Institute of Economics, Centre for Economic and Regional Studies Hungarian Academy of Sciences

Registered seat: 1112 Budapest, Budaörsiút 45, director: Imre Fertő, e-mail: kti.titkarsag@krtk.mta.hu, <u>www.mtakti.hu</u>

I. Major responsibilities of the research institute in 2016

In 2016, the institute continued to implement the objectives of its research strategy. It complied with its obligations undertaken under research contracts and agreements. Its main tasks included compiling the Hungarian version of the 2016 Competition and Regulation (*Verseny és Szabályozás*), the Hungarian version of the 2015 Labour Market Yearbook (*Munkaerőpiaci Tükör*), and the English version of the 2016 Labour Market Yearbook (*Munkaerőpiaci Tükör*), as well as the time-proportionate implementation / completion of the research projects supported by the European Commission and the continuation of research studying mechanism design, corporate strategies and competitiveness under Lendület (Momentum) programme of the Hungarian Academy of Sciences (HAS).

II. Major research results and results of other types in 2016

a) Major research results and results of other types

MACROECONOMICS AND GROWTH

The project studied the effects of monetary policy on the currency composition of bank loans, using data on corporate bank loans to Hungarian enterprises between 2005-2011. Results show that the supply of foreign currency denominated loans was less sensitive to changes in domestic monetary conditions then loans denominated in domestic currency. Foreign monetary policy, on the other hand, influenced the former more than the latter. Therefore, when foreign currency lending is present in a country, the local bank lending channel weakens, but international bank lending channels become operational. The project also studied whether low interest rates increased the supply of bank loans, i.e. whether the bank balance sheet channel was effective in Hungary. According to results, an interest rate cut lead to an increased probability of lending to new borrowers in banks with lower capital ratios, and they also increased their loan amounts to existing clients, relative to banks with higher capital ratios. This implies that the bank balance sheet channel was operational in Hungary in the sample period (2005-2011).

Another project examines the growth and convergence processes of four the Visegrad countries, using a stochastic, open economy neoclassical growth model. Estimating the macroeconomic model with econometric methods identifies the main shocks that explain the volatility of growth rates in these countries. Results suggest that changes in GDP growth in Hungary were mainly caused by persistent shocks to growth prospects, while the composition of GDP was driven by fluctuations in the foreign interest premium.

A third project studied the question of unbalanced growth slowdowns. This happens when aggregate productivity growth slows down due to a reallocations of economic activity from sectors with high productivity growth to sectors with lower productivity growth. Results indicate that unbalanced productivity slowdown significantly lowered aggregate productivity growth in the United States after 1947. The project developed a model that is consistent with the observed unbalanced slowdown of the United States after 1947, and which is capable to give forecasts as well. The somewhat surprising prediction is that the slowdown in aggregate

productivity growth in the US will come to an end. The reason is that stagnating sectors will not fully dominate the American economy.

EMPIRICAL INDUSTRIAL ORGANISATION

Based on international comparisons and models, the research project has shown the most decisive factors characterizing the state of health of each countries' population. The completed case studies and interviews pointed to the distorting effects of the pharmaceutical industry on health cost. An analysis was finished about the impacts of rapidly spreading online information sources on the connection between the medicals taff and patients, and on the functioning of health institutions. The research, using theoretical models, demonstrated that on the part of state regulation, the negligence of existing multilevel information asymmetry and unbalanced allocation of competencies leads to "perverse" incentives for health care workers and institutions.

Among the wide-ranging innovation policy researches it is worth to highlight the analysis of the framework conditions of science, technology and innovation policy (STI policy). While a large number of policy instruments used in Hungary, the Hungarian national innovation system performance is still weak by international standards. The analysis looks for an explanation of this controversial phenomenon. It concluded that the efficacy of STI policy instruments is reduced by the serious shortcomings and errors in the decision-making system. The most important role has however, the so-called framework conditions: macroeconomic situation, the constraints of access to capital, the economic structure, the forms and intensity of competition, the entrepreneurial culture, as well as the fundamental differences between the goals of publicly funded R & D organizations and of the business is so strong that they couldn't be compensated by STI policy instruments.

