axes 1-4)
Figures are in nominal terms
Source: authors' calculations based on national budgets, Romanian Ministry of Agriculture

small farms. The total eligible area under SAPS is 8.7 million hectares. For Romania the direct payments were phased in, starting at only 25 per cent of the EU level. In 2007, a Romanian farmer received EUR 50 per hectare. By 2012, this increased to EUR 120 per hectare, and will reach the full level of payment of almost EUR 200 per hectare in 2020. The post-2013 CAP reform allows Romania to maintain its SAPS until 2020. The number of applications for direct payments has, however, continued to change. Thus, in 2008, the first year of eligibility for EU direct payment, the total number of applicants was 1.2 million for an area of 9.3 million hectares, while in 2012 the number of applicants was 1 million for a total area of 9.4 million hectares. However, the distribution of direct support is very uneven amongst the eligible farms, with the majority (90 per cent) of beneficiaries receiving less than EUR 500 per year. This contrasts with the top one per cent (the large-scale farms) which, overall, benefit from more than half of the total amount allocated for EU direct payments (Alexandri and Luca, 2012). Following the initial importance of SAPS, over time Romania has been able to attract more EU funds for rural development (Figure 2). However, direct payments provided through SAPS remain the main source of income for the majority of Romanian farmers, as attracting money from Pillar 2 is difficult due to the requirement for co-financing. Out of EUR 7.3 million provided by the EU almost half (44 per cent) represented direct payments.

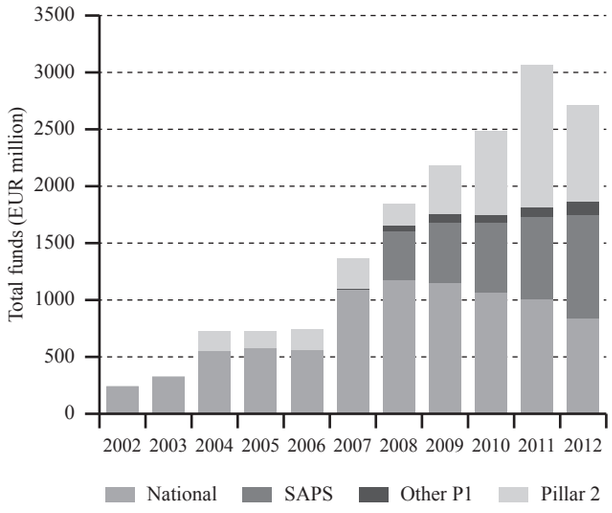

Figure 3: Total EU and national financial support, Romania, 2007-2012, (EUR million).

For key see Figure 2
Figures are in nominal terms
Source: authors' calculations based on national budgets, Romanian Ministry of Agriculture

Volume and structure of total EU and national financial support

Overall, between 2002 and 2012, Romanian agriculture benefited from EUR 16.4 billion, of which almost half (EUR 7.8 billion) was funded by the EU. Figure 3 shows the evolution of total financial support between 2002 and 2012. In 2002 the Romanian agricultural sector received EUR 242 million (domestic support only) but by 2012 total financial support from both national and EU funds had risen to almost EUR 3 billion.

With accession, as expected (in accordance with the CAP and Romania's Accession Treaty) the share of payments from the EU has continued to rise, while the contribution from national funds has decreased year by year. Nonetheless, the national contribution has remained substantial (in nominal terms) and significantly higher than the levels prior to accession. Out of EUR 13.6 billion allocated for agriculture between 2007 and 2012, almost half (46 per cent) came from the national budget.

Overall, between 2007 and 2012 approximately EUR 4 billion of total public support (national and EU) were allocated for rural development, of which only EUR 9 million was for the Leader programme (Figure 4). The three other

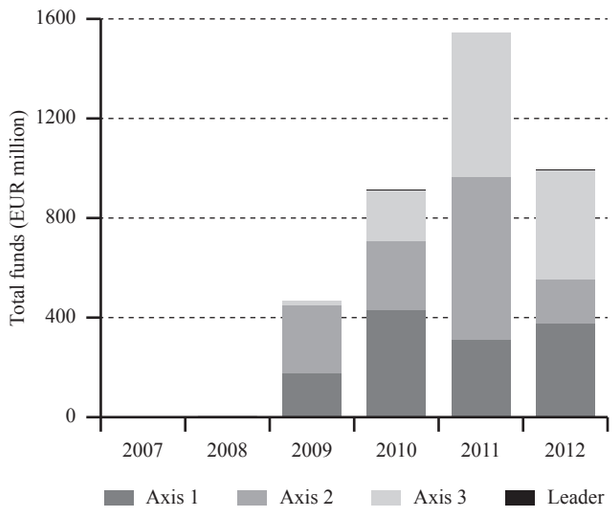

Figure 4: National and European Union funds distributed by Pillar 2 Axes, Romania, 2007-2012 (EUR million).

Source: own construction based on NRDP data for 2007-2013

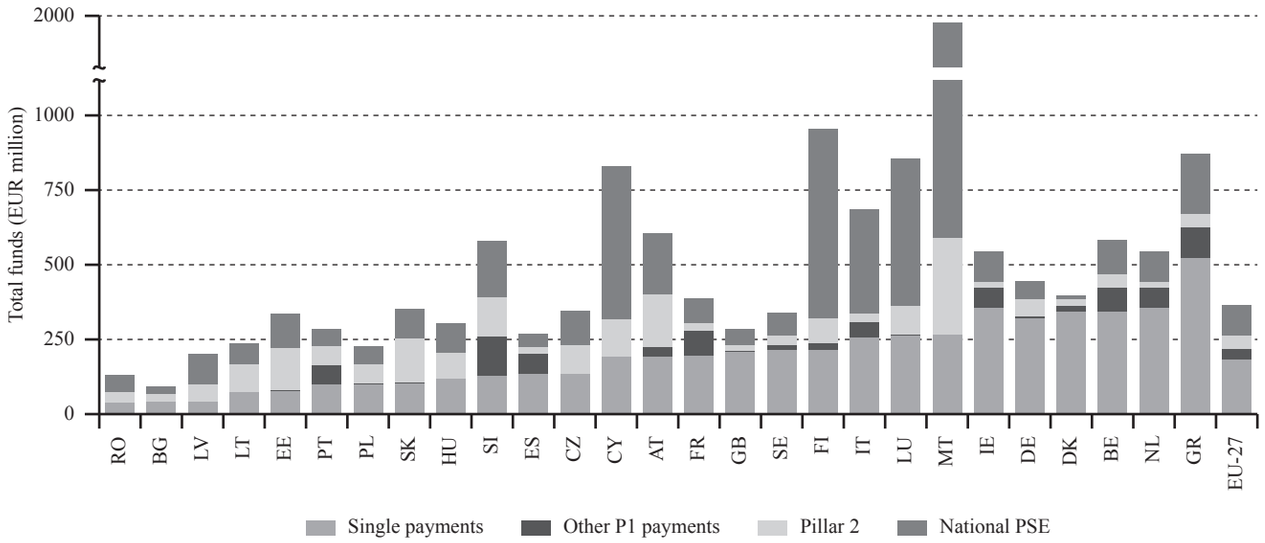

Figure 5: Payments per hectare from European Union and national funds by EU Member State, 2009.

Single payments: Single Payment Scheme and Single Area Payments Scheme; Other P1 payments: including market measures, commodity-specific payments and funds from modulation not applying to the first EUR 5000 per farm; National PSE: national payments to producers including CNDPs and national co-financing of RDP measures
Source: redrawn from OECD (2011)

axes obtained roughly equal shares, i.e. 33 per cent for Axis 1, 35.3 per cent for Axis 2 and 31.6 per cent for Axis 3. However, there is substantial variation on a year to year basis.

