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Essays on Firm Boundaries and Firm Organization in Transition countries

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Abstract

For a long time economic theory argued that the level of economic development depends on the allocation of production factors both between and within economies. However, it is rarely underlined that allocation depends on organizational decisions and management, especially on organizational decisions within and across firms. Understanding such decisions through both empirical studies and theory is highly important. It may enable us to understand the microeconomic roots of macroeconomic patterns. This thesis conducts at the empirical analysis of organizational decisions that may potentially influence aggregate performance. It shows connection of the organizational decisions with both the economic environment and firm characteristics.

The focus is on transition countries, after the massive privatization period. The reasons are threefold: i) essential differences that emerged in performances of countries with similar heritages and starting points ii) the need to quantify the impact of "complementary" reforms after privatization iii) the mis-match between the expectations and the results of building a market-oriented environment.

Following a first chapter overviewing the economic context, theoretical positioning and empirical framework, the thesis contains four studies. The first two studies (Chapter 2 and Chapter 3) are devoted to firm boundaries decisions as one of the key organizational decisions. By using the cross-section data of the EBRD-World Bank Business Environment Enterprise Survey (BEEPS III) and utilizing the predictions of Antràs and Helpman' global sourcing modelling, I study the industry-level incidence of integration and firm-level decisions to redefine firm boundaries. Both studies highlight the importance of both technological and institutional factors. Moreover, the second study presents the firm-level perspective and highlights the importance of firm propensity to change.

The third study (Chapter 4) is focused on changes of internal firm organization and their connection with international trade liberalization. It provides preliminary answers to the following questions: (i) what drives flattening decisions, and (ii) whether flatter structures may be associated with a higher degree of control. By using the Management, Organization and Innovation (MOI) Survey, this study provides new evidence on the positive connection between increased competition from imports and firm flattening in transition countries. It also suggests that flattening may have more centralization features than is usually assumed.

The fourth study (Chapter 5) explores the connection between management quality and corruption. By using the BEEPS V cross-section data, I underline the general negative connection between the management quality and different kinds of corruption over the period 2011-2014. However, the results also indicate the existence of idiosyncratic links between corruption and quality of management in some transition countries.

As a result, the thesis contributes to the literature by advancing the state-of-the-art knowledge on firm organization in transition countries over the period 2005-2014.

First, it identifies significant differences between country groups, namely EU and non-EU transition countries. The differences are persistent and characteristic for all the types of organizational change considered in the thesis, as well as the link between management and corruption. In particular, in non EU-transition countries, these differences are due to country-level and firm-level idiosyncrasy.

Second, the thesis evidences that, regardless of numerous reforms of the business environment, firms in transition countries are rarely subject to organizational changes. However, a small number of firms subject to organizational changes significantly out-perform their counterparts. Consequently, it is important to understand what features of the economic environment or characteristics of firms prevent such efficiency-enhancing changes.

Third, the thesis shows that firms in transition countries differ in their internal organizational structures, which they adjust to changes in product market competition. However, the intensity of these adjustments is heterogeneous across countries and industries.

Fourth, a negative connection between management quality and corruption indicates that further simplification of business regulations and anti-corruption measures would unquestionably enhance the quality of management in EU transition countries both at the firm and at the country level. However, similar measures are not equally efficient for non-EU transition countries, because the link is idiosyncratic in these countries at the firm level.

This thesis provides new evidence on the significant role of contractual links, technology complexity, product market competition and corruption in explaining the gap between micro-behavior and macro-objectives. However, the results put forward the need for i) a bottom-up approach, with firm behavior being analyzed and considered as an underlying force of aggregate and international performance, and ii) theories that account for firm organizational adjustments, because such adjustments may significantly alter our understanding of international trade gains and the channels through which efficiency enhancing reforms act and affect industrial reorganization.

To my family and Marco.

I could not make it without you.

Declaration

I, Maria Litvinova, declare that this thesis titled "Essays on Firm Boundaries and Firm Organization in Transition countries" is solely my own work other than where it is clearly stated that the work has been done jointly with others (in which case the extent of any work carried out jointly is clearly identified). I confirm that:

- This work was done wholly while in candidature for the doctorate degree at the School of Social Sciences of University of Trento.

- Where I have consulted or quoted the published work of others, this is always clearly attributed.

- I have acknowledged all main sources of help.

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I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

Statement of Conjoint Work

Chapter 2 is the results of joint work with Professor M.L. Segnana that was presented as a working paper of the Economic and Management department. I contributed by clearing and preparing the data, adapting the empirical model, and performing the empirical analysis. The writing of the chapter has benefited a lot from the contributions of Professor M.L.Segnana.

Chapter 3 and 4 benefited from the stimulating suggestions made during my research period at the Office of the Chief Economist at the EBRD.

Chapter 4 is the result of joint work with Professor M.L. Segnana. I cleaned, merged, and prepared the data, developing and performing the econometric analysis. The analysis of the empirical results has been made jointly with Professor M.L. Segnana.

Chapter 5 is jointly coauthored with Professor M.L. Segnana and Cristian Roner. The development of econometric specification is the result of conjoint work. I performed the econometric analysis by the means of the regression and correlation analysis.

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My most sincere and most profound gratitude is to my family, and my mother in particular, who never stops believing in me. She supports me whatever path I take, although I know how hard it is for her to be so distant from me. However, there is no possible obstacle either tangible or emotional that may stop her from sustaining and caring for me. Another person, to whom I am infinitely indebted and who contributed to the completion of this thesis, perhaps, most of all is Marco. I could not thank him enough for being next to me through all the best and worst moments of the last two years. I am most deeply grateful for all his support, patience, and confidence in me, as well as the tenderness he surrounded me with during these last years of my Ph.D. experience. All this gives me strength to overcome all the difficulties, doubts and failures I may found on my way.

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Country Groups

Eastern Europe and Baltics	Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovak Republic, Slovenia, Poland
South Eastern Europe	Albania, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Kosovo, Romania, Serbia, Montenegro
Eastern Europe and the Caucasus	Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine
Central Asia	Kazakhstan,Kyrgyz Republic, Tajikistan, Mongolia, Uzbekistan
EU transition countries	Eastern Europe and Baltics (for BEEPS 2005), Bulgaria (since 2007), Romania (since 2007); or Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovak Republic, Slovenia, Poland, Bulgaria (since 2007), Romania (since 2007)
Commonwealth of Independent States	Eastern Europe and the Caucasus, Russia, Central Asia (except Mongolia); or Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine, Kazakhstan, Kyrgyz Republic, Tajikistan, Uzbekistan, Russia
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom

Acronyms

BEA Bureau of Economic Analysis

BEEPS Business Environment and Enterprise Performance Survey

CEB Central Europe and Baltics

CEO Chief Executive Officer

CIS Commonwealth of Independent States

EBRD European Bank for Reconstruction and Development

EEC Eastern Europe and the Caucasus

EU European Union

FDI Foreign Direct Investments

FM Factory Manager

FTA Free Trade Agreement

GLM Generalized Linear Model

GVC Global Value Chains

HQ Headquarters

HQTM HQ top manager

IIA Independence from Irrelevant Alternatives

MNC Multinational Corporation

MOI Management, Organisation and Innovation

OECD Organisation for Economic Co-operation and Development

SEE South-Eastern Europe

SME Small and Medium Enterprises

TFP Total Factor Productivity

WMS World Management Survey

WTO World Trade Organization

Chapter 1

INTRODUCTION

1.1 The Research Questions

For a long time economic theory argued that the level of economic development and efficiency of production depends on the allocation of production factors between and within economies. This traditional approach attributes comparatively higher levels of development to the prevalence of capital-intensive rather than labour-intensive industries in production systems. Thus, it gives greater importance to the allocation of capital and labour across industries with different production technologies. However, in the past decade it has been widely highlighted that the allocation of resources does not only depend on the technology in industries, but also on firm characteristics and their heterogeneity both within and across industries.

More recently, numerous studies have been devoted to evaluation of within-industry heterogeneity, in particular in terms of firm-level total factor productivity (TFP), and its effect on international trade and world production patterns. While estimating total factor productivity as the residual of the production function allows researchers to highlight the most efficient firms and the redistribution of productivity, it is still comparatively rare for organizational decisions defining this productivity to be taken into consideration. By merging organizational economics with international trade, the economic literature may significantly advance our understanding of the microeconomic roots of economic changes. However, such a merger is applied relatively little, both in the theoretical and the empirical literature. This thesis conducts empirical analysis of organizational changes that may potentially affect productivity, and their connection with both the economic environment and firm characteristics. In particular, the main research question of the thesis is:

- *To what extent do the economic environment and individual firm characteristics shape the firm's propensity to change its organization?*

The importance of understanding firm behaviour and organization has been increasing since the number of commercial giants and the scale of within-firm production started to grow substantially. A striking example of the firm's growing importance in international economic activities may be drawn from the share of intra-firm transactions by US multinational firms. Such intra-firm transactions are estimated to account for around 30% of international trade in goods and around 60% of international trade in services (Lafontaine and Slade, 2007). With the revenues of some firms exceeding the GDP of a number of nations (Steger, 2009), not understanding the drivers of these firms' decisions and organization would result in the economic literature losing grip on national and international production patterns.

The organization of a firm may be considered from different angles and by analysing different features. One of the key organizational features is the definition of firm boundaries. Redefinition of firm boundaries, and integration in particular, is one of the organizational changes that may potentially be connected with higher performance, thus affecting the patterns of economic growth and international trade. By redefining its boundaries, a firm optimizes the allocation of resources with respect to the market and economic conditions. Firms may benefit from integration in many respects, e.g. higher investment rates, productivity, growth and better technology transfer (Schoar, 2002; Broedner et al., 2009; Seru, 2014). This illustrates that the organizational decision to redefine firm boundaries affects the performance of firms. However, the prevalence of integrated firms may have implications for the economic performance of countries. For instance, an economy may be more resilient to global crises or have particular patterns of international trade participation. Moreover, a recent study by Alfaro et al. (2016) shows that firm decisions to integrate are caused by, not the cause of, higher prices. This eliminates one of the main arguments for integration's negative influence on country-level economic performance. More generally, the results of Alfaro et al. (2016) suggest that organizational decisions, like integration, are caused by the changes in the firm's economic environment.

A firm's interaction with its economic environment may depend on numerous factors. A number of important factors depends on the way a firm writes contracts, which are necessary for production activity to take place. The theory of property-rights has recently proposed contractual frictions as one of the main drivers of firm boundaries' redefinition. The two key factors that affect the degree of contractual frictions faced by a firm are the technological complexity of production and the strength of contracting institutions. Consequently, one of the sub-questions that this thesis seeks to answer is:

- *To what extend does the firm's tendency to redefine its boundaries reflect contractual frictions either connected with technological complexity or associated with the institutional environment's weaknesses?*

The thesis includes analysis aimed at answering this sub-question both at industry and firm levels. While the industry-level analysis allows better comparability with the existing literature, the firm-level analysis is an original contribution of this thesis to the empirical literature.

Another organizational factor that may affect how firm production resources are allocated is the firm's internal structure and control distribution. Several empirical studies have illustrated that the firm's internal structure becomes notably flatter in advanced countries. There may be a number of reasons for this phenomenon. Some studies argue that it is connected with technological progress that makes information flows more efficient. Others show that it is international trade liberalization that affects internal firm organization. Moreover, the most recent studies on internal organizational change show that together with decreasing organizational distance (flattening) more restrictive control may be observed. This thesis aims to answer the two following sub-questions:

- *What drives flattening decisions?*

- *May flatter structures be associated with a higher degree of control?*

While analysing the first of these sub-questions, the thesis mostly focuses on the link between internal organizational change and international trade.

Furthermore, productivity enhancing organizational change (or its absence), may be largely dependent not only on change in the economic environment, but also on the firm's characteristics and quality of management. In fact, according to the recent evidence (Bloom and Van Reenen, 2010) management quality is closely connected with better performance and higher productivity in most countries. However, the characteristics of the institutional environment may reduce the quality of management, negatively affecting the productivity of firms. Such an institutional environment, therefore, may prevent productivity-enhancing national policies from being efficient. One such institutional environment characteristic is corruption. Athanasouli and Goujard (2015) show that corruption may deteriorate management quality at the regional level. Moreover, it also affects the efficiency of business reforms (Yakovlev and Zhuravskaya, 2013) aimed at enhancing firm performance. Consequently, this thesis seeks to answer the following two sub-questions:

- *Is corruption always connected negatively with the quality of management?*

- *Are there country- and firm-level characteristics that define idiosyncrasy in the link between the quality of management and corruption?*

In addressing all five of the above sub-questions, this thesis aims at revealing the interconnection between the economic environment and firms in order to answer the main question of the thesis: what defines firm propensity to organizational change?

Answering this question is especially important for understanding why reforms, such as privatization, have failed in their promises in transition countries. It also gives insight on why transition countries starting from comparatively similar levels of economic development have achieved such different results in terms of both productivity and economic development.

1.2 Transition Countries: The Economic Context

1.2.1 Reforms in Transition Countries

The group of transition countries[1] stands alone among most advanced and emerging economies due to a set of important features. First of all, the economy in these countries may not be considered independently from their experience of planned economic systems and their transition history. Second, although they have a high potential for economic growth and development, a large amount of this potential has not yet been realized. Economic reforms in multiple areas

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[1]Countries that experienced the transition from central planning to free market economies are considered as transition countries in this thesis. In particular, for the purposes of this thesis such countries include countries of the former Soviet Union, and the Eastern Bloc (non-Asian ex-soviet countries). Asian transition countries like China and Vietnam are not considered in this thesis.

failed to deliver on their promises in a significant number of these countries. The reforms encountered a set of unforeseen obstacles that still represent a puzzle for both policy makers and the economic literature.

The reforms that took place in the transition countries and their results have significantly influenced both firm organization and the economic environment of firms. The results of privatization affected the ownership structure of firms, while the liberalization of trade, both domestic and foreign, and competition-enhancing reforms significantly affected the economic environment. The major transformation increased the share of the private sector in GDP from extremely low to the level of 60-90 percent (Estrin et al., 2009) and instituted new market-oriented legal and institutional systems. All these changes could not but have an impact on firm's performance and organization.

The reforms in transition countries proceeded at different paces[2]. In almost all transition economies, governments undertook what Svejnar (2002) calls "Type I" reforms, namely macro stabilization, price liberalization and dismantling of the institutions of the communist system. Liberalization of trade and prices was one of the most active reforms and took place in the majority of countries. Most countries rapidly opened up to international trade and quickly reduced direct subsidies to firms, thus inducing a more efficient allocation of resources. The results of such opening, however, varied across countries. Import competition had a positive effect on performance in CEB, but a negative effect in the Commonwealth of Independent States (CIS) (Djankov and Murrell, 2002). Macro stabilization was not an easy task, but by the end of 1990s it had been mostly accomplished in all countries of the region (more detailed discussion in the Appendix A.2) except for several Western Balkan countries.

Svejnar's "Type II" reforms involved the development and enforcement of laws, regulations, and institutions that would ensure the successful functioning of a market-oriented economy. These reforms included privatization, establishment and enforcement of a market-oriented legal system, and the creation of effective accompanying institutions. These institutions should have enabled well-defined property rights, permitted the enforcement of contracts, and limited corruption. In the process of implementation, small-scale privatization did not encounter major obstacles. Reforms in these areas are today complete in general in all countries except Belarus. By contrast, institutional reforms related to competition policy, privatization of large enterprises, labour system and enterprise restructuring encountered many more obstacles and were much more asymmetrical among transition countries. These reforms met comparatively less resistance in countries that are today a part of the European Union; much more resistance was raised in non-European Union (EU) transition countries.[3] Reforms regarding competition

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[2]Table A.1 presents the membership of each country considered in this thesis in different country groups.

[3]With regard to the speed and efficiency of reforms, transition countries may be divided into several groups: Central Europe and Baltics (CEB), which represents the biggest share of new European Union members and the best performers in terms of reforms; South-Eastern Europe (SEE), which includes two new members of the EU and usually performs as a second-best; and the Commonwealth of Independent States (CIS) countries that include countries of Eastern Europe and the Caucasus (EEC), Russia and Central Asia (except Mongolia). This last group (CIS) usually lags behind in terms of the realization of a large number of reforms. For the purposes of analysis these groups may also be organized in two sub-sets: the group of EU transition countries whose efficient reforms allowed them to enter the European Union, and non-EU transition countries that still have

and enterprise restructuring are still incomplete for multiple countries among the latter group. According to the European Bank for Reconstruction and Development (EBRD), progress in establishing a functioning (market-supporting) legal framework and institutions was slow everywhere, although the pace was more rapid in Central Europe and the Baltic states than in the Commonwealth of Independent States. An important impetus for implementing legal and institutional reforms in most countries of CEB has been the need to develop a system that conforms to that of the European Union as a prerequisite for accession.

Focusing upon "Type II" reforms, it is possible to differentiate the results associated with i) privatization, ii) complementary reforms aimed at building up market economies, and iii) business environment.

Privatizations results

Privatization was the major challenge in the early transition period. Large-scale privatization was largely completed in Central Europe and the Baltics already in the first decade of transition, but remains to be finished in many other countries, especially in the Western Balkans and the CIS. One of the major attempt to survey the literature on privatization in transition countries was the contribution by Djankov and Murrell (2002) that combined the findings from a large number of early studies in a meta-analysis. Another contribution was made by Estrin et al. (2009). The authors differentiated rather than combined the impact of privatization on firm-level performance, including efficiency (both total factor productivity (TFP) and labour productivity), profitability, scale of operations and wages. In both studies, significant differences between the CIS and CEB countries were well summarized. In particular effects of privatization is evidenced to differ significantly in these two groups in terms of TFP, and wages. Moreover, general effects of privatization on firm performance are mostly positive during both the early and later transition periods, but uneven between domestic and foreign owners, groups of countries and greater in the later than earlier transition period.

Such significant differences in effects of privatization in terms of time, country groups and types of owners highlight that the importance of privatization being complemented by institutional reforms, and efficient business environment. Thus, building market economy and creating the proper conditions for business activity were the most important challenges of the reforms in transition countries. However, the way countries overcome these shared challenges conducted to very different results.

Building market economic systems: far from complete

The building of market-supporting institutions has been much more difficult than many expected at the beginning of the reforms. Generally, transition countries have made significant progress in terms of reforms and advancement of the market system. A number of such countries are now fully functioning market economies with stable macroeconomic performance, caught-up income levels and comparatively efficient institutions. However, there is still a considerable

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numerous reforms unfinished.

number of transition countries that struggle to create both strong institutions and efficient functioning of the market. The differential development of the countries in the region has resulted in a great disparity of economic outcomes as well. Reform momentum has also tended to slow over the years. All countries made notable progress in the 1990s, but in most cases many fewer changes have occurred in the past decade, even in countries where there is still much to be done. As a result, even in the countries with highly successful experience of reforms, the pace of economic growth and development has slowed down. Moreover, multiple countries failed fully to eliminate the link with the past in numerous aspects of economic and production organization. Consequently, they still struggle with the extremely low competitiveness of industries.

Building a sound business environment: improved conditions

An essential element in the progress of reforms has been the creation of a sound business environment that makes it possible to start a business, invest, expand, and, if necessary, close. Creating such an environment required multiple legal, administrative, and institutional reforms in transition countries where a free-market environment did not exist previously. After the long way of reforms and transformations, it is the business environment that differentiates transition countries from each other the most. Moreover, differences in the business environment has significant implications for the growth of these countries. According to World Bank Ease of Doing Business index, transition countries range from 17th to 131st place out of 189 countries worldwide in terms of business environment. The range is just as broad in terms of corruption as perceived by investors (Transparency International survey). Although improvement has been notable, with the majority of transition countries climbing much higher in the rankings and converging on more advanced countries, several transition countries (including Russia, Ukraine, and Belarus) fell back notably in terms of corruption. This evidence shows that in some countries of the region reforms in the business environment are still much needed.

Social costs: long-term effects

Building market economies and a business environment cannot be treated without considering the profound social impact of the transition. In the shift from a system of guaranteed employment to labour markets governed by supply and demand, with the closure of firms unable to adjust to new market conditions and degrading of industries not interesting for investors, unemployment inevitably increased sharply at the start of transition. For most countries, labour market reform and economic growth helped reduce unemployment, but they impacted strongly on the population. The notable exceptions were the Western Balkan countries, which struggled with extremely high unemployment throughout the transition period. Moreover, market reforms impacted on the efficiency and organization of healthcare and educational systems, creating long-term consequences for social welfare. An indicator of the severe social costs of early transition is life expectancy, which stagnated or fell for a number of years in many transition countries. Most notably it affected CIS countries.

Key lessons

The key lessons of the reforms in the past 25 years can be drawn from the two different paths followed in the transition region: most Eastern Europe and Caucasus countries, and Russia, are today in recession or near stagnation with real GDP growth expected to recover only modestly in 2017, CEB and SEE countries seem to be stabilized with positive projections for 2016 (no recession) and 2017 (3.3 percent growth). Transition seem to have created two different sub-groups of countries with a similar heritage, but different growth prospects. The latter, together with the experience of reforms discussed above, indicate that implementation of wide-ranging market reforms is not on its own able to guarantee development: deep-rooted structural and institutional reforms should be put in place.

For these reasons, the macroeconomic recommendations provided by international organizations should be supplemented with accelerating reforms aimed at the development of non-energy sectors. In particular, the reorganization of industrial system and its potential impact should be considered. Moreover, development of non-energy sectors requires to renew the reforms aimed to strengthen contract enforcement, create the proper business environment and deepen integration into Global Value Chains (GVC). But for understanding the most prominent policy design of such reforms, bottom-up approach towards interaction between firms and environment is highly required, especially for CIS countries.

The following sections discuss three structural characteristics that differentiate the most successfully reformed countries of the transition region from their counterparts. First, technological backwardness has long been an issue in transition countries. Some countries have successfully moved their economies to production of high- and medium-technology goods, but others have failed to do so for many years.[4] Second, the transition economies shared among themselves and with many other developing countries numerous characteristics associated with "weak" institutions, such as poorly conceived and/or ineffectively enforced property rights (see Acemoglu, Johnson, and Robinson, 2001). But there are significant differences among transition countries as well. Third, participation of transition countries in international trade and GVC differs largely among countries in terms of both its intensity and characteristics. These structural differences have been multiply shown to be connected with growth and development rates, but the mechanisms whereby they affect firm's behaviour and organization are poorly understood. Unless such mechanisms are understood, especially in CIS countries, further reforms may encounter further obstacles.

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[4]One example is the adoption of the Russian Federation president's initiative in 2007 to develop nanotechnology and other highly technology-intensive industries. The initiative was widely publicized and large-scale investment plans were made. However, the results were been doubtful. Dezhina (2011) estimates the efficiency of the new infrastructure for highly technological activities and innovations (set up in 2005) at 10-40%. Despite generous public spending on innovation, it is often hard to track how the money is spent and to determine the outcomes of innovation initiatives.

1.2.2 Technological Backwardness

One of the weaknesses that requires closest attention in transition countries is the technological complexity of production. In multiple countries of the region system of production, inherited from the Soviet era, still has not been fully renovated, giving rise to one of the key weaknesses of economic performance: the technological backwardness of production.

After the break-up of the Soviet Union, technology lagged significantly behind in all transition countries (Campos and Coricelli, 2002). This uniform lag may be explained by the policies implemented in the Soviet Union long before the break-up. Most of the economic policies in the Soviet Union were intended to stimulate economic growth through extensive industrialization, unlike the growth policies in Western economies which fostered productivity growth. The Soviet Union's strategy resulted in higher accumulation at the cost of technological and organizational changes (Ofer, 1987). When growth could no longer be maintained by increasing labour and capital inputs, the leadership opted to develop military technology as the core of economic growth, instead of promoting the diffusion of technological advances equally among all industries. This decision resulted in a lack of technological progress in the rest of the economy. In the literature, this lack of progress is sometimes associated with the absence of organizational innovation because there was no entry of new firms and no competition (Ofer, 1987; Campos and Coricelli, 2002)

The results of this tendency toward extensive growth, unbalanced technological progress, and scant experience in innovation may still be observed in many transition countries. While on average all transition countries lag behind in terms of technological complexity, significant disparities may be observed between more advanced CEB countries and the rest of the transition region. This is true both in terms of the concentration of production in low value-added industries and the lower diffusion of high-level innovations.

In terms of value added, the more developed of the transition countries, CEB, are among the leaders of the region. Most of the CEB were shifting their production from low-tech (low value-added) to medium-tech or high-tech (high value-added) industries already during the first years of transition (Van den Bulcke et al., 2009). Although they are still far behind their Western European counterparts and the degree of restructuring is not uniform (Table A.4), the progress is considerable.

By contrast, the SEE countries specialize more on low value-added (low-tech) activities than the CEB (Handjiski, 2009; Inotai, 2007) with only some exceptions. Lower value-added is also reflected in the relatively lower capital and skill intensity of their exports.[5] The skill intensity

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[5]As often highlighted in the literature, the technological advancement and higher value added of industrial production is often associated with the capital and skill-intensity of countries' production and international trade. Although as mentioned by Campos and Coricelli (2002), it is difficult to separate accumulation and reallocation from technological progress in transition countries, the pattern of capital-intensity distribution within the those countries is similar to the above-described situation of different degrees of technological backwardness. Recent data on capital-intensity for transition countries are not easily available in common data sources (World Penn Table database, OECD or EBRD databases). However, the results of Izyumov and Vahaly (2006) show that in 2003 average capital-intensity in the more advanced transition countries, the eight CEB countries (EU members since 2004), was less than half of the EU-15 level. For the SEE countries, it was less than one fourth, and for the CIS countries it was about one eighth, of the EU-15 average.

showed little change between 1997 and 2007 (Mitra, 2008). This absence of change evidences that there has been little development in terms of the restructuring of economic production towards higher-technology and higher value-added products.

The private sector of some countries of Eastern Europe and the Caucasus and Central Asia is heavily concentrated in low value-added industries (Shiells and Sattar, 2004). This pattern is characteristic of the private sector of Russia as well. One of the main reasons for lower value-added in such transition countries is the technology gap, with respect to their more developed counterparts (Bastic, 2004). For countries rich with natural resources it is also strongly affected by imbalances in the allocation of production resources to energy producing industries.

Not only is a small group of transition countries able to move towards higher value-added industries, but transition countries also lag in terms of innovation activity. Most of them are weakly connected with the world technological frontier (Mitra, 2008). Despite the growth of internationally competitive high-technology firms in CEB countries, the average share of innovations new to international markets in the region is equivalent to only around 0,4% (EBRD, 2014), the highest share being characteristic of CEB countries and much lower for the rest of the region.

Another example of the technological gap may be drawn from patents granted. The dynamic of internationally cited patents in transition countries also shows a comparatively low quality of technological development. According to a report of the EBRD (EBRD, 2014), only around 14% of patents held by transition countries are cited at least once,[6] being much lower than in developed countries (33% in Germany, 44% in the United States). This low performance highlights either backwardness or the incremental nature of the majority of the technologies patented.

Furthermore, if one looks closer at the differences in technological development within the region, both in terms of technologies patented and innovations of international scope, significant systematic differences between both countries and country groups may be observed. In particular, the CEB countries, followed by the SEE countries, are closer to the technological frontier, while Eastern Europe and the Caucasus (EEC), Russia and Central Asia are a long way behind.

This differences highlight not only how technological levels of production in transition countries are significantly lower than those in developed countries, but also how they vary across country groups. Because the level of technological advancement has been widely accepted to be connected with the organization of production, technology will be an important factor of the empirical analysis presented in this thesis.

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[6]The difference between more advanced countries, like Estonia and Slovenia, and CIS countries are obvious with regard to the quality of patents obtained as well. The share is almost twice higher in Estonia than in Russia, and four times higher than in Ukraine

1.2.3   Contract Enforcement and Institutions

External Economic Institutions

Stronger external economic institutions[7] are able to foster a better investment climate, higher participation in international trade, and a more efficient use of physical and human capital (North, 1990; Aron, 2000; Rodrik et al., 2004; Acemoglu and Johnson, 2005; EBRD, 2013; Acemoglu et al., 2014). The positive connection between better institutions and economic performance is not in doubt. However, little is known about the connection between stronger institutions and firms' organizational choices.

Transition countries have been widely recognized as countries with comparatively low-quality economic institutions in general, and contracting institutions in particular (Berglöf et al., 2012; Svejnar and Commander, 2007; Dvoracek, 2009; Gelbuda et al., 2008; Mitra and Schaffer, 2009). However, these countries not only differ from developed countries in terms of their institutions, but also differ from each other in a large extent. As underlined in the EBRD Transition Report (EBRD, 2013), there is a notable heterogeneity in the quality of institutions within the group of transition countries. Consequently, large amount of research focuses on the significant institutional differences among these countries with broadly similar starting points of transition but different results.

One peculiarity of transition countries after the break-up of the Soviet Union was their simultaneous economic transition and political democratization. This meant not only that an economic framework had to be created but also that the rules of the political game had to change. Thus, enforcement of the rules of the game remained difficult as long as the state was redefining its role. Not only was it difficult during the early stages, but it is still an obstacle today. Two decades after the beginning of transition only a small number of transition countries have become relatively successful in terms of law enforcement. In fact, Figure 1.1 shows that the efficiency of law enforcement ("rule of law" indicators) is significantly different amoung country groups. In particular, it is evident that law enforcement is significantly better in the Central European and Baltic countries than in the Eastern Europe and the Caucasus, Russia, South Eastern Europe and Central Asia. The same tendency characterizes the other measures for the economic institutions (EBRD, 2013).

This evidence highlights the difficulties of contract enforcement that firms may face in countries with weak law enforcement. Moreover, not only do these figures show that firms in the transition countries are still facing weak contract enforcement, they also highlight that firms in different groups of countries face different degrees of contractual frictions (failure to have fully enforceable contracts) due to the inefficient institutional setting. Contracting institutions in countries that now belong to the European Union performs better, while other countries of the region still have much to do to make their contract enforcement efficient.

Such differences in the institutional environment and contract frictions may trigger different

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[7]Following the approach of Hendley et al. (1999) I consider external economic institutions as economic institutions external to firms' environment, such as contracting institutions depending on the efficiency of the country law-enforcement system

Figure 1.1: Rule of Law in 2015 (left) and 2000-2010 (right)
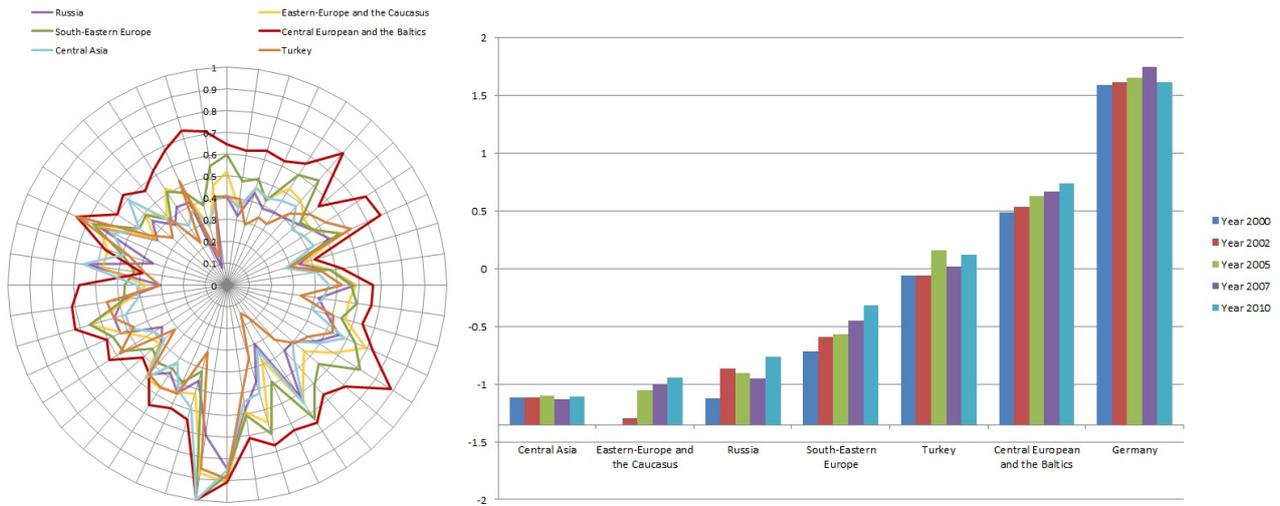
Source: The World Justice Project (WJP) Rule of Law Index and World Bank Estimates
Note: Each variable of the star plot (left) represents one of 44 indicators of rule-of-law performance (The World Justice Project) calculated as the average of the country-level values in 2015. The indicators of the rule-of-law performance are listed in Table A.3 of the Appendix. The estimates of the World Bank (right) of the rule of law are the average of all country-level estimates in a country group. The horizontal axis corresponds to the minimum estimate across country groups in 2000.

organizational reactions by firms in different regions of transition countries. Special production relationships may be formed to adapt to the institutional environment, more so in the groups of countries with weaker contract enforcement.

Internal Enforcement Mechanisms

In a situation in which external economic institutions have doubtful effectiveness, economic agents must make an effort to compensate for inadequate legal enforcement. Economic agents must build up supplementary insurance by creating their own mechanisms to enforce contracts. Trust or the lack of it plays a central role in the design of such mechanisms. I consider two such mechanisms, namely relational contracting based on trust, and prepayment designed to overcome the lack of trust.

One way to enforce contracts without relying on the state (external) contracting institutions is to base relationships on mutual trust. Mutual trust, however, requires a common history of trading and willingness to build such trusting relationships. Business contracts that rely on mutual trust are often referred to as relational contracts. In developed countries, long contract relationships complement formal contracts in mitigating hold-up problems and facilitating more efficient production (Board, 2011). In transition countries this enforcement mechanism is often applied (Hendley et al., 1999). However, due to high information asymmetry in these countries, relational contracting may not only reflect mutual trust, but also result in mutual dependence.

In particular, relational contracting is built on a self-commitment that is not based on any form of private or state enforcement. Such a self-commitment may arise because a firm anticipates future benefits from mutually trusted relationships. However, as time passes the

firm may choose to trade with the trusted partner even if no further increase in benefits is anticipated. In many transition countries with extreme information asymmetries, knowledge about alternative trading partners is limited. Moreover, relatively lower levels of trust in strangers may result in skepticism about favorable offers from unknown potential partners. As a result, the partners, who have traded with one another for a long time, may stick to this relationship not because it offers better conditions or opportunities, but because they fear that they will be unable to find a decent replacement. The threat of one partner ceasing to trade is effective in making the other partner stick to the contract, but may not be sufficient to motivate efficient fulfillment of the contract.

When either time or willingness is insufficient to build trust, firms have to opt for other internal mechanisms of contract enforcement. When trust is lacking, one way to enforce contracts is to design the terms of the contract so that neither party has the incentive to break the contract (Swinnen, 2007). This can be done, for instance, by increasing the costs of deviations from the contract through "cash-in-advance" terms, or prepayment. The choice of prepayment compensates for the difficulties of assessing the information on the partner in new relationships and the lack of partners' trust in the long-term ones (Raiser et al., 2008).

In transition countries, these two mechanisms - prepayment and relational contracting - together with acquiring property rights over partners serve as complements to the firms' attempts to overcome inefficient state contract enforcement. This may be illustrated by the historical development of transition countries.

In many transition countries production relationships have been inherited from the era of the planned economy, illustrating the prevalence of relational contracting. Although most recent data on business contracts are rarely available, by 2000 in Russia, enterprises relied first and foremost on business contacts established in the Soviet era. Among the enterprises surveyed in 1999, almost half were still trading with the old partners. Furthermore, a survey conducted by Johnson et al. (2002) on Russian, Ukrainian, Polish, and Romanian enterprises showed that firms would stick to old trading partners even if new suppliers offered better conditions. They would change a supplier only if courts, or external institutions in general, were considered as credible means of contract enforcement. Such statements highlight the role of relational contracting in transition countries as a mechanism to compensate for the inefficiency of a state contract enforcement system. However, the prevalence of this mechanism in countries with weak state contracting institutions has its trade-off, namely it results in high rigidity of the procurement system. Relational contracts compensate for risk connected with state contracting institution failure, but result in keeping old contracts even if new opportunities arise. Considering the existence of this mechanism in the past, one could expect that in countries with weakest contract enforcement more rigid production systems may be observed still today. Especially, it should be the case for Russia and the countries of Eastern Europe, the Caucasus and Central Asia.

Prepayment has also been widespread in transition countries as a mechanism to compensate for the weakness of contracting institutions. At the beginning of the transition period one of the

obstacles to firm entrance and creation of new production networks was the presence of general-ized default on payments and barter trade. These phenomena have been often considered in the literature as forms of dysfunctional institutions, reflecting an endemic lack of trust (Alesina and La Ferrara, 2002). In an environment where trust is extremely low (Van Ees and Bachmann, 2006) and non-payment is widespread, firms were often forced to require prepayment. In the most recent period the share of prepayment required in different transition countries reflects the degree of institutional weakness (for more details see Appendix Section A.3), indicating the lack of trust in these countries. In transition countries with higher law enforcement one can see many more payments after delivery, indicating a higher degree of trust among firms. The prepayment as the reflection of the opposite situation is higher in the countries with weaker contract enforcement. In fact, the highest level of prepayment is observed in Russia, Central Asia, and Eastern Europe and the Caucasus (Figure 1.2).

Figure 1.2: The share of prepayment in transition countries.
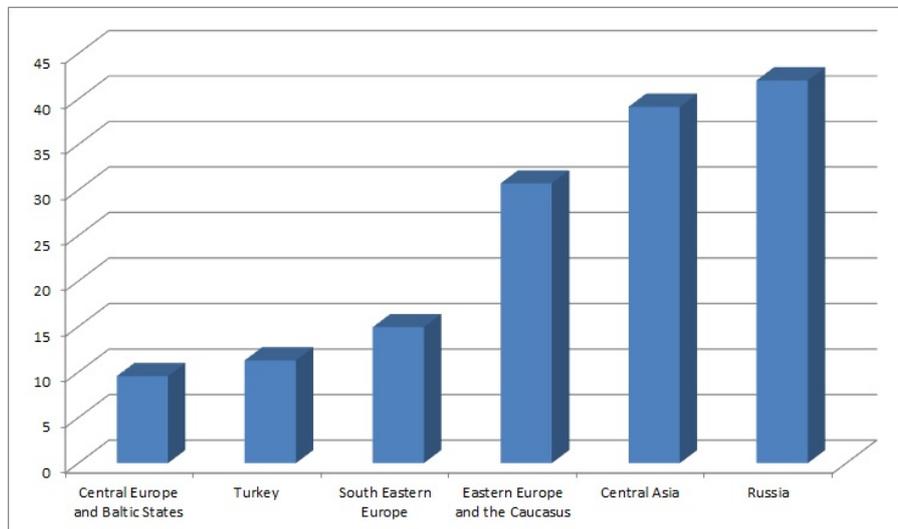
Source: Own calculations based on the BEEPS IV (2009)

The high incidence and intensity of internal enforcement mechanisms (relational contracting and prepayment) in transition countries illustrates that external contracting institutions are not considered by firms to be reliable mechanisms of contract enforcement. Moreover, the differences of intensity of prepayment as an alternative mechanism highlight that contracting institutions' weaknesses are converted into adjustments of microeconomic interactions and contracts between firms, and perhaps organization of production as well. The differences are notable between Central European and Baltic countries, and the rest of the transition countries. CEB countries represent the majority of new entrants of the European Union and have the highest level of trust. The ones closest to the best performers of CEB are the countries of South Eastern Europe, while Russia, Central Asia, and Eastern Europe and the Caucasus are among the countries with the lowest trust between firms and highest incidence of prepayment as an internal enforcement mechanism.

1.2.4 International trade, Openness and Participation in Global Value Chains

The interactions of firms do not take place in the closed economies, as well as firm organization. As a result it is important to highlight the role of the international trade context in the development of transition countries.

The reforms aimed at opening transition economies to international trade were among the earliest reforms made at the beginning of transition. Some countries went even further and relied heavily on international trade. However. some countries, although opening their economy to trade, stay comparatively closed.

For a long time, trade liberalization has been argued to be one of the policies stimulating economic growth, especially in transition countries. However, the evidence is not conclusive on the mechanisms of the intuitively positive impact of trade on growth.[8] Barlow (2006) gives empirical estimates for the connection between international trade liberalization policies and the increase in economic growth in transition countries (using EBRD indicators). He shows that improvement in the EBRD trade liberalization index by 1 unit raises the GDP growth rate by about 3 percentage points. However, there exists idiosyncrasy in the strength of the link, typical of the transition region. Barlow (2006) argues that the impact of trade liberalization policies is stronger for the countries closer to the European Union.

The dissimilarities between economies close to the EU and the rest also exist in the degree of international trade openness (see Figure 1.3). The group of Central European and Baltic countries are out-performing in terms of their participation in both international trade and GVC. The countries of this group have been the core of the German-Central European supply chain, gaining in terms of technology transfers and income convergence (IMF, 2013). However, on average the participation of transition countries in the value-added chains is quite low in comparison with the developed countries and a large share of the developing ones. It has been rising impressively since the 90's, but most of the increase has been due to the rise of raw materials exports.

In general, the participation of transition countries in the GVC bears a high share of domestic value added exported, but little foreign value added imported for the production of final goods. Thus, although the share of total imports has increased significantly since the beginning of the transition period (Figure A.5 of the Appendix), participation through the import of intermediate inputs (sourcing) is still comparatively low. The share of the GVC participation through sourcing is comparable with the shares of South America and Africa. Judging from the transition countries' participation in the GVC, the biggest suppliers of intermediate import for transition economies are, for example, EU-15 countries and USA. Thus, strengthening participation in GVC through the import of intermediate goods may also be beneficial for their suppliers.

The imports of intermediate inputs (sourcing) is often seen as one of the stimuli for strength-

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[8]See the debate in the literature on Frankel and Romer (1999) and the overview by Winters (2004). Alcalá and Ciccone (Alcalá and Ciccone) show that the effects work primarily through total factor productivity.

ening a country's comparative position within the GVC and for diversification of exports (Ben-guria, 2015). The benefits of participation in international trade and GVC through imports have been widely highlighted. Moreover, the combination of the domestic and foreign sourcing is assumed to bring multiple benefits to firms and countries. One of the first advantages usually mentioned is the economies of specialization that allow a firm to optimize input supply both, in terms of quality and in terms of expenses due to cross-border complementarities (Sturgeon and Memedovic, 2010). The importing of foreign inputs is also expected to cause spillovers of higher productivity, technology and innovations due to the production connections with the more advanced economies (Memedovic et al., 2008; Damijan et al., 2009).

