The Public Defense

of the Doctoral Thesis in Economics

by

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on

**History as an Agent of Growth:
Natural Experiments from Central Europe**

will be held on

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Central European University

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The doctoral thesis is available for inspection
at the CEU Economics Department

Abstract

In my dissertation, I study various aspects of economic growth and development that are related to societal or cultural factors. These include the economic consequences of social diversity, the cultural determination of fertility patterns and their potential implications for income growth, or the importance of infrastructural developments for the diffusion of growth-enhancing ideas. Questions like these are of great current importance, yet identifying one-way causal relationships on the basis of contemporary data is often not possible due to issues of endoegenity, simultaneity and reverse causality.

For this reason, my dissertation takes a historical approach that provides more credible identification on account of cultural diversity, social immobility, as well as limited geographical proximity and economic interdependence that characterized past societies. Specifically, all dissertation chapters focus on the Austro-Hungarian Monarchy (1867-1918), and historical Hungary in particular. While this choice is motivated in no small part by personal reasons, this Central European empire of the so-called long 19th century is a natural setting for this kind of reseach: it was characterized by an extreme degree of societal diversity due to its turbulent past, supreme social and political stability, and rapid industrialization and economic modernization all at once. It is precisely this dichotomy between that I have exploited in my doctoral research.

The empirical analysis in all dissertation chapters is based on a new, unique, comprehensive database of more than a 1000 Hungarian townships I hand-collected from official statistical sources from the 1869-1910 period. The systematic compliation and digitization of this multi-faceted dataset took up a considerable part of the time, efforts and resources invested in my doctoral studies, and can be considered as a valauable contribution to the field of European economic history on its own. The wide range of local-level information featured in the dataset come mainly from primary historical sources such as population censuses, periodical statistical publications and thematic inventories published by the Hungarian Statistical Office, and include population characteristics (e.g. size, ethnic and religious background, age profile, marital status, fertility and mortality patterns), economic indicators (e.g. tax revenues, landownership, industrial activity, labour market performance, access to infrastructure), as well as location-specific data in a longitudinal setting.

The three dissertation chapters make extensive and integrated use of this data in the service of well-defined research questions. The first chapter looks at the effect of ethnic and religious diversity on economic growth. Specifically, I find that diverse townships grew much faster during the 1880-1910 period than their homogeneous neighbors, likely due likely to productivity differences between groups that provided increased opportunities for efficient industrial sorting along ethnic and religious lines. The second chapter proposes a new explanation for the historical source of Protestant economic prosperity based on the reformed institution of marriage and the modern family. The empirical analysis reveals that the economic advantage of Calvinist townships in 1910 relative to Catholic or Lutheran ones is rooted in their modern marriage patterns, smaller household size and low fertility rates, that made it possible to increase the efficiency of agricultural production without technological advancements. The third chapter studies the

effects of railway roll-out on the spread of ideas and institutions in 19th-century Hungary, and finds that railroads were important capillaries of institutional development: connecting to the network meant faster emergence and more rapid development of growth-enhancing public institutions that facilitated the production and exchange of ideas, such as civil organizations, libraries, press outlets, coffee houses, theatres or thermal baths.

At a more general level, my doctoral research demonstrates the persistent influence of historical accidentalities on subsequent economic development as well the cultural determination of economic outcomes. From a more methodological perspective, it not only indicates the wealth and breadth of available and accessible historical data for Central Europe, but also highlights some interesting historical idiosyncrasies that may be exploited for future scientific research.

Chapter 1: Economic Growth Spurred by Diversity: Evidence from the Austro-Hungarian Monarchy

The first chapter in my dissertation looks at a salient yet not very well understood aspect of present-day economic development – that of mixed populations and diverse societies. In particular, I study the consequences of ethnic and religious diversity on economic growth in the context of the Austro-Hungarian Monarchy. By being the most diverse country formation in all of modern Europe where diversity permeated even the lowest of administrative levels, this latter provides a perfect setting for such an enquiry.

The empirical analysis in the paper contains three different yet closely related measurement strategies. First, I take direct advantage of the largely random geographical variation in diversity as a natural experiment and estimate the growth difference between diverse and non-diverse places with plain OLS. While diversity is typically endogenous, to economic development, the weak statistical relationship between diversity and observable township characteristics in the pre-industrialization period suggests that the standard issue of migration-based reverse causality is of limited importance in the current context. Main regression estimates suggest that diverse townships grew by up to 20-60% faster during the 1880-1910 period than their homogeneous neighbors, a result corroborated by a wide range of robustness checks.

