



The Public Defense  
of the Doctoral Thesis in Economics  
by

Márta Bisztray

on

Indirect Effects of International Investment and Trade

will be held on

Monday, September 26, 2016 at 9:30 am

in the

Senate room  
Central European University  
Nádor Street 9, Budapest

**Thesis Committee:**

Botond Kőszegi (Chair)

Alessandro De Chiara (Internal member)

Sergey Lychagin (Internal member)

Anikó Bíró (External member)

János Köllő (External member)

**Supervisor:**

Ádám Szeidl

**Examiners:**

Christian Fons-Rosen, Assistant Professor at Universitat Pompeu Fabra  
(External Examiner)

Sergey Lychagin, Assistant Professor at the Central European University  
(Internal Examiner)

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

## **Abstract**

In my thesis I look at the indirect effects of international investment and trade. There are several well-known direct effects: foreign direct investment (FDI) creates new workplaces and increases tax revenue; trade increases both the market for domestic goods and the scope of goods available for local buyers. There is also evidence in the literature showing that exporting and importing firms become more productive. At the same time indirect effects are less trivial, though these can also be important. On one hand, indirect effects like knowledge spillovers or increased demand can benefit other local firms. On the other hand, competition for local inputs might also become higher.

The three chapters of my thesis examine some of these indirect effects, both looking at their magnitude and the mechanism behind. In all three chapters I do an empirical analysis, using Hungarian firm-level panel data. In the first chapter I look for vertical FDI spillovers. Taking the large-scale investment of Audi in Hungary I find that local firms operating in the supplier industry increased their sales and employment after the Audi entry, which is in line with a local demand effect, but there is no evidence for increased productivity. Moreover, the demand effect is driven by firms with foreign owners, which might be the result of the large productivity gap between the domestic firms and Audi. In the second chapter I estimate the local spillovers of FDI exits. I find that sales and employment of local firms decreased after the closure of a foreign-owned large plant located nearby. I also provide evidence showing that decreased competition for local labor, decreased local purchasing power of the laid-off, and lost demand for local suppliers are all important channels in the plant closure effect. The third chapter is a joint work with Ádám Szeidl and Miklós Koren. We estimate import spillovers, finding that peers with country-specific trade experience increase the probability of starting to import from a country. This effect is even stronger if the peer operates in the same industry or imported the same product before.

In my thesis I document several types of indirect effects of FDI and international trade. I show the existence of spillovers from an FDI to the supplier industry (chapter 1 and 2) and to the local service industry (chapter 2), and provide evidence for knowledge spillovers in imports (chapter 3). Additionally, I show that spillovers are specific to certain firm groups. All the three chapters suggest that spillovers are localized in space. Knowledge spillovers are especially concentrated in close neighborhoods. Spillovers are the strongest for firms in related industries: firms in the supplier industry of the foreign direct investment or same-industry peers of the importer firms. Finally, spillovers also depend on initial firm performance. Better firms tend to gain more after an FDI entry or learn more from experienced peers. Worse firms tend to lose more after an FDI exit.

## **Chapter 1: The effect of FDI on local suppliers: Evidence from Audi in Hungary**

In the first chapter I examine the long-term effects of Audi's large foreign direct investment in Hungary on local firms operating in supplier industries. In many countries local governments

give subsidies to FDI, as it is expected to have a positive effect on the local economy, including spillovers to local firms. Yet, it is difficult to identify FDI spillover effects, and evidence on their existence is still mixed in the literature. I contribute to this topic using rich firm-level panel data that helps the identification and allows for measuring particular mechanisms. The plant opened by Audi in Győr in 1993 became one of the largest firms in Hungary, which makes it a good candidate to investigate the effects of a large FDI in a middle-income country.

For the identification of the Audi effect I assume that closely located supplier-industry firms are the ones which benefit the most from the presence of Audi. I do a triple difference-in-differences estimation, comparing outcomes of firms in supplier and control industries, close and far from the Audi plant, before and after the entry. I take the potential second best location choice of Audi as the control region, and I determine supplier industries based on 4-digit input-output table data. I measure separately the average per firm effect using within-firm estimates (intensive margin), and the effect of Audi on entering and exiting firms (extensive margin).