Figure 1.3: The share of trade in GDP in transition countries
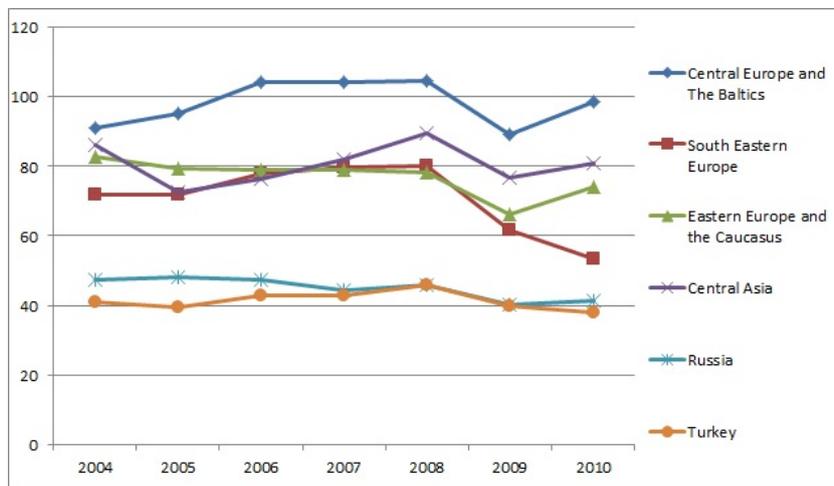
Source: The World Bank Estimates

Moving to the features of transition countries' participation in GVC, the statistics shows that transition countries are participating in the GVC mainly through supplying low- and medium-technology inputs for other countries (UNCTAD, 2013). This indicates that, on average, these countries have comparatively low benefits from GVC participation. Especially low long-term benefits are characteristic of downstream-oriented countries of the region, like Russia and Central Asia. On the contrary, by targeting participation in GVC through more upstream production, the group of Central European and Baltic countries have gained much higher benefits from trade than their less advanced counterparts.[9]

However, moving higher in the GVC may require further reforms and policy actions. For instance, Cheng et al. (2015) show that moving up the GVC is associated with higher economic complexity and diversification, demonstrating that latter are driven by institutional quality, macroeconomic stability and trade openness. This shows that, along with higher openness to international trade, more structural reforms should be made in multiple transition countries in order to gain from the GVC participation and stimulate growth. In fact, the only country

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[9]It has long been argued that moving away from supplying mainly low-technology inputs to more technology-intensive goods is essential for developing countries, like transition ones. Developing manufacturing and higher technological production is a crucial factor, and may cause more sustainable development and economic growth.

group in the transition region that has recently started to benefit from participation in GVC is the group of the Central European and Baltic states that have been overperforming their counterparts from the transition region in multiple areas. In particular, the tariffs and trade are the lowest and trade freedom is the highest in these countries (see Figure 1.4), and positively affect their possibility to move higher in the GVC. Moreover, the discussion in Sections 1.2.1 and 1.2.3 illustrated that these countries has been comparatively more successful in terms of macroeconomic stability and institutional quality. Considering all these factors, countries of the South Eastern Europe may have a strong potential for moving up the GVC, while such countries as Russia and those in the Eastern Europe and the Caucasus, and Central Asia still have a long way to go.

Figure 1.4: Tariffs (left) and the Index of Trade Freedom(right)
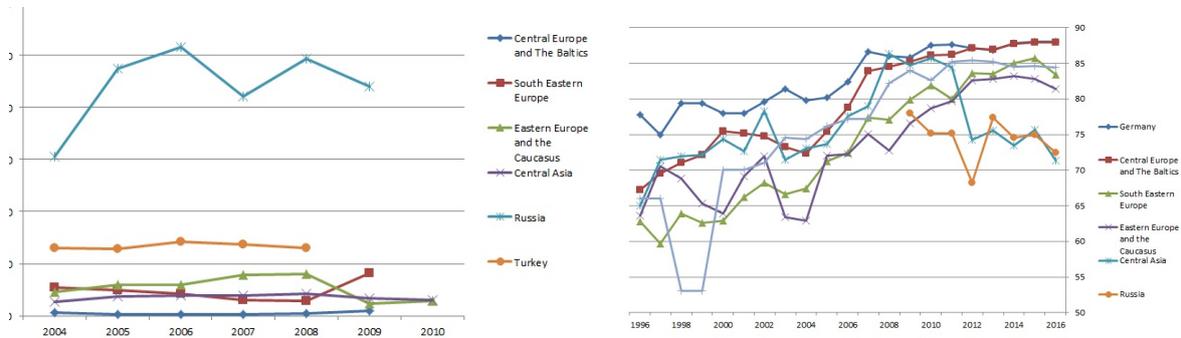
Source: EBRD estimates and The Heritage Foundation
Note: Tariffs (left) represent tariff revenues in per cent of imports

The participation and the features of GVC are helpful not only for measuring global network of transition countries in a world changing trade landscape. It is well known that there are two mappings of this landscape. The first one (top down) is based upon aggregate value added data: international input-output tables now combine national accounts with trade statistics and decompose gross trade into its foreign and domestic value added contents. The results show a mapping of changing trade landscape by analysing country and sectoral value added data. The second one (bottom-up) intensively uses highly disaggregated micro data at the firm level in Melitz's perspective or ad hoc surveys of the firm's global supply links. In between the two, analyses of trade in intermediates or in parts and components complete the picture of the trade landscape. Integration between these approaches is difficult. But the bottom-up perspective on firms' behaviour in the international arena, especially in transition countries, could be crucial for understanding the micro sources of differential GVC participation and features.[10]

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[10]For example, the degree and features of a country's participation in GVC may be defined by the positioning of single firms along the GVC. Mainly positive and desirable features of higher participation in the GVC for countries, from a firm perspective are also associated with the higher costs of failure and higher risk of the economic shocks coming from the world interdependence (Altomonte et al., 2013). To decrease such risks, firms may change their organizational form of participation in the GVC to obtain higher gains. For example, sourcing through intra-firm trade has been shown to be more resistant to international economic downturns (Lanz and Miroudot, 2011).

1.3 The Theoretical Positioning

In order to understand how the highlighted features of economic development in transition countries may have affected the firms' organization and their ability to change it, I draw largely on the combination of Organizational Economics with International Trade (Antràs and Rossi-Hansberg, 2009). This section presents theoretical motivations for studying the impact of the country and business environment on firms' organizational decisions and performance.

The performance and growth of economies is largely dependent on the allocation of resources or factors of production within and across countries. Such allocation has long been represented in economic models as the production function mapping the factors of production and production output according to a chosen functional form. The determinants of such a functional form have long been treated as a "black box". In reality, the mapping between the factors of production and output depends closely on the organizational decisions of producing agents, firms in particular.

The growing field of Organizational Economics is devoted to the study of how these organizational decisions form the mapping between factors of production and production output. On the one hand, an understanding of these decisions may be intellectually interesting in its own right: for instance, there is a vast literature trying to understand why certain transactions are carried out within or across firms. On the other hand, studying these organizational decisions provides valuable insights into the aggregate patterns and dynamics of the world economy. Thus, the importance of organizational economics transcends the narrow nature of the questions that it seeks to answer and sheds light on the microeconomic roots of macroeconomic performance.

For instance, production function $F_c(K, L)$ for a country c is traditionally used to define the output that can be produced using a set of capital (K) and labour (L) inputs in a certain location c. The assumption is that the functional form of $F_c(K, L)$ is given by the technology and is independent from the economic environment and firm characteristics, assuming away the organizational problem.

Now suppose that firms can decide how to combine the inputs, what kind of inputs to use, and where to buy them. For example, they can decide to produce only a share of required intermediate inputs and to buy the rest (outsourcing decision). The optimal decision on *how* to produce will determine the characteristics of $F_c(K, L)$ and will make these characteristics the function of Θ, which represents all prices and properties of the market and economy.

Then the problem of organization transforms the traditional view of technology into a reduced form specification given by $O_c(K, L, \Theta)$. Understanding how the production function is connected with the characteristics of the market and economy, namely what is the connection between $F_c(K, L)$ and $O_c(K, L, \Theta)$, is the goal of organizational theories.

Only by uncovering the microfoundations of the organization of production can one fully understand how and to what extend changes in the economic environment, such as falling trade, communication costs or improvements in contract enforcement, will affect economic outcomes. By introducing endogenous organizations, one can not only explain existing evidence but also

affect, and even change notably, the predictions of standard macroeconomic models.

Melitz (2003) has become the ground-breaking work to understand how microeconomic heterogeneity in productivity matters for theoretical and empirical models of trade, introducing reallocations and new channels for productivity and welfare gains. However, the model still treats the organizational problem as a "black box"

Motivated by various extensions of Melitz (2003) model, Antràs and Helpman (2004) integrated differences and dispersion of firm productivity into the analysis of organizational choices by using the incomplete-contracts approach. They endogenized the firm's organization by incorporating a multistage bargaining within production process, resulting in the trade-organizations perspective where the focus is on the organization of production as a result of firm characteristics, and international and contractual factors. They argue that in a context of heterogeneous firms both, the fixed costs of alternative organizational choices (integration versus outsourcing), and the sunk costs of alternative location of production (home versus abroad) explain why productivity level and dispersion go hand in hand with organizational choices.[11] This perspective relies heavily on the firm theory. In particular, it is based on the path-breaking study by Grossman and Hart (1986), and its two extensions, namely Grossman and Helpman (2002) and Antràs (2003). However, it is important to extend the discussion by introducing fundamental concepts such as relationship-specific investments, incomplete contracts, hold-up and quasi-rent.

Since the seminal work of Ronald H. Coase (1937), numerous theoretical models have been proposed in order to understand the nature of the firm and firm boundaries within both transaction costs economics and the property-rights theory. Both theoretical approaches focus on the complexity of inter-firm relationships, costs and benefits of bringing certain activities within the firm (integration) when "the need to make unprogrammed adaptations" arises (Gibbons, 2005; Williamson, 1971).

Transaction cost economics has benefited largely from the significant contributions of Williamson (1967, 1971, 1979) and Klein et al. (1978), which stated that integration allows economic agents to avoid haggling over "appropriable quasi-rents" and provides a more efficient way to resolve minor conflicts through fiat. The idea is that while the market gives the possibility for bargaining, it also creates "appropriable quasi-rents" or the possibility for monetary gains that neither party is ready to give up. This creates inefficiencies and additional costs, especially if investments are involved, resulting in the hold-up problem.

The hold-up problem arises from the concern of participants that their profits will be smaller due to the opportunistic behaviour of their partner. To resolve hold-up problems more efficiently, agents may opt for integration. In this case, the ownership of the physical (not human) capital of the partner gives the control rights to avoid the hold-up. The hold-up is the central component of both the transaction cost and property rights approaches. The hold-up problem in transaction cost theory arises when a part of an agent's relationship-specific investment

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[11]The choice in this case is between integration and outsourcing and between domestic sourcing and foreign sourcing. And the effects of industry and country characteristics can be studied in order to understand the relative prevalence and location of organizational forms.

can be expropriated ex-post. In the classical transaction cost theory this is represented by "appropriable quasi-rents", no matter whether these "quasi-rents" are contractible or not.

On the contrary, in the property-rights theory, mostly developed by Grossman and Hart (1986), Hart and Moore (1990), and Hart (1995), the hold-up problem arises because of the *incompleteness of contracts*[12] and the relationship-specificity of the investments made by either/both parties. Moreover, while rent-oriented transaction cost theory describes ex-post inefficiency and hold-ups, property-rights theory assumes efficient ex-ante bargaining of boundedly rational agents that anticipate possible ex-post hold-ups. In particular, because all the relationship contingencies cannot be fully written in the contract (incomplete contracts), they cannot be enforced by a third-party, giving rise to the opportunistic behaviour. Thus, once invested, the costs will be sunk if the partner violates the contract. Anticipating possible opportunism of the partner, a firm may underinvest. On the assumptions of the model, the share of the surplus is defined by the share of firm assets. As a result, with the increasing importance of investment incentives the desirability of integration (owning all assets) increases.

Summing-up, Grossman and Hart (1986) have given the tools with which to evaluate firm organization, in particular its boundaries, both domestically and internationally. By applying insights of the property-rights theory expounded by Grossman and Hart (1986), several studies have attempted to answer the questions on the determinants of when and how much firms integrate.

First, Grossman and Helpman (2002) presented an industry equilibrium model illustrating how downstream firms (final good producers) endogenously define whether to integrate their suppliers or trade with them at arm's length. The model is based on the one-input general equilibrium framework with equally productive firms within industries. The firms face frictions due to incompleteness of contracts in the arm's length trade, which they compare with the benefits of the control over residual rights under integration. As a result, some sectors consist of only integrated firms, while others include only disintegrated firms. Grossman and Helpman (2002) identify sectoral characteristics that define the prevalence of either equilibrium structure. Integration is assumed to be associated with higher governance costs, while its benefits includes (i) escaping from contractual-driven inefficiencies inherent in the hold-up problem faced by firms in market transactions, and (ii) saving on the search costs of finding a suitable independent supplier.

Second, Antràs (2003) further extended the framework of Grossman and Helpman (2002) to the trade environment. Two new features were added to the model. First, it assumed that, although integration provides well-defined residual property rights, it does not fully eliminate frictions associated with incomplete contracts. Consequently, holding property rights may or may not give integration an efficiency advantage over outsourcing. Second, the model assumes the existence of two inputs, one of which is controlled by the final-good producer, while the other is controlled by the supplier either inside or outside of firm. The relative intensity of these

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[12]Another approach is taken in the more recent studies of Oliver Hart (2007) and Hart (2009) to the characteristics that cause hold-up. Their new approach of contracts as reference points consists in the analysis of payoff uncertainty, rather than contract incompleteness, as a source of hold-up.

inputs in the production of a final good defines the choice between integration and outsourcing. It is assumed that the final-good producer controls more technological or capital-intensive input, while the supplier is focused on the production of comparatively more labour-intensive input.

The model considers more closely the relationship between a supplier and a firm within the sourcing relationship describing it as a 4-stage bargaining process in the tradition of the property rights theory. By embedding such a bargaining in the general-equilibrium framework of international trade, the model explains the prevalence of a particular organization form (vertical integration versus arm's length trade) and the drivers of firm boundaries. As a result, Antràs (2003) predicts that the integration will be prevalent in the sector more intensive in technology and capital (final-good producer's input), while sectors with lower intensity in final-good producer's inputs will be characterized by the prevalence of outsourcing, or arm's length trade. This allows authors to explain large international trade flows that take place within the same firm (intra-firm trade) between different countries and intra-firm trade predominance over arm's length trade (trade with an independent supplier) in some sectors. The model, however, does not examine organizational responses to the liberalization of product and factor markets, but it explains one important empirical feature: intra-firm trade is concentrated in capital-intensive industries and between capital-intensive countries.

Such foundations for the modelling of the endogenous organization of production allowed Antràs and Helpman (2004) to create a framework for analysing international production organization. By incorporating productivity heterogeneity and different fixed costs for any organizational form in the Antràs (2003) model, the authors studied both organization and location decisions regarding the transactions with their suppliers, either domestic or foreign. In the two-country Ricardian framework, they predicted higher foreign integration in sectors intensive in final-good producer's input, when firms are characterized by higher productivity. Thus, foreign location decisions have productivity advantages over domestic location decisions, while organizational sorting (integration versus outsourcing) follows the same logic as in Antràs (2003).

However, the Antràs and Helpman (2004) model did not consider the differences in the degree of contractual frictions caused by the different strengths of contracting institutions. Such differences have been incorporated in the Antràs and Helpman (2008) model, where countries are allowed to differ with regard to the degree of contractual frictions. The model illustrates that better contracting institutions in the country where the supplier is situated raise the incentive of a firm to trade with this supplier at arm's length. As a result, this may reduce the prevalence of Foreign Direct Investments (FDI), or international intra-firm trade, in this country. As a result, the model predicts a negative connection between integration and the quality of contracting institutions.

To sum up, the recent stream of property-rights theory, also referred to as Global Sourcing theory and largely developed by Antràs and Helpman, shows that organizational choices are determined by contractual frictions. The contracting frictions, further, are represented through technological complexity and the strength of contracting institutions, with the important influence of productivity heterogeneity. However, these models have several limitations.

First, empirical applications of these models call for significant simplification due to several factors. First of all, the assumptions about the contractual frictions are associated with the complexity of contracts, which is mostly unobserved and hard to grasp with the direct empirical measures. Second, development of these models requires introduction of multiple assumptions about the model's parameters values and distributions. Relaxing these assumptions makes multiple equilibria possible theoretically, but impossible to test with real data. Third, in order to calibrate and test these models, researchers often opt for the data on multinational corporations MNC in advanced countries[13] that allow them to be as close to the model's assumptions as possible in search of the determinants of intra-firm transactions. Moreover, such a choice is often driven by the fact that data on international transactions are particularly accessible. The application of these models to the data on firms in emerging countries requires a large degree of adaptation and aggregation.[14] This makes the testing of all model assumptions largely not feasible, especially in the case of less developed countries, leaving, however, the possibility for empirical work to be based on the conclusions and generalizations of such models.

Second, all of the theories discussed above are static in terms of firm environment. None of them studies the dynamic changes of organization together with the changes in trade liberalization. In particular, almost nothing is known about how increasing trade and market competition have affected organizational choices over time. A property-rights model that may shed more light on the influence of trade liberalization on organizational changes has been developed by McLaren (2000). In particular, it highlights that more internationally open markets provide more options for the choice of potential buyers of a firm intermediate good. With the addition of any number of non-integrated buyers on the market, the outside option of existing suppliers increases. This means that it is easier for the supplier to find alternative uses for its specialized good. This increases the bargaining position of the supplier and makes arm's length trade more attractive. The model, however, does not account for increasing competition on the product market from magnified imports of goods. Such increasing competition pressure may potentially have an opposite effect. As a result, the overall effect of trade liberalization on industrial and firm organization is still largely unclear from a theoretical point of view.

Third, the theoretical studies on how contractual frictions interact with other organizational choices have been relatively limited. For instance, the role of international trade liberalization in changes of internal firm organization has been largely neglected by the theoretical literature. Few studies have considered these issues. However, both approaches and the results that the studies provide are not uniform and too fragmentary to give unified testable hypotheses.[15]

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[13]Two main strands of the empirical literature can be identified that consider the relationships between multinational firms and their suppliers. The first one has an industry/product focus when examining the determinants of import shares attributed to intra-firm trade (Nunn and Trefler, 2008); the second one exploits firm-level data and documents productivity premia associated with differentiated sourcing strategies of multinationals (Kohler and Smolka (2014) with Spanish data, Defever and Toubal (2013) with French data).

[14]In particular, with no data on firm-product level, the heterogeneity of within-firm technology may not be explored.

[15]Grossman and Helpman (2004) provide preliminary answers on how trade liberalization affects the distribution of workers incentive schemes within firms. From a different perspective the model of Aghion and Tirole (1997), followed by its general-equilibrium extension of Puga and Trefler (2002) and Marin and Verdier (2008), analyses the association between international trade and allocation of decision rights among employees.

Bloom et al. (2014) try to draw some preliminary conclusions from existing literature and business surveys on the possible effect of trade liberalization on firm's internal organization. However, much more theoretical work is required to understand and create a systematic view on the adjustments of firm organization to increasing exposure to international dimensions.

To summarize, although numerous contributions sought to incorporate organizational decisions into general- and partial-equilibrium models, there is still a wide space to fill. The property-rights approach has made a valuable contribution to the understanding of how endogenous organizational choices are formed by technology, productivity and institutions through firm-level bargaining. Nevertheless, there are still issues to resolve: what about product market competition? or what is the role of assumptions on the fixed and sunk costs when empirical applications are to be performed? Are there differences for countries at different stage's of development? How does internal organizational structure change with trade liberalization?

In this thesis I rely on the conclusions of the theoretical literature presented in this section. However, their precise testing would fall outside of the scope of this work because it requires highly specific and extremely detailed data.

1.4 The Research Method

DATA AND DATA CONSTRAINTS

Finding appropriate firm-level data allowing analysis of firm organization and its changes is limited by several factors. In order to analyse firm decision-making in terms of boundary changes, internal restructuring and management quality the data with the following characteristics were needed for this thesis: 1) the data should be at the firm-level to account for firm heterogeneity, 2) it should contain information on firm organization and its changes to answer the main questions of the thesis, 3) it should make it possible to account for the economic environment and other firm-level characteristics (age, size, ownership, international trade participation, etc.) in order to rule out their influence on firm decision-making 4) a representative sample for the set of countries would have to be chosen. Such requirements to the data were associated with relatively more constrained data options. While firm-level surveys are available for the researchers' use, census and administrative data are rarely available.

Administrative or other large-scale firm-level data, though used more often in the literature, are still rather rare. This is partly due to the fact that firm-level data are subject to various agreement protocols and legal requirements related to the protection of private information. As a result, firm-level data are frequently only accessible to authorized individuals, while output prepared for wider circulation has to be aggregated before being released.

Although firm organization is important in transition countries, few non-survey firm-level data on firm organization are available for those countries. While EU new members have increased the standards of data sharing and data availability, the problem of access to microeconomic data on individuals and firms is still severe in non-EU transition countries. The concept of granting access to publicly collected microeconomic data for academics free of charge

(or at marginal cost) is only slowly penetrating the region. Moreover, although most statistical offices collect regular data on enterprises in transition countries, confidentiality concerns make such data hard for researchers to obtain. Census data in non-EU transition economies typically contain too little information to be of much use to researchers. Comparable micro-level data sets are even less frequent, and the issue of comparability is normally extremely severe.

However, there exist a number of survey datasets provided by diverse international organizations and research institutions. The possibility of merging the financial datasets with the data on firm organization is always preferred and desired. However, such mergers often suffer from differences in the survey frame.[16] For example, the Amadeus database is strongly focused on large and/or publicly listed firms, omitting in a large extent small and medium firms (SME). Thus, merging this database with survey data on stratified samples results in a large amount of missing information. This limitation of the merged financial data has determined my choice to rely mostly on the survey data, with only some exceptions when financial was used to enrich firm performance analysis.

Thus, due to the thematic and country requirements of the data, their quality and availability this thesis is based on the survey data provided by the EBRD and World Bank. In particular, in this thesis I utilize various releases of the Business Environment and Enterprise Performance Survey (BEEPS) and the Management, Organisation and Innovation (MOI) survey data provided by the EBRD. Apart from being publicly available and suitable for the purposes of the research, they have also been internationally accepted as representative samples of firm characteristics and behaviour in transition countries. Moreover, the choice of these data sets allowed comparability of the survey data from different countries of the region. These data have been frequently used for firm-level analysis in the literature (Gorodnichenko et al., 2014; Godart and Görg, 2013; Commander and Svejnar, 2011)[17], although no previous studies have explored the information on organizational changes contained in these databases.

Although yielding multiple gains for the analysis, the choice of these datasets imposed some limitations on my research. In particular, these datasets are either one-year or repeated cross-sections. Panel components, although they exist, are too small to be utilized. In the case when the data set is a repeated cross-section, it may be (as happened in my research) subject to the methodological change and questionnaire revisions between releases. Such changes do not allow comparison between the waves of the surveys and exploitation of the time dimension.

Consequently, the analysis relies on the cross-section dimension of the data to draw the conclusions on the differences in organizational changes within and across countries. While individual country studies can provide important insights into this issue considering different performances of sectors or individual firms, another way to highlight the desired connections is to link firm performance across countries that differ in their regulatory and policy settings. A data set consisting of "stacked" micro-level data sets from different countries will contain

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[16]The exceptions are the surveys conducted using the frame of the datasets containing financial information (or vice versa).

[17]A more extensive list of publications based on the use of EBRD data may be found on the web-page `http://ebrd-beeps.com/research/`

the necessary information lacking in either single-country micro data sets or multiple-country sectoral data sets.

However, the drawback to using such cross-sectional data is that the issues of causality and possible reverse causality are difficult to grasp. In some cases the approach of using an instrumental variable may be applied, but in our case possible instruments were extremely weak or using them would have caused the loss of large part of data. However, in Chapter 4 I attempt to deal with these issues. In particular, the import competition pressure in Chapter 4 is instrumented by the sector-level measures of import penetration rates constructed from Eora input-output tables (Lenzen et al., 2012, 2013). This instrument also rules out the possibility of inverse causality between the competitive pressure and firm organizational changes because it is fully independent from the behaviour of a single firm. The results of the following chapters are mainly intended to provide supporting evidence for the theoretical prediction. Therefore, I rely on the theory to infer the causal links associated with the correlations highlighted by my empirical results.

EMPIRICAL MODELS

In the thesis four main types of empirical models are utilized, namely fractional logit model, binary and multinomial response models, and linear models.

The choice of fractional logit model is due to the type of dependent variable used in the second chapter of the thesis. The aim of the analysis is to estimate the incidence of integration in different industries of transition countries. To this end, a logical option would be the Poisson model, which allows researchers to analyse count data. However, the industries in my sample are represented by a different number of firms, making correction for it required. Correcting for the total number of firms in an industry, which may not be higher than the incidence of integration, results in the dependent variable being represented by the ratios of integrating firms, which are latent variables truncated both on the left and on the right side of the distribution. Numerous zero values for these ratios are also found, because multiple industries may be represented by firms that did not opt for integration in the period observed. The use of a linear regression model in this case would ignore the presence of zero values.

Most recently, the empirical research has relied heavily on the use of a Tobit model for such cases, because it combines the probit likelihood that a zero value will be observed with the linear regression likelihood to explain non-zero values. While the Tobit approach certainly improves upon standard linear regression, some researchers (Papke and Wooldridge,1996) argue that the Tobit model, a censored regression technique, is not suitable when values beyond the censoring point are unfeasible. While the use of Tobit approach is usually motivated by the fact that an underlying latent variable, for instance, expected utility from a purchase, is observed only in a limited range, for instance, when the utility is positive, the ratio of integrating firms is difficult to motivate in the same way as its values less than zero are definitely not feasible. Papke and Wooldridge suggest that a generalized linear model (GLM) with a binomial distribution and a logit link function, which is also called the fractional logit model, may be appropriate even in

the case where the observed variable is continuous, but truncated in the way described above.

To model the ratio Y as a function of covariates X, the generalized linear model may be written in the following way:

$$f(E(Y)) = X\beta, Y \sim F \tag{1.1}$$

where $f(\cdot)$ is the link function (function linking the actual Y to the estimated Y in an econometric model) and F is the distributional family. In the case of a fractional logit model, this becomes the following equation, which should be estimated with a robust standard errors.

$$logit(E(Y)) = X\beta, Y \sim Bernoulli \tag{1.2}$$

The choice of binary models is also dependent on the data used as the endogenous variable. In particular, binary models are used to estimate the probability of a particular decision being made. Consequently, the endogenous variable is binary (takes the value of either zero or one). Different binary choice models are used in both the third and fourth chapters. Probit and logit models represent a standard approach when the dependent variable is binary. Both of these models are non-linear and the derivative of the probability with respect to covariates varies with the level of the covariates themselves and the other variables in the model. The logit model is derived from the distribution function that gave slightly thinner tails. In the probit model it is assumed that the link function is normal, i.e. $Pr(Y = 1 \mid X) = \Phi(X\beta)$, while in the logit model it is logit, i.e $\Pr(Y = 1 \mid X) = [1 + e^{-X'\beta}]^{-1}$. The differences in the estimation results of probit and logit models are usually rather minor; consequently the models will be used interchangeably in the thesis.

The issue of heteroscedasticity in binary models like probit and logit is usually assumed to be highly important because it is impossible to correct using the White (robust errors) estimation procedure. However, unless the precise form of heteroscedasticity (let us call it $g(X)$) is known, which is extremely rare, there is little a researcher can do about it even if he/she suspects the existence of this issue. Moreover, as underlined by Johnson and Dinardo, until the aim of the analysis is to understand the effect of covariates on the probability of a particular choice, whether the effect works through the mean (regression function $f(X)$) or through the variance ("scedastic" function $g(X)$) does not generally matter. The exception is when the object of the analysis is to find the function $f(X)$, which is not the case in this thesis.

The model that generates a binomial response probability generates readily to a system in which a vector of latent variables, not a single variable, is determined by the explanatory variables, and the link function maps the latent variable in a vector reflecting observed response. In other words, when the endogenous variable is presented as a set of non-ordered mutually exclusive and exhaustive possible choices, the standard approach is to use multinomial response models. In these models the response probability may be interpreted as a proportion of agents, firms in the case of this thesis, maximizing their utility at each alternative when faced with decisions characterized by X_1 and/or firms are characterized by X_2. It is argued (Hausman and McFadden, 1984) that functional forms of the models which allow similar patterns of inter-

alternative substitution will give comparable fits to the same data sets. The models include multinomial logit models, multinomial probit models and elimination models. The benefit of using a multinomial logit model is connected with its comparatively higher computational simplicity. It also explains why the most widely used model of multinomial response is the multinomial logit (MNL) form. This model permits easy computation and interpretation, but has a restrictive pattern of inter-alternative substitutions. In particular, it relies on the Independence from Irrelevant Alternatives (IIA) property, which states that the probability of i being chosen over j is independent of the availability or attributes of alternatives other than i and j. However, aggregation of relatively homogeneous alternatives into a smaller number of primary types may help partly to relax this restriction.

In the cases when homogeneous alternatives are grouped in nests, economists often use nested models. For the case of multinomial logit, the nested versions exist as well. However, apart from being computationally intensive, they also require the differentiation of choice- and nest-specific variables. In the case of the research presented in this thesis (Chapter 3), most of the variables are firm-specific and it is impossible to separate the firm features that characterize nests from those connected only with alternatives without making strict assumptions. No theory have been yet developed on which such assumptions may be based. Moreover, independent variables in our case may affect both the "nest" decisions and the choice between homogeneous alternatives, but in a different degree or different way. Consequently, a different approach is applied.

In order to separate more homogeneous options from a significantly different option, two models are estimated, one of which represents the choice of a stand-alone option over all the rest, while the other represents the choice between homogeneous options. However, joint consideration of all the options could introduce bias into such modelling due to self-selection into a sub-population of agents choosing the stand-alone option. It is possible to represent self-selection phenomena in a joint model by using the Heckman procedure. If the Heckman test was significant, the two models would need to be considered jointly. In the case of the research presented the Heckman test was found to be insignificant. As a result, the two models were considered separately.

While discussing the results, average marginal effects are presented in the tables for non-linear models (logit, probit multinomial logit) unless stated otherwise.

In order to analyse the quantitative differences in management quality, in Chapter 5, the analysis relies on the linear models. In particular, a standard ordinary least squares model with clustered standard errors was used, following the study of Bloom and Van Reenen (2010), where similar data were used.

1.5   Structure of the thesis

This thesis contributes to an emerging literature on models with endogenous organizations, and in particular to a recent stream of this literature which has examined firms' organizational

choices in a global economy.

Most papers have focused on how organizational design can explain the observed patterns of intra-firm trade with a clear focus on MNC. Much less attention has been paid to how firms' boundaries and organization of production react to contractual and international links. Even less attention has been devoted to internal reorganizations induced by increasing international exposure and a changing business environment. Moreover, most papers have focused on advanced countries and multinational firms, while much less attention has been dedicated to emerging or less advanced transition countries. In particular, almost nothing is known about the industrial organization that is emerging in transition countries after two decades of transformation. Nor to my knowledge has the previous literature pointed out the effects that trade liberalization may have had in transition countries on firms' internal organization — through its impact on the depth of the firms' organizational hierarchies.

The contributions of this thesis are empirically-oriented, and are focused on organizational changes at the firm level in transition countries. The main motivation was the need to understand the mis-match between tools and expectations in transition economies. The tools were massive privatization and opening to trade, while the expectations were that companies would become successfully functioning drivers of sustainable growth, similar to western companies, and provide profits and jobs.

The remainder of the thesis is composed of four chapters. Chapter 2 utilizes the theoretical predictions of property-rights theory to analyse the industry-level prevalence of organizational form changes in transition countries. In particular, it illustrates the connection of technological and institutional factors with the occurrence of decisions to redefine firm boundaries, in particular to integrate. The chapter also highlights the link between the openness to international trade and the incidence of integration choices.

Chapter 3 presents the empirical analysis of firm-level decisions to redefine firm boundaries in transition countries. It shows the complexity of the choice options when a decision to redefine firm boundaries is taken at the firm-level. This chapter also underlines the importance of technological and institutional factors in overcoming the resistance to organizational changes like redefinition of firm boundaries.

Chapter 4 focuses on the connection between trade liberalization and internal organizational change. It draws some stylized facts on the internal organization of firms in transition countries. Moreover, the chapter highlights the role of increased market competition due to increased imports in the prevalence of firms' decisions to make their internal organization flatter. It also underlines the effect of firm characteristics on the choice of flattening decisions.

Chapter 5 discusses the connection between management quality and institutional failures, such as corruption, in transition countries. It describes this connection at both country and firm level. The chapter highlights the importance of firm-level characteristics and country-group features in transition region.

A detailed description of the data used for the empirical analysis of this thesis is given in Appendix A. The appendix also includes additional figures and tables for all five chapters of

the thesis.

Chapter 2

FIRM BOUNDARIES IN TRANSITION COUNTRIES. INDUSTRY-LEVEL ANALYSIS

2.1   Introduction

Firms are choosing to trade within their boundaries more and more often. Almost one-third of the world trade of goods represents trade within the boundaries of the same firm(Antràs, 2003). Most of the growth of intra-firm trade in developed countries is attributed to the technological progress and higher complexity of production. However, little is known about what drives this process in one of the biggest world market, namely transition countries.

In order to answer this question we take the perspectives of property rights theory and new institutional economics and analyse whether or not the organizational choices of firms in transition countries have been affected by technological and institutional developments, as well as by the increase in international openness.

The focus on transition countries has two main motivations: The first is related to the historical tendency towards excessive vertical integration during the Soviet era. In the period of planned economy, firms in modern transition countries were mainly locked into highly specific supply relationships with a small number of firms or even with a single supplier. In the last 25 years transition countries have gone through significant political and economic changes. Such changes entailed institutional transformations, trade liberalization, and changes in the organization of industries, business practices and firm interactions. However, a systematic view on the production links of firms in transition countries is still to evolve. Neither national nor international production links in transition countries have been extensively discussed in the literature. The boundaries of the firm in these countries have rarely been analysed, even if the boundary extension is one of the key decisions for a firm's economic performance and a firm's adjustment to national and international changes.

The second motivation lies in the persistent weakness of institutions and slow technological advancement in transition countries. These are two features possibly influencing boundaries extension and vertical integration. However, the question rests which and how much each of these two features affects firm boundaries in transition countries.

We focus on the strand of literature that examines firm boundaries as a key decision for firm organization, by analysing relationships between firms and their suppliers. It has already

been demonstrated that vertical integration influences a firm's learning ability (Sorenson, 2003), performance improvements (Novak and Stern, 2009), resource allocation and technology transfer (Seru, 2014), as well as its productivity (Schoar, 2002; Broedner et al., 2009). However, it has also been shown that the choice of integration versus arm's length trade does not guarantee a better performance, unless it is an optimal response to institutional hazards (Leiblein et al., 2002).

The questions on the choice between vertical integration and dealing with stand-alone suppliers have been asked in the literature since Coase (1937). However, it was not until Antràs (2003), that the property-rights approach to integration was combined with the framework of international trade. The Antràs (2003) study gave rise to the new and fast-growing literature of sourcing in international trade context, that is mostly applied to the analysis of multinational corporations. It was further extended in Antràs and Helpman (2004) and became the global sourcing model where firms organize production on a global scale depending on the intensity of their inputs use and their level of productivity. Further, Antràs and Helpman (2004) was generalized in Antràs and Helpman (2008) theoretical model to analyse the impact of varying degrees of contractual frictions affecting either the supplier or the sourcing firm.

The results [1] of the first two papers (Antràs, 2003; Antràs and Helpman, 2004) are twofold. First is the development of organizational models explaining *make or buy* decision, the choice sometimes called *integration procurement* versus *market procurement* or vertical integration versus outsourcing. The main assumption behind this is that vertical integration allows the firm to partially control the customized intermediate inputs produced by its supplier. The central implication is that we should see vertical integration in industries that intensively use the headquarter inputs produced by the firm. Second is the development of organizational models treating the drivers of the *make-or-buy* decision in a global context where the choice of *how* to source goes hand in hand with the choice of *where* to source.[2]

Both these papers identify the influence of technological complexity on organizational forms. But the main message of the third paper (Antràs and Helpman, 2008) is that the relative prevalence of alternative organizational forms depends not only on technological complexity, but also on varying degrees of contractual frictions, across countries and across inputs, i.e. the quality of contracting institutions plays an important role in organization of production. On this basis, the technological intensity and institutional quality highlighted by the Antràs and Helpman (2008) paper, as well as participation in international trade make them good candidates for an empirical analysis of the relative prevalence of alternative organizational forms in the context of the increasing openness[3] to international markets of transition countries.

There exist substantial variations of both forces - technology intensity and institutional quality - across transition countries as a result of substantial disparities in economic and institutional development. Consequently, these countries offer suitable settings in which to study

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[1] Models are summarized elsewhere (Helpman, 2006; Nunn and Trefler, 2008)

[2] The second type of decisions are outside of the scope of this paper as the data does not allow us to disentangle domestic integration from integration abroad.

[3] Although an empirical approach towards accounting for the participation in international trade differs from the theoretical model of location decisions in Antràs and Helpman (2008)

the impacts of these forces on organizational choices.

However, there are not many empirical tests of the Antràs and Helpman (2008) model[4] because of the multiplicity of outcomes on firms' sorting into different sourcing strategies. The combination of input cost advantages (related to location and organizational forms) and the fixed cost disadvantages, together with the variability of contracting institutions, generates many ambiguities, at least with respect to the available data.

Moving to the level of data is not an easy task, especially in the case of transition countries. Hence, the empirical analysis uses the EBRD firm-level survey data[5] aggregated to the industry level in transition countries. Such an approach allows us to compare our results with the previous studies made on the industry level and bring to light two main results.

First, we partially utilize the theoretical predictions of Antràs' approach. Our empirical results show that both technological (capital) intensity and institutional quality can play a role in the relative prevalence of alternative organizational forms (decision about *how*) not only in more developed, but also in transition countries. However, the empirical extension of this approach to the decisions about *where* to source is constrained by data.

Second, we make room for an empirical analysis of the determinants of organizational choices in transition countries in a context of increasing international openness. Our results show that globalization in transition countries has enhanced rather than weakened the historical tendency towards excessive vertical integration or integrated procurement. This evidence constitutes one of our contributions to the literature. Such results are in contrast with McLaren (2000) predictions of a close and negative relationship between international openness and the vertically integrated organization of production, as a result of the increasing variety of suppliers entering the market.

Another contribution is our evaluation of two forces (technological and institutional) simultaneously. We show that these forces have opposite effect. Moreover, our results illustrate that the economic influence of the institutional quality on vertical integration tends to be higher than the influence of production complexity. Consequently, in countries with poorly functioning contracting institutions, higher levels of vertical integration mostly reflects contracting inefficiencies. Thus, an improvement in institutional quality in transition countries would decrease vertical integration and increase the efficiency of the production organization.

The rest of this chapter is structured in the following way. In Section 2.2.1 we present the theoretical background and empirical hypotheses for the analysis. Section 2.3 describes the data used in the analysis and explains the specifications of our empirical model and methodology adopted. Section 2.4 presents empirical findings, and the paper is concluded by the final remarks

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[4]The Antràs (2003) study also provide the first empirical validation of the theoretical model at the (4-digit SIC) industry level. The Antràs and Helpman (2004) model has also been empirically tested at the 2-3-digit 1987 SIC industry level by Yeaple (2006) and at the 6-digit HS industry level by Nunn and Trefler (2008). Self-selection into foreign sourcing based on the Antràs and Helpman (2004) has been empirically analyzed by Kohler and Smolka (2014) and Defever and Toubal (2013) at the firm-level. To the best of our knowledge, the only study that has made an empirical test of the Antràs and Helpman (2008) prediction on the effect of different contractual frictions is the Nunn and Trefler (2008) study.

[5]The BEEPS, survey organized by the EBRD and The World Bank. This paper is based on the wave of this survey that took place in 2005.

in Section 2.5.

2.2 Related Literature and Empirical Hypotheses

2.2.1 Antràs and Helpman (2008) in a Nutshell

In order to analyse the influence of contractual frictions, due to both technological and institutional reasons, we base our empirical analysis on the extended model of global sourcing presented in the work of Antràs and Helpman (2008). This model defines optimal sourcing strategy in a context where contractual imperfections exist.

This model considers a bargaining process between a firm (headquarters) and its supplier within the following set-up. Production of final goods requires two inputs: an intermediate input and a headquarter input, provided by the final-good producer. It is assumed that the final-good producer is unable to produce the intermediate input, and therefore she has to rely on its supplier. There is a differentiation in the final goods, which leads to final-good producers having market power. Differentiated goods also imply tailor-made inputs, with two important consequences.

First, writing enforceable contracts that specify the entire set of input features is impossible *(incomplete contracts)*. Second, both types of input have no value outside of this particular sourcing relationship *(relationship specificity)*. Consequently, both the supplier and the firm are locked up in a relationship characterized by opportunistic behaviour from their contracting partner, and bargaining over the final surplus of the production relationship. Due to insufficient incentives, both inputs are provided in a less than optimal amount and in an inefficient input mix, with the outcome depending on the *ex post outside options* that the agents have.

By choosing vertical integration the final-good producer may opt for higher outside option relative to the other organizational form, called outsourcing, which implies relying upon an independent supplier. For either of the two organizational forms, final-good producers may decide to turn to domestic or foreign input suppliers. They choose their sourcing strategy, in other words, a combination of location and organizational form to obtain the intermediate input, so as to maximize expected profits from the production relationship. This choice is driven by two types of advantages: A *location advantage* of obtaining the input in the domestic or the foreign economy;[6] in addition, there is an *incentive advantage* in favour of either vertical integration or outsourcing, depending on the bargaining details of the hold-up problem and the importance of the headquarter input (headquarter-intensity) for the relationship. Importantly, the advantage of one organizational mode or location over the other in sourcing is magnified by a firm's productivity.

The optimal sourcing strategy is then determined through the comparison of these advantages with a specific structure of fixed cost disadvantages associated with different organizational forms and locations of sourcing.[7]

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[6]The advantage that is not evaluated in our empirical study due to the data structure

[7]The industry equilibrium is structured as a productivity based self-selection of firms into sourcing modes.

Using the theoretical approach discussed, we make two simplified predictions of the model about the role of contractual frictions and a firm's productivity in the form of propositions. Later, we will bring these propositions to data by elaborating empirical hypotheses.

The first proposition concerns the influence of headquarter-intensity or technological complexity. Proposition 3 of the Antràs and Helpman (2008) study states that there exists a unique value of the headquarter-intensity (ν_{hc}) such that it is more profitable for a firm to integrate when its headquarter-intensity ν is greater than ν_{hc} and to outsource when ν is lower than ν_{hc}. Assumed that a firm will seek to maximize its profits, it is expected that a firm will integrate if $\nu > \nu_{hc}$ and source from an independent supplier when $\nu < \nu_{hc}$.