To address the issue of unobserved heterogeneity across townships, I then present diversity estimates based on two different IV strategies. The first uses data on ethnic diversity as of 1720 as an instrument and thus disregards the potentially endogenous effects of mass re-population movements of the 18th century. The second approach is truly novel and exploits warfare as a genuine historical driver of local-level diversity. Standing at the crossroads between Western and Eastern civilizations, Hungary was exposed to continuous warfare for centuries that set off migration movements and population mixing of an unparalleled magnitude. Based on a self-compiled unique dataset of more than 2000 documented war events on Hungarian territories between 1391 and 1718, I use the number of military events in a township as an IV. The resulting 2SLS estimates and reduced-form coefficients confirm the main OLS results and point to the

important causal role of diversity in driving economic growth differences across townships.

Finally, to understand the mechanism through which social diversity translated into higher growth during an era of rapid industrialization, I propose a simple model of industrial selection that features the potential trade-offs between comparative productivity advantages and reduced knowledge spillovers diverse communities are likely to face. The model implies that, while individuals in diverse places tend to face higher entry costs when making their occupational choice as a result of non-communication between groups, they may nevertheless capitalize on relative group-specific productivity advantages in specific sectors to earn higher wages. Empirical tests of the model's predictions are based on township-level statistics on workers' distribution across economic sectors and industries in 1900 and 1910. These confirm that the benefits of diversity outweighed its costs: mixed places 1) were more industrialized, 2) developed more complex local economies due to ethnic and religious sorting, and 3) had higher concentration of employment in productive industries.

Importantly, these findings challenge the controversial but dominant view in the literature that social diversity is detrimental to economic development, and show that diversity gains based on productivity differences may be generated even amid group antagonism. My results are also relevant for economic historians of the Austro-Hungarian Monarchy, as they emphasize the hithertho overlooked centripetal role played by diverse communities in market integration and technological innovation.

Chapter 2: What's Love Got to Do with It? The Modern Family and Its Importance for Protestant Economic History

The second chapter of my dissertation is devoted to the study of the historical sources of the relative economic prosperity of Protestant communities. Max Weber's thesis about the role of ascetic religiosity in the emergence of modern capitalism is undoubtedly the most famous explanation provided, but recent contributions to the economics literature give equal prominence to higher literacy or improved public good provision observed in Reformed communities. Not only are these theories largely incompatible with one another, the very existence of Protestant economic progressiveness is also disputed by numerous studies.

My paper proposes a new, more generic explanation that can potentially accommodate many of the aforementioned findings. In particular, by recognizing marriage as the most influential institutional change associated with Reformation, I argue that the immediate source of Protestant progressiveness concerns the domestic sphere rather than the economic one. More specifically, I claim that the insistence of early Reformers, Calvin in particular, that spouses had a religious duty to love one another, rationalize family life, and educate children for the glory of God was instrumental in the emergence of the child-centered modern family, which contributed to the fertility decline and economic take-off of the 19th century. Beyond its generality, this theory has the added merit of highlighting previously overlooked but potentially relevant economic differences within the Protestant

faith, given the divergent family ideals of down-to-earth Lutherans and puritan Calvinists.

Using the aforementioned hand-collected township-level dataset, the empirical analysis in the paper takes advantage of historical Hungary as being the only European country with a rich blend of Catholic and various Protestant denominations living in a mixed inter-religious arrangement. Focusing on within-district differences in per capita tax base by religion, OLS regressions reveal that, in 1910, Calvinist townships were 10% and 20% richer on average than their Catholic or Lutheran neighbors, respectively, even after differences in population size, literacy and a range of auxiliary township characteristics are accounted for. Interestingly, the Calvinist income gap is not explained by differences in labour market performance, industrialization, or access to finance (which systematically favored dominant Catholics), and is equally existent in agricultural areas.