EDUCATION AND LABOUR

The research used a large-scale, individual-level, panel dataset to analyse the effect of EU accession on the probability of out-migration and attrition on the part of Hungarian physicians and dentists between 2003 and 2011. The results show that after the end of the transitional period of restrictions on the free movement of labour from the new EU member states to Austria and Germany, the probability of doctors' migration increased considerably. Relative wages and peer pressure also exercise a significant role in the out-migration decisions of young medical doctors. It was also found that more than half of those medical doctors who left the country during the observation period returned some time later. The data furthermore suggest a massive flow of doctors to domestic jobs outside the health care system. Besides out-migration and attrition, leaving employment also contributes – at least temporarily – to the growing shortage of medical doctors in Hungary

The research analyzes how the effect of subsidized childcare expansion on maternal labor supply may differ in the case of Central-Eastern European countries compared to what has been found in the case of Western European countries, due to differences in their institutional and labor market characteristics. Since it is exactly this group of countries that is the farthest from fulfilling the childcare targets prescribed by the EU - especially in the case of childcare under age 3 - and further expansion is very costly, it is important to estomate the potential effect accurately. Compared to western countries, further obstacles may be present: lengthy child-related leaves, the lack of part-time work opportunities, and views that are unsupportive of institutional childcare for children at young ages.which are related to their evolution from a socialist system, and which should be considered jointly with childcare expansion.

The research shows that there are no significant differences in employment chances between similar apprentices and non-apprentices within just a year after graduation. Although some immediate positive effect of apprentice-training within sub-populations is apparent, this effect is likely due to unobserved differences between subgroups. But even if we assume that the results are unbiased they are likely due to firms screening the better students rather than the human capital increasing quality of their training.

PUBLIC ECONOMICS AND PUBLIC POLICIES

The research on the Hungarian public works scheme has showed that at the expense of its intended employment expanding role, its social role – the provision of social welfare assistance – has further strengthened. Consequently, the expected labour market effects have not occur, more and more people get struck into the public works programmes. Without these programmes, the majority of public works participants would be unemployed according to the ILO-definition. According to our calculations, without public works the 6.8% unemployment rate in 2015 would have been 10.5%. The expansion of public works has increased the income of the poor. By the annulment of a restrictive rule, further improvement could be achieved in the situation of the poorest. According to the current regulation, if there is a public works participant in a family, or there is a so-called employment substitution assistance (foglalkoztatást helyettesítő támogatás) recipient in a family (HUF 22,800 per month) then other unemployed family members are not entitled to this social support. According to our calculations, the abolition of this role would be only 4 billion HUF.

The research on the pension systems proved that—due to the steep rise of the normal retirement age— the abolishment of early retirement except for females having at least 40 years of rights will cause unbearable tensions. The seniority pension of Female 40 discriminates those females who have more fragmented careers and lower average earnings. The solution consists of eliminating Females 40 and introducing an actuarially fair early retirement system.

The latest results our research on health policy in East-, Central- and Western- Europe has showed, that the differences of countries in terms of air pollution (measured by the incidence of small particular matter) have a surprisingly great effect on the international differences in the mortality along with the impact of differences in economic development and in health damaging behavior originating from the past economic systems. The share of health care expenditure in the GDP also has a significant effect on mortality, but its effect increasing by life expectancy is not sufficient to neutralize the effect health damaging behavior pushing mortality rates high.

The corruption risks rised from 2009 in the Hungarian public procurement according the results on analysis of public procurement tenders in Hungary. This effect intensified especially after the modification of the public procurement law in 2011. In line of our estimation of price distortion the rise of corruption risks have grown at an accelerated rate after 2011 and we assume that this trend was in contact with the increasing spread of overpricing. The competitive intensity of public procurement had decressing tendency during the period of 2009-2015. The EU funded tenders have worse performance in case of corruption risks, competitive intensity, and transparency, compared with Hungarian-funded ones. The former ones are characterized by weaker competition, lower transparency, a higher level of price distortion, and higher corruption risks. The result points out the effects of crony capitalism on weakening competition and increasing price distortion, especially in EU funded public procurement. In Hungary the EU funds – besides their hypothetical positive influence

on the development of the Hungarian economy – have certainly a special and perverse effect: they foster the practice of political favoritism and fuel crony capitalism.

AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

The research investigates the differences in technical efficiency (TE) and in technology and heterogeneity between less favoured areas (LFA) and non-less favoured areas farms in Slovenia. Results indicate that there is only a minor and statistically non-significant difference in TE between these groups. Estimations show that farms in LFAs are not more inefficient but rather use different, production-environment specific technologies. These findings call attention to the fact that omitting the effect of heterogeneity on production technology leads to biased TE estimates and, in turn, leads to potentially imperfect policy choices.