The most recent available data for payments per hectare, provided country by country for all EU-27 Member States by the OECD for 2009 (OECD, 2011), put the Romanian figures into perspective (Figure 5). This comparison of the financial support (both from the EU and national) received shows a clear difference between the 'new' and 'established' Member States, with farmers from the former not only disadvantaged by the different levels of allocation from EU funds (e.g. direct payments at EUR 36 per ha for a Romanian farmer and EUR 354 per ha for a Dutch farmer) but also by the level of support provided under national programmes (e.g. EUR 27 per ha for Bulgaria and EUR 350 per ha for Italy). This has to be approved by the European Commission (EC) as it is considered state aid.

Discussion

Changes in the volume and structure of financial support provided to agriculture and rural development, whether national or EU, reveal significant revisions in support policy measures applied in Romania in the last decade. As EU membership drew near, Romania increased its efforts to provide farm support. Under the transitional arrangements, Romania negotiated the provision of subsidies as 'state aids'. In addition, various compensations were agreed with the European Commission in response to difficult circumstances created by animal disease outbreaks (classical swine fever, avian influenza) and weather conditions (the 2007 drought). In anticipation of the SAPS following the adoption of the CAP, a positive development was the increase in the proportion of the decoupled payments (per area unit or animal head) from 12 per cent in 2003 to 30 per cent in 2007. The evolution of different support measures before EU accession features also a large share held by market measures, particularly in the form of input and commodity/product subsidies. Nevertheless, their share (taken together) shrank from 74 per cent in 2002 to 41 per cent in 2007. The high volume of support for 2007 (as compared to previous years) follows the Romanian government's decision to compensate farmers for their losses caused by drought (Luca, 2013). However, the subsequent maintenance of a high level of national support might be explained by the government's temptation to respond favourably to farmers' demands for support during the elections of 2008, 2009 and 2012.

With accession, the share of EU financial support has increased, particularly in the form of direct payments, whilst the contribution of national funds has decreased year by year. Indeed, the total amount of domestic support decreased from EUR 1.2 billion in 2008 to EUR 839 million in 2012, however, it remains well above the levels allocated prior to EU accession. Since 2009, the overall Romanian agricultural financial support (from both national and EU funds) accounted for more than EUR 2 billion per annum (e.g. approximately 2 per cent of the Romanian GDP). In terms of composition there is a rather limited volume of investment subsidies, as compared to production and income support, which may partially explain the low economic performance of Romania's agriculture. Table 2 presents some key economic indicators for Romania and two similar countries with large and diverse agricultural sectors, Poland, a 'new' Member State and France, an 'established' Member State. While the gap between the GDP per capita expressed in Purchasing Power Standard is diminishing, the share of agriculture in GVA and employment remains high for Romania. Moreover, its agri-food trade balance was negative throughout the entire period of analysis. These indicators show that despite an increase in the financial support for agriculture following EU accession the performance of the agricultural sector in Romania has remained modest.

Furthermore, EU membership has not necessarily led to farm consolidation and a gradual disappearance of small-

Table 2: Key economic indicators for France, Poland and Romania.

	Year	France	Poland	Romania
Population (million)	2012	65.2	38.5	20.5
GDP per capita at current prices (EUR)	2012	31,093	9,949	6,380
GDP per capita at PPS	2012	27,554	17,091	12,726
Agriculture in total GVA (%)	2011	1.4	2.4	5.9
Agriculture in total employment (%)	2011	2.8	12.7	32.6
UAA per holding (hectares)	2010	54.9	9.6	3.6
Share of holdings < 2 ha in total number (%)	2010	14.7	24.1	74.3
Exports of agricultural products (EUR billion)	2011	58.1	14.3	4.1
Imports of agricultural products (EUR billion)	2011	42.4	12.0	4.5
Agricultural trade balance (EU countries) (EUR million)	2011	4,492.3	976.3	-626.6
Agricultural trade balance (non-EU countries) (EUR million)	2011	11,189.6	1,276.4	204

Sources: Butault *et al*. (2012) and EC (2012)

scale (semi-subsistence) farms. Despite a continuous decline in the number farms, Romania remains as fragmented as before EU accession (Figure 6a). A few large-scale (100 hectares and above) commercial holdings (less than 0.5 per cent) account for almost half of the utilised agricultural area (UAA) while a very large number of small (less than 2 hectares) farms (about three-quarters of the total) account for only 13 per cent of total UAA (Figure 6b).

Hubbard *et al.* (2014, p.50) note that this "may be the result of the CAP implementation, particularly direct payment, which encouraged even more land fragmentation". However, only one million out of 3.8 million Romanian farms are eligible for direct payments and the level of support is well below the average level of the EU-27 (Figure 5). The main beneficiaries of any public financial support are the large-scale commercial holdings, whereas the majority, which is restricted to small-scale plots, and the landless have benefited little, if at all, from the adoption of the CAP. There has been some farm consolidation, but Luca *et al*. (2012) argue that this was mainly due to the application of the Agricultural Life Annuity Scheme, which was put in place before the country joined the EU.

The absolute level of farm subsidies differs considerably across the EU, with an obvious contrast between the 'established' and the 'new' Member States. There is little doubt that the design and the rigidity of the CAP, e.g. level of support calculated on historical subsidies, has contributed to this situation. Hence, to reach (economic) convergence (in agriculture) through measures funded from the EU budget remains for many EU farmers a long-term objective. However, like all EU Member States, Romania will continue to benefit from both the EU and national budgets. Following the negotiations for 2014-2020, the EU has allocated approximately EUR 20 billion for Romanian agriculture and rural development, of which more than half (EUR 10.6 billion) is for Pillar 1. By 2019, a Romanian farmer will receive an average of EUR 196 per hectare in direct payments, as compared to EUR 139 in 2013. Farmers will continue to get supplementary national direct payments in the form of transitional payments (former CNDPs) until 2020. Both crop and livestock sectors will be supported from the national budget. A specific effort will be made to support farm consolidation, by particularly encouraging small farmers to sell or lease their land. Young farmers up to 40 years of age will get an extra 25 per cent subsidy per hectare for the first five years of their agricultural activity, for an area between 25 and 60 hectares. In relation to the perception that the burden of agricultural support has shifted to Brussels following EU accession, whilst EU funds have become more important, support from the Romanian national budget remains significant.