Consequently, we will base our empirical analysis on the following proposition:

Proposition 1 *The incidence of vertical integration with suppliers is positively connected with the average industry headquarter-intensity.*

The same Proposition of the Antràs and Helpman (2008) study also states that the cut-off ν_{hc} decreases in the degree of contractibility of the supplier's inputs. The contractability of the supplier's input μ_s depends on what share of the supplier activities[8] can be verified by a court of law. In its turn, the ability of the court of law to verify supplier's activity depends on the quality of contracting institutions regulating the production of supplier's input.

Considering cases where the quality of contracting institutions affecting the supplier's input varies between countries and industries the higher quality of these institutions is positively connected with the higher input contractibility. Importantly, the Antràs and Helpman (2008) model predict that the cut-off ν_{hc} is higher with higher degree of contractibility of the supplier's inputs μ_h and with smaller degree of contractibility of the headquarter's inputs μ_s. Consequently, by the Proposition 5 in sectors with $\nu_h > \nu_{hc}$ the share of integrating firms decrease with μ_h and increase with μ_s. Thus, we should expect less integrated firms in industries and countries with stronger contracting institutions that regulate supplier's activities, but the opposite with stronger contracting institutions that regulate headquarter's activities.[9] For the reasons associated with the data structure we focus only on the following proposition that is connected with the contracting institutions regulating supplier's activities.

Proposition 2 *In industries with a higher quality of supplier-side contracting institutions less vertical integration should be observed.*

This proposition propose that larger contractual frictions in supplier's input discourage integration.

The Antràs and Helpman (2008) paper also demonstrates that the productivity of firms plays a role in the sorting into different organizational modes of procurement. Assuming (as in

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[8]Supplier activities refer to the activities of supplier aimed at the production of the input required by the headquarter

[9]This results rely on the assumption that fixed costs of outsourcing are lower than the fixed costs of integration. Assuming the opposite it is possible to have the reverse result, i.e. higher quality of supplier-side contracting institutions increasing the prevalence of integration.

Antràs and Helpman (2004)) that the fixed costs of outsourcing are lower than the fixed costs of integration, the model illustrates that in the sectors with a higher headquarter-intensity, outsourcing is optimal only for low productivity firms. Proposition 4 of the same study states that there exists a productivity cut-off θ_O, such that in an industry with headquarter-intensity $\nu_h > \nu_{hs}$ all firms with productivity greater than θ_O integrate and firms with productivity less than θ_O outsource. However, in order to understand the validity of assumptions beneath such results, and possible empirical framework for transitional countries, additional analysis is required. Although such an analysis is possible in our future research, in this paper we are not focusing on productivity sorting.[10]

The Antràs and Helpman (2008) develops also Propositions 6-9 for the interactions between organizational and location decisions, namely between outsourcing at home (North), integration at home, outsourcing abroad (South) and integration abroad. It is assumed that the headquarter input is produced only at home, while the supplier's input may be bought (outsourced) at home or abroad, or made (integrated) either at home or abroad. Thus, only the location of supplier, either independent or integrated, changes. The sorting of decisions (outsourcing at home, integration at home, outsourcing abroad and integration abroad) depends on the assumption on the fixed costs both between organizational modes and locations. However, to test this model the location decision should be observed, which is not the case in our study. Thus, our empirical hypotheses are based mostly on the closed economy propositions discussed above with some adjustments towards the possibility of unobserved foreign sourcing.

2.2.2 Empirical Hypotheses

The empirical hypotheses tested in this paper are based on the propositions described in the previous section. The first hypothesis is related to the first proposition and focuses on the degree of headquarter-intensity. Following the approach of Antràs (2003) and previous empirical literature on the topic (Nunn and Trefler, 2008; Kohler and Smolka, 2014), we use capital intensity as a proxy for headquarter-intensity.

The evaluation of this hypothesis allows us to analyse whether the prevalence of integration is driven by the complexity and technological advancement of production in transition countries, and to what degree.

H 2.1 *In industries with higher average capital-intensity the integration with suppliers is chosen more often than in industries with a lower capital-intensity*

If our results prove that this hypothesis is correct it would also demonstrate that, with a higher participation in trade of more complex and relationship-specific intermediate inputs, there is a natural tendency for integration and enlargement of a firm's boundaries in transition countries. Consequently, more production groups and big corporations may be observed. Such phenomena should not be considered by policy makers as damaging for the economy when it takes place in industries with complex production, requiring highly specific inputs. However,

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[10]Nevertheless, we are going to control for possible differences of intra-industry productivity distribution.

integration driven by other forces, such as institutional weakness, may become excessive and hinder the increase of productivity.

Similar to the Proposition 3 of the Antras (2008) model, the cut-off of capital intensity depends on the increase of supplier input contractibility μ_s. Thus, the test of this hypothesis should be done simultaneous with, and not separately from, the accounting for the forces affecting μ_s, such as supplier-side contracting institutions.

Our second hypothesis is related to the second proposition, discussed in the previous section. As we have discussed previously, the Antràs and Helpman (2008) paper demonstrated that a higher quality of supplier-side contracting institutions may decrease the prevalence of integration. Nunn and Trefler (2008) study founds support for this proposition[11] by using Nunn (2007) measure of input relationship-specificity at the industry level multiplied by the normalized country-level rule-of-law variable (Kaufmann et al., 2007). Thus, Nunn and Trefler (2008) show that contracting institutions should vary not only across countries, but also across industries. Moreover, Du et al. (2012) illustrated that the degree of integration is connected with cross-region differences in the quality of contracting institutions. However, due to the structure of our data we leave this dimension of contracting institutions variability outside of the scope of this study.

In testing our second hypothesis we evaluate how the differences in the quality of supplier-side contracting institutions in different countries and industries are connected with the prevalence of integration.[12] In order to analyse such an influence we rely on the connection between the quality of supplier-side contracting institutions and the level of trust between the firm and the supplier.

According to Raiser et al. (2008), average country levels of trust between firms are highly connected with the quality of country institutions in transition countries. The institutions, such as court and legal enforcement system, that affect contracting and contract enforcement

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[11]The empirical approach of Nunn and Trefler (2008) is based on the open economy model (Propositions 6-9) of Antràs and Helpman (2008). Our hypotheses are based on the closed economy model as the data on the location of supplier is not observed. To draw the conclusions from the open economy model, it is critical to know where the supplier is situated. In particular, the Nunn and Trefler (2008) separate two effects of the rise in contractibility of the foreign supplier's inputs (μ_s^f). The first is referred as the "Standard Effect" and is associated with the increase in the foreign outsourcing due to higher μ_s^f. The second is referred as the "Surprise Effect" and is associated with the switch of the firms from outsourcing abroad to integration abroad. Another effect described in the Antràs and Helpman (2008) model is the switch from foreign outsourcing to integration in the home country if the contractibility of the domestic supplier's input μ_s^d increase. As a result, to understand which of this effect is prevailing the location of supplier is a neccessary information. However, as we will discuss later, our data shows that a small number of firms in the sample switch from outsourcing to integration and vice versa. Considering that such a switch abroad is associated with higher costs, we can expect that the share of firms switching to outsourcing abroad or integrating abroad can be much lower, becoming extremely small to draw any conclusions.

[12]The stream of literature focused on relational contracting has recently shown that the preference of integration increases in the parties' levels of long-term orientation (Kukharskyy, 2016). Relational contracts are sustained by the shadow of the future (Gibbons and Henderson, 2012). Thus, empirical analysis of the influence of relational contracts require the data of the length of relationships or time preferences. Due to the data limits, in this thesis we apply only on-spot perspective on contracts in the similar to Antràs and Helpman (2008) way. The incidence of relational contracting in transition countries may serve as an alternative for integration, thus affecting our results. However, if both main exogenous and indogenous variables are affected, they should be affected in the symmetric way.

are of particular interest. The empirical evidence presented by Raiser et al. (2008) shows that a higher confidence of firms in courts as being fair and efficient enforcement mechanisms, as well as information-sharing through non-governmental networks, are associated with a higher level of trust between firms.

Following Raiser et al. (2008), we evaluate the influence of contracting institutions on integration decisions through the analysis of trust between firms. By using such a channel we are able to separate the influence of contracting institutions that affect firm's relationships with its suppliers from the influence of other institutional settings not affecting the design of such relationships. Taking into account the connection between the levels of trust, contracting institutions, and the contractibility of the supplier's input, we expect that the higher trust between the supplier and the final-good producer is connected with lower incidence of integration.

H 2.2 *Lower trust between the supplier and the firm, reflecting a lower quality of supplier-side contracting institutions, is associated with a higher attractiveness of integration. Consequently, in the industries with lower trust, integration is chosen more often.*

Support for this hypothesis would underline the importance of facilitating trust between firms, and improving the quality of contracting institutions in transition countries. Better contracting institutions and contractual enforcement would thus be shown to allow transition countries to avoid excessive vertical integration and rigidity in the organization of input supply.

2.3 Data and Empirical Strategy

2.3.1 Data

The data used in this work is selected from the firm-level Business Environment and Enterprise Performance Survey (BEEPS), jointly gathered by the EBRD and the World Bank on transition countries in 2005. The data on more than 8000 firms is then aggregated to the industry level by constructing the incidence of certain firm-level answers or by the averaging of firm characteristics. For performing the analysis, we aggregated the firm-level data to the industry level based on the 3-digit codes for the main product of each firm.

The analysis presented in this study is undertaken for the 128 industries [13] belonging to 6 activity sectors (construction; manufacturing; transport storage and communication; wholesale and retail trade; real estate, renting and business services; other services) of 23 transition countries. We excluded from the main regression analysis two developed countries available in the dataset (Ireland and Spain) because as baseline countries they are very different from the countries on which this paper is focused. Country and industry distributions of firm-level data

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[13]The number of industries per country differs across countries due to the industry profiles of these countries. Some industries are presented in one country, but absent in the other. The maximum of number of industries per country is 100 (Ukraine) and minimum is 30 (Macedonia).

that was aggregated are presented in Tables B.1a and B.2a. Country and industry distributions of the aggregated data are presented in Tables B.1b and B.2b.[14]

2.3.2 Empirical Model

While testing our hypotheses we focus on the incidence of integration decisions within different industries. In contrast to most of the previous industry-level empirical studies which considered the volume of aggregate trade between integrated parties, we study the dissemination of integration decisions within and between industries. Such a choice brings us closer to the micro foundations of all three of the theoretical models: Antràs (2003); Antràs and Helpman (2004, 2008).

The models also distinguish between the decisions about *how* and *where* to source. However, due to the data constraints it is impossible to differentiate between domestic and foreign suppliers in our work. Consequently, we do not specifically analyse the location (*where*) decisions, but focus only on the choice of organizational forms (*how*), taking into consideration the degree of openness to trade.

In order to test first two hypotheses we analyse the following model using fractional logit.[15]

$$logit(\frac{N_{ic}^{int}}{N_{ic}}) = \beta_0 + \beta_1 K_{ic} + \beta_2 T_{ic} + \bar{\beta}_3 \bar{W}_{ic}. \tag{2.1}$$

Where $\frac{N_{ic}^{int}}{N_{ic}}$ is the incidence of integration in industry i and country c, K_{ic} is the mean capital-intensity of firms in industry i and country c, and T_{ic}^{1} is the measure of trust in supply relationships in industry i and country c.[16] The vector $\bar{W}_{ic}$ is the vector of control variables.

In order to test the sensibility of the empirical model we use several sets of the control variables. In the first specification of the model, the vector $\bar{W}_i$ includes the measures of export, industry population characteristics and the competitive situation within industry i.

The openness to international trade is an important issue to control for, as different transition countries are exposed to international trade to different extents. Consequently, we control for the influence of export participation and competition from imports. Similar to the dependent variable, the export control variable is represented by the share of exporting firms in the total population of firms in the industry. Such a measure allows us to control for the dissemination of the decision to export in different industries. In order to analyse the influence of the import inflows, we include the share of firms signalling that competition from foreign firms is of high importance (Import Competition) and those signalling that there is an absence of the competition from imports (Without import competition).

We also control for demand elasticity as the measure of the overall level of competition in the industry, the share of Small and Medium Enterprises (SME), and the share of multi-

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[14]The firm-level data is aggregated by unweighted averaging, as no weights are provided in the data. Therefore, obtained results represent the average behaviour of the firms in the sample

[15]All the specifications are performed on a ratio of integrating firms to the number of firms interviewed in an industry, as the population of firms differs between industries. The model is used with robust standard errors.

[16]A more detailed description may be available on request

establishment firms.

In the second specification the vector $\bar{W}_i$ also includes the variables describing financial obstacles and inclusion in the financial system. In order to evaluate the sensitivity of our results to country unobserved characteristics we control for the country and region (EU versus non-EU transition countries) fixed effects in the third and fourth specifications.

The coefficient β_1 allows us to test the first hypothesis (H2.1), while the coefficient β_2 illustrates the influence stated in the second hypothesis (H2.2).

In order to understand the difference between the EU and non-EU transition countries in terms of the incidence of integration decisions, we further run the fullest specification of the above model on the two subsamples of countries. The first subsample includes the countries that at the moment of the survey were a part of the EU, and second the countries that did not belong to the EU in 2005.

In order to evaluate the robustness of our results we also perform additional checks, using another approach to measure capital-intensity. Instead of the replacement value of capital per employee, we use the ratio of the spending on new buildings, machinery and equipment per employee.

2.4 Results

2.4.1 Technological Intensity and Institutional Quality

With respect to our first hypothesis (H2.1) the results support the stated connection between capital-intensity and the incidence of integration (Table 2.1). As can be seen from the table, capital-intensity is associated positively and statistically significantly with integration. The association remains positive and is of approximately the same magnitude when the first two specifications are used (column 1 and 2).

However, the magnitude of the connection decreases and becomes statistically insignificant when we control for country fixed effects. Such results may be explained by country differences in the upstreamness of production. It has been illustrated that countries may specialize in more or less upstream production. Consequently, it has been shown that upstreamness is highly country-specific in low-income countries (Antràs et al., 2012).[17] In our data, the number of industries for each country varies depending on the industries in which a particular transition country is specialized. As upstreamness is highly correlated with capital intensity, by introducing country dummies we smooth the variation of capital-intensity and the influence of capital intensity becomes invisible. Such results illustrate that capital-intensity is not only industry-, but also country-specific in transition countries.

The economic significance of the capital-intensity influence (when it is statistically significant) is comparatively low as well. The increase in capital intensity by one standard deviation is associated with a 22% increase in vertical integration on average. If we take into consideration

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[17]In particular it is correlated not with the actual level of development but with the choice of industries where the production is concentrated.

the size of the standard deviation and the previous growth of capital-intensity in transition countries, for vertical integration to increase by 20% capital-intensity should increase on average by almost three times more than it increased between 2002 and 2005. Nevertheless, the link between capital-intensity and integration is significant and positive on average for transition countries. These results confirm the expectations expressed in hypothesis H2.1.

The analysis of the influence of institutional frictions, stated in hypothesis H2.2, is based on the coefficient of trust variable presented in Table 2.1. The results support the hypothesis and illustrate that higher levels of trust are associated with a lower incidence of integration. The association of the same negative sign and approximately the same magnitude can be observed in all the specifications used. According to the fullest specification presented in column 4 of Table 2.1, the average increase in trust by one standard deviation would decrease the integration incidence by around 22.5%. It would mean an increase in the integration rate of around 20% in around 3 years if trust continued to grow as it did between 2002 and 2005. The coefficient of trust is robust to accounting of the accessibility of financial systems and the degree of inclusion in international trade.

2.4.2 International Trade and Economic Environment

International trade and competition

Analysing the influence of control variables based on Table 2.1, we can see several important factors characterizing a higher incidence of integration.

A very important result is associated with the inclusion of transition countries in international trade. From columns 1 and 2 of Table 2.1 we can see that a higher participation in international trade through exports is associated with a higher integration incidence. The effect, however, disappears when we control for country fixed effects (column 3 and 4). In fact, such a pattern manifests itself due to the presence of countries like Armenia, Hungary, Russia and Kazakhstan in the data, which are countries characterized by export-led growth.

Exports, however, are not the only way for a country to be linked to international trade. As mentioned in the variables' description, we control for the influence of import competition pressure on integration decisions. Based on the results presented in Table 2.1 we can see that import competition pressure is positively associated with a higher integration incidence (column 1) when we do not control for country fixed effects. A clearer pattern arises when we separate two main country groups in further analysis (see Section 2.4.3).

As we also control for the general level of competition (through the elasticity of demand), we can see that in industries with a higher level of competition, less integration is observed. Such a result shows that a pro-competitive economic policy and well-functioning market mechanisms induce firms to operate through the market rather than integrate. One standard deviation increase in the measure of competition in an industry is associated with a 41% decrease in the incidence of integration. Such result is robust to the inclusion of country dummies as well as financial constraints' measures.

Table 2.1: Integration drivers

Specifications[1]	(1)	(2)	(3)	(4)
Capital-intensity	0.146***	0.147***	0.051	0.048
	(0.051)	(0.050)	(0.048)	(0.047)
Trust	-0.465***	-0.468***	-0.625***	-0.609***
	(0.151)	(0.152)	(0.147)	(0.147)
International Trade and Competition				
Export	0.302*	0.285*	0.124	0.119
	(0.157)	(0.156)	(0.144)	(0.144)
Import competition	0.464**	0.379*	0.319	0.233
	(0.191)	(0.197)	(0.199)	(0.199)
Without import competition	-0.305	-0.259	-0.517	-0.520
	(1.275)	(1.243)	(1.111)	(1.084)
High competition	-0.623***	-0.674***	-0.547***	-0.563***
	(0.222)	(0.223)	(0.212)	(0.209)
Other Controls				
EU transition countries	-0.255*	-0.257*	1.522***	1.472***
	(0.132)	(0.134)	(0.423)	(0.419)
GDP per capita	-0.239***	-0.229***	-0.999***	-0.981***
	(0.056)	(0.056)	(0.168)	(0.166)
Labour productivity (sd)	0.163	0.184	0.204**	0.212**
	(0.146)	(0.145)	(0.100)	(0.101)
SME	-0.374	-0.348	-0.442**	-0.403*
	(0.234)	(0.239)	(0.206)	(0.209)
MES	0.281	0.268	0.089	0.045
	(0.172)	(0.175)	(0.187)	(0.185)
Finance acc. difficulty (major)		0.374*		0.101
		(0.220)		(0.238)
Borrowing from local banks		0.007**		0.010***
		(0.004)		(0.004)
Borrowing from foreign banks		-0.013		-0.009
		(0.011)		(0.009)
Country dummies	No	No	Yes	Yes
Likelihood	-842.116	-837.533	-750.014	-746.090
Chi2	134.188	146.6588	345.6422	356.1442
p-value	2.47e-23	3.34e-24	8.00e-55	2.48e-55
N	834	834	834	834

Note: [1] All the specifications include the share of integration firms as a dependent variable. Average marginal effects are presented

Other control variables

There are several minor factors connected to integration decisions that require mentioning. In particular, we can see from the results in columns 1 and 2 of Table 2.1 that firms in EU countries (both transition and developed) are integrating, on average, less than firms in non-EU transition countries, as well as in the countries with a higher GDP per capita. Such results may be explained by the higher level of economic development in EU countries, which is usually accompanied by a lower level of information asymmetries and unobserved contractual frictions.

The results also show that SME are less predisposed to integrate than their bigger counterparts (columns 3 and 4) when country fixed effects are captured by the country dummies. It is also obvious from the results that a higher inclusion of firms in the financial system is positively connected with vertical integration. In particular, a higher share of borrowing from local banks is associated with a higher integration incidence. The drawing of any causal inference from this connection, however, is ambiguous and is not allowed by the data at hand.

As can be seen from columns 3-4, labour productivity heterogeneity is positively associated with integration when country fixed effects are taken into consideration. This result is robust to different sets of control variables. Consequently, we can state that these results confirm the proposition of the Antràs and Helpman (2008) paper about the positive connection between productivity heterogeneity and the incidence of integration. However, as the discussion of such results is not the aim of this work, and would be more appropriately explored at the firm level, we leave this for further research.

2.4.3   Differences Between Country Groups

In order to deepen our analysis we check if different patterns in two main groups of transition countries (EU and non-EU) can be observed.

By dividing the countries into two subsets (Table 2.2) we can see that the supporting evidence for our first hypothesis (H2.1) is mostly due to the pattern observed in non-EU transition countries. The absence of this effect in EU transition countries is mostly due to the fact that these countries are considerably more homogeneous. If we include other European countries such as Ireland and Spain in this group, as comparison countries, the coefficients become significant for the group of EU countries as well (Table B.6). The connection between capital-intensity and integration in the more heterogeneous group of non-EU transition countries is statistically significant (column 3), but as shown in our previous analysis it is also country-specific.

At the same time, we see supporting evidence for our second hypothesis (H2.1) in both groups. However, the statistical significance of the coefficient drops when no country fixed effects are considered. Such behaviour is connected with the presence of several very different (in terms of trust) Polish industries. Introducing country fixed effects allows us to compensate for such data characteristics and highlight the effect of trust variable in this country group. This conclusion is also supported by the results for the enlarged group of European countries in Table B.6 (EU transition countries, supplemented by Ireland and Spain as comparison countries).

Dividing the sample into two subsamples also gives us a clearer picture in terms of the influence of competition and international trade. The connection between export participation and integration is not significant when we divide the data into two subsamples. This result shows that the positive connection described in Section 2.4.2 results from the difference in export participation between EU and non-EU transition countries. In fact, the average difference between the two groups is significant. Participation in international trade through exports is, on average, almost 30% higher in the group of EU transition countries.

Table 2.2: Group differences

Specifications[1]	All		EU		Non-EU	
	(1)	(2)	(1)	(2)	(1)	(2)
Capital-intensity	0.147***	0.048	0.061	0.018	0.170***	0.044
	(0.050)	(0.047)	(0.059)	(0.061)	(0.061)	(0.062)
Trust	-0.468***	-0.609***	-0.244	-0.327*	-0.592***	-0.790***
	(0.152)	(0.147)	(0.187)	(0.179)	(0.200)	(0.195)
International Trade and Competition						
Export	0.285*	0.119	0.203	0.213	0.132	-0.022
	(0.156)	(0.144)	(0.190)	(0.165)	(0.200)	(0.193)
Import competition	0.379*	0.233	-0.129	-0.040	0.724***	0.521*
	(0.197)	(0.199)	(0.217)	(0.204)	(0.252)	(0.287)
Without import competition	-0.259	-0.520	-5.082***	-5.442***	0.910	0.921
	(1.243)	(1.084)	(1.723)	(1.622)	(1.491)	(1.173)
High competition	-0.674***	-0.563***	0.335*	0.233	-1.321***	-1.201***
	(0.223)	(0.209)	(0.199)	(0.166)	(0.313)	(0.298)
Other Controls						
EU transition countries	-0.257*	-1.472				
	(0.134)	(0.419)				
GDP per capita	-0.229***	-0.981***	0.558***	0.018	-0.303***	-1.247***
	(0.056)	(0.166)	(0.185)	(0.486)	(0.069)	(0.205)
Labour productivity (sd)	0.184	0.212**	0.420***	0.421***	0.080	0.127
	(0.145)	(0.101)	(0.145)	(0.141)	(0.211)	(0.137)
SME	-0.348	-0.403*	-0.265	-0.411	-0.381	-0.420
	(0.239)	(0.209)	(0.259)	(0.272)	(0.333)	(0.276)
MES	0.268	0.045	0.029	-0.236	0.329	0.283
	(0.175)	(0.185)	(0.232)	(0.231)	(0.244)	(0.256)
Finance acc. difficulty (major)	0.374*	0.101	0.041	0.261	0.534*	-0.079
	(0.220)	(0.238)	(0.269)	(0.266)	(0.284)	(0.315)
Borrowing from local banks	0.007**	0.010***	0.009**	0.008*	0.003	0.008
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Borrowing from foreign banks	-0.013	-0.009	0.010	0.009	-0.015	-0.011
	(0.011)	(0.009)	(0.023)	(0.014)	(0.014)	(0.012)
Country dummies	No	Yes	No	Yes	No	Yes
Likelihood	-837.533	-746.090	-190.864	-177.471	-612.989	-551.326
Chi2	146.6588	356.1442	70.10218	106.3282	114.7303	279.4192
p-value	3.34e-24	2.48e-55	7.69e-10	3.77e-14	2.20e-18	2.67e-44
N	834	834	286	286	548	548

Note: [1] All the specifications include the share of integration firms as a dependent variable. Average marginal effects are presented

We also can see from Table 2.2 that import competition pressure forces firms to integrate more often in non-EU countries, the countries with, on average, a comparatively lower level of import competition. At the same time in EU transition countries, where import competition is higher on average and homogeneous among all countries in the group, the results show that more

integration is present in industries protected from import penetration. This pattern highlights how pressure from import competition is associated with a higher degree of integration among firms.

The results also show that the negative connection between the level of competition and integration (previously underlined in Section 2.4.2) is driven by non-EU transition countries. In a big number of these countries, lack of competitive markets has been well-documented in the literature. As a result, the low average level of competition stimulates more vertical integration in these countries.

The analysis of the influence of other control variables allows us to identify three more characteristic features of the country groups. First, the results illustrate that the heterogeneity of labour productivity is positively and significantly connected with the integration incidence in EU transition countries, but not in the non-EU transition countries. Second, the higher level of development in terms of income is associated with a higher level of integration in EU transition countries, and a lower integration in non-EU transition countries. Third, a positive correlation between integration and the higher possibilities for borrowing from local banks, previously discussed, is driven by EU transition countries, but is absent in non-EU transition countries.

The robustness check shows similar results (presented in Table B.5). The major difference is in terms of the degree of statistical significance of capital-intensity when country dummies are included. Such a difference may be caused by the characteristics of the alternative measure of capital-intensity used in this robustness check. This measure reflects the intensity of production in capital investments, rather than replacement value of capital. Thus, the measure is less affected by the value of historically accumulated physical capital. Moreover, this measure is more heterogeneous both between countries.[18]

2.5 Conclusions

Today, transition countries are lagging behind in terms of technological upgrading and the quality of their contracting institutions. The empirical literature has established some stylized facts, especially at the country level, but not their effects on the organizational choices of industries and firms and thus on industrial organization in that part of the world. The historical tendency towards excessive vertical integration during the Soviet era, and firms' increasing participation in international trade today and, in particular, international sourcing, puts the spotlight on the question of organizational choices for sourcing in transition countries.

Organizational choices are examined by using the global sourcing model because it assumes that both technological (capital) intensity and the quality of contractual institutional can play a role in the relative prevalence of alternative organizational forms of sourcing. But applying this model to the data available for transition countries has required some significant simplifications. On the one hand, given the data constraints that do not allow us to measure the specific location

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[18]Country differences in two measures are presented in the Appendix, Table B.1

choices of sourcing strategies, we analyse the effect of trade openness on sourcing choices. On the other hand, the analysis is at the country and industry level: despite the important role of productivity heterogeneity in the global sourcing model, such a role is limited here. But it is fully exploited at the firm-level analysis (forthcoming).

The results of the empirical analysis show, first, that the changes in the production organization in transition economies are significantly affected by contractual frictions but the main forces have contrasting, even opposite, effects, with technological (institutional) intensity increasing (diminishing) the relative prevalence of vertical integration. These results are consistent with vertical integration in industries that intensively use headquarter inputs (technological intensity) produced by the firms because it allows those firms to partially control the customized intermediate input sourcing (Nunn and Trefler, 2008). They are also consistent with empirical evidence, drawing a connection between weaker institutions and higher vertical integration (Acemoglu et al., 2009; Du et al., 2012; Fan et al., 2014). But these results also embody a major message: cross-country differences in contractibility matters, and matters differently, as shown by differential impacts on EU versus non-EU transition countries.

Second, the results show that increasing openness to trade positively affected the incidence of integration choices in transition countries, and this happens on both sides, imports and exports. The import (export) side shows that the more options there are in the procurement strategy (market diversification strategy) the more increase (decrease) the incidence of integration. This result is not in line with the theoretical predictions of the literature, as what is usually expected is a diminishing incidence of vertical integration, due to increasing trade participation (McLaren, 2000).

One concluding comment is in order. Usually, more options in sourcing strategies, caused by greater openness, reduces opportunism problems, makes a more efficient organization form possible, and makes virtual arm's-length arrangements more attractive which are unambiguously efficiency enhancing. They provide an avenue for the efficiency benefits of open trade which are completely separate from the traditionally understood avenues of increased specialization and competition. But in the case of transition countries, we find that greater openness is associated with a substantial increase in integrated organizational forms. Globalization in these countries seems to have enhanced rather than weakened the historical tendency towards excessive vertical integration or integrated procurement. Hence, the theoretically predicted efficiency benefits haven't been grasped.

In transition economies, the role of the contractual and legal environment, and the changes in industrial structure and of the internal organization of firms on a global scale, surely needs further investigation. At least because, from a macroeconomic perspective, contractual imperfections impact economic growth and the comparative advantage of these virtually new players in the international arena.

Chapter 3

REDEFINING FIRM BOUNDARIES IN TRANSITION COUNTRIES. FIRM-LEVEL ANALYSIS

3.1 Introduction

The performance of firms is largely determined by how firms are organized (Antràs and Rossi-Hansberg, 2009). While the decision of firm boundaries is one of the key organizational decisions, it is rarely analysed empirically at the firm level. Even less is known about the firm boundaries in emerging and transition countries.

The group of transition countries is a highly specific group of countries sharing a common economic history of transition from planned to market economy. They are often characterized by a historical tendency towards excessive vertical integration and locked-in nature of production. Although transition countries have experienced massive privatization and market reforms (Roaf et al., 2014), there is little evidence on whether such reforms changed the locked-in nature of production and whether they helped firms to be more efficient in redefining their boundaries.

Recent literature proposes two main factors connected with optimal redefinition of firm boundaries in advanced countries. On the one hand, the connection of technological complexity with firm boundaries has been long argued (Lafontaine and Slade, 2007). However, there is no evidence of the existence (and the strength) of technological influence on firm boundaries for emerging economies like the ones of transition countries. On the other hand, low quality of contracting institutions is often argued to be connected with higher incidence of integration (Nunn and Trefler, 2008). The literature on integration that focuses on developed countries with comparatively high quality of contracting institutions advocates integration as the more efficient way of firm organization (Conconi et al., 2012). However, difficulties of enforcing the contracts make it riskier for firms to rely on market procurement. Such conditions may alter the decision-making on firm boundaries and result in more integrated and rigid firms, especially in some transition countries characterized by a particular history of sourcing rigidity. Thus, it is important to understand how the weakness of contracting institutions influences firm organization, in particular in redefining firm boundaries in a new environment created by the reforms promoted in transition countries.

This chapter deepen the understanding of firm organization in transition countries. The analysis focuses on the evaluation of possible links between the decision to redefine firm bound-

aries and the features of both the firm itself and its environment. In particular, the analysis is made on the connection between technological and institutional factors, and firm boundaries. By applying the theoretical predictions of Antràs and Helpman (2008) model from incomplete contracting theory, this chapter identifies possible impacts of technological and institutional determinants on firms' organizational forms, specifically on vertical integration. To the best of my knowledge, there are no firm-level studies that evaluate the influence of contracting institutions on firm boundaries for emerging economies like the economy of transition countries. Therefore, little is known about the drivers of organizational decisions in a group of countries representing more than 5% of the total world market, with a high potential for growth.

I use EBRD–World Bank Business Environment and Enterprise Performance Survey (BEEPS) of the year 2005 to test the link between technology intensity and contracting institutions, and the firm-level decision to redefine firm boundaries. Two types of empirical decision models are considered. The first model follow the Antràs and Helpman (2008) idea on the choice between integration and non-integration. I develop a second model considering a two-staged decision process. In the developed two-staged model, the first stage represents the decision of a firm to change its boundaries, and the second stage represents the decision of a particular type of firm boundary change, namely integration, outsourcing or both. Such model allows the application of a systematic approach to understand the redefinition of firm boundaries and the changes of industrial organization in transition countries in 2005. The differences between two groups of transition countries, i.e. EU and non-EU, are investigated and specificity of firm-level decision-making in two groups are identified.

The results indicate that technological and institutional forces have contrasting, even opposite, effect on integration decisions. Quantitative differences between EU and non-EU transition countries are found, showing heterogeneous adjustments in these countries. By applying the two-stage decision model this chapter also shows that these forces significantly affect the decision to redefine firm boundaries. Findings highlight the importance of taking into consideration the multiple possibilities each firm faces when considering redefining its boundaries. Moreover, the results underline the role of firm-level heterogeneity, in terms of labour productivity, in firm boundaries redefinition.

The rest of this chapter consists of five sections. In Section 3.2 I discuss the literature related to the choice of firm boundary and state the main hypotheses to test. Section 3.3 presents the data, explains the main variables and describes the empirical approach. Section 3.4 discuss the results of the empirical analysis made. Section 3.5 summarize main findings and implications.

3.2   Related Literature and Empirical Hypotheses

Among the theory of property rights multiple models have been developed to explain the decisions on firm boundaries (Antràs, 2014). Some of the most recent works have given a new perspective to this issue and the influence of complexity and relationship-specificity. In these models a decision of firm boundaries is connected with the impossibility to write fully

enforceable (complete) contracts in order to source intermediate inputs required for a firm production.

It was often assumed that suppliers are required to bear relationship-specific investments (Grossman and Helpman, 2002; McLaren, 2000) as intermediate inputs should respect the specification of a sourcing firm (client). Thus, suppliers' production should be adjusted to the needs of the sourcing firm. However, most recent models proposed the relationship-specific investments being shared between a supplier and a sourcing firm (Antràs, 2003; Antràs and Helpman, 2004, 2008). Such investment-sharing is supposed to enhance the value of final-good sales. However, as contracts are not fully enforceable (incomplete) the investment-sharing is not fully contractible as well. This fact creates vulnerability for both sides, suppliers and sourcing firms. Sourcing firms provide a share of investment, but may not enforce fully the exact quality of supplied inputs. Suppliers have to adjust their production and have no alternative clients to whom to sell such a relationship-specific input. Such relationship-specificity merged with contract incompleteness creates the hold-up problem and leads to to the sub-optimal level of investments by both sides of the relationship (under-investment).

As sourcing firms are aware of the possibility of under-investment they may prefer to integrate with their suppliers and take the production of intermediate inputs fully under control. As a result, firms may prefer to extend their boundaries in order to guarantee the supply of intermediate goods. For a supplier integration means voluntary transfer of the residual rights of control with the expectation of being compensated by the provision of a certain percentage of profits.

In particular, the study by Antràs (2003) introduces the setting described above in the international trade model by incorporating the decisions on vertical integration in the analysis of international sourcing of intermediate inputs. The model shows that a firm defines the organizational form of its sourcing (integration versus arm's length trade) depending on its bargaining position, which is determined by the share of capital investments in the relationship (capital-intensity). The Antràs (2003) model, thus, attributes the choice of vertical integration to the higher specificity of production connected with its higher technological complexity and higher fragmentation. The same reasoning is used in the Antràs and Helpman (2004) and Antràs and Helpman (2008) models [1] with respect to the technological complexity.

Several empirical checks have drawn supporting evidence for the link between technology complexity and intra-firm trade suggested in Antràs and Helpman (2008) model. They have mostly confirmed predicted connection between the industrial shares of intra-firm trade and capital-intensity (technology complexity) in the international trade. In particular, Nunn and Trefler (2008) tested the model at the industry level by using the US intra-firm data on importing. They found that industry capital-intensity significantly affects the volume of intra-firm trade associated with vertical integration. The analysis presented in Chapter 2 also draw similar conclusions basing on the industry-level data. However, to the best of my knowledge, no

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[1]Antràs (2003) model have been enriched by the productivity influence in the Antràs and Helpman (2004) and institutional factors in Antràs and Helpman (2008). The modelling of the connection between the technology complexity and intra-firm trade is unchanged in all three of the models.

firm-level tests of the capital-intensity influence on integration decisions have been made yet.

Moreover, most of the empirical checks previously discussed are based on the data for multi-national corporations (MNC) and international intra-firm trade (integration abroad), while domestic integration is rarely discussed. The empirical test of this chapter is not limited to the decisions of MNC on vertical integration made abroad, but will consider the integration decisions of different firms located in a particular country.

In order to fill in such gaps this study aims at testing the following hypothesis.

H 3.1 *Higher capital investments (capital-intensity) of a firm are associated with higher probability to integrate the production of intermediate inputs previously made by an independent supplier.*

The hypothesis follows from the Proposition 3 of the Antràs and Helpman (2008) paper where headquarter-intensity higher than a certain cut-off value have been associated with higher profits of firms that choose integration. Following the approach used for the empirical application of the model in Antràs (2003) capital-intensity as a proxy for headquarter-intensity is used. In fact, in the empirical part of the Antràs (2003) study the authors tested the hypothesis stating that the share of intra-firm trade is higher, the higher is the capital intensity of the industry. The author argues that when data is disaggregated in industries based on the criterion other than technology or preferences, the model can be shown to predict smooth positive association between recorded share of intra-firm trade and recorded capital-intensity. Thus, he both proxied the headquarter-intensity by capital-intensity and eased the cut-off assumption. Applied empirical approach allows measuring probability to integrate directly without the need to measure it through intra-firm trade. Consequently, the hypothesis is formulated in a similar to Antràs (2003) way, substituting the share of intra-firm imports by the probability to integrate.

The analysis of the connection between capital-intensity and vertical integration would show whether firm-level integration decisions in transition countries are driven by a higher relationship-specificity of investments and technology complexity (capital-intensity). Supporting evidence for this hypothesis would demonstrate that, with a higher fragmentation of firms' production and a higher technological advancement in transition countries, the tendency for integration and enlargement of the firm boundaries will naturally rise. This also means that more production groups and big corporations will be formed in the industries with a higher capital-intensity.

Antràs and Helpman (2008) shows that the technological complexity and relationship-specificity are not the only factors driving the integration decisions. Different degrees of contractual frictions are introduced, where variations in the quality of contracting institutions trigger the prevalence of particular organizational and location choices of sourcing. In particular, better contracting institutions in one country can increase the attractiveness of arm's length trade, but decreases the share of integration. Such conclusions are supported by several empirical studies, which have shown that lower quality of contracting institutions is negatively

associated with vertical integration (Du et al., 2012; Nunn and Trefler, 2008). Consequently, there are two principal counteractive forces that drive vertical integration: capital intensity (or technology complexity) and quality of contracting institutions.

As discussed in Chapter 1 and Chapter 2, the quality of contracting institutions in transition countries is connected with the levels of trust between firms. In particular, contracting institutions and contract enforcement rely on efficiency of courts and legal systems. In order to analyse the influence of the quality of contracting institutions, the following hypothesis, where the connection between contract enforcement and trust is central, is tested.

H 3.2 *Higher trust between firms decreases the attractiveness of vertical integration and lower the propensity of firms to integrate the production of an input that previously was made by an independent supplier.*

This hypothesis results from two studies. It follows the Antràs and Helpman (2008) prediction stating that the share of integration is declining with increasing enforceability of contracts and, thus, higher quality of contracting institutions.[2] It further bases on the link established by Raiser et al. (2008) between the higher quality of contracting institutions and higher trust (lower distrust) between firms. As a result, it is expected that higher trust between firms is positively connected with the incidence of integration decisions.

This hypothesis underlines the importance of facilitating the trust formation between firms and improving the quality of contractual institutions in transition countries. Better contracting institutions and contractual enforcement would thus allow transition countries to avoid excessive vertical integration and inefficiencies in the organization of input supply.

The analysis of sourcing decisions would not be complete without the analysis of the influence of firm productivity on the sorting into different organizational modes of sourcing. The Antràs and Helpman (2004) work is the first work in the stream of property-rights literature that connects both integration decisions and decisions on the location of sourcing (whether to source domestically or internationally) with the productivity. The Antràs and Helpman (2008) model applies the same framework regarding the productivity influence and connects positively productivity and incidence of integration decisions in the presence of differences in contract enforcement.

By assuming that the fixed costs of outsourcing are lower than the fixed costs of integration, the model illustrates that in the sectors with a higher capital-intensity, outsourcing is optimal only for low productivity firms. However, the study also highlight that in the industries with lower capital-intensity all firms opt for outdourcing regardless their productivity. Proposition 4 of the Antràs and Helpman (2008) study states that there exists a productivity cut-off θ_O, such that in an industry with capital-intensity $\nu_h > \nu_{hc}$ all firms with productivity greater than θ_O integrate and firms with productivity less than θ_O outsource.

In the data where the disaggregation into industries is based not on the criterion of technology or preferences, one can observe the industries characterized by capital-intensity higher than

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[2]More in detail the connection is discussed in Chapter 2

Figure 3.1: Productivity Sorting
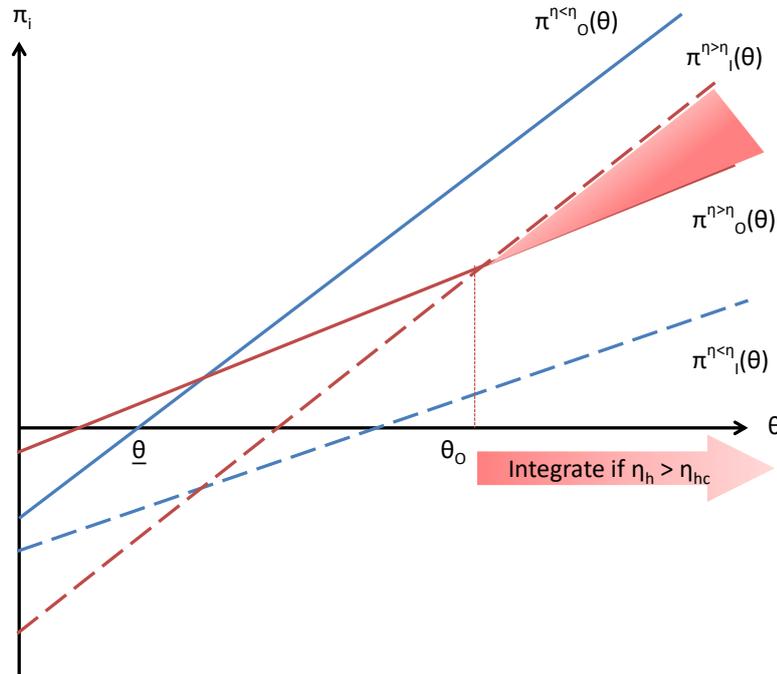
the cut-off ν_{hc} being aggregated together with the industries characterized by capital-intensity lower than the cut-off ν_{hc}. Thus, the share of integration will be dependent both on the capital-intensity and the productivity. In particular, firms with the same productivity may opt for integration or outsourcing, depending on the level of capital-intensity. However, as in the cases of industries with $\nu_h < \nu_{hc}$ with the increase of productivity the probability of integration does not change, the connection between productivity and integration will depend on the increase in integration in industries with higher capital-intensity ($\nu_h > \nu_{hc}$). The connection is illustrated on Graph ...