In contrast, denominational differences in terms of demographics are straightforward and unequivocal. Calvinist places were characterized by more modern marriage and fertility patterns, as evidenced by a higher share of married, divorced and widowed population, smaller and more nucleated households, as well as lower rates of fertility and natural increase. While statistically highly signficant, it is the economic magnitude of these differences that is most striking: in some cases, they represent a residue of a full standard deviation, or several decades of development advantage from a historical perspective. Moreover, similar marriage and birth patterns are observed for the much earlier period of 1784-1787 as well, suggesting that potential endogeneity and reverse causality considerations are unlikely drivers of these results.

To understand how exogenous variation in fertility translates into income differentials, I develop a simple theoretical model of fertility choice along the lines of the unified growth theory. This model implies that while lower child preference (or higher childrearing costs) leads to higher per capita income in the Malthusian steady-state of an agricultural economy, land ownership and increasing non-wage income of farmers may, over time, gradually eliminate these advantages at the Post-Malthusian stage of development. The model's main predictions are liable to be tested on agricultural statistics from late 19th-century Hungary, which should confirm the less fragmented and more efficient use of arable land by Calvinists.

Chapter 3: Ideas off the Rails: Railroads and Institutional Development in the Austro-Hungarian Monarchy

(joint with Miklós Koren)

The third chapter in my dissertation studies the effects of railway roll-out on the spread of ideas and institutions in historical Hungary. This is an important question for two reasons. First, despite the large literature emphasizing the importance of political institutions for economic growth, the role of cultural institutions that facilitate the production and exchange of ideas has received less attention. Second, while the role of European cities as seedbeds of capitalist practices and innovative institutions is widely

recognized, very little is known about the spatial patterns of emergence and adoption of these.

The paper provides some new insights in this regard by linking the extensive roll-out of the railway and the rapid geographical diffusion of Western institutions in 19th-century Hungary. Specifically, it aims to identify an important cultural channel of economic growth associated with one of the most disruptive modern technologies, as distinct from the direct economic effects operating through trade or labour mobility. This poses formidable methodological challenges. First, one needs to isolate the one-way effect of railroads on institutional progress from among a complex set of simultaneous development outcomes, which prompts us to employ a variety of different econometric techniques and reckon taking a model-based approach. Second, one needs to consider institution types that were truly instrumental for the production and exchange of ideas, which made us turn to cultural historiography for focusing on institutions such as civic associations, libraries, press outlets, cafés or thermal baths.

In the empirical analysis, we work with a yearly panel of 1000+ townships covering the 1800-1910 period, rely on the minutious reconstruction of more than 20 thousand kms of railway network development, and use both cross-sectional and over-time variation in several thousands of observations by each institution type. Specifically, we find that institutional development was positively affected by railroad access: not only are institutions more concentrated in treated townships, but post-treatment outcomes tend to remain different even if pre-treatment discrepancies in trends and levels are accounted for (by event study analysis and propensity score matching). More tentative evidence also suggests that some of the estimated railroad effect persists even if exogenous variation in treatment status is used, on the basis of predicted assignment probabilities and durations associated with telegraph access and intermediary straight-line corridors as IVs.

These findings are somewhat conjectural but may serve as a starting point for developing and testing a simple model of cultural contagion where the spatial characteristics of the railway network are exploited in more detail, as well as for quantifying the effects of institutional development on economic growth at the local level. While the implementation of these ideas remains for future work, even the current version of the paper makes interesting contributions to the burgeoning literature on the economic consequences of cultural institutions, knowledge flows and infrastructural developments. For economic historians of 19th-century Central Europe, the paper is most pertinent on account of its emphasis on the dual (i.e. economic and cultural) determination of the inter- and intra-regional modernization patterns of the Austro-Hungarian Monarchy.

CURRICULUM VITAE

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RESEARCH INTERESTS

Applied microeconomics, Growth and development, Economic history

EDUCATION

09/2010 –	PhD Candidate in Economics, Central European University
09/2007 – 06/2008	Master student in Political Philosophy and Ethics, Sorbonne University
01/2005 – 06/2005	Visiting student at the Faculty of Economics and Econometrics University of Amsterdam
09/2000 – 06/2006	MA in Economics, Corvinus University of Budapest Majors: Finance, Economic Policy