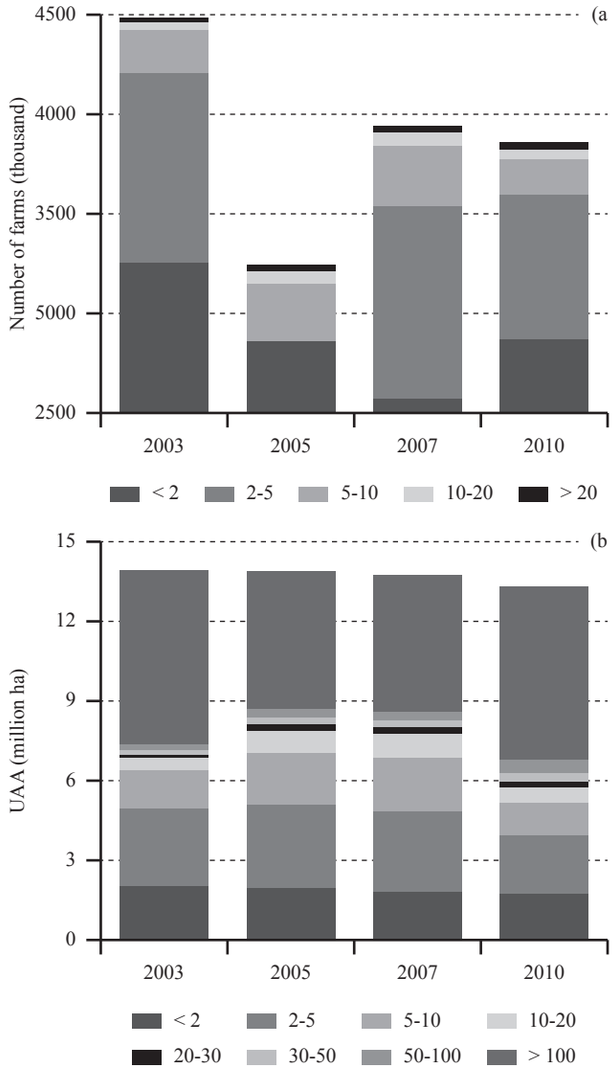

Figure 6: Structure of farms in Romania by size (ha) in terms of (a) number of farms and (b) utilised agricultural area, 2003-2010.
The number of farms of less than 2 ha includes those that have 0 ha
Source: Eurostat

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Soil and crop management and biomass removal effects on soil organic matter content in Hungary

Greater use of biomass for bioenergy has increased the need to evaluate above ground biomass removal (BR) effects on soil quality components, especially soil organic matter (SOM). A multifactor, 40 year field experiment was conducted in Kompolt, Hungary on a carbonate-free, slightly acidic chernozem brown forest soil (USDA: Ustolls) with the objective of determining the effect of different management systems with concurrent removal of the above ground biomass on the SOM content of the 0-320 mm layer. A multifactor experiment composed of treatments involving different crop rotation (CR), beef manure application, mineral fertiliser application, above ground BR (vs. biomass incorporation, BI) and lucerne management options for different rotations are the basis of this study. CR had no significant effect on SOM content. Management options that included a four year lucerne stand produced significantly higher SOM content in five out of six fertiliser and biomass management combinations. Continuous manure applications and manure + NPK fertiliser resulted in a significantly greater SOM content than management options that minimised or eliminated fertiliser or manure additions. SOM content for different soil amendments and biomass treatments ranked: BR < NPK + BR < BI < manure + BR = NPK + manure + BR with SOM contents of 2.75 < 2.82 < 2.87 < 2.92 per cent (w/w) respectively. Manure had the most profound effect because its significance was most consistent across a range of management combinations and years. The results suggest that agricultural management systems that include lucerne and manure application have the potential to sustain SOM content with concurrent above ground BR in continental climates on Ustolls with near level topography.

Keywords: biomass, bioenergy, soil organic matter, soil management

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Introduction

The U.S. government 'Vision for Bioenergy and Biobased Products in the United States' set a goal that 5 per cent of power, 20 per cent of transportation fuels and 25 per cent of chemicals will be produced from biomass by 2030 (DOE, 2003). This goal is equivalent to 30 per cent of current national petroleum consumption and will require more than one billion dry UK tons (1.016 billion dry tonnes) of biomass feedstock annually. Similarly, the European Union (EU) Directive on the promotion of the use of energy from renewable sources (EC, 2009) includes a target of a 20 per cent share of renewable energy in energy consumption in the EU and differentiated national overall targets by 2020. According to projections, by 2020 biomass is expected to contribute about two thirds of the renewable energy. The primary agricultural biomass resources in the U.S. and Europe include crop residues from major crops – maize stover and small grain straw, grains, perennial grasses and perennial woody crops (Scarlat *et al*., 2010; Scarlat *et al*., 2011; Karlen *et al*., 2011; Clark *et al*., 2013; Meki *et al*., 2013).

Soil organic matter (SOM) is a soil quality indicator upon which agricultural production is dependent, while agricultural practices influence it (Larson and Pierce, 1994). Studies have shown that SOM content is directly related to the amount of residue applied to the soil (Rasmussen *et al*., 1980; Robinson *et al*., 1996; Dalzell *et al*., 2013; Kludze *et al*., 2013). Barber (1979) showed that above ground biomass removal (BR) negatively affects SOM levels. Therefore, it is reasonable to assume that SOM will decrease if residues are removed and that large scale above ground BR can degrade our soil resources. Moreover, accelerated erosion can increase SOM loss from unprotected soil surfaces.

Decreases in SOM can however be fully or partially mitigated with appropriate management such as reduced tillage, improved crop nutrition, organic amendments, cover crops and perennial vegetation (Janzen *et al*., 1998; Bruce *et al*., 1999; Dalzell *et al*., 2013; Zhao *et al*., 2013). Several studies have evaluated SOM content change as a function of different tillage and cropping systems (Mahboubi *et al*., 1993; Reicosky *et al*., 1995; Hunt, 1996; Rasmussen *et al*., 1998; Deen and Kataki, 2003), crop management (Halvorson *et al*., 2002; McConkey *et al*., 2003) with cover crops and legumes (Drinkwater *et al*., 1998; Fortuna *et al*., 2003), mineral fertiliser application (Halvorson *et al*., 1999; Russell *et al*., 2005), farmyard and green manure application (Sommerfeldt *et al*., 1988; Nardi *et al*., 2004; Sisti *et al*., 2004) and residue management (Rasmussen *et al*., 1980; Bohm *et al*., 2002). Most of these studies investigated several combinations of the above factors in different climates and soils such as in the semi-arid Pacific Northwest (Rasmussen *et al*., 1998); in Canadian prairie soils (McConkey *et al*., 2003); in the sandy southeastern Coastal Plain (Hunt *et al*., 1996); or in the Midwest (Russell *et al*., 2005).

Results from the long-term Morrow Plots in Illinois (Fenton *et al*., 1999) showed that crop rotation along with appropriate fertilisation was an important factor in achieving the highest crop yields and the highest soil N and organic C levels during 70 years of management (Odell *et al*., 1984). Changes in SOC (soil organic carbon) are linearly related to the annual C input rates associated with N fertility management, whereas legume-cereal crop sequences maintained SOM content without external N fertilisation in southern Wisconsin (Vanotti *et al*., 1997). Clapp *et al*. (2000) examined the interaction among maize stover harvest, N fertilisa-

tion and SOC dynamics in a 13 year experiment in Minnesota. They reported that SOC in the no-till plots with maize stover harvest remained unchanged, while that with the stover returned increased. They also found that the N fertilisation effects on SOC were most evident when the maize stover was returned to no-till plots.

Long term experiments are the best means to empirically study soil management impacts on SOM content. As described previously, several of these studies exist and have been extensively analysed. However, such data published from long term research that investigates the interactions of residue harvest with various management practices such as crop rotations, mineral and manure fertiliser application are missing in the literature. The objective of this paper was to identify management practice impacts on SOM content with concurrent above ground biomass removal using long term field data with a broad range of fertiliser and crop management practices.

Materials and methods

Field site

The research was established at the Rudolf Fleischmann research station at Kompolt, Hungary in 1962. Kompolt is located 47°45' N and 20°15' E, about 110 km NE of Budapest and 25 km NE of Gyöngyös. The elevation of the research station is 125 m above sea level. The region has a temperate continental climate with the mean annual air temperature of 10°C. The mean annual precipitation is 549 mm of which 309 mm fall within the growing season although dry spells are common. Mountain ranges NW and NE from Kompolt influence the research station's climate. The topography is nearly level and the water table depth is 11-12 m (Tóth *et al*., 1998). The soil is a carbonate-free, slightly acidic chernozem brown forest soil (USDA: Ustolls, Németh *et al*., 2002). Initial soil measurements performed in 1961 indicated that the average SOM content was 2.87 per cent (w/w) and the pH was 5.5 in the field plot area. The soil NH_4^+ content was 6.4 ppm, $NO_3^- + NO_2$ was 5.4 ppm, P_2O_5 was 28.0 ppm and the K_2O content was 216 ppm in the 0-250 mm depth.