As a result a higher integration is expected in mixed industries if the share of firms with capital intensity $\nu_h > \nu_{hc}$ is big enough to have at least some firms with the productivity higher than the productivity cut-off θ_O.

In order to understand whether the positive connection between productivity and propensity to integrate exists in transition countries, the following hypothesis is tested.

H 3.3 *More productive firms with higher capital-intensity tend to choose integration more often and firms with low capital-intensity do not integrate. If there is at least one firm in the industry with capital-intensity and labour productivity high enough to integrate, higher firm-level productivity is positively correlated with the propensity of a firm to integrate.*

This hypothesis results from the Proposition 4 of the Antràs and Helpman (2008) study. The same approach that was used for the hypothesis H3.1 formulation is applied. The stark assumption of the Antràs and Helpman (2008) regarding the existence of productivity cut-off

θ_O is smoothed and transformed into a continuous positive connection between productivity and probability to integrate. The hypothesis is based on the theoretical prediction that the integrating firms are more productive ex-ante, but test in this chapter is mainly intended to examine the existence of the positive correlation between integration and firm-level productivity and does not examine the causality link. However, as more productive firms are expected to choose the integration more often, this hypothesis also underlines that the heterogeneity in firm-level productivity plays a role in the firm boundary decisions.[3]

An attempt to test the hypothesis of productivity influence on the boundary decision at the the firm-level has been done by Kohler and Smolka (2011) study, which was able to test the existence of the productivity premia for 4 choices of sourcing strategies in both organizational (integration versus non-integration) and location dimensions (home versus abroad). The authors of the study underline the importance of ex-ante productivity for the choice of firm boundaries, thus, supporting causal link between higher firm productivity and the choice of integration.[4] By using a modified theoretical model and empirical analysis, Defever and Toubal (2013) show that most productive multinationals are more likely to trade through an independent, rather than integrated, supplier, especially if they use relationship-specific inputs intensively.

Considering such a contrasting empirical evidence of organizational choices in international trade, the focus is on on the decisions to integrate regardless the location of the supplier. Additional evidence is drawn on the connection between productivity and firm boundaries by testing the hypothesis H3.3 for transition countries.

Although the literature stimulated by the Antràs (2003), Antràs and Helpman (2004), and Antràs and Helpman (2008) studies has contributed extensively to the understanding of firm interactions with its suppliers in the context of internationalization, the ability of theory to predict firm real-life decisions may be yet far from perfect. There are several discrepancies between a typical theoretical approach and its empirical testing. Most of the property-rights theory analyses the choice between firm-boundaries decisions basing on the firm-level bargaining that occur immediately after the decision to produce was made but before production actually starts. In the reality, however, most of the observed integration decisions are taken by firms that already exist and produce for a long time. For such firms the integration decision represents a change of their existing organization of production. Such organizational change (change of firm boundaries) may face significantly higher resistance when the firm production has already started and some relationships with suppliers are already established. In fact, there may exist a high level of structural inertia towards the firm boundaries change. In the countries when such inertia is high enough, not accounting for it may bias significantly empirical modelling of firm boundary decision. In order to test, whether the firms that are able to change are different from their non-changing counterparts, the following hypothesis is considered.

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[3]The hypothesis is not considering the connection between the productivity and the location decision (domestic integration vs integration abroad), but analyse the connection between the productivity and firm boundaries' choice (integrate or non-integrate) only.

[4]On the basis of Spanish data Kohler and Smolka (2011) have shown that firms choosing foreign outsourcing, domestic and foreign integration are ex-ante more productive then their domestic outsourcing counterparts.

H 3.4 *Firms changing their boundaries over-perform firms with not-changing boundaries in
terms of such performance indicators as reinvestment, productivity and participation in inter-
national trade through both imports and exports.*

Such an empirical test is required in order to highlight the importance of the difference
between a theoretical approach taking into account the choice between different types of sourc-
ing (integration versus non-integration) and real-life situation when a firm faces wider range of
choices about its boundary, which includes the decision not to change the existing organization
of sourcing (existing firm boundaries). Ignoring the possibility of a firm to keep its boundaries
fixed (lack of firm ability to change) may result in the theoretical approach being unable to
explain persistence of inefficient firm organization (sourcing organization) in such countries as
transition countries.

Another characteristic of the boundary decisions in modern firms, is driven by firms being
multiproduct (Fontagné et al., 2016) and, thus, multi-activity. Firm production organization is
organized through the chain of multiple activities aimed to result in the production of multiple
products. Rare firms focus on a single activity or a task. Thus, a firm may decide to integrate
or outsource more than one activity at a time, or to outsource one and integrate another. To
analayse empirically integration decisions on such a close to real-life and disaggregated level,
the data on firm-product or firm-activity level is required. In the absence of such data even for
a large part of developed countries, my analysis has to be based on the level of firm assuming
that all the changes of firm boundaries are connected with firm characteristics and its total
firm-level performance in terms of capital, productivity and trust.

3.3 Firm-level Data and Empirical Strategy

3.3.1 Firms' Decision Options

The data used are the data of the third round of the Business Environment and Enterprise
Survey (BEEPS) organized by European Bank for Reconstruction and Development (EBRD)
and World Bank in 2005. The survey includes information on 8378 firms in 23 transition
countries and 2 comparative countries. For the analysis only information on 7454 firms is used
for transition countries; 2705 firms are in countries that at the date of interview were a part of
the European Union, and 4749 in the rest of transition countries. The dataset includes firms in
5 activity sectors, namely construction, manufacturing, transport storage and communication,
wholesale and retail trade, real estate, renting and business services, and other services. The
data on mining and quarrying are excluded from the dataset due to the high specificity of this
sector.

The dataset is quite unique as it allows analyzing the changes of firm boundaries in transition
countries based on the direct questions of the survey. the analysis is based on the answers ("Yes"
or "No") of firm representatives on two questions regarding the initiatives undertaken by a firm
over the 36 months previous to the interview (2002-2005). First question shows whether a

firm outsourced a major production activity/service that was previously conducted in-house (integrated). Second shows whether a firm brought in-house (integrated) a major production activity/service that was previously outsourced. As a result a firm had four main options regarding the changes of its boundaries: not to change its boundaries, integrate, outsource or both (integrate and outsource).

As illustrated in the Table 3.1, firms in the dataset change their boundaries not often. Only slightly more than 14% of firms changed their boundaries through integrating of major activities (that previously had been outsources) or outsourcing of major activities. Only 6.2% of firms outsourced, 6% integrated and 2.3% both integrated and outsourced a major activity in the three years previous to the interview. It shows that the propensity of firms to integrate is almost equal to the propensity to outsource.

Table 3.1: Options of firms regarding their boundaries

Boundary change	All countries		EU TC		Non-EU TC	
	Freq	%	Freq	%	Freq	%
No change	6371	**85.5**	3195	**88.04**	3944	**83.05**
Integration	446	**6.0**	158	**4.35**	341	**7.18**
Outsourcing	463	6.2	198	5.46	335	7.05
Outsourcing and integration	174	2.3	78	2.15	129	2.72
Total	7454	100.0	3629	100.0	4749	100.0

Source: Own calculations based on the BEEPS (2005)

3.3.2 Main Exogenous Variables

The data allows capital intensity to be measured for each firm. The survey contain the questions on both the estimated replacement value of the physical production assets at the end of previous year and the value of new capital investments (spending on new buildings, machinery and equipment) during the previous year. Capital-intensity of production may be evaluated using both of these pieces of information. The choice is to perform the regression analysis by using the measure of capital-intensity based on the value of new capital investments. At the firm-level it both respects more the Antràs model's assumption of the investment-sharing and reflect the most recent needs of production.[5] Consequently, the measure of capital-intensity used is calculated as the spending on new buildings, machinery and equipment divided by the total number of full time permanent employees.[6]

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[5]The aggregated version of this measure was used in the previous chapter as a robustness check. This highlighted that investment-based measure of capital-intensity reflects most recent production needs in capital, rather than its accumulated value of total physical assets.

[6]Summary statistics is presented for capital-intensity measured as replacement value per employee for comparison (see tables C.1 and C.2)

The data also allows measuring trust of the relationship between a firm and its suppliers. I assume that a firm has trusting relationship with its supplier if it is not required to prepay any of its inputs.[7]

Labour productivity is also estimated for each firm by using the data on estimated total sales from the survey. The labour productivity reflects the total sales per employee.

The data show whether, how and how intensively firms are involved in international trade. For both imports and exports the data is similar and, for example for export, includes information on whether a firm is exporting (export status), and what percent of the total sales are exported either directly or indirectly (involving intermediaries). For the regression analysis mostly the data on firm export status is used.

At last, the data includes the information on the competition environment of the main (domestic) market of each firm as well. There are two main characteristics of the market environment that is possible to extract from data.

First is the measure of the import competition pressure that show how important is the competition from import for a particular firm. Each firm has been asked how important is competition from imports in the market for the main product line or main line of services in the domestic market of this firm. The answer represents the choice between 1 - 6 scale (1 - not important, 5 - extremely important, 6 - these products cannot be imported). These answers are grouped to present four dummy variables that show if the competition was not important (No import competition pressure), slightly or fairly important (Moderate competition pressure), highly or extremely important (High competition pressure) or the products/services analogous the main product/service of a firm could not be imported.

Second is the measure of total level of competition on the main market, or the elasticity of demand. The measures are taken from the answers to the following question: If you were to raise your prices of your main product line or main line of services 10% above their current level in the domestic market (after allowing for any inflation) which of the following would best describe the result assuming that your competitors maintained their current prices? Each firm was given the following four options to choose from: our customers would continue to buy from us in the same quantities as now; our customers would continue to buy from us, but at slightly lower quantities; customers would continue to buy from us, but at much lower quantities; many of our customers would buy from our competitors instead. Basing on this information four dummy variables are constructed: Not elastic demand, Slightly elastic demand, Moderately elastic demand, and Highly elastic demand.

3.3.3 Empirical Model

In order to analyse the connections of integration decisions with capital-intensity and trust (contracting institutions), expressed in first two hypotheses, a binary (probit) model of whether a firm decides to integrate some activity or not is performed first. The basic specification of this model has the following form:

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[7]The connection between trust and prepayment is discussed in more detail in the Chapter 1

$$Pr(Int = 1|x) = \Phi(\beta_0 + \boldsymbol{\beta_1} CI_{icj} + \boldsymbol{\beta_2} T_{icj} + \beta_3 Exp_{icj} + \beta_4 EU_c + \beta_5 W_{icj} + u) \qquad (3.1)$$

In this specification the coefficient β_1 shows the connection between propensity to integrate and capital-intensity[8] (CI) of a firm i in country c and activity sector j, which allows testing the first hypothesis (H3.1) of this chapter. The coefficient β_2 shows the connection between trust and integration of a firm i in country c and activity sector j, giving the possibility to test the second hypothesis (H3.2).

As control variables various firm-level characteristics and country group controls are included. The variables Exp_{icj} and EU_c account for the influence of being an exporter and the differences between transition countries that are a part of the European Union and those that are not. The vector W_{icj} account for the influence of such control variables as size and age of firms, ownership structure, including ownership concentration, stock exchange listing, whether firms have more than one establishment, and whether the access to finance is an obstacle for a particular firm.

The controls for different competitive environments of firms' main markets is further added to the vector W_{icj} (specification "Competition" in Table 3.3), as well as country dummies (specification "CountryFE" in Table 3.3) .

In order to test the influence of productivity on the firm decision to integrate (hypothesis H3.3) the measure of labour productivity[9] is included to the model (specifications "Productivity" and "Productivity2"[10] in Table 3.3).

$$Pr(Int = 1|x) = \Phi(\beta_0 + \beta_1 CI_{icj} + \beta_2 T_{icj} + \beta_3 Exp_{icj} + \boldsymbol{\beta_4} LP_{icj} + \beta_5 EU_c + \beta_6 W_{icj} + u) \quad (3.2)$$

The coefficient β_4 shows the connection between labour productivity of firms and their propensity to integrate. Positive and significant coefficient will confirm positive link between productivity and integration.

The models are tested on the separate subsamples of transition countries (EU and non-EU) as well. In this way I analyse if any differences in estimates exist depending on the type of a country group.

All of these specifications test the hypotheses considering the options of firms presented in the Figure 3.2, where one-stage decision model is considered. Figure 3.2 illustrates the choice between integration and non-integration as in Antràs (2003),Antràs and Helpman (2004), and Antràs and Helpman (2008).

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[8]Due to the differences between country groups (EU and non-EU transition countries), the measure of capital-intensity is normalized by the average capital intensity in each group. Thus, the comparison of the variation across firms represent firm higher capital-intensity with respect to the average of the country group

[9]The measure of productivity is normalized by the average value in each country group.

[10]The specification "Productivity2" also account for activity sector fixed effects.

Figure 3.2: The decision to integrate or not
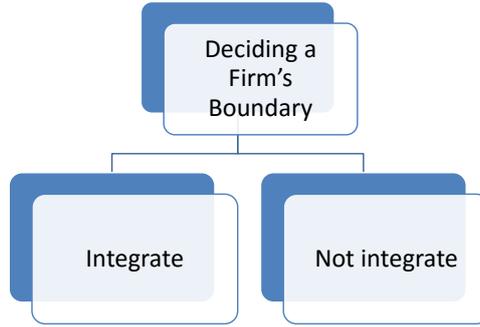
However, as the description of the data shows, firms have different strategies to choose. They are more various than just integration versus non-integration and are illustrated by the Figure 3.3. Multinomial logit model is used to account for the decision tree shown in Figure 3.3.

Figure 3.3: The decision tree containing 4 choices
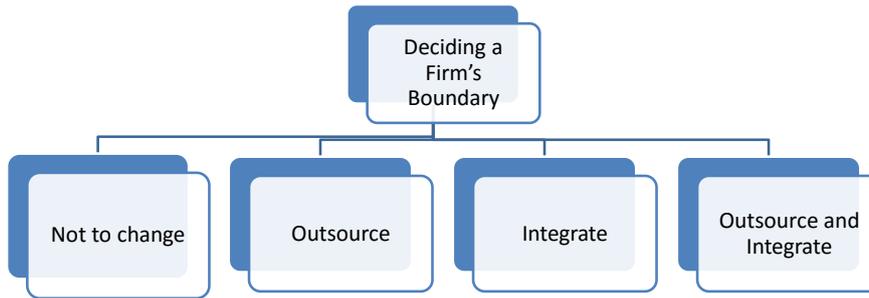
This multivariate (multinomial logit) model considers 4 choices in the following way:

$$\begin{cases} Y_1^* = \beta_1 X_1 + \varepsilon_1, Y_1 = 1(Y_1^* > 0) \\ Y_2^* = \beta_2 X_2 + \varepsilon_2, Y_2 = 1(Y_2^* > 0) \\ Y_4^* = \beta_4 X_4 + \varepsilon_4, Y_4 = 1(Y_4^* > 0) \\ Y_4^* = \beta_4 X_4 + \varepsilon_4, Y_4 = 1(Y_4^* > 0) \end{cases} \tag{3.3}$$

where

$$\left[\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \end{pmatrix} \right] \sim N \left[\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho_{12} & \rho_{13} & \rho_{14} \\ \rho_{12} & 1 & \rho_{23} & \rho_{24} \\ \rho_{13} & \rho_{23} & 1 & \rho_{34} \\ \rho_{14} & \rho_{24} & \rho_{34} & 1 \end{pmatrix} \right] \tag{3.4}$$

$$\tag{3.5}$$

The main assumption of the multinomial logit model is the Independence of Irrelevant

Alternatives (IIA) assumption that assumes that none of the options can serve as substitutes for a firm boundary decision. However, the choice to change firm boundaries may differs significantly with respect to the choice not to change them. In this perspective the type of change, i.e. integration, outsourcing or integration plus outsourcing, may serve as substitutes with respect to the decision not to change the firm boundaries. In this case, the appropriate decision tree is illustrated by Figure 3.4.[11] It will be possible to judge whether the choices of a particular type of firm boundaries' change are substitutes from the coefficients of the main independent variables. If the differences between the coefficients for the same variables in different equations are not statistically different from zero (the influence of a variable is the same for choosing integration versus no change and for choosing outsourcing over no change), it is possible to conclude that the options of integration and outsourcing are substitutes with respect to the choice of not changing firm boundaries.

Figure 3.4: The two-step decision tree
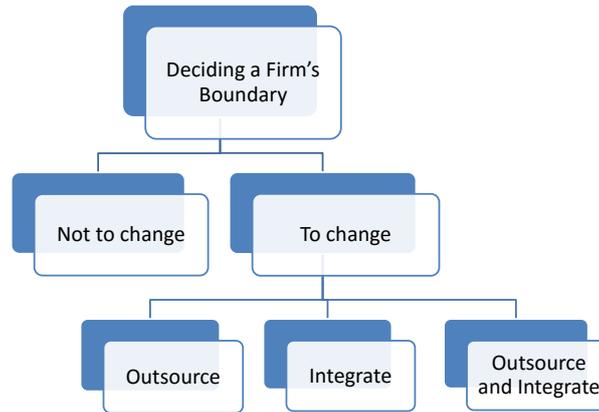
In order to highlight the differences between firms that change their boundaries and their counterparts that stay unchanged, fourth hypothesis (H3.4) is tested. The differences are tested in terms of such firm characteristics as profits, reinvestment of profits in the firm development, labour productivity and other. The Wald t-test with unequal variances is used to underline the over-performance of firms that change their boundaries.

The next step is to test whether the decision of changing or not changing firm boundaries represent a selection mechanism for further boundary decisions. By using probit model with Heckman selection, it is tested whether the decision to integrate Y_1^* is conditional on the decision to change firm boundaries Y_2^*.

The model assumes that Y_1^* is observed only when Y_2^* equals one. Thus, the dependent variables is adjusted in order to fit this assumption. No variability of dependent variable (decision to integrate) is lost as the variable always equals zero if firms decide not to change

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[11]As the focus is on the connection between main independent variables (capital-intensity, trust and productivity) and all options a firm faces, such models as nested logit do not fit the aim of this research. Moreover, the application of such a model would require multiple assumptions on choice- and nest-specific variables. Such assumptions would alter the results of the empirical analysis making them more assumption-specific

their boundaries. This model is used exclusively to test possible selection mechanism, not to evaluate the coefficients.

$$\begin{cases} Y_1^* = \beta_1 X_1 + \varepsilon_1, Y_1 = 1(Y_1^* > 0) \\ Y_2^* = \beta_2 X_2 + \varepsilon_2, Y_2 = 1(Y_2^* > 0) \end{cases}$$

(3.6)

where

$$\left[\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \end{pmatrix} \right] \sim N \left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right]$$

(3.7)

(3.8)

$$f(Y_1, Y_2) = \qquad \text{Prob}[Y_1 = 1|Y_2 = 1] * \text{Prob}[Y_2 = 1](Y_1 = 1, Y_2 = 1) \qquad (3.9)$$

$$= \qquad \text{Prob}[Y_1 = 0|Y_2 = 1] * \text{Prob}[Y_2 = 1](Y_1 = 0, Y_2 = 1) \qquad (3.10)$$

$$= \qquad \text{Prob}[Y_2 = 0](Y_2 = 0) \qquad (3.11)$$

This is one of the ways to model the two-stage decision model presented in the Figure 3.4

If the Wald test of the ρ is non-zero will be not significant, it is possible to state that the equations are independent and the decision to integrate may be modelled separately from the decision to change boundaries.

Proceeding in such a way a separate model is obtained for each of the two stages of the decision tree (Figure 3.4). The first stage of the decision process (choice between changing and staying unchanged) will be modelled by using the binary (probit) model of the specification same as in equation 3.2. The second stage of the decision process (between the types of change of the firm boundaries) will be modelled as the multinomial logit including three options: integration, outsourcing and integration plus outsourcing.

Such modelling makes it possible to understand the influence of the main explanatory variables (capital-intensity, trust and labour productivity) on each stage of the decision-making process and highlight the importance of considering the option of an existing firm not to change its firm boundaries and modes of sourcing. To the best of my knowledge, the importance of such firm-level perspective has not been underlined in the literature. Consequently, it is rarely considered that the change of the intra-firm trade flows may be conditioned by the firms being unable or unwilling to change their firm boundaries (and sourcing) even if the change would be a more efficient strategy.

3.4 Results

3.4.1 Country Groups' Characteristics

The data for two groups of countries (EU and non-EU transition countries) show that firms in these countries are significantly different (Table 3.2).

First, firms in the non-EU transition countries change their boundaries more often in EU transition countries. Second, firms in non-EU transition countries are less labour productive and less capital-intensive. Third, in non-EU transition countries less firms have trusting relationships with their suppliers. Moreover, if firms do not have trusting relationships, i.e. they have to prepay their inputs, they prepay more in non-EU countries than in EU countries.

Table 3.2: Differences between EU and non-EU transition countries

	All countries mean	sd	European mean	sd	Non-European mean	sd	Difference
Firm integrated activity	0.083	0.276	0.055	0.229	0.099	0.299	0.044***
Firm outsourced activity	0.085	0.280	0.064	0.245	0.098	0.297	0.034***
Firm changes boundaries	0.145	0.352	0.103	0.304	0.170	0.375	0.067***
Firm chooses integration over other options	0.412	0.492	0.378	0.486	0.424	0.494	0.046
Firm chooses integration over outsourcing	0.491	0.500	0.451	0.499	0.504	0.500	0.0538
Firm chooses integration and outsourcing over integration	0.281	0.450	0.300	0.460	0.274	0.447	-0.0255
Firm chooses integration and outsourcing over outsourcing	0.273	0.446	0.260	0.440	0.278	0.449	0.0179
Labour productivity	36.68	43.04	56.69	46.96	23.90	34.76	-32.8***
Labour productivity (ln)	3.084	1.062	3.769	0.747	2.646	1.000	-1.12***
Capital-intensity	41.31	1350.3	75.15	1966.8	11.16	26.6	-63.98
Capital-intensity (ln)	2.106	1.428	2.729	1.270	1.549	1.328	-1.18***
Capital investments per worker	1.248	3.214	1.822	4.272	0.838	2.067	-0.98***
Capital-intensity as investments per worker (ln)	-0.42	1.365	0.056	1.251	-0.77	1.341	-0.83***
Trust	0.541	0.498	0.611	0.488	0.501	0.500	-0.11***
Prepayment levels	0.400	0.319	0.222	0.212	0.479	0.326	0.257***
% owned by private domestic company/organisation	81.91	36.46	82.43	36.41	81.62	36.48	-0.81
% owned by private foreign company/organisation	9.09	26.62	9.25	27.2	9	26.3	-0.25
% owned by government/state	8.08	26.39	7.21	25.28	8.57	27	1.36*
% of the firm owned by the largest shareholder(s)	76.61	28.9	76.49	28.94	76.68	28.89	0.19
Export (dum)	0.271	0.444	0.330	0.470	0.237	0.425	-0.09***
Direct export (% of sales)	9.412	22.990	11.253	24.262	8.365	22.169	-2.888***
Indirect export (% of sales)	1.389	8.519	1.497	8.399	1.328	8.587	-0.169
Import (dum)	0.544	0.498	0.544	0.498	0.544	0.498	0.0002
Direct import (% of sales)	16.602	31.569	14.735	28.782	17.680	33.027	2.945***
Indirect import (% of sales)	16.108	29.926	15.431	28.975	16.500	30.458	1.069
Similar products can not be imported	0.043	0.202	0.034	0.180	0.048	0.214	0.0145**
No import competition pressure	0.260	0.439	0.235	0.424	0.274	0.446	0.0392***
Moderate import competition pressure	0.373	0.484	0.376	0.485	0.371	0.483	-0.00533
High import competition pressure	0.324	0.468	0.354	0.478	0.306	0.461	-0.0485***
Not elastic demand	0.213	0.409	0.161	0.368	0.243	0.429	0.0816***
Slightly elastic demand	0.304	0.460	0.278	0.448	0.319	0.466	0.0409***
Moderately elastic demand	0.190	0.392	0.209	0.407	0.178	0.383	-0.0311**
Highly elastic demand	0.294	0.456	0.352	0.478	0.261	0.439	-0.0914***
Size	103	373	98	411	107	349	9
Size (ln)	3.019	1.674	2.807	1.721	3.140	1.635	0.334***
Age	16	18	17	17	16	18	-1*
Observations	7454		2705		4749		

Note: $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$

Fourth, firms in two groups are different with respect to their involvement in international trade. There are fewer firms that export in transition countries outside of the European Union.

They also export less, especially directly. There is not a big difference in the number of importers, but importing firms in non-EU transition countries have higher shares of imports. Summing up, firms in transition countries outside of European Union are less involved in export, but more dependent on import of intermediate inputs.

Fifth, the market environment is significantly different in two groups of countries. The pressure from import is lower on average in non-EU transition countries. As shown in the Table 3.2, there is smaller number of firms that report high import competition and higher number of firms that report no import competition pressure. The elasticity of demand on main markets of firms in two country groups is different as well. It is lower in non-EU transition countries. More firms in non-EU countries report that they sell on not elastic or slightly elastic demand and less firms report that they sell their products on the moderately or highly elastic demand.

Other significant differences between country groups include size, age of firms, and the share of state ownership.

3.4.2 Integration Decisions, Technology and Trust. One-Stage Decision Model

The results of the one-stage (probit) model for the choice of integration over non-integration support three of the main hypotheses testing the following: the positive connection of the propensity to integrate with capital-intensity (H3.1), with labour productivity(H3.3), and negative connection with the degree of trust or quality of contracting institutions (H3.2). The results are also consistent with the results in the previous chapter of the thesis.

Fist, as illustrated in the Table 3.3, a higher capital intensity is associated with a higher propensity of a firm to integrate as suggested by the first hypothesis (H3.1). The link is statistically significant and is robust to the inclusion of a variety of controls and fixed effects.

Second, as proposed by the second hypothesis (H3.2), higher trust, on contrary, is connected with a lower propensity to integrate. The correlation is robust to the inclusion of different control variables. It illustrates that better contracting institutions stimulate firms to choose non-integration over integration. The results show the existence of two counteracting forces, namely technology complexity (proxied by capital-intensity) and quality of contracting institution (proxied by trust between firms), that are connected with the probability of a firm to choose integration.

Positive connection is also found between a decision to integrate and firm labour productivity, supporting the previous evidence on the higher productivity of integrating firms and the third hypothesis (H3.3). The link is robust to the inclusion of different control variables, including country and sector dummies.

Table 3.3: Probit model of the choice between integration and non-integration

Specifications [1]	Base	Competition	CountryFE	Productivity(1)	IndustryFE	Productivity(2)
Capital-intensity (normalized)	0.019***	0.019***	0.014***	0.011**	0.013***	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Trust	-0.030***	-0.030***	-0.033***	-0.028***	-0.031***	-0.026**
	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Labor productivity (normalized)				0.013*		0.015**
				(0.007)		(0.007)
Control Variables[2]						
Export	0.043***	0.039***	0.032***	0.031***	0.027**	0.025**
	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)
EU membership	-0.033***	-0.029***	-0.068***	-0.069**	-0.073***	-0.076***
	(0.009)	(0.010)	(0.026)	(0.029)	(0.026)	(0.029)
Moderately elastic demand		-0.022	-0.023*	-0.033**	-0.024*	-0.033**
		(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Highly elastic demand		-0.027**	-0.022*	-0.024*	-0.022*	-0.024*
		(0.012)	(0.012)	(0.013)	(0.012)	(0.013)
Medium firms	0.021*	0.018	0.013	0.016	0.009	0.011
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Large firms	0.045***	0.049***	0.048***	0.049***	0.039**	0.039**
	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)	(0.018)
Young firms	-0.021	-0.022	-0.015	-0.023	-0.012	-0.019
	(0.014)	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)
Multi-establishment firms	0.034***	0.036***	0.031***	0.030***	0.033***	0.033***
	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)
Finance obstacles	0.024**	0.023**	0.013	0.018*	0.010	0.014
	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Firms listed on a stock exchange	-0.031	-0.036	-0.033	-0.040	-0.038	-0.045
	(0.031)	(0.032)	(0.032)	(0.033)	(0.032)	(0.033)
Ownership structure[3]	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	Yes	Yes	Yes	Yes
Sector dummies	No	No	No	No	Yes	Yes
Likelihood	-1306.86	-1246.11	-1190.97	-1070.91	-1180.54	-1060.03
Pseudo-R2	0.041	0.046	0.083	0.089	0.091	0.099
p-value(Wald)	0.000	0.000	0.000	0.000	0.000	0.000
N	4174	4013	3950	3593	3950	3593

Note: $^*p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

[1] The names of specifications reflect control variables included the model. Productivity(1) includes productivity and country fixed effects. Productivity(2) includes productivity, industry and country fixed effects.

[2] The vector of control variables also included ownership concentration and the dummy variables for moderate and high competition pressure, firms whose products has no substitutes as it cannot be imported, and not elastic demand.

With regards to the effect of control variables, several important links are observed. First, firms that choose integration are more often exporters. This link is significant in all the specifications.

Second, the competitive environment of firms' market is an important factor for the choice of integration. On one side, a higher import competition pressure is connected positively with the propensity of a firm to choose integration. However, the connection is comparatively week for the full sample. On the other side, the total competitive environment has negative connection with the probability of integration decision. A higher level of the elasticity of demand (competition) is associated with a lower propensity to choose integration. It shows that on more competitive markets less integration will be chosen.

Third, the size and the structure of a firm are important factors for the decision to integrate. Larger firms and firms with multiple establishments (opposed to small and single-establishment firms respectively) are more prompt to integrate.

Forth, the connection between the financial constraints and the decision to integrate is taken

into account. As the results in the Table 3.3 show, firms that report that the access to finance is a moderate or major obstacle to their activity are more prompt to choose integration over non-integration.

In order to account for possible differences in the decision-making process in different country groups five out of six specifications (excluding the basis specification) are tested for each of the subsamples, i.e. EU and non-EU transition countries (Table 3.4).

Furthermore, firms in EU transition countries are choosing integration less often. For both of the country groups the positive link between capital intensity and decision to integrate stays significant in majority of specification (coefficients have lower than 90% level of significance when controlled for productivity in non-EU countries and for productivity together with fixed effects in the EU countries). Such results mainly support the first hypothesis (H3.1) for both of the country groups. It also indicates the possible connection between labour productivity and capital intensity at the firm-level.

The negative link between the propensity to choose integration and trust between firms (H2) is robust to the division into two subsamples as well. It stays significant in almost all the specifications.

Productivity connection with the probability of the decision to integrate is, however, more characteristic for the EU transition countries. It is robust the accounting of both country and sector dummies. In the non-EU transition countries the connection between labour productivity and the decision to integrate is not statistically significant, underlining the possible connection between control variables, such as export. Such results draw supporting evidence for the third hypothesis (H3.3) for EU transition countries, but underline the structural difference between EU and non-EU transition countries in terms of interaction of labour productivity with other firm characteristics.

Table 3.4: Probit model of the choice between integration and non-integration in two country groups

Specifications[1]	European countries					Non-European countries				
	Comp.	CountryFE	Prod.(1)	IndustryFE	Prod.(2)	Comp.	CountryFE	Prod.(1)	IndustryFE	Prod.(2)
Capital-intensity (normalized)	0.012***	0.014***	0.010*	0.014***	0.009	0.024***	0.009	0.010	0.011*	0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Trust	-0.029**	-0.032**	-0.029**	-0.031**	-0.030**	-0.036**	-0.032**	-0.032*	-0.035**	-0.028*
	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.015)	(0.017)	(0.016)	(0.017)
Labor productivity (normalized)			0.018**		0.021***			0.003		0.003
			(0.007)		(0.008)			(0.011)		(0.012)
Control Variables[2]										
Export	0.028**	0.028**	0.031**	0.022*	0.023	0.048***	0.025	0.027	0.028	0.023
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.016)	(0.017)	(0.018)	(0.017)	(0.018)
Medium firms	-0.014	-0.013	-0.013	-0.015	-0.016	0.056***	0.035*	0.052***	0.039**	0.045**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)	(0.019)	(0.018)	(0.019)
Large firms	0.037	0.038*	0.033	0.031	0.024	0.068***	0.057**	0.067**	0.053**	0.059**
	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.026)	(0.027)	(0.028)	(0.027)	(0.028)
Young firms	-0.020	-0.024	-0.014	-0.020	-0.009	-0.019	-0.007	-0.029	0.001	-0.023
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)	(0.025)	(0.022)	(0.025)
Multi-establishment firms	0.032**	0.032**	0.031**	0.034**	0.034**	0.046***	0.041***	0.039**	0.040**	0.039**
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.017)	(0.016)	(0.017)
Moderate import competition pressure	-0.011	-0.015	-0.015	-0.019	-0.018	0.034*	0.034	0.029	0.022	0.028
	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)	(0.020)	(0.021)	(0.022)	(0.020)	(0.022)
High import competition pressure	-0.018	-0.024	-0.024	-0.031*	-0.029*	0.071***	0.059***	0.059**	0.051**	0.056**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.020)	(0.022)	(0.023)	(0.021)	(0.023)
Moderately elastic demand	-0.005	-0.004	-0.008	-0.006	-0.009	-0.032	-0.053**	-0.058**	-0.036*	-0.057**
	(0.017)	(0.018)	(0.018)	(0.017)	(0.018)	(0.021)	(0.021)	(0.023)	(0.021)	(0.023)
Highly elastic demand	-0.003	-0.002	-0.004	-0.001	-0.003	-0.056***	-0.052***	-0.051**	-0.048**	-0.049**
	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)	(0.020)	(0.020)	(0.022)	(0.020)	(0.022)
Ownership structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Sector dummies	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Likelihood	-583.75	-576.11	-537.90	-568.59	-530.82	-665.35	-490.40	-536.28	-617.47	-532.61
Pseudo-R2	0.031	0.044	0.051	0.056	0.064	0.066	0.130	0.127	0.124	0.132
p-value(Wald)	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	2100	2100	1995	2100	1995	1944	1663	1625	1881	1625

Note: $^*p < 0.10,^{**} p < 0.05,^{***} p < 0.01$

[1] The names of specifications reflect control variables included the model. Productivity(1) includes productivity and country fixed effects. Productivity(2) includes productivity, industry and country fixed effects.

[2] The vector of control variables also included ownership concentration and the dummy variables for moderate and high competition pressure, firms whose products has no substitutes as it cannot be imported, and not elastic demand.

The division of the sample in two country groups allows highlighting the differences in the integration decision-making in terms of the influence of the market environment. The influence of import pressure has opposite effects on the probability to integrate in two country groups. In the EU transition countries high import competition pressure is associated with a lower propensity to take an integration decision at the firm-level, while in the non-EU transition countries such pressure has strong positive effect. This opposite effects in two country groups explain why no significant effect of import competitive pressure on the decision to integrate was observed for the entire sample. The elasticity of total demand on the firms' market is negatively associated with the integration decision, but is significant only for non-EU transition countries. It highlights that the import competition has the same effect as the domestic competition in EU transition countries, but have the opposite effect in non-EU transition countries, underlining the significant difference between domestic and foreign competition in the non-EU transition countries. Such results also demonstrate that firm in transition countries outside of the European Union tend to avoid foreign competition by extending their boundaries (integration more production activities).

Among the other control variables the size and structure of firms should be highlighted. The connection between having multiple establishments and taking the decision to integrate stays significant across all the specifications in both groups. The size effect tend to be more

characteristic for the non-EU countries, as both medium and large firms are more prone to integrate that their smaller counterparts (large more than medium).

3.4.3 Do Firms Decide to Change or to Integrate? Is Two-Stage Decision Model Necessary?

The results described above show the forces that drive probability of choosing integration over non-integration within and across different countries and sectors. However, previous results do not take into account other options a firm faces when consider the changes of its boundaries. As shown in the Section 3.3 the firm does not only choose whether to integrate or not, the options of each firm include integration, outsourcing, doing both and doing none. The last option is, in fact, prevailing in the population of firms in the sample.

Analysing the integration decision in the connection with other options of firm boundaries' change and taking no change as the base outcome, all of four main hypotheses find support (see Table 3.5). Capital intensity stays positively connected with the integration decisions, although the significance of this link decreases when productivity is included. Trust stay negatively and significantly connected with the propensity to choose integration. Labour productivity stays positively and significantly connected with choosing the integration as well.

However, what is observed is the choice of integration over not changing the firm boundaries, which is the most popular choice. It is possible to observe that both the choice of outsourcing and the choice of outsourcing plus integration have similar connections with the main variables of interest. It suggests that these strategies are substitutes with respect to the influence of capital-intensity, trust and productivity when no-change is taken as the base choice of firms. Such substitutionality of the integration and outsourcing options with respect to the choice of keeping firm boundaries fixed are not considered in the previously discussed theoretical models. And to the best of my knowledge, has not been underlined in the existing literature, most probably due to the lack of firm-level data.

Testing the difference of the coefficients in different equations for main explanatory variables, this difference is found to be not statistically different from zero. It supports the assumption that the different types of firm boundary change, namely choosing to integrate, outsource or do both, are substitutes with respect to the choice of not-changing the firm boundaries. This, it is possible to suppose that such results are driven by the significant difference between the firms that are able to change their boundaries and those that are not. In fact, the Table 3.6 show that firms that change their boundaries are significantly different from their counterparts that keep their firm boundaries unchanged, regardless of the country group. This supports hypothesis 3.4 on the over-performance of firms that changes their boundaries.

First of all such firms are investing much more of their profits in their development. The difference between the share of profits that was reinvested equals to 11.5% in transition countries of the European Union and 5.56% in transition countries outside of the European Union. This happens, perhaps, because such firms also have higher profits on average especially if firms with zero profits (mainly among not changing firms) are not considered. Changing firms are

Table 3.5: Multinomial logit model of all the possible choices for the change of firm boundaries

Base outcome = No Change [+]	Base	Productivity	CounryFE	Productivity(2)[1]	Productivity(3)[2]
Integration					
Capital-intensity (normalized)	0.028***	0.020***	0.015	0.010	0.008
	(0.007)	(0.008)	(0.090)	(0.074)	(0.101)
Trust	-0.099***	-0.100***	-0.074	-0.066	-0.059
	(0.018)	(0.018)	(0.375)	(0.599)	(0.843)
Labor productivity (normalized)		0.034***		0.033	0.038
		(0.010)		(0.339)	(0.541)
Control Variables					
Export	0.099***	0.089***	0.079	0.070	0.059
	(0.018)	(0.019)	(0.369)	(0.599)	(0.738)
Ownership concentration	-0.001**	-0.001**	-0.001	-0.001	-0.001
	(0.000)	(0.000)	(0.004)	(0.008)	(0.012)
High import competition pressure	0.069***	0.068***	0.019	0.023	0.023
	(0.024)	(0.025)	(0.203)	(0.402)	(0.433)
Not elastic demand	-0.019	-0.017	-0.026	-0.027	-0.027
	(0.025)	(0.026)	(0.301)	(0.533)	(0.715)
Moderately elastic demand	-0.068***	-0.079***	-0.059	-0.063	-0.062
	(0.025)	(0.026)	(0.379)	(0.883)	(1.343)
Highly elastic demand	-0.066***	-0.061***	-0.039	-0.035	-0.035
	(0.022)	(0.023)	(0.403)	(0.734)	(1.065)
Outsourcing					
Capital-intensity (normalized)	0.023***	0.022***	0.017	0.014	0.010
	(0.007)	(0.008)	(0.028)	(0.020)	(0.016)
Trust	-0.115***	-0.115***	-0.088	-0.080	-0.072
	(0.018)	(0.018)	(0.166)	(0.232)	(0.318)
Labor productivity (normalized)		0.024**		0.036	0.045
		(0.010)		(0.132)	(0.204)
Control Variables					
Export	0.106***	0.098***	0.098	0.088	0.076
	(0.019)	(0.019)	(0.171)	(0.246)	(0.271)
Ownership concentration	-0.001**	-0.001**	-0.001	-0.001	-0.001
	(0.000)	(0.000)	(0.002)	(0.003)	(0.005)
Moderately elastic demand	-0.063**	-0.057**	-0.063	-0.054	-0.053
	(0.027)	(0.028)	(0.164)	(0.375)	(0.572)
Integration & Outsourcing					
Capital-intensity (normalized)	0.024***	0.021***	0.013	0.009	0.006
	(0.005)	(0.006)	(0.127)	(0.115)	(0.086)
Trust	-0.090***	-0.089***	-0.060	-0.051	-0.044
	(0.014)	(0.014)	(0.320)	(0.348)	(0.402)
Labor productivity (normalized)		0.020**		0.024	0.028
		(0.008)		(0.164)	(0.251)
Control Variables					
Export	0.087***	0.082***	0.066	0.055	0.046
	(0.014)	(0.015)	(0.361)	(0.433)	(0.386)
Ownership structure	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	Yes	Yes	Yes
Sector dummies	No	No	No	No	Yes
Likelihood	-2506.29	-2264.31	-2355.88	-2113.78	-2084.95
Pseudo-R2	0.033	0.037	0.091	0.101	0.113
p-value(Wald)	0.000	0.000	0.000	0.000	0.000
IC	4	4	10	11	12
N	4018	3657	4018	3657	3657

Note: $^*p < 0.10,$ $^{**}p < 0.05,$ $^{***}p < 0.01$
[+] Only significant coefficients are reported. Each of the models account for ownership concentration, import competition pressure and elasticity of demand in a way similar to previously discussed models.
[1] The specification includes also country dummies
[2] The specification includes country and activity dummies

also different in terms labour productivity in both country groups. They overperform more in terms of labour productivity in the EU countries than in the non-EU countries.

Firms that change their boundaries also are more actively involved in international trade. They are more often both exporters and importers. They also have higher shares of both export and import. They export around 10% more in the EU transition countries and around 6% more in the non-EU ones with respect to their not-changing boundaries counterparts. These firms also have higher shares of foreign ownership and their ownership structure is less concentrated.

In non-EU transition countries changing firms have also higher capital-intensity measured using both replacement value of capital (Capital-Intensity) and new investments in physical capital (Capital investments per worker).

The levels of trust are observed to be lower for these firms in both country groups. This means that they are more often forced to prepay their inputs because of weak contract enforcement. Such lower quality of contract enforcement, perhaps, is one of the forces that drive their necessity to change boundaries. In the non-EU transition countries they, however, have to prepay lower share of their input purchases than their not-changing counterparts.

The firms that choose to change their firm boundaries are also bigger and older than their counterparts.

