

The Public Defense  
of the Doctoral Thesis in Economics  
by  
István Boza  
on

**Possibilities in Linked Employer-Employee  
Panel Data**

will be held on  
Thursday, 13 January, 2022 at 14:00 pm  
online via Zoom (registration: [szimlerk@ceu.edu](mailto:szimlerk@ceu.edu))

Central European University  
Doctoral School of Economics

**Thesis Committee:**

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**Supervisors:**

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(External Examiner)

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(Internal Examiner)

The doctoral thesis is available for inspection  
at the CEU Department of Economics and Business.

## Abstract

The thesis consists of four chapters connected by their methodology, data usage and shared focus on wages and inequality. The content of the individual chapters are summarized in the following abstracts.

### **Chapter 1: Wage Structure and Inequality: The Role of Observed and Unobserved Heterogeneity**

This study aims to contribute to the literature of firms and occupations as prominent drivers of wage-inequality in multiple ways. First, we synthesize novel modelling approaches of recent studies in the field and use administrative linked employer-employee panel data from an Eastern European country, Hungary, to assess the contribution of individual, firm and job heterogeneity – and their interactions – to overall wage inequality. Consistent with earlier findings from Western Europe, Scandinavia, the US and Brazil, we show that firm heterogeneity provides around 22%, individual heterogeneity 50%, and occupational heterogeneity 8% of overall wage dispersion, with wage sorting between firms and individuals in itself explaining around 9%. Notably, around half of this contribution is accountable to observable sub-components of individual and firm wage effects. Also, the same magnitude of assortativity can be found between individuals and occupations. Utilizing unique features of our data, we compare mathematics and literature test score records of 10<sup>th</sup> grade students to their future labor market outcomes, finding a positive correlation between test scores and future firm value added, a direct evidence for assortative matching in productivity. Finally, we assess sorting along observable characteristics such as gender, education, occupation, worker age, and the ownership of employers.

### **Chapter 2: A Fixed-effect Approach to Estimating Rent-sharing Elasticities**

The paper provides rent-sharing elasticity estimates from Hungarian administrative linked employer employee panel data. By combining recent advances in the literature of rent-sharing and firm-specific wage premia, we propose an estimation design which relies on within-firm identification of wage effects of inter-temporal productivity changes of the firm, while also controlling for the heterogeneity in the firm's workforce composition, but still incorporating information on the wages of both stayers and job-switchers. Hence this approach intends to solve the selectivity issues present in the state-of-the-art specification of productivity-wage pass-through estimations. The estimated OLS elasticities range between 0.05-0.16, while estimates relying on internal instruments, such as past productivity, range between 0.12-0.18 across the established specifications. The selectivity problem turns out to be only a second-order issue.

A second set of results focuses on heterogeneity of firms with respect to their rent-sharing behaviour. We find that, while the wage-productivity relation in cross-sectional research designs is weakest in agriculture, firms of this sector show the strongest response to inter-temporal changes of productivity. Finally, we test whether firms share their rents differently

with different sub-groups of their workers as such phenomena can be a prominent source of within-firm wage differences. Even after accounting for the possible non-random sorting of workers into firms with different firm-specific pass-through rates, we find significantly higher wage reactions for males, more educated workers, and for those in better occupations, and minor differences for those with more seniority in the given firm. The gender differences are also found to be stable across different occupations and firm types.

### **Chapter 3: Decomposition of Co-worker Wage Gains**

**Joint work with Virág Ilyés, published as Boza and Ilyés (2020)**

We address the presence, magnitude and composition of wage gains related to former co-workers, and discuss the mechanisms that could explain their existence. Using Hungarian linked employer-employee administrative data and proxying actual co-worksip with overlapping work histories, we show that the overall wage gain attributable to former co-workers consists of multiple elements: a contact-specific, an individual-specific, a firm-specific and a match-specific component. Former co-workers, beside the direct effect of their presence may funnel individuals into high-paying firms, enhance the sorting of good quality workers into firms, and may contribute to the creation of better employer-employee matches. By introducing and applying a wage-decomposition technique, we demonstrate that there are non-negligible differences between linked and market hires in all empirically separable wage elements. By focusing on specific scenarios, we provide additional empirical evidence in favor of employee referral and information transmission as the main drivers of co-worker gains.