Sampling procedure

A multifactor 40 year-long experiment was established in 1962 with three crop rotations (CR), 12 fertiliser and biomass management (FBM) treatments and three fertiliser and lucerne (*Medicago sativa* L.) management (FLM) treatments. Each treatment was replicated four times. Based on the objectives of this paper the authors were interested in six of the 12 FBM treatments and only those will be introduced and discussed in this paper. In this experiment, a four year period was considered a sequence. During the experiment conventional soil tillage practices were used and above ground biomass was removed by hand. Farmyard beef manure with wheat straw as bedding was applied to selected plots at a rate of 35.2 Mg ha^{-1} wet weight (8.5 Mg ha^{-1} dry weight). Manure supplied 0.176 Mg N ha^{-1} (Kismányoky, 1994). The mineral fertiliser applied was a 0.236 Mg ha^{-1} NPK mix that contained 0.088 Mg N ha^{-1}, 0.044 Mg P_2O_5 ha^{-1}, and 0.104 Mg K_2O ha^{-1}. Based on the local practices, green pea vine residue and spring barley straw was always removed from the plots. Biomass removal (BR) or biomass incorporation (BI) from other crops in the rotations is the basis for the BR treatments in this study. Manure was applied in the first year within each crop rotation sequence (once every four years).

The three different CR (main plots) were: (a) maize (*Zea mays* L.) monoculture; (b) maize-maize-wheat- (*Triticum aestivum* L.) wheat; and (c) maize-spring barley- (*Hordeum vulgare* L.) green pea- (*Pisum arvense* L.) wheat. The different FBM treatments were used to split the main plots and the different FLM treatments were used as the second split. The three FLM treatments within the different rotations were: (a) a four year sequence with annual fertiliser application followed by a four year sequence with no soil amendments; (b) annual fertiliser application; and (c) a four-year sequence of annual fertiliser application followed by a four-year sequence of lucerne.

The lucerne stands received minimal amounts of N fertiliser in the first year to establish seeding while P and K were applied in sufficient quantities to meet the four year growth requirement. The lucerne was cut and removed from each plot three or four times annually. Green pea received only 73 per cent of the N fertiliser applied to the other crops. Plots were 54 m^2 (6 m x 9 m). Soil samples for SOM analysis were collected every fourth year of the experiment (0-320 mm). The SOM analyses were performed using Turin's methodology (Belchikova, 1965). For this study four sampling years (SY) 1969, 1977, 1981 and 2001 were used. SOM content is expressed as per cent on a gravimetric basis.

Statistical analysis

The statistical design was a split-split-plot in time. The effects of CR were tested on the main plots, the effects of FBM were tested on the split plots, and the effects of FLM were tested on the split-split plots. For statistical analyses, blocks were treated as having random effects, while CR, FBM, FLM and SY as fixed. Interactions with random block effects were used as error terms. Statistical analysis was performed using SAS version 9.1 (SAS Institute, 2003). Means were obtained with the least square mean (LSM) statement and significant interactions that occurred were evaluated using the LSM procedure. Least significant difference (LSD) statements allowed mean comparisons for FBM to examine the impact of mineral fertilisation, manure application and BI on SOMC. Treatment differences were considered significant at a probability level of 0.05.

Results and discussion

Table 1 shows the analysis of variance for gravimetric SOM content.

Table 1: Analysis of variance for gravimetric SOM content.

Source	DF	Type III SS	Mean Square	F value	Pr > F
Block	3	0.42	0.14	5.69	0.0008*
CR	2	3.25	1.63	2.78	0.1397
FBM	5	2.94	0.59	6.46	0.0001*
CR x FBM	10	0.89	0.09	0.98	0.4755
FLM	2	3.86	1.93	96.71	< 0.0001*
CR x FLM	4	0.09	0.02	1.19	0.3208
FBM x FLM	10	0.56	0.06	2.83	0.0037*
CR x FBM x FLM	20	0.29	0.01	0.72	0.7987
SY	3	0.57	0.19	7.61	< 0.0001*
CR x SY	6	1.00	0.17	6.73	< 0.0001*
FBM x SY	15	1.07	0.07	2.88	0.0002*
CR x FBM x SY	30	0.80	0.03	1.07	0.3653
FLM x SY	6	0.20	0.03	1.34	0.2395
CR x FLM x SY	12	0.16	0.01	0.53	0.8927
FBM x FLM x SY	30	0.34	0.01	0.46	0.9942
CR x FLM x FBM x SY	60	0.51	0.01	0.34	1.0000

* Significant at probability level, P<0.05
Abbreviations: CR: crop rotation; FBM: fertiliser and biomass management treatment; FLM: fertiliser and lucerne management treatment; SY: sampling year

Fertiliser and lucerne (FLM) management

Differences between FLM treatments depended on FBM treatments. FLM that included a four year lucerne stand, even though top growth was removed, produced significantly greater SOM content in five out of six FBM treatments (Table 2 column c vs. a and b). Similar results were observed in Iowa (Robinson *et al*., 1996; Russell *et al*., 2005) and in Hungary (Tóth and Kismányoky, 2001; Krisztián and Holló, 1995) where cropping systems with lucerne proved to be viable management options for increasing SOM content. The treatment that included BI and NPK application showed no differences in SOM content between annual fertilisation application (2.88 per cent SOM) and lucerne stand (2.94 per cent SOM). It appears that the effect of continuous BI on SOM content was similar to the effect of producing lucerne.

Treatments in which biomass was removed and manure applied had significantly higher SOM content when fertiliser was applied annually (2.90 and 2.94 per cent SOM) than when it was applied in four of the eight years (2.83 and 2.81 per cent SOM). In summary, treatments with lucerne stands and continuous manure application had the greatest positive effect on SOM content. Tóth and Kismányoky (1997) found similar results in Hungary in a long term experiment where they investigated the effects of fertilisation and crop rotation on SOM content.

Fertiliser and biomass (FBM) management

Differences in SOM content between years depended on FBM. The control treatment showed a decline in SOM content in 1981 and in 2001 (2.67-2.71 per cent SOM content) compared to 2.81 per cent SOM content in 1969 (Table 3).

Table 2: Soil organic matter content in different fertiliser and biomass management (FBM) and fertiliser and lucerne management (FLM) treatments from the last sampling time (2001), %.

FBM			FLM			Mean
NPK Mg ha^{-1}	Manure Mg ha^{-1}	Biomass	a*	b**	c***	
0	0	BR	2.70d	2.67d	2.88e	2.75
0.236	0	BR	2.76d	2.79d	2.91e	2.82
0	35.2	BR	2.83d	2.90e	3.00f	2.91
0.236	35.2	BR	2.81d	2.94e	3.02f	2.92
0	0	BI	2.82d	2.84d	2.95e	2.87
0.236	0	BI	2.82d	2.88de	2.94e	2.88
Mean			2.79	2.84	2.95	2.86

Within rows, values followed by the same letter are not significantly different using LS Mean test; P< 0.05; BR: biomass removed; BI: biomass incorporated; *: a sequence (four year period) with annual fertiliser application followed by a sequence with no soil amendments; **: annual fertiliser application; ***: a sequence (four year period) of continuous fertiliser application followed by a sequence of lucerne stand
Source: own data

Table 3: Soil organic matter content in different fertiliser and biomass management (FBM) treatments and sampling year.