Table 3.6: Differences of firms that change their boundaries in EU and non-EU transition countries

| | European countries | | | | | | Non-European countries | | | | | |
| | Changing | | Not changing | | Difference | | Changing | | Not changing | | Difference | |
	mean	sd	mean	sd			mean	sd	mean	sd		
% of the total profits in 2003 invested in the firm in 2004	66.822	36.959	55.321	39.615	-11.50***		54.916	38.468	49.356	39.856	-5.560***	
Operating profits	1289.736	3421.341	586.174	2712.460	-703.6**		399.440	1449.994	307.160	1940.922	-92.28	
Operating profits (ln)	5.457	1.956	4.475	1.915	-0.982***		4.446	1.757	3.718	1.870	-0.728***	
Labour productivity	68.415	58.141	55.262	45.215	-13.15***		28.290	44.824	23.008	32.269	-5.282**	
Labour productivity (ln)	3.966	0.706	3.745	0.749	-0.221***		2.809	1.048	2.613	0.987	-0.196***	
Capital-Intensity	31.249	34.643	80.906	2091.901	49.66		14.896	40.185	10.239	21.864	-4.657*	
Capital-intensity	2.867	1.263	2.711	1.271	-0.156		1.691	1.411	1.513	1.304	-0.178*	
Capital investments per worker	2.274	3.070	1.768	4.392	-0.506*		1.166	2.785	0.765	1.864	-0.401**	
Capital-intensity as investments (ln)	0.187	1.316	0.037	1.240	-0.150		-0.620	1.377	-0.808	1.329	-0.188*	
Trust	0.486	0.501	0.625	0.484	0.140***		0.359	0.480	0.529	0.499	0.170***	
Prepayment levels	0.199	0.193	0.226	0.214	0.0265		0.434	0.310	0.492	0.330	0.0582***	
Size	195.076	675.383	86.475	368.297	-108.6**		173.770	542.153	93.600	293.874	-80.17***	
Size (ln)	3.537	1.867	2.723	1.684	-0.814***		3.696	1.637	3.027	1.611	-0.669***	
Age	18.372	20.728	16.450	16.940	-1.921		18.685	20.762	14.962	17.741	-3.723***	
Export	0.514	0.501	0.309	0.462	-0.205***		0.393	0.489	0.205	0.404	-0.188***	
Direct export (% of sales)	20.986	31.664	10.135	23.008	-10.85***		13.326	26.102	7.353	21.138	-5.973***	
Indirect export (% of sales)	3.565	12.961	1.259	7.673	-2.305**		2.244	10.272	1.141	8.190	-1.103**	
Import (dum)	0.705	0.457	0.526	0.499	-0.179***		0.688	0.464	0.515	0.500	-0.172***	
Direct import (% of sales)	21.882	31.144	13.924	28.396	-7.958***		22.332	34.895	16.726	32.554	-5.606***	
Indirect import (% of sales)	14.011	25.288	15.592	29.364	1.581		18.569	30.033	16.075	30.531	-2.494*	
% owned by private domestic company/organisation	74.683	42.112	83.312	35.600	8.628**		77.258	38.786	82.505	35.934	5.247***	
% owned by private foreign company/organisation	15.665	34.539	8.515	26.135	-7.151***		11.826	29.163	8.420	25.635	-3.406**	
% owned by government/state	7.838	26.397	7.141	25.156	-0.698		9.761	28.391	8.329	26.698	-1.433	
% of the firm owned by the largest shareholder(s)	72.549	29.144	76.944	28.888	4.395*		72.403	29.419	77.545	28.702	5.142***	
Observations	278		2427				805		805			

Note: $^{*}p < 0.10,$ $^{**}p < 0.05,$ $^{***}p < 0.01$

The discussed differences between the firms that decide to change their boundaries and their non-changing counterparts support the fourth hypothesis (H3.4) and highlight the importance of modelling the decision to change explicitly. It further may be considered as a first stage of choosing a particular firm boundary change.

In order to test if there is a selection mechanism into changing boundaries that condition

the decision to integrate the probit with Heckman selection model is used. The effect of the selection into change is tested (see Table C.3) basing on the specification equal to the one used for the choice of integration over non-integration. However, not significant ρ estimates show that the decision to change and the decision to integrate can be modelled separately. This test allows moving to the analysis of two-stage decision model, that consist of two separate equations. First equation explains the change of firm boundaries and second equation explains the choice of integration and integration with outsourcing over outsourcing.

3.4.4 Two-Stage Decision Model

In order to model two-stage decision making of firms regarding their boundaries and the organization of input sourcing, first model is focused on the choice to change the firm boundaries over not changing the boundaries (the first stage of a two-staged decision tree in the Figure 3.4).

The results in the Table 3.7 show that the propensity to change firm boundaries is positively correlated with the capital intensity of a firm, especially in non-EU transition countries. In the EU transition countries the connection is positive, though have lower significance with country and sector fixed effects.

The results also illustrate that trust is negatively associated with the propensity of firm to change its boundaries. This association is statistically significant for both of country groups and all the specifications. It indicates that the higher quality of contracting institution is stimulating the firms to search for optimal firm organization through boundaries' change much less than lower quality of contracting institution.

Labour productivity is positively connected with the change in firm boundaries, but it is significant only for the EU transition countries when the model without country and industry fixed effects is applied.

Therefore, the results show that both technological (capital-intensity) and institutional (trust) factors are significantly connected with the propensity of firms to change. The higher is the technological complexity of the production and the lower is the trust between firms (stimulated by low quality of contract enforcement) the more changes of the firm boundaries may be observed. On one side the higher technological complexity of production forces a firm to look for the optimization of its boundaries more often as the environment of the production process requires it. On the other side, more advanced contracting institutions allow such a firm to make the modifications of their input supply through the adjustments of both internal and external contracts without losing their efficiency. Thus, with efficient contract enforcement the firm is not constrained to change its boundaries in any way, which is not the case when the contract enforcement is weak and trust between firms is low.

Regarding the control variables, export status and firm size affect significantly the decision to change the firm boundaries.

In non-EU transition countries the link with the import competition pressure stays positive and significant, while the link with the elasticity of main market demand is negative and sig-

Table 3.7: The probit model of the decision to change the boundaries of a firm

	European countries			Non-European countries		
	Base	Productivity	Cntr*ActivityFE	Base	Productivity	Cntr*ActivityFE
Changing Boundaries						
Capital-intensity (normalized)	0.020**	0.012	0.013	0.034***	0.024***	0.022**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
Trust	-0.033*	-0.041**	-0.035*	-0.106***	-0.087***	-0.082***
	(0.018)	(0.018)	(0.018)	(0.019)	(0.020)	(0.020)
Labor productivity (normalized)	0.024*	0.015	0.014	0.001	0.015	0.019
	(0.013)	(0.014)	(0.015)	(0.011)	(0.013)	(0.014)
Control Variables						
Export	0.045**	0.035*	0.043**	0.099***	0.082***	0.077***
	(0.019)	(0.019)	(0.020)	(0.021)	(0.021)	(0.021)
Medium firms	0.019	0.013	0.008	0.078***	0.072***	0.062***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Large firms	0.102***	0.083***	0.075**	0.093***	0.097***	0.085**
	(0.030)	(0.030)	(0.030)	(0.034)	(0.034)	(0.034)
Firms listed on a stock exchange		0.076*	0.078*	0.016	0.050	0.042
		(0.041)	(0.041)	(0.070)	(0.068)	(0.068)
Moderate import competition pressure	-0.002	0.003	0.002	0.052**	0.031	0.031
	(0.024)	(0.023)	(0.023)	(0.025)	(0.025)	(0.025)
High import competition pressure	-0.013	0.003	0.008	0.119***	0.081***	0.080***
	(0.025)	(0.025)	(0.025)	(0.026)	(0.026)	(0.027)
Moderately elastic demand	0.007	-0.001	-0.002	-0.090***	-0.094***	-0.093***
	(0.025)	(0.025)	(0.025)	(0.028)	(0.028)	(0.028)
Highly elastic demand	0.008	0.001	-0.006	-0.060**	-0.048*	-0.048*
	(0.022)	(0.022)	(0.023)	(0.026)	(0.025)	(0.025)
Ownership structure	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes
Activity dummies	No	No	Yes	No	No	Yes
Likelihood	-491.28	-460.50	-456.13	-796.18	-747.10	-743.36
Pseudo-R2	0.045	0.104	0.113	0.081	0.137	0.142
p-value(Wald)	0.000	0.000	0.000	0.000	0.000	0.000
N	1359	1359	1359	1684	1684	1684

Note: $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$

The vector of control variables also included ownership concentration, the dummy variables for young firms, firms whose products has no substitutes as it cannot be imported, and not elastic demand.

nificant. This shows that in non-EU transition countries the competitive market environment significantly affects a firm's propensity to change its boundaries. In particular, a higher pressure of domestic competition is associated with firms opting more often for not-changing their boundaries, while pressure of foreign competition on the final market drives firms to opt for changing their boundaries.

In order to conclude the empirical modelling, the decision of the types of the boundary change is analyzed (the second stage of the two-staged decision tree in the Figure 3.4, conditional on the choice of changing the firm boundaries).

As the results in the Table 3.8 show, there is a positive link between the choice of integration over outsourcing and labour productivity. Such results support hypothesis H3.3. The connection is positive and significant only if no country and sector dummies are included. This may be caused by a significantly reduced sample size.

The results also show that there is a significant and negative connection between choosing integration over outsourcing as a firm boundary change. Moreover, positive link is observed between the trust measure and the propensity to choose integration over outsourcing. These results are opposite to the predictions of property-rights theory.[12]

Such results may be caused by the structural differences of the firms in analysed countries or the data limitations. Due to the data constraints it is not feasible to control for multiple characteristics of a particular activity that is integrated or outsourced. Nevertheless, the results underline that the firms with higher technological complexity (capital-intensity) tend to opt for outsourcing not integration as well as firms experiencing lower quality of contractual enforcement (trust between firms). This shows that the boundary decisions in transition countries should be receive more attention so that the reasons for such structural differences in the decision-making are understood.

The results, however, do not contradict directly the Antràs models as the theoretical framework applied in these models does not account for the possibility of choosing between changing and not changing the firm boundaries. The models include only the choice between a choice of a particular type of sourcing which define a firm boundary of a new-born firm. In practice the models assume a firm that decides between internal sourcing (integration) and external sourcing (non-integration or arm's length trade) for each of its input before it enters the market or on a continuous basis before starting to produce new products.

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[12]Another theoretical model, however, may shed more light on the positive connection between integration and higher trust between domestic sourcing firm and suppliers. The Conconi et al. (2012) model if adjusted for different degrees of contractibility may explain why managers of firms may choose to integrate more when the contracting institutions are better. By the assumptions of the model if different degrees of contractibility (due to higher or lower quality of contracting institutions) are possible the compensation of the HQ manager will grow with the quality of contracting institutions and, thus, it will be more prompt to integrate (no changes of prices assumed). However, such modification of the model has not been elaborated fully in the literature and is not the scope of this chapter.

Table 3.8: Multinomial logit model with three choices of firm boundaries' changes

Base outcome = **Outsourcing**	Base	Productivity	CounryFE	ActivityFE
Inetgration				
Capital-intensity (normalized)	-0.006	-0.046**	-0.058	-0.061**
	(0.017)	(0.021)	(0.170)	(0.027)
Trust	0.117***	0.132***	0.104	0.114*
	(0.045)	(0.048)	(0.206)	(0.059)
Labor productivity (normalized)		0.085***	0.024	0.009
		(0.028)	(0.192)	(0.042)
Control Variables				
Export	-0.028	-0.033	-0.006	-0.030
	(0.046)	(0.049)	(0.125)	(0.061)
Young firms	-0.116*	-0.112*	-0.166	-0.160*
	(0.063)	(0.068)	(0.292)	(0.082)
Firms listed on a stock exchange	-0.143	-0.142	-0.405	-0.431**
	(0.120)	(0.123)	(1.858)	(0.168)
High import competition pressure	0.123**	0.121*	0.063	0.026
	(0.061)	(0.065)	(0.126)	(0.083)
Not elastic demand	-0.106*	-0.122**	-0.067	-0.037
	(0.059)	(0.062)	(0.479)	(0.075)
Highly elastic demand	-0.098*	-0.116*	-0.109	-0.078
	(0.057)	(0.060)	(0.222)	(0.076)
Inetgration & Outsourcing				
Capital-intensity (normalized)	0.028**	0.041***	0.010	0.008**
	(0.012)	(0.013)	(0.534)	(0.003)
Trust	-0.041	-0.042	-0.013	-0.008
	(0.031)	(0.032)	(0.679)	(0.007)
Labor productivity (normalized)		-0.029	-0.009	-0.008
		(0.170)	(0.482)	(0.006)
Control Variables				
Young firms	0.042	0.028	0.007	0.009
	(0.040)	(0.042)	(0.387)	(0.009)
Firms listed on a stock exchange	-0.042	-0.110	-0.037	-0.028
	(0.096)	(0.116)	(2.037)	(0.021)
High import competition pressure	-0.058	-0.068*	-0.006	-0.008
	(0.038)	(0.039)	(0.323)	(0.010)
Not elastic demand	0.052	0.042	0.023	0.016*
	(0.039)	(0.040)	(1.232)	(0.009)
Highly elastic demand	0.032	0.018	0.003	-0.000
	(0.039)	(0.039)	(0.169)	(0.010)
Ownership structure	Yes	Yes	Yes	Yes
Country dummies	No	No	Yes	Yes
Sector dummies	No	No	No	Yes
Likelihood	-572.67	-499.24	-429.48	-414.10
Pseudo-R2	0.035	0.051	0.184	0.213
p-value(Wald)	0.119	0.015	0.000	0.000
N	589	525	525	525

Note: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

The set of control variables includes also the export-status, size dummies, finance obstacle measure, controls for moderate import competitive pressure and moderately elastic demand.

The table shows that firms rarely change the firm boundaries in order to adjust the organization of their input sourcing that means that the boundaries of a firm is rarely changed in transition countries. Such a feature of the boundary decision-making require much more attention from both theoretical and empirical point of view as the firms that change their boundaries are also found to be better performing firms. Consequently, the rigidity of firm boundaries is highly important to take into account especially in (but not limited to) transition countries.

The results on two subsamples (Table 3.9) show that capital-intensity keeps to be connected negatively and significantly in the subsample of the EU transition countries. The trust is

positively and significantly connected with the choice of integration versus outsourcing in the non-EU transition countries. The labour productivity is (positively and significantly) connected with the integration decision in the non-EU transition countries. These results appear not to be robust to the different specification. It demonstrates that the model efficiency is limited by the small sample of firms in each of the country groups. Dividing in the sample into two groups the sample size shrinks, especially for the EU group. Thus, considering the complexity of the empirical models, the robustness of the results is decreasing, especially when country and activity dummies are introduced. However, the results indicate, that while in EU group the capital intensity has a more significant role; in the non-EU group the weakness of contracting institutions (lower trust) has a stronger role.

Results regarding the choice of doing both integration and outsourcing should also be mentioned. These results show that firms that choose a joint strategy of both integrating and outsourcing are more capital-intensive, especially in EU transition countries. It indicates that the boundary decisions should be analysed at more disaggregated level, such as level of transactions or tasks. However, since little of such disaggregated data is available for the research purposes, and even less for transition countries, for the empirical analysis of boundary decisions at the firm-level the multiplicity of combinations of boundaries' change should be taken into account both in empirical and theoretical studies.

Table 3.9: Multinomial logit model of the type of the change of firm boundaries in two country groups

	European countries				Non-European countries			
	Base	Productivity	CounryFE	ActivityFE	Base	Productivity	CounryFE	ActivityFE
Base Outcome = **Outsourcing**								
Integration								
Capital-intensity (normalized)	**-0.066****	**-0.097****	**-0.108****	-0.063	0.021	-0.021	-0.041	-0.046
	(0.034)	(0.039)	(0.046)	(0.050)	(0.022)	(0.025)	(0.185)	(0.034)
Trust	0.026	0.065	0.118	0.103	**0.157*****	**0.154****	0.117	0.120
	(0.084)	(0.091)	(0.102)	(0.119)	(0.056)	(0.062)	(0.504)	(0.075)
Labor productivity (normalized)		0.029	0.068	-0.012		**0.099*****	0.018	0.011
		(0.064)	(0.080)	(0.095)		(0.035)	(0.129)	(0.049)
Control Variables								
Medium firms	-0.079	-0.142	-0.136	**-0.304****	0.009	0.054	0.053	0.041
	(0.105)	(0.113)	(0.127)	(0.137)	(0.063)	(0.070)	(0.358)	(0.082)
Large firms	-0.160	-0.208	-0.249	**-0.418****	0.082	0.070	0.000	-0.002
	(0.132)	(0.141)	(0.168)	(0.208)	(0.091)	(0.099)	(0.125)	(0.125)
Young firms	-0.157	-0.166	-0.228	-0.266	-0.120	-0.127	-0.164	**-0.181***
	(0.124)	(0.129)	(0.167)	(0.207)	(0.078)	(0.089)	(0.741)	(0.098)
Firms listed on a stock exchange	**-0.509***	**-0.553***	**-0.714****	**-0.702*****	0.057	**0.400****	-0.226	-0.274
	(0.269)	(0.296)	(0.320)	(0.259)	(0.166)	(0.173)	(8.133)	(0.251)
High import competition pressure	0.125	0.184	0.027	-0.232	**0.135***	0.107	0.090	0.081
	(0.109)	(0.119)	(0.148)	(0.176)	(0.077)	(0.085)	(0.387)	(0.099)
Similar products can not be imported	-0.340	-0.356	-0.585	**-0.566***	**0.706*****	**0.611*****	0.153	0.203
	(0.270)	(0.267)	(0.372)	(0.317)	(0.185)	(0.199)	(8.188)	(0.226)
Not elastic demand	-0.091	-0.161	**-0.336***	-0.010	-0.106	-0.118	-0.052	-0.039
	(0.140)	(0.153)	(0.203)	(0.243)	(0.069)	(0.072)	(0.233)	(0.083)
Moderately elastic demand	-0.154	**-0.252***	-0.149	-0.011	0.011	-0.077	-0.023	-0.025
	(0.119)	(0.130)	(0.142)	(0.170)	(0.079)	(0.093)	(0.217)	(0.109)
Outsourcing & Integration								
Capital-intensity (normalized)	**0.052****	**0.061****	0.042	**0.016****	0.018	**0.019***	0.002	0.001
	(0.021)	(0.024)	(0.026)	(0.007)	(0.012)	(0.010)	(0.259)	(0.001)
Trust	-0.062	-0.089	**-0.104****	**-0.027***	-0.031	-0.008	0.000	0.000
	(0.055)	(0.055)	(0.053)	(0.016)	(0.030)	(0.024)	(0.031)	(0.002)
Labor productivity (normalized)		-0.009	-0.015	-0.012		-0.013	-0.002	-0.002
		(0.037)	(0.035)	(0.010)		(0.011)	(0.255)	(0.001)
Control Variables								
Finance obstacles	0.065	0.079	**0.091***	0.018	-0.002	-0.009	-0.002	-0.002
	(0.060)	(0.058)	(0.055)	(0.014)	(0.029)	(0.023)	(0.313)	(0.002)
Firms listed on a stock exchange	0.025	0.038	0.030	-0.023	-0.031	**-0.886*****	-0.108	**-0.076*****
	(0.124)	(0.111)	(0.132)	(0.022)	(0.113)	(0.142)	(17.694)	(0.015)
Similar products can not be imported	0.029	0.076	0.111	0.001	**-1.264*****	**-0.937*****	-0.116	**-0.082*****
	(0.156)	(0.138)	(0.145)	(0.030)	(0.170)	(0.145)	(18.556)	(0.014)
Not elastic demand	**0.239*****	**0.235*****	**0.333*****	**0.089*****	0.009	0.000	0.001	0.001
	(0.086)	(0.085)	(0.096)	(0.029)	(0.035)	(0.028)	(0.119)	(0.002)
Ownership structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	Yes	Yes	No	No	Yes	Yes
Sector dummies	No	No	No	Yes	No	No	No	Yes
Likelihood	-169.19	-149.49	-126.19	-107.77	-385.12	-329.37	-284.54	-278.91
Pseudo-R2	0.103	0.138	0.272	0.378	0.048	0.066	0.193	0.209
p-value(Wald)	0.095	0.038	0.000	0.000	0.000	0.000	0.000	0.000
N	184	171	171	171	405	354	354	354

Note: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

The set of control variables includes also the export-status, size and age dummies, finance obstacle measure, controls for moderate import competitive pressure and moderately elastic demand.

To conclude, the differences between firms that choose integration over outsourcing are evaluated (Table C.4). The results illustrate that firms that chooses integration over outsourcing are over-performing their counterparts that chooses outsourcing both in terms of profits (and profit reinvestment) and labour productivity in the non-EU transition countries.

3.5 Conclusions

Multiple theoretical studies try to model macroeconomic predictions basing on the theoretical modelling of production function, however, most of these studies tend to treat the production process as a black box. In practice, the production is determined by how and what

kind of organization decisions are made by firms.

In this chapter the links between the decisions to redefine firm boundaries and technological and institutional determinants are uncovered. Such decisions are one of the key decisions that define firm organization, and are particularly relevant for the changes of industrial structure in transition countries. This chapter highlights, however, that there are significant differences between transition countries within and outside of the European Union.

By using a single-stage empirical model I analyse the choice of integration over non-integration as a way to redefine the boundaries of a firm in 23 transition countries. I find that institutional and technological factors play a role in taking integration decisions of firms in transition countries. In particular, a higher technological complexity (capital-intensity) is positively connected with a higher probability of choosing integration as a way to redefine firm boundaries. On the contrary, weakness of contracting institutions, acting through the low trust between firms, increases the probability of firms to opt for integration in redefining their boundaries. Such results are in line with the prediction of the property-rights approach and, in particular, Antràs and Helpman (2008) model. They are also in line with previous empirical studies on more advanced countries (Nunn and Trefler, 2008; Antràs, 2003). The results underline that there is no differences between advanced and transition countries in terms of the existence of two counteractive forces, namely technology complexity and contracting institutions. However, the results show that the intensity of the connection is slightly different between EU and non-EU transition countries. Such results underline that the degree of the influence of both technological and institutional determinants may be different depending on the advancement of the economy.

The chapter also highlights a positive connection between firm productivity and the decision to integrate, supporting previous evidence (Kohler and Smolka, 2011) and Antràs and Helpman (2008) model. However, this connection is mostly observed in EU transition countries. The connection for non-EU transition countries is too weak to be considered significant. This highlights the difference of the structural connection between productivity and integration decisions in less advanced countries like non-EU transition countries. Such results call for collection of specific data and for further investigation of the link between productivity and integration in less developed countries.

Furthermore, by using the two-stage empirical model I analyse all possibilities of firms with respect to the redefinition of firm boundaries. I find that the possibility of a firm not to change its boundaries is an important option of firms that should be considered carefully. the results show that although the firms that decide to redefine their boundaries are over-performing those who do not in terms of multiple performance outcomes, they represent a small share of the sample in transition countries. Firms that decide to redefine their boundaries are over-performing their unchanging counterparts even more in EU transition countries, but are even less numerous. Such differences highlight that firms are different both within the same country group and between country groups. The results also suggest that the forces defining the rigidity of firm boundaries in transition countries should be considered when analysing firm boundaries.

This chapter shows that technological complexity and the quality of contracting institutions are affecting all types of the redefinition of firm boundaries, suggesting that these two forces (technological and institutional) trigger the search of the boundary optimization strategy in transition countries. Such results are important from both theoretical and empirical perspectives.

From a theoretical perspective, the results call for the development of dynamic theoretical models that could account for the possibility of firms to choose between keeping their firm boundaries unchanged and redefining them. Such theoretical models would allow explaining the dynamics of changes in industrial organization in different groups of countries and its consequences in terms of the dynamics of intra-firm trade. Such models would also help explaining why in some countries, like transition countries, firm boundaries continue to be highly rigid even if their changes may bring significant benefits. Finding the reasons for the absence of efficiency increasing change in these countries would help to elaborate adequate policies to foster further economic growth in these countries. As the results show, the technological complexity and weakness of contracting institutions could be in the list of the major factors defining such dynamics, but may be not exhaustive.

From an empirical perspective, the results call for more data being gathered in transition countries focusing on the firms that decide to redefine their boundaries. While the data do not allow a detailed analysis of the choice of integration over outsourcing as a way of redefinition of firm boundaries, more data on the firm-level decisions on this topic would allow researchers to evaluate the drivers that causes firms to redefine their boundaries through either integration or outsourcing, or both. Such empirical studies would uncover the dynamics of the development of firm organization in a group of countries, where the industrial structure has changed greatly in the last two decades, but has been almost totally unexplored.

Chapter 4

INTERNAL ORGANIZATION. THE EFFECT OF INTERNATIONAL TRADE LIBERALIZATION

4.1 Introduction

Globalization has been particularly pronounced in the recent decades, especially in terms of massive inclusion of different countries in international trade (IMF, 2016; Soubbotina et al., 2004). The studies evaluating effects of international trade on national and world economy have been manifold (Melitz and Redding, 2014; Antràs, 2014; Melitz and Trefler, 2012; Harrison and Rodríguez-Clare, 2009). However, the mainstream economic models of international trade rarely account for firm-level organizational adjustments to the changes in economic environment. This happens in spite of the capability of such adjustments either to restrain or to magnify the effects of increasing international trade (Garicano and Rossi-Hansberg, 2015).

Such a capability is connected with the link between a firm organization and its productivity. The positive effect of the international trade liberalization on productivity is often argued to occur through the productivity reallocation or selection mechanism (more productive firms survive, while less productive firms leave the market) (Melitz, 2003). However, the effect of trade on the growth of productivity within a single firm is rarely considered. In order to understand whether and how firm productivity is affected by the international trade liberalization, it is essential to understand what intra-firm changes are caused by the international trade liberalization. An example of such intra-firm changes is the change of firm hierarchies (Wulf, 2012).

Firm hierarchies are evidenced to become flatter in advanced countries. This has been widely discussed in business press, but has attracted far less the attention of academics. There is only a small number of academic papers that focus on the changes in firm hierarchies, which has started to grow only recently. Existing studies document that the depth of hierarchies (number of organizational levels) is remarkably diminishing, while their width (the span of top managers' control) grows (Wulf, 2012; Rajan and Wulf, 2006). Such a trend shows that firm flattening has been significant in recent decades in advanced countries. However, little is known about the implications and the drivers of flattening. Even less is known about flattening and its drivers for emerging and transition economies.

A classic example of flattening may be represented by the elimination of the position of the

chairman of the General Electrics that previously connected the top manager with the heads of business units (Rajan and Wulf, 2006). By the elimination of this position the top manager simultaneously decrease his organizational distance and increase the number of positions who report directly to him/her. This example illustrates a well-recognized fact that flattening is associated with the trade-off between the depth of a hierarchy (number of organizational layers) and its width (number of direct subordinates). However, there are multiple factors that may affect this trade-off. Such factors have been little explored in the literature.[1]

In the literature, flattening used to be often associated with the empowering of middle and lower management and pushing more decision-making down the organizational structure (Aghion et al., 2014). However, while empowering is one of the features of organizational decentralization, it is not straightforward whether flattening may be unambiguously associated with "decentralization". The nature of flattening is such that the top manager of a firm is getting connected further downward in the organization hierarchy, and is getting directly involved in decision making across a higher number of organization units. Considering the nature of the flattening process, flattening may be much more associated with centralization and higher control than it used to be assumed. Moreover, the emergence of highly restrictive control structures has also been documented within the firms that have flattened their organizational hierarchy (Teubner, 2001).

This chapter discuss the organizational changes that are often ignored in the mainstream international trade literature, in particular flattening. The two main questions addressed in this chapter are: i) What drives the flattening decisions? and ii) Are flatter structures associated with a higher degree of control or more empowerment? With respect to the first question, we are interested in whether the increase of import competition due to higher trade liberalization forces more flattening in transition countries. With respect to the second question, this chapter investigates whether the flattening has delivered on its promise to push more decisions downward. In particular, we propose the measure of the degree of control in a firm and analyse its connection with prevalence of flatter organizations.

Both of the two questions are very important for transition countries. On the one side, the trade-off between the organizational depth and width (flattening) has not been fully measured and assessed after the intense period of organizational restructuring in these countries. Trends are measured and documented for advanced countries (Rajan and Wulf, 2006; Wulf, 2012), but close to nothing is known for transition countries. On the other side, even less is known on the causes behind these trends for transition countries.

Transition countries experienced both organizational changes and increasing openness to international trade. They went through a massive privatization, WTO accession or negotiations that bounded them to open their markets. Thus, transition countries may serve as good candidates for testing how much and how far increasing product competition resulting from

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[1]It is often assumed that the result of this trade-off depends on the interplay between the cost of supervising and the cost of information spreading. Any force that lowers the cost of supervising is assumed to enlarge the optimal span of control. At the same time, anything that lowers the cost of acquiring and spreading the information would imply higher number of organizational layers as the marginal cost of adding another layer becomes lower. However, this idea has been rarely tested

trade liberalization has impacted organizational design through flattening.

By using a unique dataset (MOI) of firm organization in 10 transition countries, we find that increasing international competition leads firms to become flatter. In particular, they decrease the number of organizational levels (depth of hierarchies), thus, reducing organizational distance between top manager and production employees. The data structure does not allow us to identify also the connection with the changes in the span of control, the second feature associated with flattening. Nevertheless, to the best of our knowledge, this is the first study of flattening in a different from advanced countries' set-up.

Moreover, the results show that firms in transition countries differ in terms of their internal organization both between and within countries. Only around 9% of firms eliminated the organizational levels in 2007-2009. This is consistent with the prevailing notion of flattening. However, a big share of firms did not change their internal organization, regardless the changes in economic environment. This illustrates a high degree of inertia of organization in transition countries in these years.

Furthermore, the results underline that flattening may be associated with higher degree of control of the top managers. Such a finding supports the arguments expressed in Wulf (2012), Rajan and Wulf (2006) and Teubner (2001) emphasizing that it is inaccurate to equal flattening and decentralization. In fact, flattening can show features of both empowering (decentralization) and increasing control (centralization).

The remainder of the chapter is organized as follows. Section 4.2 discusses related literature including both property-rights and knowledge-based perspectives. Section 4.4 presents the data used for the analysis and Section 4.5 describe the empirical strategy. Section 4.6 presents and discusses the results of the analysis. The chapter ends by concluding remarks in Section 4.7.

4.2 Related Literature

The topic of internal organization of firms has received growing attention from business and organizational studies in the last decade. However, special attention has been paid to hierarchical structures and the allocation of decision-making authority (i.e. centralization or decentralization).[2] Although a large share of the theoretical literature has been focused on the authority allocation, the empirical literature has been evidencing rapid changes of the internal organizational structure of firms in developed countries (Rajan and Wulf, 2006).[3] Rajan and Wulf (2006), Wulf (2012) and Caliendo et al. (2015) have shown that firms have been actively adjusting the number of management layers in their organization.

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[2]Multiple studies have been documenting the increase in decentralization in developed countries. In particular, Bloom et al. (2012) showed that firms has been decentralizing in recent decades. Technology, institutions and other factors have been proposed as possible factors affecting decentralization. Caroli and Van Reenen (2001) and Bresnahan et al. (2002) have pointed out a positive correlations between decentralization and both human capital and information technology. Bloom et al. (2012) have examined the importance of culture, finding that a higher level of trust in the region where a plant is located is associated with a significantly greater degree of decentralization. On the other hand, much less is known about the causes of decentralization and changes of internal organization of firms in transition countries.

[3]On average firms were observed to flatten in 1986-1998 and 2002-2007

Unlike authority allocation, the drivers of flattening and changes in firm organizational structures have received much less of attention. From a theoretical point of view, changes in firm organizational structures have been associated with either the results of bargaining or the distribution of knowledge between the agents of a firm. From an empirical point of view, the pressure from product market competition has been proposed as a driver of the flattening process. In particular, Guadalupe and Wulf (2010) argued that trade liberalization has affected the process of firm internal reorganization to a large extent. They empirically show that Canadian-US Free Trade Agreement (FTA) in 1989 implied an exogenous increase in competition for US firms in the industries where tariffs were removed. Exploiting this policy experiment they found that competition is associated with flattening that is likely to be related with increased delegation. However, the link between flattening and higher delegation has yet to be clarified.

Although no model dealt directly with the connection between product market competition and flattening, several theoretical models have been developed for understanding the internal organization of firms. Some aspects of these models may be helpful to explaining the process of flattening; however, much more theoretical work is still needed. Two frameworks can be identified among existing models dealing with internal organization from different aspects. The most extended body of the theoretical work dedicated to the internal organization is based on property rights/incomplete contracts theory. However, these models do not treat flattening. We are going to discuss some of these models because several notions covered in this body of the literature may be useful for our empirical analysis. The second body of literature we are going to discuss includes theoretical models of knowledge-based hierarchies. This body of the literature considers changes of the firms' organizational structures such as flattening, although paying little attention to the import competition.

4.2.1 Theoretical Models Based on the Property-Rights Perspective

The studies of Grossman and Hart (1986) and Hart and Moore (1990) gave rise to the property rights theory of firm dedicated to both its boundary (see Chapter 2 and Chapter 3) and its internal organization.

Among the first models focused on the internal organization of firms, Aghion and Tirole (1997) proposed the ideas of real and formal authority within the organization of a firm. Their model (denoted as AT model) illustrates the trade-off between top manager *loss of control* and middle manager *initiative* effect. The results of such a trade-off are driven by the effort to acquire information of either top or middle managers. Moreover, the model introduces the connection between the span of the top manager control real authority in a firm. The increase in the span of control is assumed to decrease the possibility of the top manager to pay enough attention to each of her subordinates, thus limiting her control. Another feature that is thought to limit top manager's control is the urgency of decision making. Urgency is considered to constraint manager's time and control, increasing the initiative of middle managers. The model, however, does not consider changes in the depth of control and their connection with

changes of the span of control, a link that describe flattening. Thus, while urgency is proposed to cause changes in internal firm organization, no clear predictions can be made with respect to flattening.

A theoretical notion that may be potentially useful for the analysis of product market competition has been described in the very close to AT model of Acemoglu et al. (2007). In this model the owner of a firm (top manager) can learn about the possible outcomes of her decisions either from the experience of similar firms on the market or by relying on the superior information of middle-managers. In particular, the more difficult it is to learn from the production decisions of other firms in the sector, the more the top manager will rely on the knowledge of its subordinates. In sum, the the model illustrates that the changes in the composition of firms on the product market, or their higher heterogeneity, might affect firm internal organization. However, the problem of product market changes is considered separately from the problem of changes in both span and depth of control.

Even if useful for the understanding some notions on the potential drivers of firm internal reorganization, described models mostly focus on the distribution of authority within a firm. None of above-mentioned models explicitly explain the changes in both span and depth of control. The first model based on the property-rights approach that illustrate the differences between hierarchies with various span and depth of control is developed in the Rajan and Zingales (1998) study.

Rajan and Zingales (1998) introduced the notion of *access* as complementary to ownership. The *access* is described as a relationship-specific investment of middle managers' human capital in specific activities of a firm. From one point of view, middle managers' specialization reduces their outside option. From another point of view, the *access* gives them more power and the opportunity for expropriation of firm critical resources, such as ideas or clients. This gives rise to the competition against the entrepreneur (or top manager/CEO).

By further developing the idea of access, Rajan and Zingales (2001) describe two types of hierarchies, namely vertical and horizontal, that may be formed for production of goods and services. The vertical structure is characterized by the high organizational distance between the head of the hierarchy (CEO) and numerous levels of managers. The horizontal structure is, *vice versa*, characterized by flatter structure and numerous managers at the level right below the head of the hierarchy. The Rajan and Zingales (2001) study does not focus on the change from vertical to horizontal hierarchies as such and does not focus on the drivers of this change. However, the answers on what can drive such a change may lie in the forces that magnify the problems of vertical hierarchies.

In the vertical hierarchy the main incentive problem lies in the possibility of expropriation by middle managers. Middle managers have direct power over their subordinates, with whom they can form coalition and start a rival spin-off. In the horizontal hierarchy this problem is resolved by the reporting of multiple subordinates directly to the head of the hierarchy (top manager). In this case the risk of expropriation is significantly lower as middle managers have fewer subordinates with whom they can form a coalition. The study further makes the conclusion,

that a higher incidence of horizontal structures is associated with a higher expropriability. In the
tradition of property rights theory, higher expropriability is further connected with the type of
production (physical-capital-intensive or human-capital-intensive) and the strength of property-
rights enforcement. In particular, horizontal hierarchies are assumed to be predominant in the
human-capital-intensive industries and countries with weaker property-rights enforcement, as
critical resources are harder to protect there. However, while it takes a long time to change
the property-rights enforcement to cause a switch from vertical to horizontal hierarchies, other
forces may affect the necessity to protect firm critical resources. For instance, the increase of
the product market competition might increase the value of the critical resource, or the cost of
it being expropriated, and force firms to opt for the horizontal hierarchies.

4.2.2 Knowledge-Based Hierarchies

Property-rights models, discussed previously, aim at the analysis of the bargaining process
within firms and its effect on resulting internal organization. However, they examine organi-
zation in isolation from the market, rarely taking into consideration the interaction between
organization and the economy. Neither of these models incorporates changes of economic en-
vironment, like trade liberalization, nor productivity heterogeneity of firms. Moreover, none of
the mentioned studies has allowed for the analysis of macroeconomic gains of such transforma-
tions as firms' flattening.

The theories on knowledge-based hierarchies developed in a great degree by Garicano,
Caliendo and Rossi-Hansberg give the first attempts to incorporate internal firm organiza-
tion into mainstream economics frameworks. The approach to model internal organization is
different from property-rights approach: no conflict or bargaining within a firm is assumed,
rather firm managers optimize their time with regards to the amount of problems they have
to resolve and their knowledge. The knowledge an individual possesses can be used in order
to solve limited amount of problems. In order to optimize the use of knowledge in a restricted
time, individuals closer to production process focus on routine tasks, while the complexity of
non-routine tasks increase with the organizational distance from production employees. The
aim of the organization then becomes the definition of the distribution of knowledge, organi-
zation of communication between the individuals, the number and type of workers required to
minimize the cost of producing a certain amount of output. In other words, the problem for
the internal organization becomes the efficient use of knowledge.

Garicano (2000) study proposes the basic production technology of knowledge-based hier-
archies. The study introduces the organization of a single firm that has potentially multiple
layers of management and define the optimal number of layers and managers on each of this
level in order to use the knowledge efficiently. As the distribution of knowledge is connected
with the level of information and communication technology (ICT), this approach predicts
flattening (increase of hierarchical layers) when acquiring knowledge (communication) is be-
coming cheaper. The model proposed by Caliendo and Rossi-Hansberg (2012) goes further
and incorporates the Garicano (2000) approach in a standard international trade model with

heterogeneous firms based on Melitz (2003). It is focused on the gains from international trade liberalization due to heterogeneous demand changes when firms start to export. Although the model gives the first link between trade liberalization and changes in internal firm organization (depth of hierarchies), it considers trade liberalization only from the perspective of exports, no effects of import increase is introduced.

Some insight on the possible connection between increase in import competition due to trade liberalization may be drawn from Patacconi (2009) model. He proposes that increasing importance of fast execution and urgent decision-making of firms facing high import competition may explain the tendency of such firms towards flatter organizational structures. In particular, he argues that when the competitive time pressure grows the role of coordination increases and firms tend to minimize duplication of tasks, thus, moving towards flatter and broader organizations.

The theories on knowledge-based hierarchies has contributed largely not only to the understanding of the drivers of firm internal reorganization, but also to the understanding of its economic impacts. In particular, it is shown that changes of layers affect the distribution of wages in firms (Garicano and Rossi-Hansberg, 2004, 2006). The evidence suggests that international trade causes job polarization (Keller and Utar, 2016; Autor et al., 2014). In particular, the biggest gains from the changes in the wage distribution were grasped by the bottom and top percentiles of workers. In other words, these changes must have affected workers in the middle of the skill (or knowledge) distribution negatively, whereas it should have affected other workers positively. Nonetheless, little is known about the mechanisms behind such a causal link. It is proposed that accounting for internal organization allows explaining why globalization has led to higher wage inequality, or job polarization, in less advanced countries (Feenstra and Hanson, 1997; Goldberg and Pavcnik, 2007). In particular, several recent studies propose that this causal link is driven by organizational adjustments of firm organizational hierarchies (Garicano and Rossi-Hansberg, 2015; Friedrich et al., 2015). As with the increase of international trade, firms are argued to eliminate the middle organizational layers (Guadalupe and Wulf, 2010) that consist of middle-skill and mid-wage jobs, international trade liberalization may cause lower employment possibilities for mid-wage jobs through flattening. Thus, it is highly important to incorporate the hierarchies and internal firm organization in more general framework, allowing the analysis of the effects of international trade liberalization to be done more accurately.

Summing up, the knowledge-based approach has allowed both the evaluation of the effect of changes in the economic environment on the width and the depth of firm hierarchies, and the effect of hierarchical changes on the distribution of gains from trade. However, the analysis of the effects of other than ICT changes in economic environment is still to be fully developed. Although trade liberalization and increase in urgency (Patacconi, 2009) have been introduced in these models, trade liberalization has been associated exclusively with the increase in export opportunities, while possible effects of import pressure have been mainly overlooked. The connection between the increase in urgency and flattening has not been associated with particular economic environment changes, like increase in import pressure.

4.2.3 Flattening, Centralization and Decentralization

While the drivers of flattening have been rarely discussed in the theoretical literature, flattening has often been associated with decentralization.

As it has been previously underlined, the property-rights perspective mostly considers the changes of internal firm organization through the lenses of the changes in distribution of authority, in particular through centralization or decentralization. Traditionally the decentralization has been associated with the increase in the span of control (Aghion and Tirole, 1997). Top managers were expected to decrease the time they can spend controlling each of their subordinates when the number of subordinates increase. Thus, subordinates could enjoy higher degree of autonomy in making decisions, higher decentralization. Traditional perspective has been persistent among the theoretical studies, within both knowledge-based (Patacconi, 2009) and property-rights perspective (Aghion et al., 2014; Marin and Verdier, 2012), and empirical studies (Bloom et al., 2010; Marin and Verdier, 2014). However, some recent studies, including this thesis, suggest that flattening may be rather associated with centralization.

The studies of Wulf (2012) and Rajan and Wulf (2006) highlight that flattening may have features of both centralization and decentralization. They argue that flatter structures may in reality mean higher control of the top management and, thus, it may not be considered as an unambiguous and full equivalent of decentralization. Often the decrease of the organizational distance between top management and production workers, hierarchy flattening, allows CEOs to have more direct contacts with the employees and faster decision-making (Wulf, 2012). In particular, by analysing the use of top managers' time Wulf (2012) shows that firms with flatter organization and larger span tend to spend more time in meeting with their subordinates, rather than being alone. Contrary to the predictions of Aghion and Tirole (1997), this indicates that top managers of flatter organizations are more, rather than less, involved in the firm operations. Such findings show centralizing features of the flattening process.

Moreover, some indirect evidence exists that flattening is associated with strengthening other control features. Hannan et al. (2010) study suggests that flattening (modelled as increasing span of control) improves the effectiveness of the budgeting process, an important component of most firms' control environment.

As a result, although flattening has been documented and some attempts were taken to theoretically explain it, the traditional link between flattening and decentralization has been recently questioned.