RESEARCH AND WORK EXPERIENCE

12/2013 – 11/2015	Research assistant, Division for Employment Analysis and Policy Organisation for Economic Co-operation and Development, Paris
01/2013 – 07/2013	Research assistant to Professor Koren for the "Knowledge flow" project Economics Department, Central European University, Budapest
04/2009 – 10/2012	Actuary, Supervisory Division of Banking Groups Hungarian Financial Supervisory Authority, Budapest
10/2006 – 10/2007	Visiting fellow, Research Departments Federal Reserve Banks of Boston and New York

TEACHING EXPERIENCE

Graduate level   Data Analysis for Economic Policy (Spring 2013, CEU)
                        Statistics (Fall 2012, CEU)
                        Macroeconomics for Public Policy (Winter 2011, CEU)
                        Mathematical Statistics (Fall 2011, CEU)
                        Introduction to Econometrics (Fall 2011, CEU)

Undergraduate level   Economic Policy (2003/2004, Corvinus University of Budapest)
                        Microeconomics (2002/2003, Corvinus University of Budapest)

PUBLICATIONS IN REFEREED JOURNALS

"Revisiting the Effect of Immigration on Native Employment in the EU", *Research in Economics and Business: Central and Eastern Europe*, Vol. 4, No. 1, pp. 5-18, January 2012.

"Estimating the Hungarian New-Keynesian Phillips Curve", *Acta Oeconomica*, Vol. 58, No. 3, pp. 295-318, September 2008.

POLICY CONTRIBUTIONS

"Measuring Labour Market Security and Assessing Its Implications for Individual Well-being", (with Alexander Hijzen), *OECD Social, Employment and Migration Working Papers*, No. 175, January 2016.

"Enhancing Job Quality in Emerging Economies", (with Paolo Falco and Sandrine Cazes), *OECD Employment Outlook*, Chapter 5, September 2015.

"How Good is Your Job? Measuring and Assessing Job Quality", (with Paolo Falco, Alexander Hijzen, Hande Inanc and Anne Saint-Martin), *OECD Employment Outlook*, Chapter 3, July 2014.

"Supervisory Review Process at the Hungarian Banking Groups" [in Hungarian], (with Vilmos Fliszár, Béla Krekó and Márk Szenes), Financial and Economic Review , Vol. 9., No. 4.

SELECTED CONFERENCE PRESENTATIONS AND SEMINARS

PhD Meeting of the Royal Economic Society, 3-4 January, 2017, London
41st Simposio of the Spanish Economic Association, 15-17 December, 2016, Bilbao
INET Young Scholar Initiative Plenary, 19-22 October, 2016, Budapest
22nd Dubrovnik Economic Conference, 12-14 June, 2016, Dubrovnik
Budapest Science Meet-up, 14 April, 2016, Budapest
Regional Development Seminar, OECD, 11 June, 2015, Paris

Applied Economics Work-in-Progress Seminar, OECD, 18 March, 2015, Paris
Applied Economics Lunch Seminar, Paris School of Economics, 17 February, 2015, Paris
WEAST wksh. "Historical sources of development in CEE", 9-10 Jan., 2015, Budapest
Summer School of the European Historical Economics Society, 1-5 Sept., 2014, Berlin
29th Annual Congress of the EEA, 25-29 August, 2014, Toulouse
17th IZA European Summer School in Labour Economics, 12-18 May, 2014, Ammersee
Frontier Research in Economic and Social History meeting, 6-7 July, 2013, Warsaw
Economic Challenges in Enlarged Europe (ECEE) conference, 17-19 June, 2012, Tallinn
1st Conference of the Hungarian Society of Economics, 19-20 December, 2007, Budapest
Lunch Seminar, Federal Reserve Bank of Boston, 6 April, 2007, Boston

HONORS AND SCHOLARSHIPS

Write-up Grant for Doctoral Students, Central European University (2016)
Advanced Doctoral Student Award, Department of Economics, CEU (2013)
Olga Radzyner Award, Austrian National Bank (2013)
Doctoral Fellowship, Central European University (2010-2103)
Graduate Scholarship of the French Government (2007-2008)
Scholarship of the Hungarian-American Enterprise Scholarship Fund (2006-2007)
Erasmus Scholarship (2005)

SKILLS

Languages: Hungarian (native), English (fluent), German (advanced), French (advanced)
Software: STATA, Python, MATLAB, R, LaTeX, MS Office