FBM treatments			Sampling year				Mean
NPK Mg ha^{-1}	Manure Mg ha^{-1}	Biomass	1969	1977	1981	2001	
0	0	BR	2.81d	2.82d	2.67ef	2.71f	2.75
0.236	0	BR	2.82d	2.81d	2.80d	2.85d	2.82
0	35.2	BR	2.89d	2.91d	2.90d	2.94d	2.91
0.236	35.2	BR	2.88d	2.91d	2.86d	3.04e	2.92
0	0	BI	2.92d	2.88de	2.83ef	2.85df	2.87
0.236	0	BI	2.87d	2.88d	2.84de	2.93df	2.88
Average			2.86	2.87	2.82	2.89	2.86

Within rows, values followed by the same letter are not significantly different using LS Mean test; P< 0.05; BR: biomass removed; BI: biomass incorporated
Source: own data

The BI+NPK treatment in 1969 (2.87 per cent SOM content), manure+BR and NPK+manure+BR in 1977 (2.91), manure+BR in 1981 (2.90), and NPK+manure+BR in 2001 (3.04) demonstrated the greatest SOM content. Application of manure+BR and manure+NPK+BR showed the greatest SOM content among the treatments in 1977, 1981 and 2001. However, SOM content was not statistically different across years in treatments with manure+BR. This suggests that treatments with manure+BR were able to maintain relatively high SOM contents (compared with the other treatments) but were not able to increase these values over years. On the other hand, in treatments with manure+NPK+BR, SOM content remained relatively high and tended to increase over the second half of the experiment (2.88-3.04). Similarly to treatments with manure+BR, treatments with NPK+BR were unable to increase SOM content over the years. When FBM treatments were averaged over the effects of SY and FLM, it showed that the control treatment produced the lowest (2.75) and NPK+manure+BR the greatest (2.92) SOM content.

Crop rotation

Differences in SOM content between years depended on the CR. Mean SOM content was the lowest for maize monoculture (2.77 per cent SOM content) and the highest for two- or four-crop rotations (2.90) (Table 4). Similar results were observed in the Morrow Plots in Illinois where crop rotation

retarded the decline in SOC (Odell *et al*., 1984), in Nebraska where after eight years rotation significantly increased SOC across all cropping systems (Varvel, 2006) and in Hungary where crop rotation increased SOM content compared to monoculture maize (Tóth and Kismányoky, 2001). Robinson *et al*. (1996) found that maize monoculture was the most detrimental to SOC in different soil management systems in Iowa.

Table 4. Soil organic matter content in different crop rotations and sampling years, %.

Crop rotation	Sampling year				Mean
	1969	1977	1981	2001	
Monoculture	2.78d	2.84e	2.66f	2.81de	2.77
Two crop rotation	2.91d	2.90d	2.89d	2.91d	2.90
Four crop rotation	2.89d	2.88de	2.91d	2.94df	2.90

Within rows, values followed by the same letter are not significantly different using LS Mean test. $P<0.05$
Source: own data

The impact of soil amendments on soil organic matter content

The impact of mineral fertilisation on SOM content was established by comparing mean values of NPK + BR with the control (no fertiliser application + BR) treatment (Table 3). Mean SOM content was greater with mineral fertiliser application (2.82 per cent SOM content) than without soil amendments (2.75 per cent SOM content). This trend held in sampling years 1981 and 2001 when differences were statistically significant. Similar results were found in Iowa (Robinson *et al*., 1996) and in Hungary (Krisztián and Holló, 1995) where NPK treatments increased SOM content compared with no fertiliser application. The impact of manure application on SOM content was established by comparing mean values of manure + BR with the control (no soil amendment + BR) treatment. Mean SOM content was greater with manure application (2.91) than without soil amendments (2.75) and this trend was consistent across the years with significant differences being observed in the last two sampling times. There were similar results from the Broadbalk experiment at Rothamsted in the UK where additions of farmyard beef manure increased total C content compared to the control treatment (Blair *et al*., 2006). Of note is that manure application alone resulted in greater mean SOM content than application of NPK.

The impact of BI on SOM content was determined by comparing mean values of SOM content of no fertiliser application + BI with the control (no fertiliser application + BR) treatment. The mean SOM content was greater with BI (2.87 per cent SOM) than with BR (2.75 per cent SOM). This trend was true for each SY although differences within years were not statistically separable. Similar results were found in Indiana (Barber, 1979) and Minnesota (Allmaras *et al*., 2004) where maize stalk residue removal decreased SOM when compared with residue returned to the soil. Effects of both mineral and organic amendment application on SOM content were established by comparing mean values of NPK + manure + BR with NPK + BI. The mean SOM content was greater for mineral fertiliser and manure application followed by BR (2.92 per cent SOM content) than for mineral fertiliser alone followed by BI (2.88 per cent SOM content).

The impact of soil amendments including BI were determined by comparing mean values of NPK + BR with manure + BR and no soil fertiliser application + BI with NPK + BR. SOM content for manure + BR was significantly greater than for NPK + BR consistently across years. On the other hand SOM content for no soil fertiliser application + BI was statistically similar for most SY with NPK + BR. These results show that the value of biomass as soil amendment was equivalent to that of mineral fertiliser but less than that of manure amendment in increasing SOM content. There were no statistical differences between NPK + BI (2.88) and BI + no fertilisation (2.87); between NPK + manure + BR (2.92) and manure + BR (2.91); and manure + BR (2.91) and NPK + BI (2.88). The results indicate that the ranking of different management treatments on SOM content was: BR + no fertilisation < NPK + BR < BI + no fertilisation < manure + BR = NPK + manure + BR with SOM content of 2.75 < 2.82 < 2.87 < 2.92 respectively.

The impact of soil organic matter on bulk density

It is well recognised that organic matter content affects soil physical properties. An increase in soil C content increases aggregation, decreases bulk density, and increases water holding capacity and hydraulic conductivity (Williams and Cooke, 1961; Tiarks *et al*., 1974; Gupta *et al*., 1977). In some soils, organic matter has a dominating effect on soil bulk density (Curtis and Post 1964; Saini, 1966). Although studies similar to ours on SOM content determined soil C differences among treatments based on concentrations (Barber, 1979; Odell *et al*., 1984; Reicosky *et al*., 1995), unless this effect is considered, quantitative SOM data based on a percentage of total soil weight can be misleading (Adams, 1973). If the study goal is to estimate treatment effects on the mass of SOM, drawing conclusions based on the values of concentration are subject to error if bulk density varies among treatments.

Adams (1973) suggested that the SOM content could be used to predict soil bulk density. We used Adams` equation to estimate bulk density differences among treatments simply to see the potential relative impact of the SOM content differences observed:

$$BD = \frac{100}{\left(\frac{\%OM}{OMBD}\right) + \left(\frac{100 - \%OM}{MBD}\right)} \quad (1)$$

where BD is bulk density (g cm^{-3}), OM is organic matter (per cent), OMBD is bulk density of organic matter (g cm^{-3}) and MDB is bulk density of mineral matter (g cm^{-3}). OMDB was assumed to be 0.244 g cm^{-3} (Mann, 1986; Post and Kwon, 2000). MBD is usually assumed to be 2.65 g cm^{-3}, which was used in Adams` calculation. We assumed that soil BD was 1.3 g cm^{-3} in the experiment. We further assumed that the per cent OM was 2.86, the average OM content across treatments at the beginning of the experiment. BD then was calculated for treatments with the lowest and greatest percent SOM.