4.3 Bringing Theory to Data

The two theoretical approaches, namely property-rights theory and the theory of knowledge-based hierarchies, can have different predictions with respect to some phenomena; for instance the development of information technology and the decrease of its costs. However, it is important to understand the differences in theoretical predictions as regards the effects of trade liberalization on firm internal organization.

First, it is important to differentiate between the effects of trade liberalization through import and the ones through export. While the property-rights approach focuses on the modelling of interactions between agents of the same firm, it says little if nothing with respect to the connection of internal organization with international trade, either import or export. On the contrary, the approach of knowledge-based hierarchies incorporates international trade in the model that predicts changes of the number of managerial layers. However, only the effect of export is incorporated. The impact of import penetration and the consequent increase in competition pressure has not been included in the models of this approach explicitly.

Second, with respect to the effects of import, some aspects described in theory may be useful, in particular the concept of the decision-making urgency. The increase in the import competitive pressure may increase the urgency of decisions-making. Both, property-rights and knowledge based, approaches highlight the importance of urgency for the internal organization of a firm. Although the mechanisms and affected features considered in two approaches are different. While property-rights approach focus on the time constraints of the top manager and their influence on the top manager's control, the literature on knowledge-based hierarchies show that with the increase in urgency the coordination within the firm becomes so important to make the organizational hierarchy flatter. This is possible only if the interests of managers within the organization are aligned. However, such an alignment of interests is hardly possible in countries where the levels of trust are on average considerably low.

The property-rights perspective is based on the presence of incentive conflict between the top managers (owners) and their subordinates. In particular, when the actions of the similar firms on the product market are less observable, which is the case when more foreign competitors enter the market, it is expected that a firm top manager depends more on the knowledge of her subordinates. Loosing the control over the situation and depending on the behavior of the subordinates, a fear of subordinates misbehaviour may be born. This is the case especially in countries where the level of trust is low and property-rights are less enforceable. Due to the theory, top managers may opt for a flatter hierarchy if they expect that the critical resource can be expropriated. More so if the cost of loosing the critical resource increase significantly, like in the case of high competition. For instance, when the competition increases the loss of a share of firm clients (being taken away by a subordinate spin-off) may result in bankruptcy for a firm. Thus, in this chapter we test the following hypothesis.

H 4.1 *When a firm faces an increase in the competitive pressure due to higher import penetration on its product market, it reacts through the adjustment of its internal organization. In particular, it eliminates managerial layers between the top manager and production employees, in other words it flattens.*

With respect to the connection between flattening and centralization, Wulf (2012) empirically shows that the managers of flattening organizations tend to be more involved in the firm decision-making. This demonstrate that flattening may have features of centralization. In order to analyse the involvement of the top manager in the activities of a firm, a relevant factor is the share of firm non-production workers that respond directly to the top manager. A higher

absolute number of subordinates directly responding to the top manager (the span of control) used to be associated with higher initiative or decentralization in Aghion and Tirole (1997) model. However, Wulf (2012) shows that with the increase in the span of control the involvement, and associated control, of the top manager in the activities of the firm does not decrease, but rather increase. Moreover, the top manager involvement takes a different form. Managers start to use their time more efficiently, participating more in the multilateral meetings. Thus, in this chapter we provide preliminary evidence to support the following hypothesis.

H 4.2 *The decrease in the depth of control (number of organizational layers) is positively associated with a higher control of the top manager, and in particular with a higher share of directly reporting employees.*

4.4 Measuring Internal Organization and Trade Liberalization

4.4.1 Data

The sample is based on the EBRD-World Bank Management, Organisation and Innovation (MOI) survey. The MOI survey covers 10 transition countries (Belarus, Bulgaria, Kazakhstan, Lithuania, Poland, Romania, Russia, Serbia, Ukraine and Uzbekistan) and two baseline countries (Germany and India). The primary dataset is a cross-section of more than 1800 manufacturing firms. The survey was implemented in October 2008 - November 2009 in most of the countries with the interviews in the Far East region of Russia organized in February 2010 - April 2010.

In order to allow better comparability of organizational structures and avoid the ambiguities of data for multi-establishment firms the focus is on single-establishment firms. New firms, aged less than three years, are also eliminated. As the result the data used for the analysis consists of the sample of 1059 firms in transition countries and 1218 firms in the sample that includes Germany and India. For the regression analysis we use only the sample of transition countries (not including Germany and India).

Most of the interviews in the transition countries took place in October-November 2008 (around 60%), around 30% of interviews took place in January-March 2009. The interviews of Russian firms in the Far East region (February-April 2010) represent around 6% of the sample of transition countries.

The size of firms in the revised sample varies between 8 and 4800 employees, with 95% of firms being between 8 and 800 employees, with the average size being different across countries of the sample (see Table D.1)

The survey also included the direct questions on what is the main market of the firm in the last year, in particular whether it is local, national or international market. In this way, domestic firms (both local and national) may be distinguished from exporters (see Table D.2).

4.4.2 Organizational Structure

The dataset is rather unique as it allows us to analyse internal structure of firms in a group of countries, for which the data is rarely available. In particular, the dataset includes information on two main features of firm flattening: the reporting relationships within firms (span of control) and the organizational distance (depth of control) from both the national headquarters' top manager (further HQ top manager or HQTM) and factory managers FM to a typical production employee. Moreover, not only it gives us the view on the static picture of firm organization in different transition countries, but it also includes the information on the dynamic change of the organizational distance in three years previous to the interviews.

Span of control. The information on reporting relationships includes information on the number of workers directly reporting to either HQ top manager or FM. The measure of directly reporting employees is also known as the span of control or breadth of hierarchy and reflects the horizontal dimension of the hierarchy. As argued by Guadalupe and Wulf (2010) this information reflects two main features of firm organization. First, it shows over how many employees either HQTM or FM has direct authority. Second, higher number of subordinates directly reporting to, for example, HQ top manager means that the information is exchanged more directly than it would be if intermediary positions would exist. Such information is available for almost all firms in the sample, with no information for less than 4% of the sample. The span of control of the HQ top manager varies between 1 and 300 people, with the average (mean) span between 4 and 33 depending on the country (see Table D.3). The span of control of the FM varies between 1 and 800 people, with average between 5 and 60 (see Table D.4).

The dataset also provides us with additional information on internal firm organization, which, to the best of our knowledge, was not available in previous studies on the topic. In particular, the data includes the information on the number of employees directly managed either by the HQ top manager or by the FM. The information on the number of workers directly managed by either HQTM or FM is available for smaller number of firms in most of the countries of the sample as the interviewees were asked about it only in the case the number of employees reporting directly were more than 20. (No information is available for India). Consequently, we explore this information with caution at the descriptive stage of the analysis. This information allows us to draw some stylized facts on the internal organization of firms in transition countries, which has not yet been done in the literature. The number of directly managed employees varies between: 2 and 200 for the HQ manager, with the average number between 12 and 55 depending on the country (see Table D.5); between 1 and 590 for FM with the average between 16 and 52 depending on the country (see Table D.6).

Depth of control. Another measure of the organization structure is the measure of organizational distance, which represents the number of managerial layers between the production employee and either HQ top manager or FM. It is also often called the depth of control or depth of hierarchy in the literature and represents a vertical dimension of the internal firm

organization. An example is presented in the Figure 4.1. Unlike the measure used in the work of Guadalupe and Wulf (2010) where the depth of hierarchy was measured as the distance between the Chief Executive Officer (CEO) and the division manager, the data provide the information on the distance between either HQ top manager or FM from the level of typical production employee. The information on the factory organization is not available. As a factory may include several divisions, we use the full organizational distance from a production employee as a measure of the hierarchical depth of a firm.

Figure 4.1: An example of internal organization structure
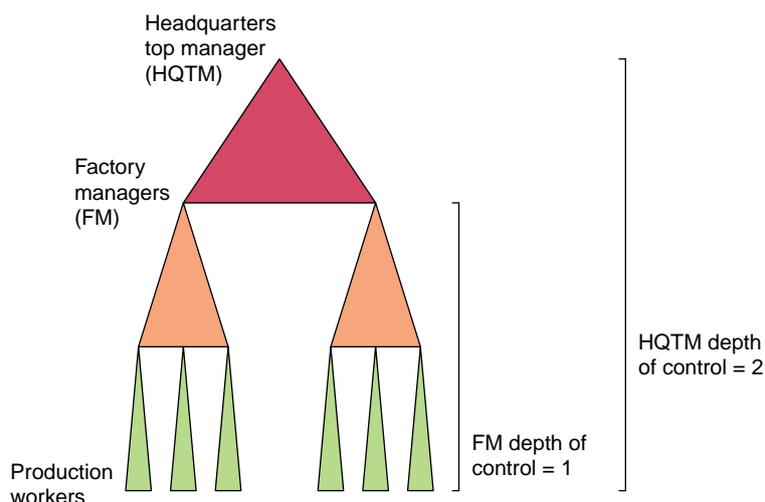
In the sample the number of layers between production employee and the HQ top manager ranges between 0 and 14 with the mean values for different countries between 2 and 4 (see Table D.8). The number of layers between production employees and FM is between 0 and 10 with mean values for countries between 0.9 and 3.2 (see Table D.8).

Further the discussion will be mostly focused on the analysis of the internal organization of firms with respect to the position and reporting relationships of top managers.

Flattening and growth. Apart from the description of the organizational structure at the moment of interview, the data provide the information on the changes of the depth of control in the three years previous to the interview, which allows us to capture one side of the process of flattening. The dataset allows us to know whether the organizational distance (number of layers) between the HQ top manager and a typical production employee increased, decreased or did not change (see Table D.9).

The information on the changes of the span of control, the other side of the flattening process, is not provided by the data. Consequently, we measure flattening by using only the change in the number of layers or the change of the depth of control.

The dataset also allows us to observe if a particular firm has been growing in the previous years in term of employment and how much it was growing. Some information is available with respect to the growth of firms in terms of operating revenues, profits and other information merged from the Orbis dataset. Such information is going to be used in the description analysis

when the discussion moves to the connection between the growth (in terms of employment, value-added and value added per employee), flatter structures and the change in the depth of control. However, a more extensive use of this information is limited due to missing data.

4.4.3 Trade Liberalization

For the analysis of trade liberalization we use the data provided in the Eora input-output tables (Lenzen et al., 2012, 2013) for each country from 2000 to 2010.

For measuring trade liberalization we follow the approach used in Bloom et al. (2012) and use the import penetration rate. The import penetration rate is measured as the ratio of imports to the sum of domestic production and imports in a particular industry. Due to the difficulty of concordance between the domestic production statistics in transition countries and the MOI dataset on the product level[4] (as in Bloom et al. (2012)), we used the Eora input-output tables to construct the industry measure of input penetration. As the result, the data on the import penetration rate in 9 manufacturing industries per country were used.

As the dataset provides the information on the main product of each firm, we organize the sample in three groups with respect to the Bureau of Economic Analysis (BEA) classification. In particular, firms are divided into those producing mostly final, intermediate or capital products. This division gives us the possibility to calculate the import penetration measures for each industry and each type of product. As a result, the measure of import penetration is constructed such that it varies across types of products, industries and countries.

The measure of import penetration MP_{jc} for final goods ^{f} is calculated as the ratio of import M_jc from the world to country $_c$ in industry $_j$ to the total final consumption of households, government and non-profit institutions serving households FC_jc in country $_c$ that includes both imported and domestic products of industry $_j$ consumed in country $_c$, i.e.

$$MP_{jc}^f = \frac{M_{jc}^f}{FC_{jc}} \tag{4.1}$$

, where

$$FC_{jc} = M_{jc}^f + D_{jc}^f \tag{4.2}$$

The measure of the import penetration for intermediate inputs i is calculated as the ratio of imported to country c intermediate inputs M_{jc}^f produced by industry j to the sum of imported and domestic intermediate inputs IC_{jc} produced by the industry j (where the firm products belong to) and used by all industries H in country c. As the data on the industry to which a particular firm is selling its products is not available, we assumed the probability of selling

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[4]The main product of each firm (the product representing the largest share of annual sales) in the MOI dataset is given in terms of the 4-digit ISIC Rev. 3.1 code. Most of the countries in the dataset use both different between them classification and different from ISIC classifications. To the best of our knowledge, there are no concordance tables or other ways to transform those specifications on the product level. The supply and use tables available for these countries are also not having the same product-level classifications and are not comparable to each other.

them to any industry being equal. Consequently, the share of input penetration on the potential market of a particular firm, if it is producing intermediate inputs, is measured in the following way:

$$MP_{jc}^i = \frac{M_{jc}^i}{IC_{jc}} \tag{4.3}$$

, where

$$IC_{jc} = \sum_{h=1}^{H} M_{hjc}^i + \sum_{h=1}^{H} D_{hjc}^i \tag{4.4}$$

The measure of the import penetration for capital goods k is calculated as the ratio of imported capital goods M_{jc}^c in total gross fixed capital formation in industry j in country c. The total gross fixed capital formation includes both domestic production D_{jc}^k and import M_{jc}^c of capital goods.

$$MP_{jc}^k = \frac{M_{jc}^k}{CF_{jc}} \tag{4.5}$$

, where

$$CF_{jc} = M_{jc}^k + D_{jc}^k \tag{4.6}$$

Each of this measures is calculated for each year between 2005 and 2010 and is associated with a firm in country c with the main product of type $z = \{i, f, k\}$ belonging to the industry j. Around 20% of the sample was associated with a unique measure, other 30% was associated with the measure equal for 2-4 firms, in total 80% of the sample was associated with the measure equal for not more than 10 firms. Maximum number of firms associated with the same measure of import penetration is 43.

In order to account for the changes of import penetration we calculate the ratio of 3-year import penetration change to its beginning value. As firms may be interviewed in different months of the same year, the change of import penetration rate is counted as either difference between year t value and year $(t - 3)$ value if interview took place in the last 6 months of the year t; or difference between year $(t - 1)$ value and year $(t - 4)$ value if interview took place in the first 6 months of the year t. Most of the firms in the sample were interviewed either between October and December or between January and March. As results the measure of import penetration becomes even more specific for each firm. Consequently, the measure of import penetration change is counted as following:

If a firm was interviewed in January-June

$$\triangle MP_{zjct}^3 = \frac{(MP_{zjc}(t - 1) - MP_{zjc}(t - 4))}{MP_{zjc}(t - 4)} \tag{4.7}$$

If a firm was interviewed in July-December

$$\triangle MP^3_{zjct} = \frac{(MP_{zjc}(t) - MP_{zjc}(t-3))}{MP_{zjc}(t-3)} \tag{4.8}$$

t={2008,2009,2010}

$$\tag{4.9}$$

4.5   Empirical Model

In order highlight the influence of import competition on the internal firm restructuring in transition countries, we exploit the fact that some transition countries have gone through significant opening towards international markets, which reflected in an increasing import penetration. The sectors and countries that went through significant increase in import penetration are discussed in Section 4.6.1.

First, we draw some stylized facts using descriptive statistics and correlation analysis. In particular, we analyse the differences between firms and countries with respect to the organizational distance (number of layers) and the span of control (number of employees directly reporting to the national HQ top manager and to the factory managers (FM)).

Second, basing on the work of Rajan and Wulf (2006) we define a new measure of control within the organizational structure. By using this measure we give preliminary evidence for the hypothesis H4.2 stating that flattening is connected with the increasing control of top managers.

Third, the regression analysis is presented to highlight the influence of trade liberalization on the process of flattening. we use probit model in order to analyse the probability of a firm to flatten. The binary variable on whether the number of management layers of a firm has decreased is used. In the rest of this paper we use "flattening" for referring to the decrease of the number of management layers. The data does not allow evaluation of the changes in the number of directly reporting employees.

In order to analyse this influence we use the following empirical model:

$$Pr(Y = 1|X) = \Phi(\beta^* X'), where \tag{4.10}$$

$$X = (\triangle MP^3_{zjct}, Mark_f, PT_{jcz}, W_f) \tag{4.11}$$

To reflect the flattening as a dependent variable we use the binomial data on whether the firm decreased the depth of its organizational hierarchy in the three years previous to the interview $Pr(Y = 1|X)$, where Y is either 1 (number of layers decreased) or 0 (number of layers did not decrease).[5]

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[5]At the last stage of the analysis, we use the data on increase in the number of layers in order to control for the robustness of the results and to check if the increasing import competition is connected with increasing hierarchical depth. In that case Bivariate Probit model is used with two dependent variables: $Pr(Y_1 = 1|X)$ being the probability that the number of layers decreased and $Pr(Y_2 = 1|X)$ being the probability that the number of layers increased.

Specification 1   In the basic specification the main independent variable is the change of
import penetration ($\triangle MP^3_{zjct}$). we also include several important control variables, such as
the type of the main market $Mark_f$[6], the type of the main product PT_{jcz}[7]. The vector W_f
in this specification includes size of the firm (S_m), accounted through the natural logarithm of
the number of full time employees in the year t, and the share of non-production employees
(NpE_m) in the firm in year t.

Specification 2   More extended specification of the model is used in order to control for
different probability of flattening among either growing or contracting firms. As it is illustrated
by Rossi-Hansberg, Garicano and Monte (2012) the firms that decrease the number of layers are
often the firms that contract. Consequently, we want to avoid the possibility that the results
are driven by the influence of import competition on the size of firms. To do so vector W_f
is extended by the inclusion of dummy variables for firms that either contract or grow in the
three years previously to the interview.

Specification 3   The next specification also includes the control variables for the influence
of ownership. The vector W_f in this specification includes the set of ownership dummies as
well.[8] Thus, the differences between firms with different types of main owners is taken into
consideration. Another important issue with respect to ownership in transition countries is
whether these firms have ever been state owned. The discussion of the differences between
privatized firms and either originally private or state-owned firms is not the aim of this study.
The overview of only their performance and decision-making differences could result in a sepa-
rate study. Some of the features differentiating the privatized firms from their counterparts are
summarized in Estrin et al. (2009) and in Godoy and Stiglitz (2007). What is the objective of
this specification is to be sure that the results are not driven by the issues connected with the
privatization history of a firm.

Specification 4, 5   As firms has been interviewed in different years we include year dummies
in the vector W_f as well. This is done in the Specification 4 in order to exclude possible
time specific effects . In this specification 5 other controls are included to control for the
characteristics of the survey data. As the data is based on the survey, it may be biased by
the several characteristics. First, opinion and personal experience of the respondent may affect
her responses. Second the procedure followed in order to obtain the answers or to provide the
answers (especially for the quantitative questions) may be important to account (Schweiger and

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[6]First of the $Mark_f$ variables is a dummy taking 1 if the main product of a firm m was sold mostly at the
national market and 0 otherwise. Second of the $Mark_f$ variables is a dummy taking 1 if the main product was
sold mostly to the foreign nations (exported) and 0 otherwise. Thus, the baseline group consists of firms selling
their product on the local market.

[7]Measure PT_{jcz} accounts for the type of product through the inclusion of two dummies - capital good and
intermediate good(final goods are the baseline).

[8]The measure includes the dummies for firms owned by foreign individuals/firms, foreign state, foreign
family, domestic family, the state where firm HQ is situated, other owners or for firms owned by multiple
owners with no one holding the largest block of shares. The domestic private individual/firm is taken as a
baseline.

Friebel, 2013). As a result, we include in the vector W_f control variables for the number of times the interview was rescheduled, respondent's willingness to answer the questions and her knowledge about the firm, the way how quantitative questions was answered (taking figures from accounting books, making some counts or giving approximate measure not supported by objective information), judgment of the interviewer about the truthfulness regarding opinions and perceptions of the respondent, and the number of years the respondent is working in the firm.

Specification 6 Country fixed effects are controlled for in a separate specification. However, a significant correlation between country fixed effects and main independent variable may be expected as trends of import penetration suggest more country- than industry-specificity.

Robustness check The survey took place partly during the global trade collapse that has affected imports in transition countries in different years over 2007-2009. we acknowledge the possibility of the crisis influence on the results. In order to account for this a robustness check is proposed. To perform such a robustness check we first regress the main independent variable of import penetration on two dummy variables. First dummy variable take value 1 if the firm is performing within the industry and country that has been affected by the import drop in the same year (or 1,5 year) before the interview and 0 otherwise. The second dummy variable is taking value 1 if the firm is performing within the industry and country that has been affected by the import drop in the previous three years but more than 1,5 year before the interview and 0 otherwise. Then, we correct the main independent variable for the influence of these two dummies. we further analyse the influence of adjusted measure of import penetration change using all specifications described above.

4.6 Results

4.6.1 Static Picture of the Firm Organization in Transition

As data show, the internal organization of firms differs significantly between transition countries both in terms of its width and breadth. The countries with lower number of layers between the national HQ top manager and production employees in median are Uzbekistan, Serbia, Lithuania and Bulgaria (see Figure 4.2 and Table D.7). Uzbekistan, Serbia and Lithuania have in median the factory managers in a layer directly below the HQ top manager, while in Bulgaria the top manager and factory manager are situated at the same level of organizational hierarchy (Figure 4.2).

The typical internal organization of firms in different countries is presented in Figure 4.2. The group of countries with the maximum median width of hierarchies includes Belarus, Russia and Ukraine (see also Table D.3). The smallest median width of hierarchies is characteristic for Lithuania, Uzbekistan, and Romania. However, big variability is observable within countries as well. The distribution of the number of layers (the depth of hierarchies) in different countries is

summarized in D.7. Large right tails are characteristic for Ukraine, Kazakhstan and Romania where the hierarchies are reaching the breadth of 11-14 levels.

The measures of the number of employees directly reporting to the national HQ top manager and the number of employees she/he manage directly on the daily basis are highly positively connected. In multiple countries the share of the employees the top manager manages directly arrives at more than 0.8. It highlights that a big share of top managers control or interact with their subordinates (which report directly) on a highly regular basis. However, there is significant variation of such a share; it varies between 0.3 and one (see more in Table 4.1). The possibility to use this information for further analysis is limited by the small sample size of the firms that responded to this question.

Table 4.1: The share of employees directly reporting to the national HQ top manager that he/she manages directly

Country	Min	Max	Mean	Median	Num
Belarus	0.27	0.50	0.34	0.29	4
Ukraine	0.29	1.00	0.85	1.00	14
Uzbekistan	0.33	1.00	0.82	1.00	7
Russia	0.08	1.00	0.55	0.40	39
Poland	0.20	1.00	0.64	0.67	5
Romania	0.24	1.16	0.73	1.00	9
Serbia	0.04	1.36	0.38	0.20	20
Kazakhstan	0.33	0.43	0.38	0.38	2
Lithuania	0.25	1.36	0.78	0.78	6
Bulgaria	0.33	1.00	0.81	1.00	9
Total	0.01	1.36	0.54	0.43	149

Source: Own calculations based on the BEEPS (2005)

The measure of both breadth (depth of control) and width (span of control) of hierarchies are positively and statistically significantly correlated with the size of firms. It underlines that firms are bigger if they have either a higher number of layers or a higher number of top manager subordinates.

4.6.2 Depth, Span and Control

The measure of the span of control reflects the two main phenomena. First, the higher number of subordinates reporting directly to the top manager implies that the top manager is having the authority over higher number of employees. Second, the higher number of direct reports also suggests that the information sharing is more direct. As it has been underlined by the study of Rajan and Wulf (2006) and Wulf (2012) the higher span of control (more directly reporting subordinates) is associated by managers with the more direct control and involvement

Figure 4.2: Organization structure of average firm (median)

93
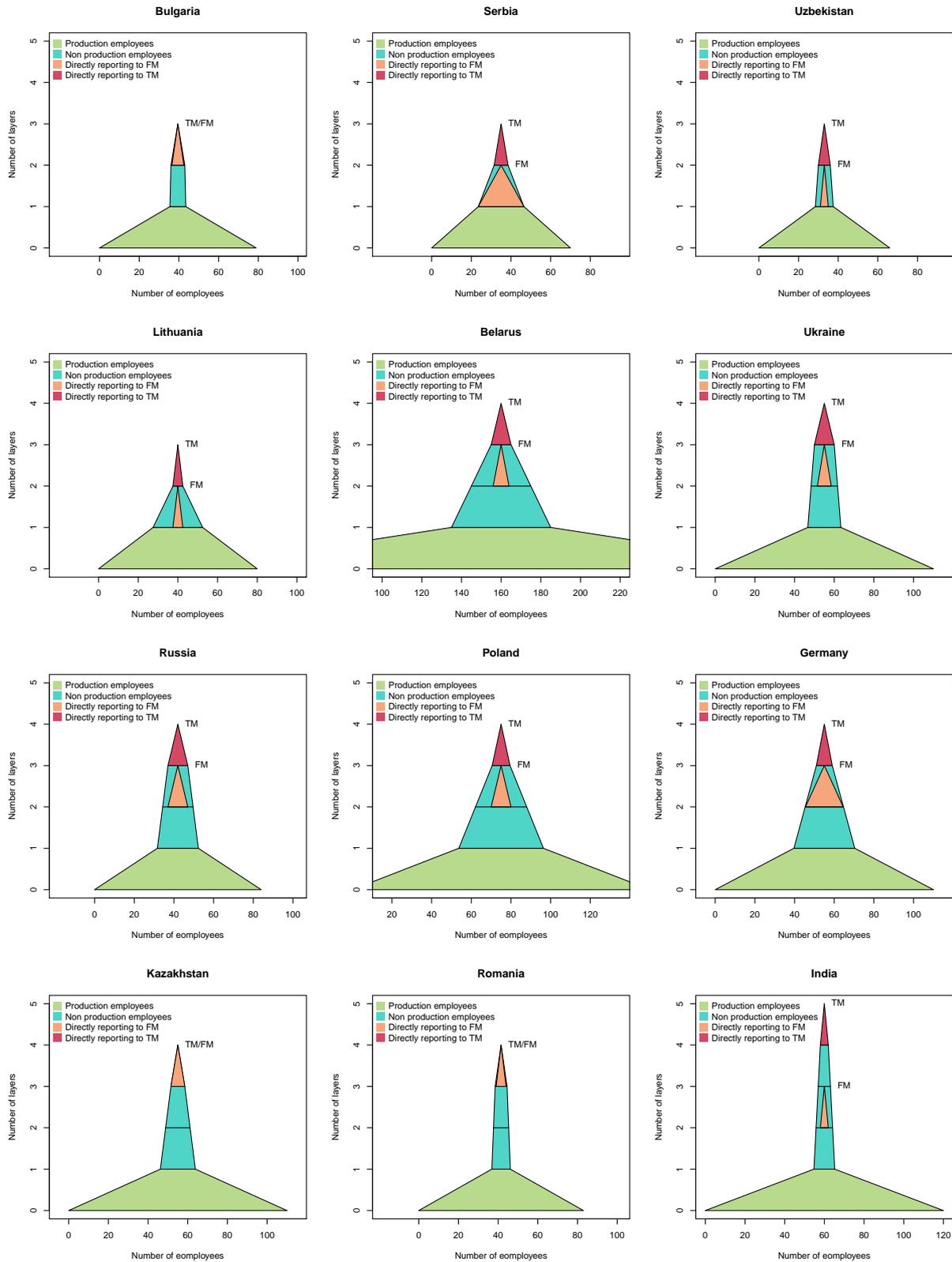
in decision-making.

In order to analyse the degree of control we calculate the share of employees who directly report to the top manager in the total number of firm non-production employees. Such a measure shows the degree of direct authority or direct control of the top manager.

The results show that such a degree of control is negatively correlated with the share of employees that regularly use personal computers in their jobs. Such results confirm the negative connection drawn by Bloom et al. (2014) between information technology and control of the top manager over the employees. Bloom et al. (2014) conclude that improvements in information technologies are associated with the increase in autonomy of workers and plant managers. we find the same results. This further supports the consistency of the proposed measure as a measure of control.

By further analysis of the connection between the proposed measure of control and firm internal organization we find that this measure is negatively and highly significantly correlated with the number of layers in the organization hierarchy (Pearson correlation coefficient equals to -0.1618, p-value < 0.001). Such a significant connection suggests that the flatter is the hierarchy of the firm the bigger share of firm organization is under direct control of the top manager. Hence, the conclusion can be made that the process of flattening increases the degree of control of the top manager. It underlines that even though the flattening may have some features of decentralization it is also associated with a significant expansion of the control from the part of the top manager.

4.6.3 Trade Liberalization and Its Impact on the Firm Performance

By using the data from the input-output tables we analyse the dynamics of import penetration as a measure of trade liberalization and its influence on firm's environment and behaviour. The dynamics of the import penetration measure calculated for the analysis is presented in tables D.4.

The majority of countries did not experience big changes in the import penetration in the period of 2005-2010, the exception is Ukraine, Uzbekistan, Serbia in some cases, and Russia. And while Ukraine was through a significant increase of import inflow, Uzbekistan and Serbia experienced an increase of import penetration in multiple industries and types of products, Russia saw a significant decrease of import penetration. For example, in the 3-year period before the interviews in Russia, import penetration had dropped almost by 16% for capital goods in metal products' sector, by 12 and 21 percent for intermediate goods in the sectors of "Wood and paper" and "Transport equipment". It also had dropped by 13% for final goods in the sector of "Wood and paper". The opposite picture may be observed in Ukraine. The increase of import penetration varies in the range between 20% and 200%. Uzbekistan is characterized by a notable increase in import penetration as well. The majority of sectors and product types has seen the increase of import penetration between 17% and 32%. In Serbia import penetration of the market of capital goods increased by 18-38%, followed by several industries in final goods with increase between 19% and 22% and several in intermediate goods

with the increase of 11-15%. In Germany the increase of import penetration took place in capital goods, final goods of food and beverage sector, while most of the markets of intermediate goods experienced the decrease of import penetration. Penetration of food and beverage sector also increases in Bulgaria and Romania.

Such changes in import penetration could have had an impact on the environment and performance of firms in these countries. In order to analyse it we draw some stylized facts on the connection between the changes of import penetration rates and firm performance.

In order to analyse whether the increase in import penetration contributes to the increase in competition pressure we analyse its contribution to the change in firms' profit margins. we find that the changes in import penetration are negatively associated with the profit margins of firms(results presented in Table D.10). Hence, more import in the industry is connected with smaller possibilities for higher profits. It underlines that import penetration is actually affecting the competitive situation on final markets of firms and increase the competitive pressure, as assumed in the literature.

Moreover, the data analysis shows that the changes in import penetration and the changes of firm size are negative connected. The change of employment in the period of three years previous to the interview is calculated using the survey data. The results illustrate that import penetration changes in these years are negatively associated with the changes in total employment of firms. Such results, suggest that pressure from import penetration constrain firms to contract in terms of employment. It is underlined by Caliendo et al. (2015) that the firms that contract have higher probability to decrease the depth of control. However, only around 12% of contracting firms choose flattening, and no increasing trend of this share is observed when increase in import penetration is considered.

When the yearly changes in import penetration are considered, the positive link is observed between the changes of import penetration and the following (a year after) changes in the value added and value added per employee. For example, an increase of import penetration in 2008-2007 is positively correlated with the growth of both value-added and value-added per employee in the year after.[9] we also find that firms that faced higher increase of import penetration in the previous 3 years have lower labour productivity (Table D.11). As it is shown in the table, the increase of import penetration change by 10% is associated with the decrease of labour productivity by around 6%.[10]

4.6.4 Influence of Trade Liberalization on the Change of Internal Firm Organization

The fact that the changes in import penetration affect firm performance can be observed from the results of the previous section. The question of this section is whether such changes affect firm internal structure as well. In particular, we analyse whether it increases the probabil-

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[9]However, the results of this correlation analysis are ambiguous and may be year specific. As such results require more detailed analysis the issue is left for the further research.

[10]I do not find significant correlations between import penetration change and total factor productivity

ity of firm to become flatter. The probability of flattening in the empirical model is represented by the probability that a particular firm decreases the number of layers between the national HQ top manager and a typical production employee.

The results show that the change of import penetration is positively connected with the decreasing number of organizational layers. The connection is statistically significant and robust to the accounting for multiple control variables. Although the results show that connection between import competition and flattening is highly significant in most cases, country fixed effects decrease the significance of such a connection. This may be explained by the presence of Ukraine in the data. we will discuss the particular features of the link in Ukraine further on.

For the whole sample marginal effects are quite small but they increase significantly with the increase in the magnitude of the main dependent variable. However, if the test of the same model is done only for the firms that faced the increase in import penetration of at least 50%, the effects of increase in import penetration by 20% rise from 0.4% (on the total sample) to 2-4% (on the "tail" sample). An increase of the change in import penetration from 56% to 200% is associated with the increase of the flattening probability by almost 40% (from 0.9%), keeping all other factors stable at their mean.

With regards to the effects of control variables four significant links can be observed. First, firms with higher share of non-production employees tend to flatten more often. The group of non-production workers may include top and middle managers, lawyers and administrative support workers, and is characterized by higher skill-intensity. Skills have already been argued to complement organizational changes in developed countries (Caroli and Van Reenen, 2001). The results of this chapter show that even in developing (transition) countries they are positively connected.

Second, the firms that have an experience of being state-owned tend to flatten more than their originally private counterparts. However, on average the firms that have passed through privatization are also more often publicly or privately traded and, thus, has no single owner. It is especially important as the results show that the firms with no single largest owner tend to flatten less often. In order to check whether the model is biased by such a connection, we eliminated either of these variables and the results tend to be robust. Thus, firms that both are not having single owner and are the ones privatized in the past have lower tendency to flatten than their counterparts with a single person/firm/state as a main owner. At the same time they have higher tendency to flatten than their originally private counterparts. Such results underline the influence of the ownership structure, and in particular the effect of ownership concentration.

Table 4.2: Trade liberalization and flattening

	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration (3years change)	**0.327****	**0.339****	**0.292***	**0.314***	0.432	0.374
	(0.161)	(0.167)	(0.170)	(0.175)	(0.360)	(0.377)
Import penetration # Firm contracted						0.217
						(0.370)
Control Variables:						
Main market - national	0.237	**0.283***	0.244	0.224	**0.295***	**0.296***
	(0.157)	(0.165)	(0.169)	(0.170)	(0.177)	(0.177)
Mainly exporters	0.196	0.224	0.179	0.122	0.215	0.224
	(0.188)	(0.201)	(0.206)	(0.213)	(0.230)	(0.230)
Share of non-production workers	**1.102*****	**1.168*****	**1.219*****	**1.156*****	**1.158*****	**1.135*****
	(0.340)	(0.357)	(0.361)	(0.370)	(0.397)	(0.399)
Firm shrunk	**0.343***	0.277	0.274	0.283	**0.368***	0.330
	(0.189)	(0.195)	(0.196)	(0.199)	(0.209)	(0.219)
Firm grew	-0.181	-0.167	-0.178	-0.179	-0.134	-0.131
	(0.190)	(0.197)	(0.198)	(0.202)	(0.209)	(0.209)
No single ownership		**-0.499****	**-0.522****	**-0.502****	**-0.526****	**-0.524****
		(0.217)	(0.220)	(0.221)	(0.226)	(0.226)
Domestic family ownership		**0.594*****	**0.580*****	**0.555*****	**0.619*****	**0.612*****
		(0.212)	(0.213)	(0.216)	(0.225)	(0.226)
Privitized		**0.416*****	**0.431*****	**0.442*****	**0.386****	**0.389****
		(0.152)	(0.153)	(0.160)	(0.164)	(0.164)
Constant	-2.394***	-2.502***	-2.499***	-2.956***	-3.568***	-3.542***
	(0.398)	(0.423)	(0.438)	(0.690)	(0.813)	(0.814)
Other control variables:						
Size	Yes	Yes	Yes	Yes	Yes	Yes
Year of interview	No	No	Yes	Yes	Yes	Yes
Survey characteristics	No	No	No	Yes	Yes	Yes
State, Foreign and Other Ownership	No	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	Yes	Yes
Likelihood	-262.875	-249.156	-247.259	-242.443	-236.988	-236.815
Pseudo-R2	.0711876	.1191877	.1258958	.1321	.1516291	.1522462
P-value	6.72e-06	5.95e-08	5.75e-08	1.03e-06	3.25e-06	4.72e-06
Marginal_effect1 (↑ sd)	**.007**	**.007**	**.005**	**.005**	**.010**	**.008**
Marginal_effect2 (↑ from min to max)	**.017**	**.017**	**.012**	**.014**	**.027**	**.020**
N	1085	1083	1083	1070	1070	1070

Note: $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$

Specifications also included the measure of size and dummy variables for intermediate goods and capital goods. Specifications 3-6 also included dummy variables for the type of foreign ownership (family, firm or state). Specifications 4-6 included the dummy variables for the year when interview took place. Specifications 5-6 included noise variables for respondent's willingness to reveal information, knowledge about the firm, years in the firm, as well as reliability of figures and truthfulness regarding opinions

Third, a strong connection between the family ownership and flattening is established. The results show that domestic (not owned by foreigners) family firms are more predisposed to flatten. It may be caused by the multiply documented differences in management styles. The evidence exists that family-owned firms has different management styles, in particular they tend to be more centralized (Levina, 2016), and have a more hierarchical management approach (Mullins and Schoar, 2016). Thus, the effect of family ownership on a higher probability to decrease the number of managerial layers and family ties connection with higher centralization underline the centralization feature of the flattening.

Fourth, the firms that sell their main product on the national markets are flattening more often than their counterparts targeting local markets. Moreover, the positive correlation between the status of being an exporter and flattening may be observed, however it lacks enough significance.

Firms that face contraction in employment do not have statistically significant connection with higher probability of flattening in presented specifications. Neither do firms that have increased their employment in the previous three years. When the entire sample is considered, the connection of import competition with the flattening does not pass through the contrac-

tion of firms. In particular, the interaction between import penetration (import competition measure) and the dummy for contracting firms is not significant. If import competition forced firms to contract and flattening would be the consequence or the preferable choice of firm contraction, one would observe positive and significant connection between the interaction term and flattening. This is not the case in the transition countries.

As the results are sensitive to the country dummies, one can rightful doubt if they are not driven by the tail of distribution characteristic for a particular country. The answer is: they actually are. The highest effect on the probability to flatten comes from the big increase in the import penetration in particular country, which is Ukraine. As it is illustrated in the Figure D.4 Ukraine firms faced a comparatively much higher change of import penetration (import surge), especially in intermediate inputs. Almost 90% of Ukrainian firms in the sample faced import penetration increase of more than 50%. There are no Ukrainian firms in the sample that faced less than 20% increase.

Consequently, to avoid mixing up two different phenomena (import surge and comparatively mild increase of import penetration) we organize the sample in two subgroups: firms that faced import penetration increase of at most 50% and firms that faced import penetration increase of more than 50%.

First, we test the model on firms who faced an import surge (Table 4.3). Among such firms, an increase of import competition by one standard deviation (39%) from its mean (94%) increase the probability to flatten by 15.5 percentage point, keeping all other factors stable at their mean. Previously, on the full sample, similar increase of import competition (31%) increased the probability to flatten by only 0.5 percentage points.

Table 4.3: Effects of the import penetration increase of more than 50%

	(1)	(2)	(3)
Import penetration	**1.211**	**1.806***	**1.807***
(3years change)	(0.810)	(1.009)	(1.016)
Import penetration # Firm contracted			-0.010
			(1.046)
Control variables:			
Share of non-production workers	1.505	1.002	1.004
	(0.997)	(1.155)	(1.170)
Firm shrunk		5.488	5.497
		(548.6)	(548.4)
Firm grew		4.253	4.253
		(548.6)	(548.4)
Constant	-3.746***	-8.001	-8.002
	(1.271)	(548.6)	(548.4)
Other control variables:			
Size	Yes	Yes	Yes
Main market	Yes	Yes	Yes
Type of good	Yes	Yes	Yes
Year of interview	No	No	No
Survey characteristics	No	No	No
Ownership	No	No	No
Likelihood	-32.260	-25.496	-25.496
Pseudo-R2	.0951793	.284895	.2848962
P-value	.4513997	.0160656	.0264106
Marginal_effect($\uparrow$ sd)	**.134**	**.155**	**.155**
Marginal_effect2($\uparrow$ from min to max)	**.399**	**.695**	**.695**
N	109	109	109

Note: $^*p < 0.10,^{**}p < 0.05,^{***}p < 0.01$. Specifications 4 - 6 are not feasible due to the sample size limitations

Second, we test the model on firms who experienced a mild increase in import penetration (Table 4.4). When the regressions are made on the sample of such firms, the significance of the main independent variable is decreasing drastically. By analysing if the change of the variable form from a share to a percentage (share multiplied by 100) may change the results, we find that the coefficient become significant, but is very small. Such results may be explained by the fact that the changes of import penetration, if the tail is excluded, varies between -38% to 38%, with the 80% of firms in the range of -8% to 20% , with median at 2.1% and mean at 3.9%. It shows that majority of firms in this period did not face a significant increase in the import penetration rate and thus didn't face significant increase of competitive pressure from import.

However, the results changes when we account for different effects of import penetration on firms that contracted and those that grew. In particular, Table 4.4 shows that for firms that do not contract increase in import competition by one standard deviation (10%) results in the increase of flattening probability by 29 percentage points.[11] Meanwhile, the effect for the firms

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[11]The same change of 10% for the whole sample (including also firms facing the decrease of import penetration) is only 7 percentage points. Such results highlight that higher changes in import competition have much more visible effects on the internal organization of firms. For example, the inflow of imports due to rapid reduction of tariffs would induce a much bigger share of firms to flatten. In such a case our results would be

that contract is close to zero. This shows that in front of the increasing import penetration firms tend to opt for either flattening or contraction, thus, suggesting that firm reorganization is an alternative to firm shrinkage when the reaction to mild increase in market competition is considered.

Table 4.4: Effects of the import penetration increase of at most 50%

	Import Penetration < 50%		Import Penetration > 0, but < 50%	
	(1)	(2)	(3)	(4)
Import penetration **(3years change)**	1.025 (0.626)	**1.880**** (0.774)	1.665 (1.253)	**3.487**** (1.534)
Import penetration # Firm contracted		**-1.927*** (1.010)		**-3.381**** (1.592)
Control variables:				
Share of non-production workers	1.020** (0.427)	1.027** (0.430)	1.127** (0.535)	1.194** (0.544)
Firm shrunk	0.169 (0.219)	0.276 (0.227)	-0.076 (0.267)	0.350 (0.333)
Firm grew	-0.197 (0.219)	-0.209 (0.221)	-0.372 (0.265)	-0.382 (0.268)
Constant	-3.121*** (0.789)	-3.065*** (0.794)	-3.632*** (1.006)	-3.849*** (1.028)
Other control variables:				
Size	Yes	Yes	Yes	Yes
Main market	Yes	Yes	Yes	Yes
Type of good	Yes	Yes	Yes	Yes
Year of interview	Yes	Yes	Yes	Yes
Survey characteristics	Yes	Yes	Yes	Yes
Ownership	Yes	Yes	Yes	Yes
Likelihood	-208.12	-206.28	-144.60	-142.27
R2	0.144	0.152	0.156	0.169
p-value(Wald)	0.000	0.000	0.010	0.005
Marginal_effect(↑ sd)	**.023**	**.076**	**.055**	**.256**
Marginal_effect(↑ from min to max)	**.12**	**.361**	**.204**	**.92**
Marginal_effect(↑ sd) for Shrinking Firms		**.00005**		**.0002**
Marginal_effect(↑ from min to max) for Shrinking Firms		**.0002**		**.0007**
N	964	964	619	619

Note: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$; [1]

When the possible influence of crisis is accounted in the model, similar results are found. The marginal effects of the main variable are slightly lower than in the main model, but not significantly. Moreover, most of the underlined connections stay statistically significant.