The research investigates the innovation performance in the Hungarian food chain using the concept of open innovation. Results imply the openness along the food chain may decrease the introduction time of innovation in all areas of innovation, as well the innovation propensity. The openness towards competitors may decrease the introduction time of innovation with regard to technological innovation, but it may increase with regard to product innovation, as well the innovation propensity. The absorptive capacity decreases the introduction time of technological product, organizational and market innovation. There is a positive relationship between the use of external and own innovation capacity with regard to innovation propensity, but not when it is defined as openness along the food chain.

The research examines the pattern, duration and country-level determinants of global agrifood export competitiveness of EU-27 member states and 23 major global agri-food trading countries. Results suggest that duration of revealed comparative advantage is short lieved and heterogeneous at the agri-food product level. The level of economic development, the share of agricultural employment, subsidies to agriculture, and differentiated consumer agri-food products increase the likelihood of failure in the duration of comparative advantage, while agricultural land abundance and export diversification reduce that likelihood. Results are robust for both EU-27 member states and major global agri-food trading countries.

The research investigate determinants of quality upgrades in European Union agri-food exports using panel data models for the period 2000-2011. By employing highly disaggregated data we show that the unit value of exports is positively correlated to level of economic development and size of population. Results highlight the negative impacts of comparative advantage and trade costs on upgrades in export quality. The analysis partly confirms the role of income distribution in quality specialization, that greater income inequality increases specialization in quality upgrades. Findings are robust when applied to alternative subsamples, including vertically specialized and final agri-food products.

GAME THEORY

A special form of externalities is due to information. In this study they investigated decisions by deposit holders whether to withdraw their deposits or not and how patterns of such behaviour lead to bank runs. The model assumed rule-of-the-thumb decisions based on past decisions by other deposits in their network. Theory predicted that higher correlation leads to a higher chance for bank runs and this was confirmed by simulated laboratory experiments, too.

The problem of risk allocation in finance leads to interesting theoretical and practical questions. How to allocate the portfolio risk among subportfolios? How much capital should be kept in reserves to cover our existing risk and how to share this among different subunits or departments? They took an axiomatic approach to study risk allocation, that is, they looked at the fundamental properties of different risk allocation methods. Generalising the axiomatisation of the Shapley-value they have shown that core compatibility, equal treatment property and strong monotonicity are incompatible when risk is measured using coherent measures of risk. They also found that on illiquid markets the class of risk allocation games coincides with the class of totally balanced games. These properties have been studied on several popular methods both analytically and using simulations. Their main conclusion was that the incompatibility is more than just a mere theoretical artefact, but a real practical problem. This deep study of the various practical methods used should benefit theorists and practical users alike.

As part of the normal operation of financial markets actors have liabilities to each other. When the assets of an actor cannot cover its liabilities it must file for bankruptcy. A bankruptcy rule then determines how to allocate the available assets to their creditors. Looking at the case when there is a smallest accounting unit -- such as a whole forint -- they have introduced a convenient representation for bankruptcy rules.

A payment matrix is a clearing matrix if it satisfies limited liability, priority of creditors and follows the bankruptcy rules of the actors. Clearing matrices and the resulting final equities are not well-defined. They have shown the possible range of equities. As a main contribution they have studied decentralised clearing processes and have shown that they all converge to the smallest clearing matrix in finite number of steps. If the accounting unit is sufficiently small then the decentralised clearing process gives practically the same assets as centralised clearing. As an important policy implication there is no need to collect the actors' sensitive data for centralised clearing.

FIRMS, STRATEGY AND PERFORMANCE

Their research analyzes which types of firm-level shocks were associated with the centralization of strategic decision-making during the recession of 2008-09. We use a unique survey dataset of more than 14000 manufacturing firms from seven European countries. The study is motivated by theoretical approaches claiming that organizations under considerable stress are more likely to centralize. The results present evidence that employment change and postponing innovations are indeed associated with centralization even when control for ownership, group structure, financing, management, and strategy is included.

A unique cross-section survey of manufacturing firms from four European countries (France, Germany, Italy, Spain) linked with balance sheet data studies the relationship between key aspects of globalization and firm-level markups. The main results are: (i) Exporting is

positively correlated with markups; (ii) Importing intermediate inputs and outsourcing are also positively correlated with markups; (iii) Firms with affiliates have higher markups than other firms, while simply membership in a group or being foreign-owned seem to be less important; (iv) Perceived competition from low-cost markets is negatively correlated with markups; (v) Higher quality production and innovation, especially if it results in IP, has a strong positive relationship with markups; (vi) While these variables are correlated, they are significant in a joint model including all four groups, and `fully globalized' firms tend to charge around 100% higher markups than non-globalized firms.