The results show that a difference in BD between those treatments would be 0.027 g cm^{-3}. The real influence of SOM, however, could be masked by the effect of soil structure on bulk density (Adams, 1973). In that conventional tillage practices were used in all treatments – for this region that means multiple passes starting with an autumn mouldboard ploughing operation – the differences in structure due to the relatively small differences in SOM content seems quite unlikely, although it was not measured in this experiment. Overall, we concluded that the difference in BD that may have existed and could have influenced the conclusions would have been due only to changes in SOM content, and the greatest influence would be about 0.026 g cm^{-3}. According to the literature, the spatial variability in BD measurements in a common treatment is about 10 per cent of the mean bulk density measure (Aljibury and Envans, 1961; Warrick and Nielsen, 1980) – a value which is much greater that our estimate of SOM content bulk density impact between treatments. Therefore, we concluded that the results of this study using SOM content rather than a calculated mass of SOM between treatments truly reflects treatment impacts on SOM changes.

Implications and limitations

Elevated global demand for agricultural products, in particular crop biomass for biofuels, bioproducts and livestock feed and bedding, favours short-term agricultural economics, but threatens soil quality and long term economics due to depletion of SOM under many management scenarios (Cruse *et al.,* 2009). Numerous studies previously cited illustrate a sound understanding of crop management impacts on SOM, especially when crop residues are retained on the field and/or when organic matter is returned to the field as manure following use in animal based enterprises. Unfortunately, off farm markets are increasingly moving crop biomass into production facilities that have no or little economic incentive to return organic matter or organic matter by-products to the field of origin. This study substantiates previously recognised science regarding soil and crop management impacts on SOM content with biomass returned to the soil to biomass removal systems.

This study suggests SOM maintenance will be a challenge if some form of above ground biomass is not returned to the soil, especially with monocultures of maize. Diversifying a row crop operation such that lucerne is included within the rotation seems to offset the negative SOM impact of long term maize biomass harvest. Realistically, however, getting farmers to diversify existing row crop dominated enterprises has been futile in areas such as the U.S. even though more diverse farming operations have been shown to be as profitable per unit land area as continuous row cropping with maize and soya (*Glycine max*) (Davis *et al.,* 2012).

While long term studies such as this are valuable, they have limitations. Technology change can be rapid, thus caution is advised when making direct application of results obtained from studies initiated decades ago to current farming systems. For example, no-till methods and use of modern day maize cultivars with significantly higher production potential than older cultivars could modify SOM dynamics and result in different SOM contents than observed in this study. However, in the absence of literature addressing the interaction of SOM dynamics with variables such as tillage and genetics, one should assume that absolute values of SOM content would change, but that relative impacts of treatments would remain.

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Book review

POTORI Norbert, Paweł CHMIELIŃSKI and Andrew FIELDSEND (editors)

Structural Changes in Polish and Hungarian Agriculture since EU Accession: Lesson Learned and Implications for the Design of Future Agricultural Policies*

* Agrárgazdasági Kutató Intézet, 2014, 292 pp.

Assessment of the scope and approach of the study

This study is the result of research cooperation between the staff of the Research Institute of Agricultural Economics (AKI) in Budapest, Hungary and the Institute of Agriculture and Food Economics of the National Research Institute (IERIGŻ-PIB) in Warszawa, Poland. The study's title defines its purpose and approach, and the words of introduction from the Directors of the two institutes, Dr. Kapronczai István of AKI and Prof. Dr. hab. Andrzej Kowalski of IERIGŻ-PIB reinforce this message.

The study analyses the changes in the agri-food sectors of Poland and Hungary since these countries' accession to the European Union (EU) in 2004. Both countries have benefited from EU accession, although the chances and opportunities arising therefrom have been exploited differently. The agri-food sector in Poland has probably adapted a little better to the requirements and benefits of the Common Agricultural Policy (CAP). However, further challenges await the agri-food sectors of both countries in terms of, for example, institutional efficiency and competitiveness, and the environmental context. Thus, it seems useful to carry out a cross-cutting, comparative analysis of the processes of change in the sector during the period of adaptation to the new opportunities and challenges associated with the common market, common rules for support schemes under the CAP and other institutional arrangements related to EU accession. This study is not only an *ex-post* assessment, but it also features some elements of an *ex-post* analysis.

It can be difficult to maintain the scientific nature of such an analysis without falling into the mannerisms of so-called expert consulting studies, and having an excessive focus on the description of statistical data. The authors have avoided this by properly recognising and analysing statistical data and drawing generalisations of cognitive and scientific importance with policy implications. Moreover, the involvement of two institutes can make it difficult to maintain consistency of approach, but the adoption of common methodologies by the two sets of researchers emerges quite clearly from the study's constituent chapters.

In such a cross-cutting study it is also difficult to define an ideal hierarchy or even order of the topics to be discussed. Structural changes, especially within the meaning of their qualitative dimension, refer both to institutional and regulatory spheres, and to changes in the real sphere, that is in management processes in the agri-food sector. The added value of the publication is the attempt to describe the relationship between these structural changes in both spheres. This attempt has proved fairly successful. The study is diligently and accurately written. It comprises relatively few repetitions, the majority of which address support schemes under the CAP.

Institutional and regulatory conditions of structural changes

The study does not present an overall view of the institutional and regulatory changes in the agri-food sector related to EU accession, but rather of selected topics. Attention is paid, without assigning any appropriate priority or hierarchy, to such institutional factors or conditions which have had a significant impact on structural changes in the sphere of real management in the agri-food sector. Let us refer to some of them which are, according to the reviewer, the best presented scientifically in the relevant chapters, and probably the most important.

Certainly, the land market, and the right of ownership and lease are such conditions. With certain limitations the *Land tenure* chapter addresses these issues from the relevant perspective, i.e. efficient allocation of land, transaction costs and property rights. These conditions result in the specific structure of ownership and use of land and changes thereto, i.e. processes that are quite different in both countries. In Poland, the result is the high price of land, hardly visible structural changes and a weak system of leasing. In Hungary, the well-developed system of land leasing has facilitated adjustment of the production structure; however, the purchase of land is a problem. Generally though, the land market, regulatory solutions and land policy have not reduced the relative allocative inefficiency of this factor among agricultural producers.

The development of institutional and regulatory conditions for innovation in the two countries is an equally fundamental issue. In addressing it the *Institutional preparations for the implementation of the European Innovation Partnership* chapter meets high standards of scientific analysis. It includes relevant conceptual references, especially to the 'Agricultural Knowledge and Innovation System' model and outlines its components, i.e. research, extension, education and support system. Readers will find the presentation of the European Innovation Partnership and the analysis of Hungarian and Polish preparations for participation in this programme interesting, but the conclusions drawn as to this participation are quite unclear, not synthesised and too technical. The reference to the concept of 'innovation brokers' is interesting. It is a pity that the authors did not consider whether the support system actually liberates or rather forces

innovation. In the neoclassical approach, innovation as a source of increasing competitiveness is induced by competitive equilibrium conditions and the dependence of producers on the market and resulting tight budgetary constraints.

The *Agricultural insurance support schemes* chapter is written knowledgeably but too much attention is given to business and environmental issues and too little to insurance as a factor of economic stability. Whether attention is given only to production risk insurance against, for example, drought, floods, or also to market risk insurance associated with increasing price volatility and fluctuations related to the integration and globalisation of agricultural markets is not clearly explained. During the period of previous regimes in both countries, compulsory insurance schemes against *force majeure* existed. The question arises as to why this arrangement was changed. There is, however, no market risk to which the authors do not refer. The ways of developing a new production risk insurance scheme in both countries are synthetically presented and provided with rich empirical illustration. Remarks on obstacles to the development of the agricultural insurance market in both countries and subsidisation of insurance policies, e.g. the NAR system in Hungary, are valuable.