### **Chapter 4: Wage Gains from Foreign Ownership: Evidence from Linked Employer-Employee Data**

**Joint work with János Köllő and László Balázs, published as Köllő et al. (2021)**

We compare the wages of skilled workers in multinational enterprises (MNEs) versus domestic firms, the earnings of domestic firm workers with past, future and no MNE experience, and estimate how the presence of ex-MNE peers affects the wages of domestic firm employees. The analysis relies on monthly panel data covering half of the Hungarian population and their employers in 2003–2011. We identify the returns to MNE experience from changes of ownership, wages paid by new firms of different ownership, and the movement of workers between enterprises. We find high contemporaneous and lagged returns to MNE experience and significant spillover effects. Foreign acquisition has a moderate wage impact, but there is a wide gap between new MNEs and domestic firms. The findings, taken together, suggest that MNE employees accumulate partly transferable knowledge, valued in the high-wage segment of the local economy that is connected with the MNEs via worker turnover.

# Curriculum vitae – István Boza

## Contact

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## Personal

Citizenship: Hungarian

Date of birth: 25th May, 1990

## Education

- 2016-(2022) PhD Student in Economics, Central European University, Budapest  
Thesis: *Possibilities in Administrative Linked Employer-Employee Panel Data*
- 2012-2015 Economic Analyst MA (with honours), Eötvös Loránd University (ELTE)  
Thesis: *Agent-based Simulation Analysis of a Modified Tourist-Trap Model*
- 2009-2012 Applied economics BA (grade: excellent), Eötvös Loránd University (ELTE)  
Thesis: *Tax-shifting and competition in the Hungarian cigarette market*

## Research experience

- 2021 - Junior research fellow, Institute of Economics – CERS
- Education and Labour Economics research unit
- 2020 Research Assistant, Umeå University
- Investigating residential mobility probabilities and patterns of Swedish youth
- 2019 - 2020 Research Assistant, Budapest Institute
- Preparing administrative data for policy analysis of wage subsidy programs
- 2019 - 2020 Researcher, Institute of Economics – Centre for Economic and Regional Studies
- Exploring educational and employment histories of future convicts
- 2018 - 2019 Research Assistant, CEU MICRODATA research group
- Cleaning and analyzing administrative VAT data from the Statistical Office
- 2017 Research Assistant, Corvinus University
- Investigating contract-enforcement and rent-seeking on a firm-level survey
- 2015 - 2016 Research Assistant, Databank of the Institute of Economics - HAS
- Cleaning the data of the Hungarian Household Budget Survey's latest wave
- 2015 - 2016 Research Assistant, DeFacto Blog, Central European University (CEU)
- Testing reproducibility of results presented in economics themed blog posts
- 2014-2015 Research Assistant, Central European University (CEU)
- Estimating wage returns to experience at multinational employers
- 2013 Research Assistant, Institute of Economics - Hungarian Academy of Science
- Estimating politicians' (long-term) wage gain on administrative data

## Teaching experience

2021	Teaching Labor Economics at ELTE TÁTK, 2 semesters
2017-2019	CERGE Teaching Fellow at ELTE TÁTK, teaching Microeconomics I and II
2017-2019	Teaching Assistant at CEU for Econometrics I and II and "R skills" courses
2012-2016	Teaching Assistant in Labor economics class (ELTE TÁTK), 4 semesters
2014-2015	Teaching Assistant in Microeconomics I. and II classes (ELTE TÁTK), 3 semesters