A research into the impact of foreign-owned large plant closures on local firms in Hungary examines 41 such events between 1992 and 2012. The study finds that after the foreign-owned large plant closures sales of nearby firms decreased by 6 percentage points and employment decreased by 3 percentage points on average. Firms operating in local services were hurt even more, suggesting that reduced local purchasing power due to the layoffs is a significant channel of the local plant closure effect. Firms operating in the supplier industry of the closing plant also decreased employment more than average, suggesting that input-output linkages play an important role in the propagation of negative shocks. In contrast, firms in the industry of the closing plant increased their employment, suggesting that they could benefit from the increased local labor supply.

In November 2005, the Hungarian government frontloaded the unemployment benefit path, while kept constant the total benefit amount that could be collected over the unemployment spell. The research studies the effect of this reform on non-employment duration using an interrupted time series design. The results show that non-employment duration fell by 1.5 weeks after November 2005, while reemployment wages and the duration of new jobs remained the same. The research also demonstrates that the decrease in non-employment duration was large enough to make the benefit reform revenue neutral. The researchers' welfare evaluation for this reform is positive: frontloading increased job finding, it made some of the unemployed better off, and did not cost anything to the taxpayers.

ECONOMICS OF NETWORKS

The research project examined the role of various networks in spreading knowledge, and how the knowledge-flow generated by networks of ties influences the economic performance. Researchers studied these networks to find the answer to the question how they affect labor market processes, as well as the firm productivity and regional development. According to their results, labor-flow between firms is an important instrument of knowledge spread and has a significant role in improving firm performance. Productivity differences between the sending and receiving firms have been found to drive significantly these spillovers, and they demonstrated that the influence of labor-flow on firm productivity is affected by the technological similarities of industries, as well as the experience of international operation of firms (knowledge spillover between multinational and domestic firms). The results demonstrate that technological proximity of industries increases the positive effect of productivity differences: labor inflows from industries that are more skill-related to the firm increases productivity more, particularly inflows from the same industry.

The research project carried out with Swedish partners studies firstly the role of social networks in regional productivity growth. The project confirms the statement that the density of social networks has a positive effect on productivity growth of regions. Additionally, by means of co-workers networks, researchers also found new evidence that rather diverse knowledge externalities have more important role in metropolitan regions of large cities,

whereas in regions of middle-sized cities knowledge externalities based on specialization have a dominant role.

MECHANISM DESIGN

Their research was concerned with the specialities of the Hungarian higher education admissions from an optimisation point of view. The most important special features are the ties, the lower quotas for the programmes, the common upper quotas on some sets of programmes and the applications for pairs of teachers' programmes. They have formulated integer programmes for solving each of these specialities and they tested their performance of real data from 2008. As a particularly interesting result they demonstrated that the NP-hard problem of lower quotas was in fact tractable for the real data after using a sophisticated filtering method.

In a joint work with foreign colleagues they studied a cooperative game where pairs of players can form coalitions, they can share their total utilities with side-payments and every player may be involved in several pairs up to her capacity. They gave an efficient method for finding a stable solution, if there exists one. They have also considered the core of this game, they showed that if every player has capacity at most two then a core solution can be found efficiently, if the core is nonempty. However, when every player has capacity three or more then the problem of checking whether a solution is in the core is already co-NP-complete.

The studied the kindergarten allocation problem for an Estonian municipality close to Tallinn. They tested seven possible policies through simulation on real data from 2016 using the student-optimal stable solution by the Gale-Shapley algorithm. They found that the way of setting the distance priorities has already a huge impact on the results. They did a sensitivity analyses to check how robust are the results for the changes in the input, and in particular when the preferences of the parentsare affected by the distance and sibling factors with different intensities.

They also studied the stable roommates problem for the special setting where the players' preference lists are restricted. Many applications has this feature as a player may only find a few other players acceptable, e.g. for becoming her roommate. The paper contains primaliry complexity results, but besides proving the NP-hardness of different special cases they also give an approximation algorithm.

b) Science and society

The Institute's research portfolio contains both theoretical and applied empirical research in topical economic policy and welfare issues. A few examples of topics of this kind include the research on universities group project roster; on the Hungarian food-chain supplies' innovation performance; corruption researches; pension system. They studied the role of networks and labor- flow on labor-market processes and firm-productivity, the role of social networks in regional productivity growth, the labour market situation of those employed under the public work scheme, the effects of foreign currency lending, the growth processes of Hungary, out-migration of Hungarian doctors and also the effect of the unemployment benefit path's reform.