I find that after the Audi entry the average annual growth rate of local firms increased by 3 percentage points for sales and 2 percentage points for employment, which is in line with a positive demand effect. Yet, there is a 5-year lag in the growth rate increase, suggesting that local supplier-industry firms needed some time to be able to benefit from the foreign investment. Additionally, I do not find a positive effect on productivity. This puzzle might be explained by the pattern that firms with foreign owners account for all the positive demand effect, suggesting a foreign-to-foreign complementarity in investments. Firms with higher productivity also gained more. As domestically-owned firms were less productive before the Audi entry than foreign-owned firms, this productivity gap might have prevented them from enjoying the benefits of Audi's presence. Furthermore, firms with foreign owners might have had less room to learn from Audi. These results suggest that the complementarity of policies attracting FDI and promoting improvement of local firms is crucial for being able to enjoy the potential benefits of FDI in the local economy.

New firms entering supplier industries close to Győr after the Audi entry are on average larger and have a higher growth rate. As a total effect on the supplier industry, I estimate that the growth rate increased by 8.3 percentage points for sales and 3.8 percentage points for employment due to Audi. My back of the envelope calculation suggests that the indirect contribution of Audi to the Hungarian GDP through the demand effect was about 50% of its direct contribution.

## **Chapter 2: The effect of foreign-owned large plant closures on nearby firms**

In the second chapter I estimate the impact of foreign-owned large plant closures on local firms. The local effect of FDI entry is a widely researched topic. There is much less research on the effect of FDI exit, although the literature shows that foreign-owned firms tend to be



effect on firm productivity. Yet lack of information and trust might prevent firms from importing. Indeed, there is much heterogeneity in seemingly similar firms' importing behavior. Personal and business connections might play an important role in decreasing information barriers. This mechanism is already documented for exports, but we cannot generalize to imports, as the importance of information barriers is not necessarily the same in the export and import decision.

Using rich firm-level panel data from Hungary we document that those firms which have peers with trade experience from a specific country are more likely to start importing from that country. We measure information diffusion in multiple networks, defining peers as firms located in the same or in a neighboring building (closely-located peers) and firms connected through managerial networks (person-connected peers). We also control for ownership links between the firm and the peer, thus eliminating several possible alternative explanations. Our empirical strategy is based on variation in partner countries, controlling for firm-year and country-year effects. We look at imports from four fairly comparable partner countries: the Czech Republic, Slovakia, Romania and Russia, and restrict our sample to those firms in Budapest which have no previous import experience with the given country.

We show that knowledge spillovers are highly localized in space. Having a neighbor with country-specific import experience in the same building doubles the average probability of starting to import from the same country. The effect of a firm with a similar experience in the neighboring building is only one-fifth as large. Country-specific experience of person-connected peers and firms in the same ownership network also plays a significant role in the import decision. The magnitude of the effects is comparable to export spillovers estimated with a similar identification strategy. We further support our findings with an event study. We look at firms with country-specific import experience moving into an address where no such experience was present before, and show that firms located in this address start to import from that country with a higher probability than from other countries. Our findings suggest that even in a very open economy information frictions form an important barrier to importing.

We also address heterogeneity in the spillover effect. We find that the effect of same-building and ownership-connected peer experience is present in almost all firm or peer groups. Yet larger, more productive and foreign-owned firms learn more. Similarly, firms learn from those peers on average more which are larger, more productive or foreign-owned. Still, the knowledge gap to be bridged matters in learning: low-productivity firms learn rather from low-productivity peers. Import spillovers are also stronger when peer firms operate in the same industry or import the same product, but cross-industry and cross-product effects are also significant. The larger peer effect within industry, product category and among similarly-productive firms suggests that knowledge spillovers are higher among firms facing similar business decisions. Our results also highlight the potential benefit of industrial clusters for encouraging not only exports but also imports.