The study addresses the issues of financing and taxes in the *Financing of agriculture and investment support in agriculture* and the *Taxation in the Polish and Hungarian agriculture and health care system* chapters. They describe the changing status of these common agricultural and fiscal policy instruments, including the relationship between EU and state budget funding. In this sense, along with the cited and described empirical data, these chapters leave us no doubt about their illustrative value; however, their cognitive value is lower. Nevertheless, they contain a certain impact assessment of the financing system under the CAP. Slowing down structural changes is one of the impacts. Furthermore, excessively complicated procedures related to financing are a problem. The important issue of investments and their funding is presented quite schematically, for example there is no reference to their rationality in view of their relatively very large subsidisation. In the light of the political debate in Poland, the description of the income tax system in agriculture in Hungary is of high informative value. Considerations regarding the VAT system in both countries in the framework of a unified EU regulation are of similar importance. Obvious from an economic point of view, the issue of social care is also a political problem. The tax systems of the two countries differ in agriculture and other sectors. Social care systems are also different; however, it seems that the Hungarian system is more rational and less burdensome to taxpayers. The critical comparative analysis is not exhaustive enough from the perspective of theory and policy implications.

Structural changes in the real sphere of the agri-food sector

The comparative analysis of structural changes in the agri-food sector indicated in the title of the study is of diverse nature as to both the subject and approaches. On the one hand, the analysis compares the most important characteristics of the entire sector, and on the other hand, examines the whole sector in terms of post EU accession changes. Two chapters address this issue, *A comparison of the agro-food sectors in Poland and Hungary from macro perspective* and *Development of the Polish and Hungarian food industry from 2000 to 2011*.

The first of these chapters introduces the book and illustrates the role of the sector in the economy and the state of its development in the two countries. Thus it constitutes a good starting point for the analyses included in the following chapters. Indicators, such as the share of the agri-food sector in GDP, employment, the national economy and investments, are analysed first. Then, the value of agricultural production, its structure, as well as support and income in agriculture, the trade of agri-food products and expenditure on food are studied. This is not the best possible order. The conclusions point to, *inter alia*, the diversity of land use structure and income, the role of investments in the process of adapting to EU requirements, the role of agri-food sector in the economies of the two countries which, despite the declining trend, is still socially and politically important. The second of these chapters (the final one in the study) discusses the effects of EU accession and the resulting changes in the institutional and regulatory sphere. These effects are the structural development of the agri-food sector in general, in contrast to the results of detailed analyses of selected sectors, to which I refer below. Such an approach is also illustrative, rightly referring to the most important indicators, such as the value of production in the agri-food sector, the volume of consumption, the productivity of the labour factor in the sector in both countries. References to the structure of the entire food industry, e.g. in terms of its business structure, as well as the analysis of the level of investments and economic and financial results are the most important. These analyses are synthesised and have high informative value; however, the comparative analysis represents a weakness.

Four chapters analyse selected product sectors in the two countries. Relatively comprehensive analyses relate to the *pig*, *dairy*, *fruit and vegetable*, and *sugar* sectors. Underlying trends for production, structure and efficiency at the levels of agriculture as a supplier of raw materials and of processing are analysed, based on a wide range of empirical data. The two countries are analysed somewhat more individually than comparatively. However, the analyses in these chapters add value to the study. It is difficult to find both references to theory and more general patterns in a cognitive sense. However, observations regarding agricultural policy are important. They resemble sectoral analyses a bit too much, which is not necessarily an advantage here but they may be an important reference for other publications and assessments. The analysis of the development of the fruit and vegetable sector reveals massive structural and qualitative changes, including foreign trade accompanied by consumption changes related not only to domestic production, but also to imports of fruit from other climatic zones. The role of this sector has decreased in Hungary, but has gained importance in Poland. The structure of the diary production and processing sector is examined in depth, and the analysis has proper theoretical and methodological grounds. The impact

of market and non-market regulations, as well as production quotas is shown. Structural changes in the sector, especially in Poland, and their effects in the form of consumption, foreign trade and prices are presented. The comparative analysis of the development of the dairy sector in the two countries allows for some generalisations. Similar remarks may be applied to the sugar sector where convincingly demonstrated structural changes are almost in line with the neoclassical model. The analysis of the relationship between value chain prices of pork production, and the relationship of livestock and feed prices and production efficiency is deepened. Risk management and forecasting, i.e. key aspects in this market, are passed over.

The analysis in the *Structure and development of the food retail sector in Poland and Hungary* chapter occupies a separate place. Retail sale of food is in fact a synthetic picture of the results of changes in the agri-food sector and its individual markets. Generally, this is not the subject of an integrated analysis in studies prepared by agricultural economists. The chapter addresses relevant issues of efficiency of this segment, which is in fact a driving force for the entire agri-food sector. This is where the most significant structural changes have occurred, enhancing consumer welfare, of course, based on the structural and qualitative development of the agri-food sector in both countries throughout the post-socialist period and especially since EU accession.

Summary

The study is sure to become a reference point for numerous analyses and publications. Providing agricultural economists from both countries with a basis for analysis that is fairly consistent in terms of methodology is an achievement. Analyses of the institutional and regulatory sphere and the real sphere of the agri-food sector separately for each country are in-depth and at the same time synthesised. The weaknesses of the study are the comparative analysis and drawing of generalisations. Furthermore, it does not include many *ex-ante* analyses, projections or expert opinions on future challenges. Nevertheless, each chapter provides a wide range of information, analyses and observations, the collection of which would otherwise involve much effort. The study carries a certain cognitive message, but most of all – a utilitarian message for agricultural policy.

Structural Changes in Polish and Hungarian Agriculture since EU Accession: Lesson Learned and Implications for the Design of Future Agricultural Policies may be obtained in printed form free of charge from Agrárgazdasági Kutató Intézet by emailing aki@aki.gov.hu and downloaded from http://ier-igz.waw.pl/download/15665-structural_changes_fin.pdf.

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Conference report

European Innovation Partnership for Agricultural Productivity and Sustainability

Budapest, 6 May 2014

The establishment of European Innovation Partnerships (EIPs) represents a new approach by the European Union to encouraging research and innovation. EIPs are designed to be challenge-driven, focusing on societal benefits and rapid modernisation. The EIP for Agricultural Productivity and Sustainability (EIP-AGRI) which was launched in February 2012 aims to foster a competitive and sustainable agriculture and forestry sector that 'achieves more from less'. It will contribute to ensuring a steady supply of food, feed and biomaterials, both existing and new, sustainable management of the natural resources on which farming depends, and working in harmony with the environment. To achieve this aim, the EIP-AGRI must build bridges between research and practice (farmers, businesses, advisory services, NGOs etc.).

The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) Conference was organised in Budapest, Hungary by the National Food Chain Safety Office (NÉBIH) on 6 May 2014. The aim of the conference was to the draw the attention of all interested actors in Hungary and the neighbouring EU Member States both to the importance of innovation in farming and the agri-food supply chain and to promote the formation of new relationships, partnerships and networks to capitalise on the opportunities offered by the EIP-AGRI.