The Institute sets great store by publishing the research results that society is likely to put to good use, raising awareness of them in the right forums and public events and making them available for the interested public at its website.

The results of labour market research are given publicity annually at a labour economics conference in Szirák, the 2016 edition of which had the title Labour market research in 2016 (*Munkaerőpiaci kutatások 2016*). Papers were presented in five sections.

Volume 16 of the Labour Market Yearbook presenting the topical characteristics of the Hungarian labour market and employment policy in Hungary and analysing various areas of this topic in detail was published in Hungarian and in English. The yearbook presents the characteristics of the processes in and the internal interconnections of the Hungarian labour market on the basis of available statistics, theoretical research and empirical analyses, in an easy-to-follow style and structure and in an international comparison. In keeping with the earlier practice adopted by the editors of the series, an area that is key to understanding labour market processes in Hungary and the success of fact-based employment policies was selected for special discussion. The Close-up ($K\ddot{o}zelk\acute{e}p$) chapter of this year's edition discusses the international migration.

The 2016 edition of Competition and Regulation (*Verseny és szabályozás*) analyses the sectoral and competition rules' past, present and future. Readers of this volume can also learn about the network industries' market and regulation system. It also discusses the role of data and information in sectoral and competition rules. The yearbook ends with a detailed Hungarian and international bibliography.

In 2016, the Institute hosted two successful conferences: one in June, organised by our Institue and BNU Business School: 6th International Conference on trade, labor economics, education economics and finance. This year saw the 13rd edition of the international conference *Transition in Agriculture – Agricultural Economics in Transition*, organised by the Agricultural Economics and Rural Development research team.

The research results achieved in the Institute and discussed in seminars were published in 37 working papers and 6 issues of the Budapest Working Papers on Labour Market (Budapesti Munkagazdaságtani Füzetek). A professional blog serving as a discussion forum for the Institute's research results, policy opinions and topical economic, public and socio-political issues is in place and is regularly used by the staff to disclose their opinions and papers thereby facilitating social interaction. News about the media presence of the staff is available in the Press Survey section. The website offers up-to-date information in both English and Hungarian on the main activities, publications and projects of as well as the conferences and seminars organised by the individual research groups.

III. National and international relations and co-operation in 2016

Researchers of the Institute teach at nearly all Hungarian higher education institutions offering undergraduate and graduate courses in economics (CEU, BCE, ELTE, DE, PTE, etc.). Furthermore, they are engaged in PhD programmes at Pannon University in Veszprém, Kaposvár University, Szeged University and Szent István University under a co-operation agreement. They also teach at universities (Cardiff University, UK Open University) and work as external researchers in prestigious research institutes (CEPR, IZA) abroad.

As a result of the measures taken in the interest of establishing the professional integration of research in competition regulations, a forum has been set up for lecturers and professionals at universities, research institutes and institutions of public administration in Hungary and abroad dealing with competition regulations, the economics of network industries and the legal issues of regulations.

The Institute organised its Summer Workshop for the sixteenth time, offering a forum for young economists studying or working abroad.

Researchers provide expert services for the Competition Office, the Central Statistical Office, TÁRKI, FIW and the Fiscal Council. Its researchers include consulting experts of the Monitoring Committee of the Economic Development and Innovation Operational

Programme, members of the Advisory Panel of Parliaments and Civil Society in Technology Assessment (PACITA) and the Expert Group 'Strategic Foresight for R&I Policy in Horizon 2020' (SFRI) at the European Commission's DG Research and Innovation. The Institute is an advisory member of the Evaluation Committee of the National Strategy entitled "Let's Make Things Better for Our Children" and the Indicator Sub-committee.

Many researchers are founders or members of the presidium of the Hungarian Society of Economics and participate as members of the presidium in the work of the Hungarian Economic Association.

IV. A brief description of successful national and international applications in 2016

There were 27 OTKA project in progress in 2016. Research in 7 new topics was commenced. Regarding project applications, the HAS Lendület (Momentum) Programme, under which mechanism design research and research in corporate strategies and competiveness continued, is of key importance.

A project entitled *Education Economics Network* financed under the H2020 programme was launched. It marks the start of an enhanced cooperation in the field of education economics between three top ranked economics of education research groups in EU-15 countries - KU Leuven, U Maastricht and Politecnico di Milano - and the CERSHAS. Education economics is one of the most important applied economics fields that provide direct evidence to policy makers on educational issues. The proposed project focuses on three clusters of methodologies – program evaluation, structural modeling and efficiency analysis – and fosters cooperation between the institutions along more specific research lines within these clusters.

V. Major publications during the year

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