# CURRICULUM VITAE

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## RESEARCH INTEREST

International trade, empirical industrial organization, foreign direct investment, firm performance

## CURRENT ACADEMIC POSITION

2015- Junior research fellow, Institute of Economics, Centre for Economic and Regional Studies, Hungarian Academy of Sciences

## EDUCATION

2010- Central European University, Budapest, Department of Economics  
PhD Candidate in Economics  
2008-2010 Central European University, Budapest, Department of Economics  
MA in Economics  
2004-2008 Corvinus University of Budapest and the University of Passau  
Certificate of the Joint Program in German Language (DSG)  
2003-2008 Corvinus University of Budapest  
Major: Industrial Organization

## TEACHING EXPERIENCE

2011 Certificate from the “Teaching in Higher Education” program, Central European University, Budapest  
2014 Basic Economics, Eötvös Loránd University, Budapest (Master Program in Health Policy, Planning and Financing), lecturer  
2014 Microeconomics II, Eötvös Loránd University, Budapest, assistant lecturer  
2013 Introduction to Economics and Law, Eötvös Loránd University, Budapest, lecturer

2012, 2013	Economics of Trade Policy, Central European University, Budapest, teaching assistant
2012	Introduction to Econometrics, Central European University, Budapest, teaching assistant
2012	Mathematical Statistics, Central European University, Budapest, teaching assistant
2011	Game Theory and Applications, Central European University, Budapest, teaching assistant
2011	Advanced Microeconomics, Central European University, Budapest, teaching assistant
2010	Microeconomics for Economic Policy, Central European University, Budapest, teaching assistant
2007	Macroeconomic Analysis, Corvinus University of Budapest, teaching assistant
2007	Introduction to Dynamics in Economics, Corvinus University of Budapest, teaching assistant
2005-2006	Macroeconomics, Corvinus University of Budapest, teaching assistant

## **RESEARCH EXPERIENCE**

2012-	Central European University, research assistant for Professor Adam Szeidl in the project “Networks”
2013 Fall	Centre for Economic Performance at the London School of Economics, visitor
2007-2010	Regional Centre for Energy Policy Research, scholarship student, later researcher

## **SCHOLARSHIPS AND AWARDS**

2015	Olga Radzyner Award, Österreichische Nationalbank
2013	Central European University, Doctoral Research Support Grant
2012	Central European University, Academic Achievement Award for First-Year Doctoral Students
2010	Central European University, Outstanding Academic Achievement Award
2009	Central European University, Academic Pro-Rector's Excellence Award
2008	Corvinus University of Budapest, Excellence Award for Graduating Students
2005-2008	Scholarship of the Hungarian Republic
2006-2008	Skala Co. Ltd scholarship

## **PROFESSIONAL ACTIVITIES**

2010-2013	Central European University, Economics Department, Coordinator for the weekly Microeconometrics Reading Group
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## **CONFERENCE PRESENTATIONS**

- 2016 “Quality FDI, Growth and Development: Discussing the Impact and Policy Options” conference of UNIDO and the Kiel Institute, Vienna
- 2016 ETSG Annual Conference, Helsinki
- 2016 "Multinationals, local firms and innovation in post-transition and transition economies" workshop, organized by EADI Working Group on Transnational Corporations and Development and CERS-HAS, Budapest
- 2015 Spring Meeting of Young Economists, Ghent
- 2013, 2014 Annual Conference of the Hungarian Society of Economists, Budapest
- 2013 CEP International Economics Workshop, London
- 2013 MKE-PTE PhD Summer Workshop, Pécs

## **WORKING PAPERS**

- The effect of FDI on local suppliers: Evidence from Audi in Hungary,  
IE CERS HAS, MT-DP 2016/22.
- The effect of foreign-owned large plant closures on nearby firms,  
IE CERS HAS, MT-DP 2016/23.

## **OTHER PUBLICATIONS**

- 2009 Co-author in “Mikroökonómiai és piacelméleti feladatgyűjtemény” (problem collection in microeconomics and market theory), editor: Eva Berde, TOKK, Budapest, 2009

## **SKILLS**

- Languages: Hungarian (native), English (fluent), German (fluent), French (basic)
- Software: STATA, Python, Matlab, Latex, SQL, Eviews, SPSS