I also control for the possible influence of the simultaneity of the decisions to increase or to decrease number of managerial layers. By applying the bivariate probit model, one of possible unobserved variable biases is eliminated. In particular, the bias connected with the multiplicity of decision options. As a result, we obtain highly similar results (see Table 4.6).

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similar to the results presented in Guadalupe and Wulf (2010).

Table 4.5: Trade liberalization and flattening, adjusted for crisis influence

	(1) Basic	(2) Firm_growth	(3) Ownership	(4) YearFE	(5) Survey	(6) CountryFE
Import penetration (3year change) adj.	0.249**	0.257**	0.257*	0.249*	0.267*	0.461
	(0.119)	(0.129)	(0.134)	(0.138)	(0.140)	(0.320)
Control variables:						
Main market - national	0.196	0.229	0.275*	0.244	0.225	0.300*
	(0.119)	(0.157)	(0.165)	(0.169)	(0.171)	(0.177)
Mainly exporters	0.194	0.170	0.197	0.167	0.113	0.222
	(0.149)	(0.188)	(0.202)	(0.213)	(0.213)	(0.230)
Share of non-production workers	1.047***	1.082***	1.141***	1.212****	1.151***	1.174***
	(0.336)	(0.340)	(0.357)	(0.360)	(0.370)	(0.396)
Firm contracted		0.331*	0.263	0.262	0.272	0.363*
		(0.189)	(0.194)	(0.196)	(0.199)	(0.209)
Firm grew		-0.191	-0.179	-0.190	-0.193	-0.143
		(0.190)	(0.197)	(0.198)	(0.202)	(0.209)
No single ownership			-0.491**	-0.518**	-0.496**	-0.529**
			(0.217)	(0.220)	(0.220)	(0.226)
Domestic family ownership			0.592***	0.581***	0.557***	0.619***
			(0.212)	(0.213)	(0.216)	(0.226)
Other ownership			0.486*	0.451*	0.445	0.546*
			(0.263)	(0.266)	(0.273)	(0.279)
Privitized			0.417***	0.430***	0.440***	0.390**
			(0.152)	(0.153)	(0.160)	(0.164)
Still state-owned			0.298	0.295	0.338	0.236
			(0.205)	(0.207)	(0.214)	(0.236)
Number of rescheduling					0.066	0.100
					(0.058)	(0.062)
Country FE	No	No	No	No	No	Yes
Constant	-2.337****	-2.325****	-2.431****	-2.473****	-2.861****	-3.398****
	(0.410)	(0.399)	(0.423)	(0.438)	(0.683)	(0.827)
Likelihood	-271.284	-262.930	-249.367	-247.090	-242.226	-236.662
Likelihood_C	-283.0226	-283.0226	-282.8713	-282.8713	-279.3443	-279.3443
Pseudo-R2	.041477	.0709927	.1184438	.1264948	.1328758	.1527958
Chi2	24.92123	40.18506	67.0087	71.56351	74.23617	85.36528
P-value	.0007836	7.03e-06	7.01e-08	5.05e-08	8.87e-07	2.64e-06
Marginal_effect1	.004	.004	.004	.004	.004	.013
Marginal_effect2	.010	.011	.010	.009	.011	.034
N	1085	1085	1083	1083	1070	1070

Note: $^*p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

Specifications also included the measure of size and dummy variables for intermediate goods and capital goods. Specifications 3-6 also included dummy variables for the type of foreign ownership (family, firm or state). Specifications 4-6 included the dummy variables for the year when interview took place. Specifications 5-6 included noise variables for respondent's willingness to reveal information, knowledge about the firm, years in the firm, as well as reliability of figures and truthfulness regarding opinions

Table 4.6: Robustness check: Bivariate probit

	(1) Probit	(2) Probit	(3) Bivar.Probit	(4) Bivar.Probit
$Pr(Y_1 = 1\|X)$ [1]				
Import penetration (3years change)	0.312**	0.314*	0.308**	0.305*
	(0.140)	(0.175)	(0.139)	(0.175)
Control variables:				
Main market - national	0.202*	0.224	0.196*	0.221
	(0.119)	(0.170)	(0.119)	(0.171)
Mainly exporters	0.217	0.122	0.213	0.122
	(0.150)	(0.213)	(0.150)	(0.213)
Share of non-production workers	1.067***	1.156***	1.052***	1.150***
	(0.337)	(0.370)	(0.335)	(0.367)
Firm contracted		0.283		0.289
		(0.199)		(0.198)
Firm grew		-0.179		-0.163
		(0.202)		(0.202)
No single ownership		-0.502**		-0.507**
		(0.221)		(0.220)
Domestic family ownership		0.555**		0.546**
		(0.216)		(0.214)
Other ownership		0.445		0.439
		(0.273)		(0.272)
Privitized		0.442***		0.446***
		(0.160)		(0.159)
Still state-owned		0.346		0.358*
		(0.215)		(0.214)
Constant	-2.395***	-2.956***	-2.391***	-2.919***
	(0.412)	(0.690)	(0.416)	(0.692)
$Pr(Y_2 = 1\|X)$ [2]				
Import penetration (3years change)			0.006	0.023
			(0.152)	(0.218)
Control variables:				
Main market - national			0.065	0.069
			(0.152)	(0.167)
Mainly exporters			0.081	0.139
			(0.185)	(0.215)
Firm contracted				0.681***
				(0.261)
No single ownership				-0.345*
				(0.207)
Still state-owned				-0.516**
				(0.251)
Constant			-2.052***	-2.510***
			(0.387)	(0.699)
athrho				
Constant			-1.522***	-1.657
			(0.221)	(30.806)
Likelihood	-271.285	-242.443	-502.450	-456.110
Chi2	23.37515	73.80278	31.66216	87.60972
P-value	.0014661	1.03e-06	.0044732	.0007991
Marginal_effect1	.006	.005	.006	.005
Marginal_effect2	.015	.014	.015	.013
N	1085	1070	1085	1070

Note: $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

The results for selected variables are presented. Full table is available upon request.

[1] $Pr(Y_1 = 1|X)$ - The probability that a firm decreased the number of layers (flattened);

[2] $Pr(Y_2 = 1|X)$ - The probability that a firm increased the number of layers

4.7 Conclusions

By using unique data on the organization of firm in transition countries, namely EBRD "Management, Organization and Innovations" (MOI) dataset, merged with the Orbis dataset on firm performance indicators and Eora input-output tables we analyse the effect of changes in import penetration on the changes in internal firm organization, and flattening in particular. we consider the effect of import penetration growth on the probability to decrease the depth of control (organizational distance between top managers and production employees) within organizational structures of firms in transition countries.

Our results show that firms differ in their internal organizational structures, which they adjust actively in 2007-2009. Multiple firms eliminated the layers of their organizational structures. This finding is consistent with the prevailing in the literature notion of flattening. Firms decrease their depth of control (one of the characteristics of flattening) as a response to intensified competition in their product markets due to higher import penetration. However, the connection between increase of import competition and flattening is not homogeneous throughout transition countries and in different industries. we find that the organizational response, in particular the decrease of the depth of control, is stronger when the openness of the markets to the international trade is higher. For example, the connection is much stronger and has higher magnitude for Ukraine, which in 2007-2009 experienced a remarkable increase in import penetration in most of the manufacturing industries, than for Russia, which experienced significant decrease of import penetration in multiple manufacturing industries.

Moreover, by proposing a new measure of the degree of control (the percentage of non-production workers under direct authority of the top manager) we find that firms that flatten their organizational structures are also the firms that have a higher degree of control over non-production workers. Such a finding suggest that in transition countries flattening is associated with some features of centralization (higher control) supporting the previous research on the link between flattening and functional centralization (Wulf, 2012).

As a result, we conclude that greater international competition following trade liberalization leads to flatter firm hierarchies in transition countries. Moreover, we argue that it is inaccurate to label flattening as a synonym of decentralization as decentralization does not accurately represent changes of internal governance. In the case of transition countries, flattening is a complex phenomenon that in the end is more similar to the centralization of organizational structure. Moreover, improving corporate governance per se was not the primary goal for organizational change in transition countries. Instead, perhaps it was an evident increase in the amount of competition faced by firms to act as an external impetus for organizational change.

Considering the link between the depth of organizational structures and the job polarization proposed in multiple studies (although not analysing it directly), the heterogeneity in the connection between import market competition and firm flattening is illustrated. Such heterogeneity of countries with respect to the connection between trade openness and firm flattening could allow explaining why, for example, job polarization has not been documented in Russia

in 2000-2012 (Gimpelson and Kapelyushnikov, 2014). In fact, the degree of import penetration in the manufacturing industries in Russia in the bigger share of this period was either stable or falling. Therefore, it did not cause significant flattening of firm organizational structures in this sector of production and did not result in job polarization.

This chapter provides a relevant contribution to the understanding of the influence of international trade openness on the changes of firm organization. The increase of the openness towards the international trade has been often argued as one of the main policies to increase the efficiency and productivity of these countries. Multiple studies have been dedicated to understand the impact of such a policy on the country performance, welfare and economic growth. However, a big share of international trade studies has been treating a firm as a fixed production technology. Regardless the fundamental role of firm organization for the efficiency of production, firm organizational changes have been rarely considered. In some cases accounting for the change of firm organization while analysing the response to international trade opening may significantly alter, or even cancel out, the gains from international trade.

The results of this chapter also contribute to the understanding of firm organization in transition countries. Firm organizational structures have been documented to change significantly in recent decades in developed countries as response to higher international trade. However, little is known about the organizational structures of firms in developing countries due to data constrains, even less in transition countries. Transition countries have experienced changes in multiple areas, including international trade liberalization and World Trade Organization (WTO) accessions (or negotiations), privatization and structural reforms resulting in significant organizational changes. However, the results of such reforms are often falling short of expectations. Accounting for organizational changes or their absence may give us more insight on why the expected results have not been met in transition countries, especially in terms of international trade openness.

Chapter 5

BUSINESS ENVIRONMENT, MANAGERIAL PRACTICES AND CORRUPTION

5.1 Introduction

Research suggests that firms that apply good management practices perform significantly better than those that do not. This indicates that improved management practice is one of the most effective ways for a firm to outperform its peers, accessing notable improvements in performance simply by adopting good practices used elsewhere. For policy makers, it lays down a challenge. The overall performance of most countries is determined not by the performance of its leading companies, but by the size of its "tail" of poor performers. By developing environments that promote good management practices across all firms and by devoting as much attention to the followers as to the leaders, governments can drive the competitiveness of their entire economies.

Even in transition countries the quality of management practices is positively associated with various measures of firm performance (Bloom et al., 2012), with privatized and private firms showing better outcomes than state-owned firms. However, some exceptions exist. In Russia, only firms operating in most competitive regions present positive association, while majority of firms in the country does not (Schweiger and Friebel, 2013).

In transition countries, management practices were traditionally affected by significant administrative burden from public regulations. This has changed a lot with either extensive national or specific reforms. Examples abound. In Russia, the level of regulatory burden prior to the Russian liberalization reform of business regulations was extremely high. Between 2001 and 2004, Russia started a drastic liberalization reform of business regulation. Three consecutive national laws focused on liberalization of entry and operation of existing businesses in the areas of inspections, licenses, and registration. The reform consisted of a package of three laws passed at different points in time during the period 2001–2004: the law on inspections — on 8 August 2001; the law on delicensing on 11 February 2002; the law on registration — on 1 January 2004. Moreover, Russia launched in 2003 a large-scale reform project focusing on modernization of the Federal Custom service in order to promote internationally acceptable practices for processing of internally traded flows by Customs. However, the success of the implementation of reforms and legislation was largely uneven (Yakovlev and Zhuravskaya, 2007).

Another example may be found in the regulatory reforms in Ukraine. Public procurement in Ukraine was harshly criticized since early 2000s and a new public procurement law was passed in 2010.

But business operations and management practices in transition countries are still subject to numerous obstacles: corruption is characterized by significant amount and frequency of bribery (sometimes called administrative corruption (World Bank, 2011) and often represent a major obstacle for businesses, regardless extensive reforms in the region in cutting red tape, simplifying taxes, and strengthening audits. These reforms reduce the opportunities for corruption and show real results on the ground in many countries, with firms reporting bribery to be in some cases less frequent and in smaller amounts.[1] However, there is still a large gap between the level of corruption in transition countries and their more advanced counterparts.

Thus, there remain important reasons to reinforce and accelerate reforms. Moreover, corruption is falling not in all countries or all sectors, and even the most successful reformers still tend to have higher levels of corruption than in Western Europe (World Bank, 2011). Corruption continues to weigh most heavily on new private firms that are the engine of growth and employment in the region.[2] Whenever corruption is perceived as a severe obstacle to business, it is generally positively correlated to bribery or informal payments to government officials.

The impact of corruption on firm performance and the associated underlying mechanisms need to be assessed. Management is one of such mechanisms as quality of management is strongly linked to firm performance. This chapter investigates whether bribe frequency and corruption as an obstacle explain differences in managerial quality in transition countries. We find that it does explain substantially the difference between transition countries that are now EU members and the remainder of the region. EU memberships created incentives for improvement in governance and business climate that has given European transition countries an advantage over their peers in other regions, in terms of corruption levels and regulatory burden. This advantage is clearly reflected in significant improvement of managerial quality.

This chapter use the latest release of BEEPS V showing results characteristic for years 2012-2014, comparing these results with previous data. It is organized as follows: Section 2 looks at the literature related to managerial quality and its determinants. Section 3 explains how to measure management practices; Section 4 describes the pattern of management practices across transition countries, while Section 5 investigates the factors accounting for differences in management practices across firms and countries. Finally, Section 6 concludes.

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[1]On the one side, results about relative comparisons in 2008 versus 2005 in the perception of severity of corruption as an obstacle show that corruption increased in the period and moved up from third- biggest problem in 2005 to the second biggest in 2008. On the other side, results on administrative corruption show mixed results with an average increase in 22 transition countries according to the World Economic Forum survey and a decrease with the exception in public procurement, according to BEEPS IV.

[2]World Bank (2011) assesses levels and trends in corruption and the administrative burden from government regulation of private firms. Results are largely based upon BEEPS 2008 updating the progress that transition countries have made since 2005, showing favourable trend regarding firms' payments of administrative bribes with some country outliers and a significant exception in bribery in public procurement

5.2   Related literature

Economists have long been raising a question on the differences in productivity, across countries, firms and over time. Businesses' productivity levels vary significantly within industries. For example, looking at disaggregated data on U.S. manufacturing industries, Syverson (2004) found that plants at the 90th percentile produced four times as much as plants in the 10th percentile on a per-employee basis. Only half of this difference in labour productivity could be accounted for by differential inputs, such as capital intensity. Foster et al. (2008) show large differences in total factor productivity even within industries with very homogeneous goods. Some of these productivity differences across firms and plants are temporary, but in large part they persist over time. At the country level, Hall and Jones (1999) show how the stark differences in productivity across countries account for a substantial fraction of the differences in average per capita income. Moreover, they document that the differences in capital accumulation, productivity, and therefore output per worker are driven by differences in institutions and government policies.

Aggregate TFP, rather than labour productivity, differences across countries have been important explanations of the cross-country success. But, a puzzle still remains: observable characteristics such as human and nonhuman capital seem to be unable to account for large GDP per capita differences observed across countries. However, an expanded view of human capital that includes managerial and entrepreneurial skills can account for a significant share of the TFP differences(Gennaioli et al. 2013).Aggregate TFP differences across countries are also affected by how different economic systems allocate output to plants of heterogeneous productivity levels. The empirical evidence from firm-level data has shown that the widespread heterogeneity in firm-level performance is accompanied by substantial heterogeneity in the size of firms, even within narrowly defined industries. Data suggest that there is considerable variation in the strength of the link between productivity and size both, across countries and industries, as well as over time. Misallocation or allocative inefficiency as well as policy-induced distortions may be at the heart of the observed variation in the productivity-size covariances, contributing to the explanation of observed differences in aggregate performance.

However, recent empirical evidence focuses on another possible explanation for persistent differences in productivity at the firm and the national level, namely persistent differences in productivity largely reflect variations in management practices. The issue of whether management practices are an important factor in understanding the heterogeneity of firm productivity was at the heart of the World Management Survey (WMS) with their large scale samples of management data across firms and countries. Practices that are essential for good management (Bloom and Van Reenen, 2010) have been identified and measured, and most recent literature is in search for explanations. Many empirical contributions show [3] that numerous organizations throughout the world are very badly managed. Moreover, they show that indicators of better management and superior performance are strongly correlated with measures such as productivity, return on capital employed, and firm survival, and that management makes a difference

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[3]For a survey on what has been learned empirically and theoretically from WMS see Bloom et al. 2014

in shaping national performance.[4]

Looking at transition countries, evidence suggests that while there are many well-managed firms, many firms are also operating with extremely old-fashioned management practices. More generally, it appeared that decades of central planning had left many managers in small and medium-sized firms with weak financial management, no vision of how to develop their company, and how much investment they need. Several studies on firm productivity in transition countries highlights the lack of appropriate managerial skills as a possible explanation for lower productivity found among state-owned or formerly state-owned firms (Estrin et al., 2009). Bloom et al. (2012) investigate the factors that account for poor management in many transition countries. They find that factors that matter in non-transition countries matter in transition countries as well. Stronger product market competition, higher levels of multinational ownership, and greater employee education are all strongly correlated with better management. They also show that higher levels of private ownership are strongly correlated with better management. This suggests that the continued opening of markets to domestic and foreign competition, the privatisation of state-owned firms, and the increased levels of workforce education should promote better management, and ultimately higher national productivity.

The business environment in transition countries has improved since the beginning of 2000s. However, the transition regions have not yet reached the level of mature market economies. Moreover, any average measures masks important differences between and within countries, between different types of firms and between different dimensions of the business climate. In 2005, (EBRD, 2005) the business obstacles hit hardest those firms that are most likely to generate growth and new jobs, such as private firms, exporting companies and firms located outside of capital cities. Micro and small enterprises also faced a more difficult business environment than large firms – including accessing finance. In 2009, business obstacles still affected systematically especially manufacturing firms, firms in joint ventures with foreign partners and firms that compete with informal markets firms. Not only firms characteristics, but also country characteristics as, for instance, country geopolitical location (Anderson and Shimul, 2013) were important for the impact of business obstacles. Corruption was one of the main obstacles and its severity was associated to firms characteristics like private and larger firms and to type of countries where firms operate, like CIS countries. The severity of the corruption obstacle is on average positively connected with informal payments to government officials or bribe frequency. In general, as firms judge the obstacle to be more severe, the likelihood of making an informal payment rises (Anderson and Shimul, 2013).

In more general terms, corruption has been often associated with the deterioration of aggregate efficiency. The channels of the negative effects of corruption are manifold. In particular, it may alter aggregate efficiency by increasing the costs imposed either on firms, on government activity, or through the government's lack of efficiency to correct externalities (Olken and Pande, 2011). The most relative to this study is the first channel. In particular, corruption has been found to affect not only macroeconomic performance (Mauro, 1995), but also significantly

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[4]For example, variation in management accounts for nearly a quarter of cross country and within country TFP gaps in Bloom et al. 2014)

affect firm behaviour (Sequeira and Djankov, 2014), firm growth (Fisman and Svensson, 2007; Gaviria, 2002) and firm productivity (De Rosa et al., 2010). Moreover, Dal Bó and Rossi (2007) developed a model and supported it empirically, arguing that higher levels of corruption are associated with the higher presence of inefficient firms. Although the evidence supporting negative effects of corruption is strong (Aidt, 2009), the opinion persists that corruption can foster development in some cases by "greasing the wheels" of an economy (Méon and Weill, 2010). From the firm level perspective, Dreher and Gassebner (2013) illustrate that in highly regulative economy corruption reduces the deterioration effect of excessive regulations on business, thus, facilitating firm entry. Supporting evidence for "greasing-wheels" hypothesis has also been found for Chinese firms facing underdeveloped financial markets(Wang and You, 2012), and for SMEs in the Philippines (Mendoza et al., 2015).

Most of the discussed studies on corruption tended to focus on the corruption impact on firm economic performance. However, it is important to analyse the role of firm management in both enduring the negative presence of corruption and exploiting opportunities presented by it. In other words, it is necessary to look at the connection between corruption and firm management. The unanswered question is how firms are managed in the presence of corruption.

It is well known that corruption can deteriorate firm management practices (Athanasouli and Goujard, 2015). The main channels are the following three: first, managers are engaged in alluring public officials, through unofficial payments or gifts in exchange for services, licences or contract; second, specific forms of governance could prevail, capable to deal with conditions of a corrupt business environment; third, firms may pay bribes to outbid competing parties in public procurement. All this can result in lower managerial quality. However, it is possible that management of some firms may gain from corruption in terms of its efficiency. Basing on the issues highlighted by the managerial literature, Galang (2012) generates a theoretical model of firm strategy in the presence of government corruption. He argues that firms are not passive with respect to corruption, rather they are active contributors in boosting or resisting to corruption through their strategic activities. The model emphasizes that not all firms suffer from being embedded in a business environment with deep-rooted corruption because some of them are able and motivated to make these institutional inefficiency work in their favour. Building on the interviews with more that 300 top mangers in India, Collins et al. (2009) show that top managers are likely to rationalize corruption as mean for being competitive. Thus, the role of corruption as a determinant of management quality is not straightforward and require further analysis.

The search for determinants of management quality is a part of a larger field of research on the effectiveness and the channels of transmission of the many liberalization reforms of business that took place in transition countries and it can be central to any evaluation and design of public policies. Good governance institutions surely played an important role for the positive effects of liberalization reforms on firm performance and small business employment. For instance, in Russian regions with higher transparency of government, better access to independent sources of information, more concentrated large businesses, and better fiscal incentives,

the liberalization reform was better enforced and led to a significantly higher drop in the actual regulatory burden, and as a result, better outcomes. On the contrary, the most corrupt regions delay or circumvent the implementation of liberalization policies (Yakovlev and Zhuravskaya, 2013). Differential enforcement of liberalization features Russian regions goes hands by hands with different institutional environments. The geography of good governance institutions seems to have played a crucial role for business reforms enforcement. And thus geography matters not only for the geographical dispersion of management quality but also for the relative strength of the determinants of managerial quality, especially in Russia (Friebel and Schweiger, 2013). The role of good governance institutions and the degree of exposure to corruption seem to play an important role for firm performance, and for management practices.

We can take for given the importance of management, both at the macro level (in accounting for the large disparities in cross-country total factor productivity) and at the micro level (in accounting for unobservable components of within country TFP differences and firms' heterogeneity). Now the questions are: how we measure management differences, what are the main determinants of managerial differences across countries and whether or not these determinants are similar across countries that experienced very different institutional adjustments. Among these determinants a crucial role is played by the corruption and by the compliance burdens of firms in transition.

5.3   Data on management practices and corruption

5.3.1   Data: MOI 2008-2009 and BEEPS V 2012-2014

We use data from two data sets. The first data set is the EBRD-World Bank "Management, Organization and Innovation" (MOI) survey assessing management practices in 1,800 manufacturing establishments with between 50 and 5000 employees in 10 transition countries (Belarus, Bulgaria, Kazakhstan, Lithuania, Poland, Romania, Russia, Serbia, Ukraine and Uzbekistan) as well as Germany and India. The survey was implemented in partnership with the World Bank from October 2008 to November 2009. The objective of this survey is to measure and compare management practices across countries, to assess the constraints to private sector growth and enterprise performance resulting from management practices.

The second data set is the BEEPS V, the fifth round of the EBRD-World Ban "Business Environment and Enterprise Performance Survey", implemented from 2011 to 2014 that covers 15,883 enterprises in 30 countries of the transition region, including Eastern Europe and Baltics (Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovak Republic, Slovenia, Poland), South Eastern Europe (Albania, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Kosovo, Romania, Serbia, Montenegro), Eastern Europe and the Caucasus (Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine), Russia, Turkey and Central Asia (Kazakhstan, Kyrgyz Republic, Tajikistan, Mongolia, Uzbekistan). BEEPS V started in Russia in 2011-2012, covering 4,220 enterprises in 37 regions, followed by other countries in 2012-2014.

5.3.2 Good managerial practices: How to measure them.

To measure management requires codifying the concept of "good" or "bad" management into a measure applicable to different firms across the manufacturing sector. This is a hard task as good management is difficult to define, and is often contingent on a firm's environment. The initial hypothesis is that while some management practices are too contingent to be evaluated as "good" or "bad", others can potentially be defined in these terms, and it is these practices we consider. This is in line with Bloom and Van Reenen (2007) that suggest examples of practices that may be quantified and compared across countries and firms. However, there is room for legitimate disagreement over whether all of these measures really constitute "good practice". Three practices are generally considered in Bloom and Van Reenen (2007, 2010) studies as essential elements of good management: 1. Targets: Does the organization support long-term goals with tough but achievable short-term performance benchmarks? 2. Incentives: Does the organization reward high performers with promotions and bonuses while retraining or moving underperformers? 3. Monitoring: Does the organization rigorously collect and analyse performance data to identify opportunities for improvement? Using data from MOI (2008-2010) and BEEPS V(2012-2014) in Appendix A we detail the practices and the type of questions asked, including associated scoring system.[5]

With these data, we first have to construct a robust measure of management practices overcoming one hurdle: scoring management practices on the basis of available data. As argued in Bloom et al. (2012), practices in MOI data set can be grouped into four areas: Operations (one practice), Monitoring (seven practices), Targets (one practice) and Incentives (three practices). The operations practice focuses on the introduction of lean manufacturing techniques, the documentation of processes improvements and the rationale behind introductions of improvements. The monitoring practices focuses on the tracking of performance of individuals, reviewing performance (e.g. through regular appraisals and job plans), and consequence management (e.g. making sure that plans are kept and appropriate sanctions and rewards are in place). The targets practice examine the time-scale of production targets, namely whether goals are simply short term or more long-term or their combination. Finally, the incentives practices include promotion criteria (e.g. purely tenure based or including an element linked to individual performance), fixing or firing bad performers and rewarding production target achievement.

The calculation of the management quality score consists of 4 steps, as in Bloom et al. (2012). First, since the scaling may vary across practices the scores are converted to z-scores by normalizing each practice:

$$Z_{p_{ijc}} = \frac{P_{ijc} - \bar{P}_{ijc}}{\sigma_{P_{ijc}}} \tag{5.1}$$

Where where $Z_{p_{ijc}}$ is the z-score of management practice P_{ijc} of a firm i in industry j and country c, $\bar{P}_{ijc}$ is the unweighted average of management practice P_{ijc} across all observations

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[5]The questions and scoring is presented for the BEEPS V. For the MOI scoring is fully based on the scoring tables and questions presented in Bloom et al. (2012)

in all countries and $\sigma_{P_{ijc}}$ is the standard deviation of management practice P_{ijc} across all observations in all countries.

The second step consist of the calculation of the average of z-scores of different practices belonging to the same area. This is necessary to avoid biases towards the area of the management represented by the higher number of questions in the survey. Thus, the following unweighted average is calculated:

$$\bar{M}_{ijc}^{A} = \frac{1}{n_{P_{ijc},A}} \sum_{P_{ijc} \in A} Z_{p_{ijc}} \tag{5.2}$$

Where where $\bar{M}_{ijc}^{A}$ is unweighted average of management practices (z-scores) $Z_{p_{ijc}}$ belonging to the same management area A (operations, monitoring, targets or incentives) of a firm i in industry j and country c.

The third step is to average the performance of a firm across different management areas:

$$\tilde{M}_{ijc} = \frac{1}{4}(\bar{M}_{ijc}^{Oper} + \bar{M}_{ijc}^{Monit} + \bar{M}_{ijc}^{Targ} + \bar{M}_{ijc}^{Incent}) \tag{5.3}$$

The final step of the calculations consists of the trasforming the unweighted average in the z-score of the final measure with the mean zero and standard deviation 1:

$$MQ_{ijc} = \frac{\tilde{M}_{ijc} - \bar{\tilde{M}}_{ijc}}{\sigma_{\tilde{M}_{ijc}}} \tag{5.4}$$

The overall result M_{ijc} can be used as a measure of the management quality (across countries and across practices). The (positive/negative) deviations from the average score illustrates the ("good"/"bad") quality of the management.

In the BEEPS V data set the practices are also grouped into four areas. While the number of practices for some areas varies between MOI and BEEPS V, all the areas are represented and accomplish the same functions. The area of operations (one practice) represent how the firm deal with problems arising in the process of production, while the area of monitoring (one practice) cover the use of production indicators. The area of targets (three practices) represents the timescale for production targets, their difficulty and the awareness of them among managers and production workers. The area (three practices) of incentives addresses whether and how firms encourage performance, in particular through performance-based bonuses, promotions and discharging underperforming employees. The same procedure as for MOI data was used to average the practices and create a combined measure of the management quality.

Both of the datasets allow us to measure the quality of management at the moment of the interview. The measurement is, however, based on the survey responses of the firms. Survey data is often affected by the perceptions and experience of the respondent. One of the ways to limit such a basis is by elimination potential markers of desired answer in the questions of the survey. As the questions of the survey regarding the management quality was focused on the quantifiable measures rather than on the judgment of the respondent[6] the bias caused by the

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[6]An example can be fount in the question of the time frame of reassignment/dismissal of under-performing non-manager, that included the options like whithin 6 months, after 6 months or raraely/never

question formulation has been minimized. In particular, the ranking of the practices has been done by the survey organizers, rather than by the respondent. However, it is possible that firms that performed worse or better in the past could have differences in their management quality assessment due to their past experiences. This possibility is reasonable to analyze when the data on the past performances is available, in particular the data on such shock events like a near bankruptcy situation or the cases of particular success. In the absence of time series data, exclusion of such biases is highly challenging.

5.3.3 Patterns of management across practices and countries

Accounting for the distribution across countries, Figure 5.1 shows that Germany has on average the highest scores (0.13 more than sample average), Poland is second, Lithuania is third and the Uzbekistan is the last. Moreover, several country groups emerge. Central European transition countries like Poland and Lithuania operate with practices which are close to those of European countries, like Germany. Central Asian countries, i.e. Uzbekistan and Kazakhstan, are among the countries with the lowest quality of management. The presence of Germany at the top of the ranking is consistent with anecdotal evidence from other surveys. Figure E.1 in Appendix provides more details behind these cross-country comparisons, and reveals uneven distribution of best practices among countries. For instance the table shows a relative strength of Lithuania in targets, of Bulgaria in monitoring, of Ukraine in incentives, and German strength in operations.

Figure 5.1: Management practices across countries and country groups (MOI)

(a) Countries

(b) Country Groups
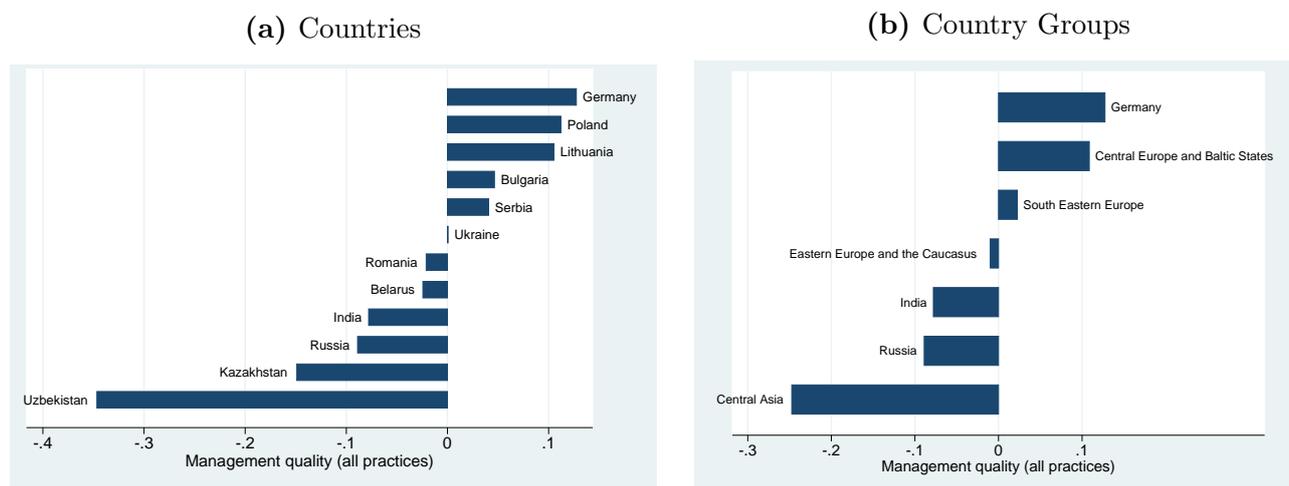
Source: own calculations based on the MOI survey (2009)

Using the data of the BEEPS V survey performed in 2012-2014, one may observe that some individual countries have moved up and down in the cross-country ranking of management quality. However, similar patterns are observed in terms of ranking of the country groups.[7] Although

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[7]The countries included in the country groups differ between surveys. In MOI data, Central Europe and Baltic States (CEB) includes only Lithuania and Poland, Eastern Europe and the Caucasus (EEC) includes

the representation of the country groups has changed between the surveys, using BEEPS V survey similar country groups emerge that approximate economic development. Central European transition countries are again among the best performers in terms of management quality. While, Turkey and Central Asian countries mostly operate with very poor management. The management quality in Ukraine and Belarus as a part of the Eastern Europe and the Caucasus countries is again very close to the one in Russia, although in BEEPS V it is slightly lower, while in MOI it is slightly higher. Scores across country groups (Figures 5.2)confirm this finding: the ranking goes from the positive results for Central Europe and Baltics, positive but lower results for South-Eastern Europe, to the negative outcome for Eastern Europe and the Caucasus and Central Asia. Significant differences across country groups characterize management practices in transition countries and for many countries these differences are persistent.

Figure 5.2: Management practices across country groups (BEEPS V)
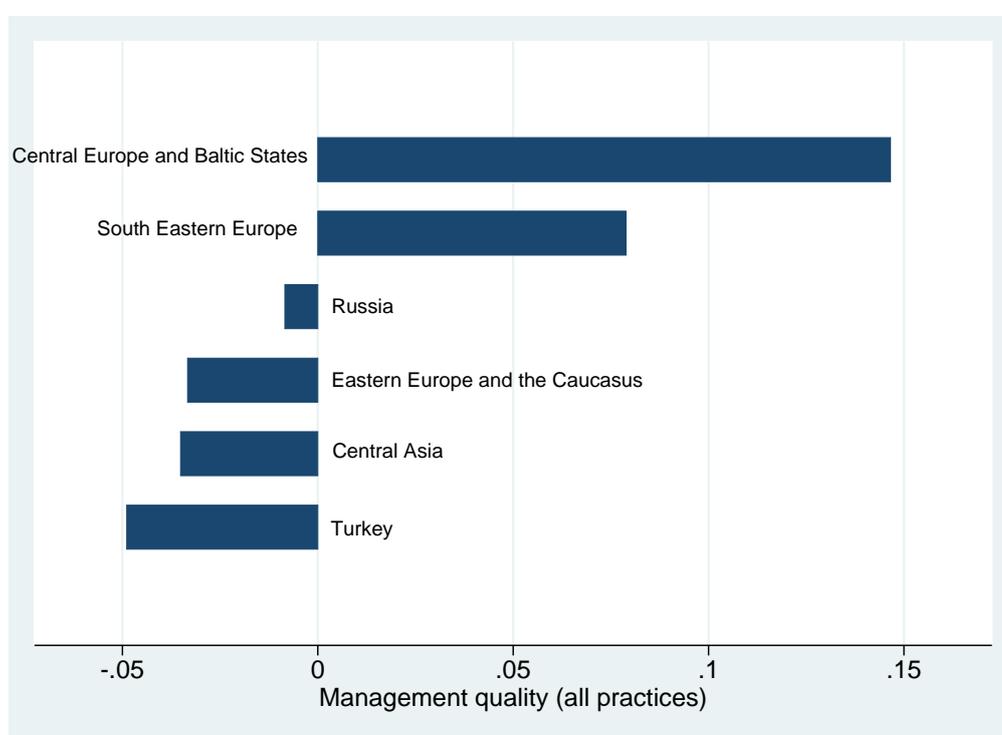
Source: Own calculations based on BEEPS V. Country groups: Central Europe and Baltics (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South-Eastern Europe (SEE)

In the more recent period, management scores range from an average score of -0.22 for Mongolia to 0.37 in Estonia (the distribution is presented in the Figure E.2 of the Appendix). Accounting for the distribution of management practices, Figure E.3 and E.4 of the Appendix shows the distribution of the average management scores in different areas of practices, plotted for country groups and individual countries. They appear highly heterogeneous within country.

Ukraine and Belarus, Central Asia includes Kazakhstan and Uzbekistan, and South Eastern Europe (SEE) includes Bulgaria, Romania and Serbia. BEEPS V allows better representation of the country groups. Thus, the comparison of country groups performance should be make with caution. However, grouping of countries presented in MOI data allows us highlight the similarity of the patterns between the surveys.

5.3.4   Corruption

In order two evaluate how deep is corruption incorporated in the business environment of transition countries we use three different measures. First gives us the idea on how frequent are informal payments to regulatory authorities when firms need to "make things done". This measure gives us the view a firm has on the overall frequency of administrative corruption in an industry and location where it operates. We will further mention it as administrative corruption. Second measure gives us the information of the frequency of administrative corruption in dealing with either customs (imports), taxes and tax collection or courts (further referred as administrative corruption by type). Both of this measures are normalized by the sample mean in our analysis in the similar to management quality way. The distribution of these two measures by group of countries is presented in the Figure 5.3

Unlike most freedom indexes predicts, Turkey is ranked among the countries with lower administrative corruption reported by operating firms. Such controversial ranking may be caused by the efficiency of the resent measures against corruption (Adaman, 2011) or by the structural differences in the perception of corruption frequency in this country.

However, the second best in the ranking is the group of Central European and Baltic countries, which usually perform better in most of characteristics of the institutional environment for business. Especially low levels of administrative corruption are in Estonia, Hungary and Slovenia. If we consider the types of administrative corruption, the lowest is the administrative corruption in taxes and tax collection. The next group of countries that perform better than average is the group of Southern Eastern Europe. Eastern European and the Caucasus countries perform worse than CEB, but better than Central Asia and Russia, while Russia is a leader in terms of highest levels of administrative corruption.

Figure 5.3: Administrative corruption by group of countries
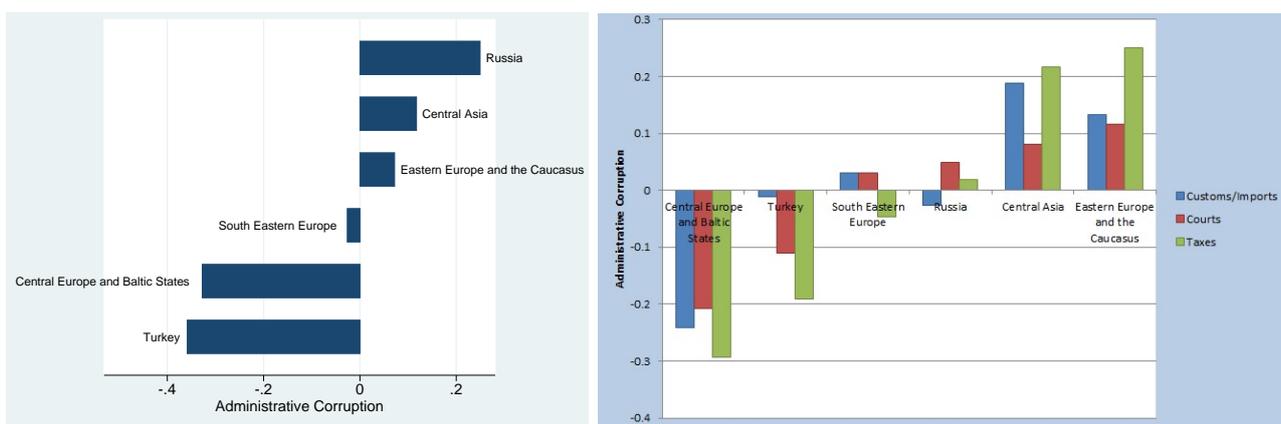
Source: own calculations based on BEEPS V
Note: Administrative corruption represents the standardized measure of the frequency of informal payments to "have things done" either in general (variable ecaq39) or in certain spheres like taxes and tax collection, courts or customs and imports (variables ecaq41a ecaq41b ecaq41c)

The third measure indicates in what degree a particular firm considers corruption an obstacle to its operation. In particular, it shows whether the obstacle is minor, moderate, major or very

severe. This measure is more subjective than the two previous measures as the perception of an obstacle may vary depending on a firm performance, its characteristics and experience of dealing with authorities. Opposite to the previous measures, the answer scale has no quantifiable minimum and maximum as they are "no obstacle" and "very severe obstacle", respectively.[8] However, the use of this measure allows us to highlight the characteristics of and drivers behind firms' perception of corruption. As the later may potentially affect firm behaviour and organization.

The distribution of corruption as an obstacle between country groups is presented in the Figure 5.4. As the left chart of the figure shows the lowest average score of corruption as an obstacle is observed in Turkey and Central Europe and Baltics. However, there is significant differences in severity of the obstacle corruption represents. In Turkey much higher than in CEB is the number of firms report that corruption is a very severe obstacle, while it is mainly a moderate obstacle in CEB. Russia and South Eastern Europe are among the worst performers, and while in Russia corruption is extremely more often a major obstacle, in SEE poor performance is mostly due to corruption being a very severe obstacle.