The plenary session began with an opening speech by Tóth Katalin, Hungarian Deputy State Secretary for Parliamentary, Social and International Relations, who welcomed the conference participants and set out the aims of the conference. Then, Krijn Poppe, co-chair of the Standing Committee on Agricultural Research (SCAR) Collaborative Working Group on Agricultural Knowledge and Innovation Systems (CWG AKIS), highlighted the importance of the state's role in encouraging innovation. Moreover, cross-border collaboration in research could benefit from harmonisation of rules and procedures for commissioning research, to help to create to a more integrated 'market' for research.

Deputy Team Leader of the EIP-AGRI Service Point, Pacôme Elouna Eyenga, stated that the EU intends to use the EIP-AGRI to build bridges between research and practice. The key actors of the EIP-AGRI will be the Operational Groups, which will bring the stakeholders together to implement innovative projects in pursuit of the objectives of rural development. Financial support will be available both for the operational costs and the realisation of the projects. In addition, Innovation Support Services will be established to provide assistance in finding partners and solutions to research problems as well as being a network of the stakeholders in the European Union (EU).

Feldman Zsolt, Hungarian Deputy State Secretary for Agricultural Economy, explained that in Hungary the cooperation between the actors of agricultural economy and scientific research has to be improved. According to the Ministry's plans, consortia that involve agri-business participants, research organisations and advisory organisations will be eligible to receive support for the realisation of innovation projects, including investments related to putting the results of innovation into practice for farmers.

To illustrate how agro-innovation could work in practice, three good practice case studies were presented. Moira Forsyth of Scottish Enterprise described rural innovation through knowledge transfer in Scotland, Hans-Olof Stålgren of the Swedish Rural Network introduced a method that shows that it is possible to actually produce innovations in a short time, and Benedek Zsuzsanna of the University of Pannonia, Hungary, outlined the operation of the Pannonian 'Household' Swine Programme.

In the afternoon session, seven parallel, interactive workshops were conducted to address five questions about the EIP-AGRI. These questions, which centred on the role and formation of Operational Groups in Hungary, were as follows:

- Which function could you play in the implementation of the EIP-AGRI?
- What kind of problems are there to forming Operational Groups?
- What do you think are the most useful practical steps for 'kicking-off' the establishment of an Operational Group?
- What are the main obstacles/challenges for setting-up Operational Groups?
- Are there any other 'burning questions' you want to discuss?

These workshops identified several problems and possible solutions, and these were summarised and presented by the moderators of each working group. Generally the difficulties of cooperation, lack of trust and information, complicated administrative system and the scarcity of farmer-oriented scientific experts were identified as key challenges for the future of a smoothly operating EIP-AGRI system in Hungary.

Closing the interactive discussion, Feldman Zsolt concluded that the most important challenges at present are the active involvement of the currently quite sceptical farmers in the work of Operational Groups, and the development and establishment of a simple management structure of the EIP-AGRI at both EU and Member State level.

The level of interest the EIP-AGRI in Hungary is reflected in the fact that the conference was heavily oversubscribed, with around 250 participants. The PowerPoint presentations can be downloaded from: https://www.nebih.gov.hu/aktualitasok/hirek/05_06_EIP.html or http://elbs.hu/konferencia/eip-konferencia-2014-majus-6/. Further information is available from Szabó Dorrotya (szabodo@nebih.gov.hu).

KAPRONCZAI István, General Director of AKI

Agrárgazdasági Kutató Intézet, 1954-2014

On 1 January 1954 the Ministry of Agriculture established a new institute with the name ***Institute for Farm Management***, under the leadership of Horváth Lajos. This institute was, however, dissolved by the Ministry after just half a year of operation and was replaced by two institutes, the ***Research Institute for State Farm Management*** (RISFM, at Székkutas) and the ***Institute for Farm Management*** (IFM, in Budapest).

The establishment of two ministerial institutes was justified by the fact that the organisation and direction of state farms represented a different set of problems for the Ministry. The RISFM developed a statistical system for the analysis of state farm operation. In 1956 the Budapest-based Farm Management Department of the AGROTERV (a firm planning modern technologies for large-scale farms) joined the institute and in the following year the institute was relocated to Budapest. Meanwhile, the main task of the IFM, under the leadership of Lukács László and then Latkovics György, was to solve the current practical farm organisation problems of cooperative farms and machine stations.

Recognising that there was also a need for basic research, in 1956 the Hungarian Academy of Sciences (MTA), from the Farm Organisation Department of its Agricultural Research Institute at Martonvásár, organised in Budapest the ***Farm Study Group*** of the MTA under the leadership of Pálinkás István, and then from 1 January 1957, Erdei Ferenc. In early 1957 this group evolved into the ***Institute of Farm Management*** of the MTA (IFM-MTA). In 1962 the name was changed to the ***Research Institute for Agricultural Economics of the MTA*** (RIAE-MTA).

Also in 1962 the RISFO and the IFM were amalgamated by the Ministry of Agriculture as the ***Research Institute for Farm Management*** (RIFM), located in Budapest under the leadership of Tótth Jenő. This institute functioned until the end of 1964. With effect from 1 January 1965 the RIFM of the Ministry of Agriculture and the RIAE-MTA were amalgamated into one institute under the name ***Research Institute for Agricultural Economics*** (RIAE). The institute was placed under the supervision of the Ministry of Agriculture and Erdei Ferenc was appointed as its leader.

The main reason for the union was to achieve closer cooperation between agricultural economics and farm management research in order to promote more efficient scientific development in agriculture. This involved both basic and applied research. In 1968 the various parts of the institute were moved from three separate locations in Budapest to the present address of AKI, Zsil utca 3-5. Only the Department of Data Processing (i.e. the computer unit) remained in its old home. On 1 January 1969 the Section of Farm Analysis and the computer stock was transferred to the recently established ***Statistical and Farm Analysing Centre*** (SFAC).

A further development in 1962 was the setting up of the STASZIG (a computer and statistics centre that was part of the Ministry of Agriculture) under the leadership of Szemesy Tibor, which served as the informational background of the Institute. A few years later the ***Statistical Agency for Data Processing and Economic Analysis*** (SADPEA), which united the capacity of certain departments pertaining to STASZIG and the RIAE, was formed, headed by Németi László. Its main task was to collect and process data in cooperation with the Hungarian Central Statistical Office and the Ministry of Finance.

In 1982 the ***Institute for Research for Food Production and Economy*** (IRFPE) came into existence, focusing on research. This development recognised the close links between agriculture and the food processing sector. IRFPE belonged to the Ministry of Agriculture and later was merged with the RIAE.

In 1970 the RIAE employed nearly 250 people but between 1984 and 1991 the headcount fell from 207 to 83. Meanwhile, the number of persons employed at SADPEA decreased to one tenth of its original total. In 1991 the SADPEA and RIAE were reunited again under the name of the ***Research and Information Institute for Agricultural Economics*** (AKII), although for the time being they continued to be located at separate offices. Although a main driver of the merger was to achieve cost savings, it was logical to bring together the information technology databases and the research activities in one institute.

Over time, the former SADPEA staff were relocated to Zsil utca, thus bringing all activities of the institute under one roof. The institute regained its former name, the ***Research Institute for Agricultural Economics*** in 2004, the year of Hungary's accession to the European Union. At this time, the country became part of a large, organised but highly competitive market that offered great opportunities for the stakeholders but also brought along serious challenges. The work of AKI has helped Hungary to become an important and successful part of the EU's agricultural industry.

Since 2004, neither the framework nor the role of the institute has changed significantly. As a background institute of the Ministry of Rural Development, its 130 staff continue to provide support to decision makers and other agri-food supply chain actors in Hungary, with 60 years of experience behind them.

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