## Publications

- (with János Köllő and László Balázs). "Wage Gains from Foreign Ownership – Evidence from Linked Employer–Employee Data " *Journal for Labour Market Research* 55 (3). 2021. <https://doi.org/10.1186/s12651-021-00286-0>
- (with Virág Ilyés). "Decomposition of co-worker wage gains" in *IZA Journal of Labor Economics* 9 (1). 2020. <https://doi.org/10.2478/izajole-2020-0008>.
- (with Donald Tomaskovic-Devey et al.). "Rising between workplace inequalities in high income countries" in *Proceedings of the National Academy of Sciences* 117 (17). 2020. <https://doi.org/10.1073/pnas.1918249117>
- (with Anikó Csáki, Virág Ilyés, János Köllő, Zsófia Kőműves, Lili Márk and Mercedes Mészáros). "Keresleti korlátok a börtönből szabadultak reintegrációjában" in *Mobilitás és integráció a magyar társadalomban*. 2020.
- (with Virág Ilyés). "A korábbi munkatársak bérekre gyakorolt hatása" in *Közgazdasági Szemle* 65 (7-8). 2018. <http://dx.doi.org/10.18414/KSZ.2018.7-8.726>.
- (with Károly Mike and Gábor Tamás Molnár). "A vállalkozói szerződések mint szerződéstámogató intézmények. Egy magyar vállalati felmérés tanulságai" in *Verseny és Szabályozás 2017*. 2018.

## Working papers / under review

- Wage Structure and Inequality: The role of observed and unobserved heterogeneity (KRTK-KTI Working Papers, 2021)
- (with Virág Ilyés, László Lőrincz and Rikard Eriksson). "How to enter high-opportunity places? The role of social contacts for residential mobility" — Under second review at *Journal of Economic Geography*
- (with Andrew Penner et al.) " Within Job Gender Pay Inequality in 15 Countries " — under second (minor) revision at *Nature Human Behaviour*
- (with Olivier Godechot et al.) "The Great Separation: Top Earner Segregation at Work in High-Income Countries" — under first (major) revision at *American Journal of Sociology*

## Other publications / presentations

- Beszélgetés a közgazdasági Nobel-díj díjazottjairól (2021, Széchenyi István college for adv. Studies)
- A multi tényleg többet fizet, de nemcsak ezért éri meg ott dolgozni (2021, Portfolio.hu)
- Miért kerül ennyibe egy doboz cigaretta? (2015, Index.hu)

## Conferences

- New Findings in Labor and Education Economics - organized by CERS-HAS (Szirák, 2021)
- EALE Virtual Conference Padua 2021 (online, 2021)
- XIV. Annual Conference of the Hungarian Society of Economists (Budapest, 2020)
- 6th Linked Employer-Employee Data (LEED) Workshop (Braga, 2019)
- New Findings in Labor and Education Economics - organized by CERS-HAS (Szirák, 2018)
- 6<sup>th</sup> International PhD Meeting in Economics (Thessaloniki, 2018)
- XI. Annual Conference of the Hungarian Society of Economists (Budapest, 2017)
- Network, Complexity and Economic Development International workshop (Budapest, 2017)
- VI. Annual Conference of the Hungarian Society of Economists (Budapest, 2012)

## Awards

2021	CEU Award for Advanced Doctoral Studies
2015	3 <sup>rd</sup> place at National Students' Science Conference (OTDK); Economics/ Macro-modeling section; Paper: <i>Agent-based Simulation Analysis of a Modification of the Tourist-Trap Model</i>
2014	1 <sup>st</sup> place at Students' Science Conference (TDK), Eötvös Loránd University Paper: <i>Freeconomics. The Zero-price effect and its marketing considerations</i>
2012	Award for outstanding thesis, Hungarian Society of Economists, 2012 Paper: <i>Tax-shifting and competition in the Hungarian cigarette market</i>
2011-2014	Distinguished Scholarship of the Hungarian Republic in 2011, 2013 and 2014

## Language skills

English, advanced (C1): 2009; Spanish, intermediate (B2): 2015;

## Other skills and certificates:

Statistical packages: professional Stata; intermediate SPSS and EViews

Programming languages: intermediate R, Matlab and Python

Other software: NetLogo, Gephi and Mapinfo knowledge

Certificates from various online courses in *data science*, *data mining* and *network science* topics (see: LinkedIn profile)