Figure 5.4: Administrative corruption by group of countries
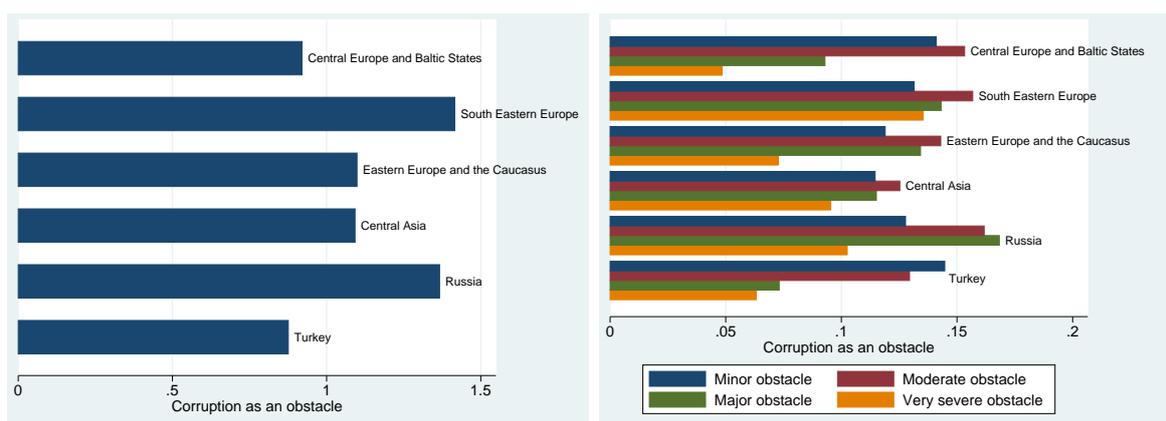
Source: own calculations based on BEEPS V
Note: Corruption as an obstacle represents either the average score of the variable j30f by country group (left) or the share of firms responding that corruption represent an obstacle of a certain degree (right)

As these figures show the ranking of countries may differ depending on the type of corruption measure is used. However, a bigger share of the patterns is characteristic for multiple measures of corruption. Although, one comment is in order. While the administrative corruption mainly represent the idea of firms about average exposure of other firms like themselves to informal irregular payments to regulative authorities, corruption as an obstacle represent the perception of a particular firm reflecting how big is the burden of corruption to its operations and efficiency. Such distinction is important as while the main tool of anti-corruption and regulative reforms is the reduction of the frequency of informal payments to authorities, the main aim is usually

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[8]The frequency of bribes varies between never (0% of cases) and always (100% of cases) that have the same meaning independently of the country or firm characteristics

to decrease the burden of corruption for business.

5.4 Empirical Strategy

Main specification

The estimation strategy is to run regressions of the following form:

$$MQ_{ijc} = \beta_0 + \beta_1 \boldsymbol{Corr_{ijc}} + \bar{X}_{ijc}\beta_2 + \beta_3 W_c + \beta_4 Wj + u \tag{5.5}$$

where MQS_{ijc} is the Management score by firm i, in industry j and country c The main variable of interest is $Corr_{ijc}$ which is the measure of corruption at the firm level representing either normalized frequency of administrative corruption or dummy variable of the frequency of administrative corruption when firms deal with imports/customs, taxes or tax collection, and courts. The model also includes a number of control variables (vector X_{ijc}) that serve to detect the influence of observable firm-level characteristics on the corruption-managerial quality relationship. It includes dummy variables representing the type of firm ownership, size and age of the firm, and the that consist of firm-level variables like human-capital and ownership concentration. We also control for country W_c and industry W_j fixed effects.

Corruption as an obstacle

In order to underline the connection between management quality and the perception of corruption reported by firms we estimate the following equation:

$$MQ_{ijc} = \beta_0 + \boldsymbol{CorrObst_{ijc}}\beta_1 + X_{ijc}\beta_2 + X_{ijc}^2\beta_3 + \beta_4 W_c + \beta_5 Wj + u \tag{5.6}$$

where $CorrObst_{ijc}$ reflect the degree of obstacle represented by corruption as viewed by a firm i, in industry j and country c. The difference from the previous specification mainly lies in two aspects. First, we use the perceived level of corruption as an obstacle $CorrObst_{ijc}$ (set of dummy variables; explained in more details in Table E.1). Second, we include the interactions of this level with a set of firm characteristics in the vector X_{ijc}^2. The inclusion of this vector allows us to highlight the possible firm features affecting both firm perception of corruption and its management quality.[9] Vector X_{ijc}, as in previous specification, includes the controls

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[9]This allows us to eliminate a part of possible endogeneity caused by different firm characteristics. Nevertheless, other firm-level features may potentially affect firm perception of corruption. Such endogeneity is often dealt in the literature through the use of instrumental variables or group averages excluding firm own response (Aterido et al., 2011; Commander and Svejnar, 2011). Although we are concerned with endogeneity problem, we find the instrumental variable approach infeasible. Moreover, in this study we are interested in the connection between firm perception and both firm size and type of ownership. Consequently, desired way to deal with endogeneity other than the one caused by these two features would be to estimate average corruption perception of firms similar to interviewed firm in terms of country of activities, sector, size and ownership. However, data limitations do not allow us to have such a grouping, as number of state- and foreign-owned firms within country-sector-size groups is too small. As a result, acknowledging the possible endogeneity of this measure we use it strictly as a complement for the main specification

for human-capital and ownership, size and age of firms. We also control for country W_c and industry W_j fixed effects.

In both cases the OLS regression is used in order to highlight the influence of corruption on the continuous differences in the quality of management. Clustered standard errors are used in order to account for possible correlation of errors between firms within countries.

The detailed description of the construction of control variables is presented in Table E.1 in the Appendix E

5.5 Results

5.5.1 Administrative corruption and management quality by country

Privatization and the adoption of new regulatory systems in the period of transition provided enormous opportunities for bribe-seeking and improper use of connections and influence. Some countries have been able to partly defeat an incentive to use these opportunities. Some other have been much less efficient in doing so. As a result, we may observe that in countries with lower frequency of corruption (administrative corruption) successful countries also are characterized by, on average, higher quality of management. The unconditional correlation between the management scores and the measure of administrative corruption is displayed in Figure 5.5 for main groups of countries, whereas distribution of some types of administrative corruption are displayed in Figures E.5 and E.6.

This initial graphical evidence shows that, although the link between administrative corruption and management quality on average tends to be negative on the country level, this link can be quite different for different country groups. While Central and South Eastern European transition countries show on average a negative link between managerial quality and corruption, they also present much lower superior limit of corruption and much higher superior limit of management quality. The rest of transition countries on average show much weaker negative link between administrative corruption and management quality, mostly due to the presence of much higher idiosyncrasy of the association: some countries reveal a positive association between deviations from the average of corruption and the quality of management. For instance, a comparatively higher level of administrative corruption in Kyrgyzstan is associated with a comparatively higher level of management quality. Comparatively lower levels of corruption in Turkey and Belarus are associated with comparatively lower levels of management.

Such initial results illustrate that, although the link between administrative corruption and management practices is negative on the country level, there are some unobserved features of countries and firm performance that may alter, and even reverse, this link.

Figure 5.5: Administrative Corruption and Management Quality (BEEPS V)
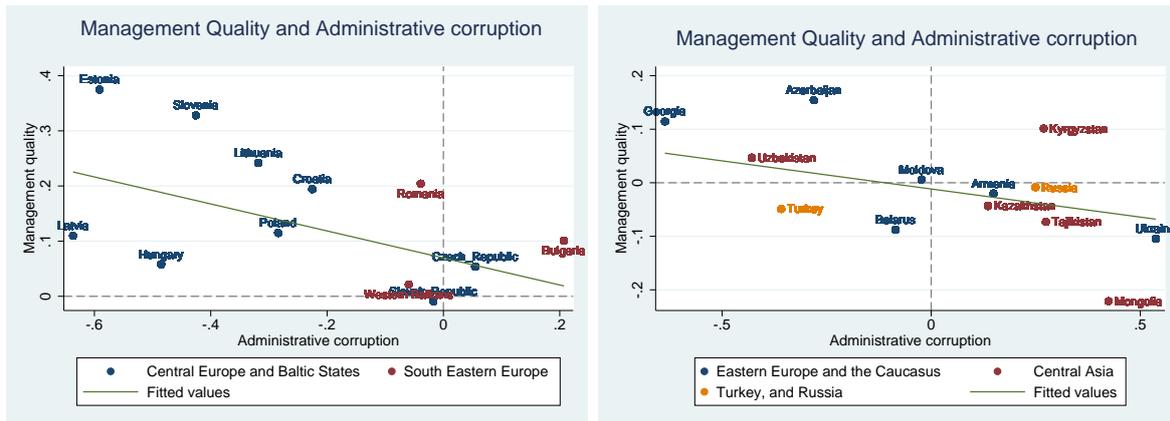
Source: Own calculations based on BEEPS V

Note: Country groups: Central Europe and Baltics (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South-Eastern Europe (SEE). Western Balkans include Serbia, Bosnia and Herzegovina, Kosovo, Albania, FYR Macedonia, Montenegro.

5.5.2 Corruption and management quality: within and between countries

In order to evaluate country and firm features that may affect the link between corruption and management quality, we have moved to the firm-level regression analysis. The results of the analysis on the total sample are presented in Table 5.1. The results indicate that administrative corruption is an important obstacle to management quality.

Supporting previous results of the unconditional correlations, the results in Table 5.1 show statistically significant negative association between the level of administrative corruption and management quality. This result is obtained by accounting for both between-countries and within-country variation. The partial correlation of -0.027 in this case means that an increase of frequency of administrative corruption from seldom to very frequent, on average, would result in decrease of management quality from 0.0541 to -0.004. In other words, such a difference would be equal to the difference between average management quality in Czech Republic and average management quality in Serbia.

The results also show that the link between administrative corruption and management quality may be idiosyncratic on the sub-national level in different countries and for different firm. As soon as we eliminate the between-countries variation from the regression (Table 5.1 column 'CountryFE'), the coefficient becomes statistically insignificant. Indicating that within-country connection of corruption with management quality may not be grasped by the unique empirical model for all transition countries.

However, we find significant negative link between administrative corruption in tax collection (taxes) and management quality characteristic for all the countries in the sample. This results underlines that certain types of administrative corruption may have stronger negative impact at the quality of management that others.

Table 5.1: Management Quality and Corruption. Firm-Level Results

	Base	Country FE	Corruption Type	Corruption Obstacle
Administrative corruption	**-0.047***	-0.013		
	(0.024)	(0.021)		
Administrative corruption(customs/imports)			0.020	
			(0.025)	
Administrative corruption(courts)			0.028	
			(0.046)	
Administrative corruption(taxes)			**-0.083***	
			(0.042)	
Corruption-Minor obstacle				-0.260
				(0.237)
Corruption-Moderate obstacle				**-0.918***
				(0.492)
Corruption-Major obstacle				-0.348
				(0.256)
Corruption-Very severe obstacle				**-0.729***
				(0.363)
Foreign ownership	0.186*	0.062	0.067	0.016
	(0.099)	(0.089)	(0.097)	(0.071)
State ownership	-0.065	-0.123	-0.121	-0.163
	(0.141)	(0.156)	(0.152)	(0.149)
Size	0.021	0.033	0.045**	-0.001
	(0.018)	(0.020)	(0.019)	(0.032)
Age	-0.025	-0.049**	-0.044**	-0.033
	(0.030)	(0.020)	(0.019)	(0.020)
Size# Minor obstacle				0.015
				(0.058)
Size# Moderate obstacle				**0.130***
				(0.073)
Size# Major obstacle				0.037
				(0.048)
Size# Very severe obstacle				0.104
				(0.068)
State# Moderate obstacle				**1.412****
				(0.567)
State# Major obstacle				**0.605*****
				(0.194)
Foreign# Moderate obstacle				0.112
				(0.199)
Foreign# Major obstacle				0.079
				(0.168)
Foreign# Very severe obstacle				**0.376***
				(0.201)
Constant	0.381**	0.695***	1.215***	0.568***
	(0.164)	(0.147)	(0.185)	(0.161)
Country dummies	No	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Response controls	Yes	Yes	Yes	Yes
Likelihood	-2919.31	-2862.71	-2762.00	-3123.01
R2	0.037	0.088	0.092	0.098
p-value(Wald)	0.037	0.088	0.092	0.098
IC				
N	2081	2081	2009	2296

The control variables include "Response controls": the variables controlling for respondent gender, the judgment about the truthfulness of the responses (variable a16), and the sources of the data for quantity questions (variable a17).

The results also show negative within-country connection between the corruption as an obstacle and management quality, though its strength differs depending on the degree of its severity. In particular we find statistically significant negative connection of corruption being moderate and very severe obstacle. Although, it is important to underline that the connection is heterogeneous for different types of firms. For example, the effect of corruption being moderate

or major obstacle on managerial quality becomes positive if the firm is state-owned. The negative association of corruption being very severe obstacle is weaker if the firm is foreign-owned. Bigger firms suffer less from corruption as a moderate obstacle. Such results indicate that while anti-corruption and business regulation measures may give more space for the growth of management quality in transition countries, the effects of such measures may greatly depend on the firm-level characteristics, and ownership in particular.

As Section 5.5.1 shows there are significant differences between different groups of countries. In order to explore the difference in terms of the connection between management quality and corruption we apply our empirical model to EU transition countries and non-EU transition countries separately. The results in the Table 5.2 confirm that there exist significant differences between two sub-samples.

Table 5.2: Management Quality and Corruption. Differences between firms in EU and non-EU countries

	EU countries		non-EU countries	
	Country FE	Corruption Obstacle	Country FE	Corruption Obstacle
Administrative corruption	**-0.141****		0.014	
	(0.058)		(0.019)	
Corruption-Minor obstacle		0.439		**-0.212***
		(0.675)		(0.116)
Corruption-Moderate obstacle		-0.414		**-0.527***
		(0.522)		(0.284)
Corruption-Major obstacle		-0.185		-0.145
		(0.386)		(0.188)
Corruption-Very severe obstacle		**-1.258***		-0.289
		(0.595)		(0.219)
Foreign ownership	0.097	0.037	0.052	-0.026
	(0.108)	(0.114)	(0.115)	(0.054)
State ownership	-0.356	-0.543	-0.113	-0.093
	(0.387)	(0.323)	(0.179)	(0.086)
Size	0.046	0.033	0.022	-0.004
	(0.033)	(0.066)	(0.024)	(0.021)
Age	-0.024	0.018	-0.025	**-0.019****
	(0.069)	(0.079)	(0.021)	(0.009)
Size# Minor obstacle		-0.132		0.020
		(0.154)		(0.033)
Size# Moderate obstacle		0.053		**0.077***
		(0.122)		(0.041)
Size# Major obstacle		-0.009		0.012
		(0.107)		(0.035)
Size# Very severe obstacle		0.217		0.036
		(0.165)		(0.041)
State# Minor obstacle				0.301
				(0.281)
State# Moderate obstacle				**0.706****
				(0.283)
State# Major obstacle		**0.879****		
		(0.330)		
State# Very severe obstacle				
Foreign# Minor obstacle		0.089		0.103
		(0.394)		(0.216)
Foreign# Moderate obstacle		0.244		0.004
		(0.295)		(0.135)
Foreign# Major obstacle		-0.243		0.148
		(0.236)		(0.113)
Foreign# Very severe obstacle		0.352		0.202
		(0.226)		(0.125)
			(0.003)	
Constant	0.321	-0.377	1.318***	0.986***
	(0.286)	(0.391)	(0.185)	(0.185)
Country dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Response controls	Yes	Yes	Yes	Yes
Likelihood	-533.54	-595.83	-2128.44	-1302.33
R2	0.143	0.145	0.078	0.079
N	435	489	1534	1846

The control variables include "Response controls": the variables controlling for respondent gender, the judgment about the truthfulness of the responses (variable a16), and the sources of the data for quantity questions (variable a17).

In fact, the results show that the connection between administrative corruption and management quality is negative and statistically significant for EU transition countries at the within-country level, but keeps to be insignificant for non-EU transition countries. The coefficient of -0.71 show us that if the administrative corruption from being seldom should become frequent it would bring firms from performing above the average of EU transition countries to performing below the average, with all the rest being equal. The table also present that management quality of firms in EU transition countries are more sensible to the high corruption levels, while quality of management quality in non-EU countries is responding more to the lower levels of corruption. This is drawn from the fact that lower management score in EU countries is mostly associated with corruption being perceived as a severe obstacle, while it is mostly associated with corruption being perceived as minor or moderate obstacle in non-EU transition countries. Table 5.2 (columns 'CountryFE'), however, highlight that state-owned firms are responding differently to corruption in terms of management quality both in EU and non-EU transition countries.

The results provide two main ideas with respect to the link between corruption and management quality in non-EU transition countries. First, the link is not evidenced to be significant for within-country distribution of management quality. Second, corruption only on the lower levels of severity is associated with lower quality of management. We do not observe the negative connection of higher levels of corruption. This may perhaps be explained by the diversity of countries represented in this group. Some of these countries at the very low level of development, and, as it was mentioned above, some present idiosyncratic link between corruption and management quality. One of such examples is Moldova. The results for this country are presented in Table 5.3.

The table shows the positive connection between administrative corruption and management quality at the firm-level, which is the opposite of what we observe for more developed transition countries of the EU. Evidence has been drawn highlighting that on the lowest level of development corruption may be correlated positively with firm performance (Svensson, 2003).

Table 5.3: Management Quality and Corruption in Moldova

	Moldova	
	Adm. Corruption	Corruption Obstacle
Administrative corruption	**0.254****	
	(0.091)	
Corruption-Minor obstacle		-0.236
		(0.336)
Corruption-Moderate obstacle		0.416
		(0.451)
Corruption-Major obstacle		**0.423****
		(0.195)
Corruption-Very severe obstacle		0.225
		(0.240)
Constant	-0.532	-0.159
	(0.572)	(0.699)
Likelihood	-4.63	-9.73
R2	0.620	0.521
p-value(Wald)	0.620	0.521
N	34	39

Note: $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

It is argued that at the low level of development it becomes beneficial for firm growth (Méndez and Sepúlveda, 2006; Neeman et al., 2008; Méon and Weill, 2010) as it provides mechanisms to overcome inefficient regulations (Wang and You, 2012). The presence of such countries and/or regions in the group of non-EU transition countries creates asymmetries and may cause insignificant results as we observed above due to positive and negative links between corruption and management quality being cancelled out.

5.6 Conclusions

Excessive, complicated or continuous changing regulations to business activity create an environment in which firms make irregular payments or bribes to government officials. Thus, the reduction of the burden created by such regulations would also reduce bribery or administrative corruption. Multiple countries in transition have implemented different reforms aimed at reduction of regulation burdens, but results are highly mixed.

This chapter have drawn empirical evidence on the link between the frequency of irregular payments (administrative corruption) and corruption as an obstacle with the quality of management in transition countries. We show that on average corruption affects firm management quality in a way that changes drastically across country groups. Overall the results show the negative link between overall management scores and administrative corruption and corruption as an obstacle. But the differences between groups of countries belonging to the European Union and those who do not are striking. Some countries in the non-EU transition countries, in fact, present the opposite trend.

Before interpreting the results of this study, it is important to mention its possible limitations. First, the measurement of the management quality is based on the survey responses of the firm representatives. Thus, the respondents may be biased by their past experience and

firm past performance. Although the framework of the survey has been developed to limit possible responses biases, there is still the possibility of management quality assessment being biases by the firm and respondent past experience. However, the elimination of such remaining biases is limited by the data available for the resent study. Second, Athanasouli and Goujard (2015) show that the link between a firm management quality and corruption may vary between industries and depends on the degree of industry contract dependence. In our study, the industry dimension has not been explored in such a detail. Although accounting for the contract dependence of different industries may help us explain drastic differences between EU and non-EU countries, at the moment the implementation of such a framework is limited by the data constraints. Third, potential endogeneity connected with the measurement of corruption as an obstacle is not fully eliminated in the study. The use of the corruption as an obstacle has allowed us to illustrate the connection of corruption perception with the firm characteristics, such as ownership. However, there may exist other firm-level characteristics that affect both the firm perception of corruption and its management quality. Dealing with this limitation, however, is bounded by two factors. First, the use of this measure in this study has been motivated by its connection with the firm features, and, thus, aggregation or instrumentation would eliminate this feature. Second, the sample of the data available for the analysis is not sufficient to aggregate the corruption perception using location, size and firm features grouping.

The key conclusions of this study include two main points. First, further simplification of business regulations and measures discouraging payment and acceptance of bribes would be unquestionably efficient in EU transition countries. Such measures would contribute to higher management quality both at the firm and at the country level. Second, similar measures may not be equally efficient for non-EU transition countries. Higher specificity of a number of this countries, as well as firm characteristics, should be taken into account when reforms of business regulations are designed. One must be aware of the channel through which policy makers can positively affect management quality before putting reforms in action. In some cases, the efficiency of such reforms may be mediated by idiosyncratic connection between corruption and management quality, and thus performance. No uniform solutions may be applied in less developed countries and regions among non-EU transition countries where corruption may act as "efficiency grease". Especial attention should be paid to firm characteristics in these countries as, for instance, state-owned firms may react differently from private firms nullifying the effects of the policies.

Conclusion

Firm organization has for long been treated as fixed and modeled as a random draw. However, organization is neither fixed nor random. Studies merging organizational economics with international trade illustrate that organizational decisions are endogenous and largely depend on production characteristics and the economic environment. This thesis has explored how both firm and environment characteristics are connected with changes of firm organization. It has considered the decisions to redefine firm boundaries, and the prevalence of vertical integration, internal organizational restructuring and management quality. In particular, the thesis addresses the following questions:

- To what extent are contractual friction due to technological complexity and the weakness of contracting institutions associated with the decisions of firms to redefine their boundaries?

- What drives the organizational decisions of firms to flatten in transition countries after privatization reforms have finished? May flatter structures be associated with a higher degree of control in these countries?

- Is corruption negatively connected with the quality of management? Are there country- and firm-level characteristics that define idiosyncrasy in the link between the quality of management and corruption?

The empirical findings of this thesis show that the main forces defining contractual frictions, namely technology complexity and quality of contracting institutions, have opposite effects on firm boundaries. The degree of influence is different for different groups of countries. Moreover, labor productivity tends to be positively associated with vertical integration in more advanced EU transition countries, but not in the rest of the transition region. Openness to trade is also illustrated to be connected with decisions to redefine firm boundaries through the increase in product market competition and export possibilities.

However, regardless of massive reforms in transition countries and high expectations about their effect on firm restructuring, only a small proportion of firms experienced organizational changes in the years concerned (2002-2005 or 2007-2009). This inability of firms in transition countries to change is driven mainly by the weakness of contractual enforcement. This is alarming because firms that are able to change out-perform their rigid counterparts in numerous ways. This may indicate why the results of reforms, especially in the least advanced countries of the transition region, have largely fallen short of the expectations and why growth perspectives are so different in two sub-groups of transition countries. While the most successfully reformed countries of the region have been able to encourage efficient firm restructuring, in the countries

lagging behind in terms of completeness of reforms firms are facing an economic environment that prevents them from optimizing their organization.

When internal organization is examined, the data show little restructuring as well. However, firms are readily affected by trade openness. The results show that massive increases in the level of import competition on the product market drive the decisions of firms to flatten their organizational hierarchies. Moreover, this study highlights that flattening may be associated with centralization and more restrictive control, much more than is usually thought in the literature. These results highlight not only that firms adjust their organization actively when environment conditions are changing notably; they also emphasize the need for new theoretical studies on this issue, because little theory has been conclusive in explaining such empirical findings. The theoretical studies on the gains from international trade openness, therefore, need to be revisited because consideration of internal firm restructuring, which may potentially affect intra-firm growth of productivity, may change our understanding of reallocation and selection effects due to trade liberalization.

A joint reading of the empirical results and stylized facts presented in chapters 1 to 4 illustrates that the economic environment, and especially contract enforcement and regulations, is significantly associated with firm organization. However, it is sometimes argued that the policy measures directed to improve that such environment may face obstacles connected with the structural characteristics of the interaction between firms and regulatory authorities. One of such characteristics that has been shown to interact with the efficiency of regulatory reforms is corruption. As the ability of firms to create efficient organizations may be highly dependent on the quality of management, the last chapter of the thesis illustrates the connection between the quality of management and corruption. This connection evidences that structural characteristic of the relationships between private firms and public services may interact with the effects of regulatory reforms. The empirical results highlight that the presence of corruption is generally negatively connected with the quality of management. However, this link is idiosyncratic on the firm level in less developed countries of the region. This indicates that improvement of the business environment, which is the main objective of the reforms, may be crowded out by corruption. Moreover, policies that have been highly efficient in some countries may produce exactly the opposite results in others.

Moreover, the thesis has identified significant differences in all the considered types of firm-level organizational behavior between country groups, namely between EU and non-EU transition countries. This illustrates that the countries with comparatively similar starting points have achieved remarkably different results, not only in terms of their growth perspectives but also in terms of firm organization and firms' ability to change their organization with respect to the changing market environment. The differences are persistent and highlight that not only are markets and institutions different in these country groups but also firm characteristics and firm perspective greatly differs between them. This evidence indicates that firm organization, especially in less advanced countries of the transition region, requires more attention from both empirical and theoretical points of view. Only through understanding of the firm organization

in these countries can economists understand how the systemic problems of these countries may be tackled.

To conclude, the results of this thesis argue that both theoretical modeling and policy advice should pay careful attention to the complex system of interactions between the economic environment and endogenous and constantly changing firm organizations, especially in countries like the transition ones. The use of a bottom-up approach and analysis of firm behavior may be crucial for understanding the micro foundations of macroeconomic and international performance. Excluding such micro foundations and the influence of firm organization from economic analysis may result in inconsistent predictions about the channels of transmission and effects of trade liberalization policies, as well as regulatory and industrial reforms.

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Appendix A

Appendix to Chapter 1

A.1 Used Datasets

A.1.1 Business Environment and Enterprise Survey (BEEPS)

The Business Environment and Enterprise Performance Survey (BEEPS) is a joint initiative of the European Bank for Reconstruction and Development (EBRD) and the World Bank Group (the World Bank). The survey is repeated approximately every three years and represent firm-level data on the firms' perception of business environment, their performance and some organizational and production changes in the previous three years. It represents stratified random samples of a transition countries' private sector[1]. It is collected through face-to-face interviews.

The survey was first undertaken 1999 – 2000, when it was administered to approximately 4,100 enterprises in 25 countries of transition countries (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Turkey, Ukraine, and Uzbekistan) to evaluate the environment for private enterprises and their business development. The distribution of the size of firms was skewed towards small and medium enterprises. The differences in industry categories in the sample reflected the variations in the national economies

In the second round of BEEPS in 2002, the survey included 6,667 enterprises in 27 countries[2]. The survey covered both industrial sectors and services. Their representation was determined by the relative contribution of GDP with minimum of 15% for either. Firms that operated in sectors subject to government price regulations and prudential supervision, such as banking, electric power, rail transport, and water and waste water were excluded. The minimum quota for each category, namely size, ownership, exporters and locality, was set at 10% of the total sample. The sample frame was elaborated to be as representative (self-weighted) as possible subject to these quotas. Firms established later that 2000 was excluded from the survey.

In the third round of BEEPS, the survey included more than 9,000 enterprises in 27 countries[3]. It was implemented mostly in 2005. As in 2002 sectoral representation of manufacturing

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[1]Since 2008 BEEPS has followed the Enterprise Surveys Global Methodology to create stratified random sampling. Earlier diverse quota was used to reach representatives. The details on earlier sampling methodology can be found in the reports on sampling and implementation, available on the EBRD website (http://ebrd-beeps.com).

[2]Tajikistan, and Yugoslavia was added to the BEEPS 1999 set of countries

[3]Yugoslavia was represented by Serbia and Montenegro as a single country

and services was determined by their relative contribution to GDP. Firms that operate in sectors subject to government price regulation and prudential supervision were excluded. The quota in terms of size, location, ownership and export status were the same as in 2002. Moreover, a panel component of the sample consisted of slightly more than 1,000 firms that were interviewed in 2002 as well. In seven of the countries (Kazakhstan, Armenia, Azerbaijan, Poland, Hungary, Romania and Moldova) more than 1,700 additional interviews were made among firms in three manufacturing sectors: garments, food processing and metal and machinery. Furthermore, a survey was implemented in Ireland and Spain in 2005, and Germany, Greece, Portugal, South Korea and Vietnam in 2004 to provide comparisons for transition countries.

In the fourth round of BEEPS in 2008-2009, the survey covered more than 11,900 firms in 29 countries [4]. The survey was restructured to improve cross-country comparability and to make it compatible with the Enterprise Surveys of the World Bank. There were significant changes in the questionnaire and methodology. Some questions were fully eliminated or modified, while others were added. However, limited use of panel component (2005-2009) of more than 1,500 firms is sometimes possible; panel component including three rounds (2002-2009) includes only 374 firms. Starting from this round three questionnaires, manufacturing, retail, and core (residual sectors), are used to survey firms in different activity sectors. Numerous questions overlap between questionnaires, but some are applicable only to specific type of activities. Starting from this round the weights reflecting the eligibility of firms are also included in the data.

Since 2008, the survey frame included the majority of manufacturing sectors, and services sectors (wholesale, retail, hotels, restaurants, transport, storage, communications, IT) and construction. Unlike previous rounds firms in extraction, real estate, equipment renting, research and development, other business activities, and other community, social and personal service activities were excluded (ISIC Rev 3.1 codes 10-14, 70-74, 92.1-92.4 and 93). No restrictions on the age of firms were laid. Fully state-owned firms were excluded from the sample.

The fifth round of BEEPS in 2011-2014 covered more than 15,800 enterprises in 30 countries (Kosovo was interviewed separately), including 4,220 enterprises in 37 regions in Russia. The panel component including 2,730 firms interviewed in 2008-2009 is also available. The latest round includes an Innovation Module, covering product, process, organizational and marketing innovation. A section accessing management practices is also included in the questionnaire for the first time. However, only enterprises in manufacturing with the size of more than 20 employees (50 employees for Russia) were asked the questions on management practices.

A.1.2 Management, Organization and Innovation (MOI)

The Management, Organisation and Innovation (MOI) Survey aimed at the analysis of management and innovation practices, and firms' internal organization in 10 transition countries (Belarus, Bulgaria, Kazakhstan, Lithuania, Poland, Romania, Russia, Serbia, Ukraine and Uzbekistan), and is based on the work of Nick Bloom and John Van Reenen. The data set

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[4]Due to separation of Serbia and Montenegro, the number of countries increased by one. Firms in Mongolia were interviewed for the first time.

includes information on 1,800 manufacturing establishments with at least 50 and at most 5000 employees. The survey was implemented by the European Bank for Reconstruction and Development in partnership with the World Bank through face-to-face interviewing from October 2008 to November 2009. In order to provide baselines for the performance of firms in transition countries, firms in Germany and India were interviewed as well. The sampling frame was based on Bureau Van Dijk's Orbis database when available and for some firms, with the permission of the EBRD, merged information from the Bureau Van Dijk's Orbis database was used to describe firm performance in this thesis. In some countries (Kazakhstan and Uzbekistan) the sampling frame was based on the information obtained from registering state or statistical offices.

Two versions of the questionnaire were implemented. First questionnaire was used when interviewing establishments that are part of multi-establishment firms, while second accessed the practices and performance of single-establishment firms. The first questionnaire includes all the questions of the second, only questions regarding the position of a particular establishment and organization of the establishment net are excluded. The main difference is in the reference to a particular respondent establishment, which is called "national firm" in the first questionnaire and a "firm" in the second. The survey is targeted at senior managers, who are close to day-to-day operations of the firm.

Even though the MOI survey was run in conjunction with BEEPS IV, selected establishments participated in only one of these two surveys, that is, either BEEPS IV or MOI survey, but not both. The survey allows researchers to reach several objectives: (i) to analyse management and organizational practices applied in transition countries (ii) to give quantitative representation to the quality of management and compare it across countries, and (ii) to conduct firm performance analysis focusing on the interaction between firm organization and management, its organization, and performance in manufacturing. To achieve these objectives the sampling methodology generates a random sample representative of the manufacturing sector.

A.2 Reforms in Transition countries: space and time dynamics

1990s

First stage of transition towards market economy took place in all the transition countries in the beginning of 1990s, right after the break-up of the Soviet Union. Although in a big share of countries was expected to be rapid and give fruits in comparatively short time, full scope of transition challenges and related trade-offs became apparent only when the actual reforms were attempted. As expected, centrally planned system was demolished in quite a short time. However, the new market-based mechanisms were nowhere close to being functioning. Production and trade links within the region were ruptured, complicated by the painful macroeconomic consequences of the dissolution of the Soviet Union, and enterprises (both small and large)

found themselves at the beginning of a long journey towards the reintegration through market into both local and global supply chains. Many of producers closed as were unable to adapt towards new market conditions. As a result, most countries experienced extreme difficulties during the first years of transition, including extreme drops in output, skyrocketed inflation, boom of informal economy, and severe increase in poverty.

The countries with better initial conditions, less dependent on trade with the former Soviet Union and closer to advanced markets were more successful in reaching the stabilization. Moreover, the policy was critical. Most of the transition countries started the small-scale privatization, price and trade liberalization already in the beginning of 1990s, but the results were uneven. For instance, Poland and the Baltics went through the reforms quicker, although paying high social costs, while countries with longer experience of planned economy tended to prolong the privatization reforms or make them in a highly cosmetic way.

In the mid-1990s the reforms were proceeding with different speed and scale in different countries as well. Large-scale privatization was largely initiated, but was mostly completed only in Central Europe and the Baltics by the end of the first decade of transition. For many of other countries it was much more difficult and lengthy. More broadly, starting from the mid-1990s reform programs were focused on macroeconomic stabilization, price liberalization and current account convertibility, finishing the privatization (mostly large-scale), creation (strengthening) of social safety nets, and institutional reforms that sustaining the functioning of market economy. However, the programs tended to be ambitious, and in many cases implementation fell short of expectations. Nevertheless the first decade of the transition was a period when many countries made progress in market reforms and most countries of the region started growing. The Central European and Baltic countries started earlier and have become the leaders in gaining from reforms. The success in the reforms made it possible for some of these countries to integrate into the global economy through OECD and WTO entrance. Many South Eastern European countries made great progress as well, although being behind the Central European and Baltic countries. Despite the late initiation of the reforms the CIS countries had significant advances. Nevertheless, for many countries there was still a long way to go until the completion of transition.

The integration in the international market was particularly uneven. Apart from entering the OECD and WTO, Central and South Eastern European countries signed bilateral trade agreements with the EU as early as in mid-1990s, lowering tariff rates and fostering with all possible means closer economic integration with the EU. On the contrary, although signing a number of partnership agreement, CIS countries avoided taking significant measures toward higher integration in international trade. It took other 17 years for Russia and 13 years for Ukraine to enter WTO, while Belarus is still among observers.

The last years of the 20th century was characterized by a number of economic crises. Although experiencing the economic turmoil with different lags, numerous transition countries were hit by the world economic turbulence. With macroeconomic stability not reached, emerging market and financial institutions, these countries were particularly helpless against shaking

global environment. In the 1998 Russian economy suffered from a devastating devaluation and effective default, having strong impact on the connected economies of other transition countries. However, the region saw considerably rapid recovery. By the 2000 all countries of the region were growing. Some of the countries, like Russia, experienced a particularly fast return to growth, mostly relying on the improvement in commodity prices, more organized policy actions and growing competitiveness.

2000s

Favourable global economic environment allowed most of the countries in transition reach much needed stability in the mid-2000s, and brought confidence in successful development. A key turning point was the accession of 10 countries of the region to the European Union, which gave them significant economic and institutional benefits comparing to the other countries of the region. Simultaneously with economic growth, the pace of reforms largely slowed down in most of the countries. Moreover, the growth of the entire region was reached through the rise in domestic demand fuelled by the consumption credit possibilities that opened. Large external imbalances were making the growth highly unsustainable that resulted in high vulnerability by the time of global crisis in 2008.

When the global financial crisis hit economies worldwide, unleashing their economic breaches, countries of the transition region had still too many of weaknesses. Most of the countries suffered notable output losses and, what is more dangerous, loss of the confidence in the success of reforms and their beneficent impact.

The short-term consequences of the global financial crisis varied substantially across the CEB countries, largely reflecting imbalances created in the previous period of economic growth. The Baltic countries suffered biggest output contractions, with Latvia losing as much as 15 percent of its GDP. The countries outside of EU, namely SEE countries, Russia and small CIS countries, experienced the negative impact of financial crisis to a much smaller extent, while the countries of Central Asia was mostly not affected by it (see Figure A.4).

In the short run the output returned to growth considerably fast, in many cases already by the end of 2009. However, the crisis damaged the long term growth of these countries through the rise of Euro area crisis, the fall of external demand, the financial system instability and the fall in investments and the confidence of the market. As a result multiple countries of the region saw notable growth slowdown by 2012.

The years after the 2012 have been characterized by the slow down, and even reversal, of the reforms in transition countries. Each country has had to deal with structural problems revealed by the global financial crisis. Moreover, a big share of the countries of the region was affected by the oil price shocks that gave rise to macroeconomic and geopolitical turmoil.

A.3 Trust, Prepayment and Legal Enforcement in Transition Countries

This section reflects the connection between terms of contracts, legal enforcement and the degree of trust between firms in transition countries.

According to Raiser et al. (2008), the quality of country institutions in transition countries is highly correlated with the trust between firms. The higher degree of trust in the study is represented through the higher level of prepayment. Thus, prepayment may serve as a measure of distrust (or trust if inverted). In Raiser et al. (2008) the positive correlation between trust and the quality of institutions, in particular, concerns the institutions affecting contracting and contract enforcement (courts and legal systems).

Figure A.1: Prepayment and Trust
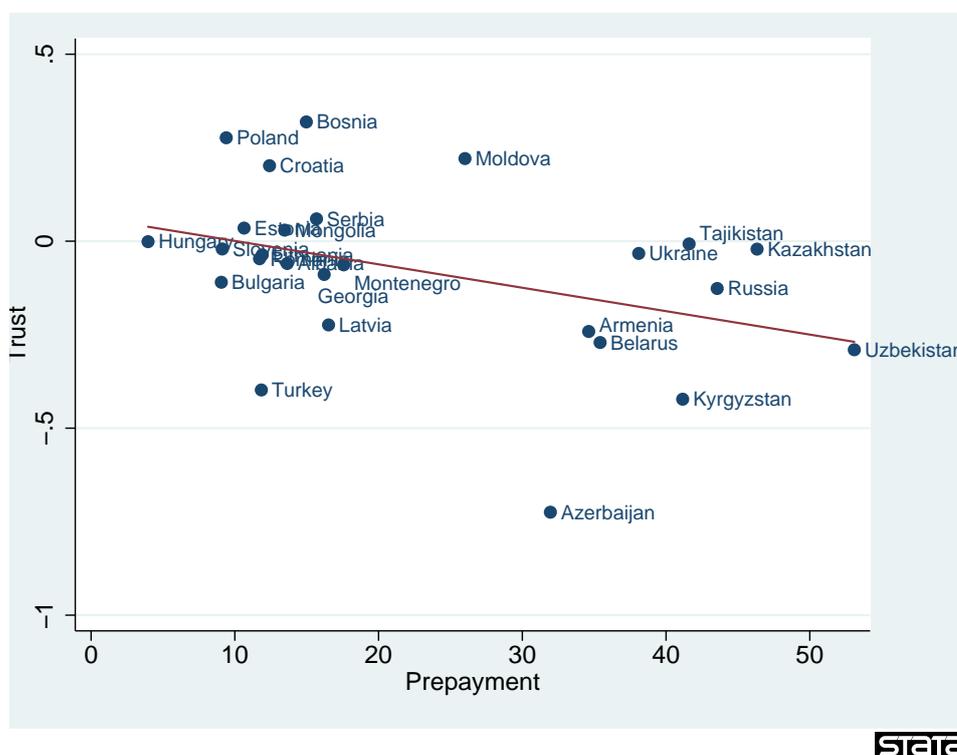
Source: Own calculations based on BEEPS IV and LITS data
Note: The prepayment is calculated as the share of sales being prepaid. Trust is based on the question of Life in Transition Survey (LITS): "To what extent do you trust people from the following groups? People you meet for the first time?"[a] The answer options vary between 1 (Complete distrust) and 5 (Complete trust). The answer of each respondent is further standardized by the sample mean by calculating the z-score. In the figure the averages for each country are presented.

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[a]The choice of the measure is based on the results of Torpe and Lolle (2011) showing that it better reflect trust in strangers.

The empirical evidence presented by Raiser et al. (2008) shows that higher court' fairness and

legal efficiency as well as information-sharing through non-governmental networks are associated with lower levels of prepayment. Theoretically the model developed by Teraji (2008) also support this connection stating that low levels of trust are the result of equilibrium with the weak property rights institutions. The figure A.1 shows that the level of prepayment (distrust), in fact, is negatively connected with the trust towards unfamiliar people in transition countries. The results of Raiser et al. (2008) were based on the data from BEPPS 2002, more recent evidence is presented in Table A.2. The table shows the link between levels of prepayment (distrust between firms) and the World Bank estimates of the rule of law in different groups of transition countries (CEB, SEE, EEC, Central Asia, Russia and Turkey). It illustrate that, not only higher distrust is observed in the country groups with weaker contracting institutions, but such a link also has been growing stronger over years.

Figure A.2: Prepayment (mis-trust) and the rule of law
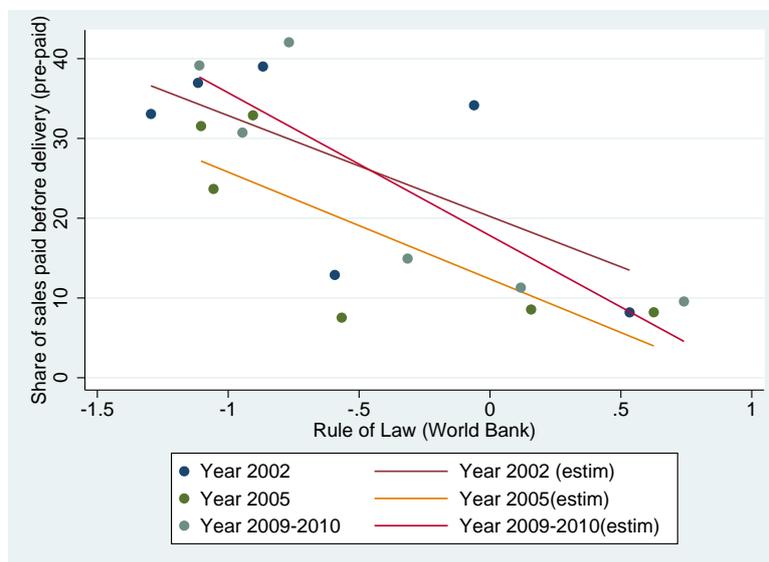
Source: Own calculations based on BEEPS II-IV and World Bank Estimates
Note: The prepayment (mis-trust) is calculated as the share of sales being prepaid. The rule-of-law indicator is borrowed from the World Bank Estimates

Empirical studies focusing on the use of prepayment by firms in more developed countries (Mateut, 2014; Antràs and Foley, 2015) also document positive connection between the weakness of contracting institutions and levels of prepayment. Mateut (2014) argues that higher transaction risks connected with weaker contracting enforcement drive higher prepayment levels in the transactions of French firms. Antràs and Foley (2015) show that also in the international trade the US firms' choice of prepayment is positively connected with how weak are the contracting institutions of the country where importer is located. Taking into account previously discussed connection between prepayment and level of trust in transition countries, it is evident that lower trust (higher levels of prepayment) is connected with weaker contracting institutions.

A.4   Figures and Tables

Table A.1: Country Groups and Memberships

Country	Country Group (EBRD)	Income Group (WB)	EU memebers	CIS members
Albania	SEE	Upper middle income		
Bulgaria	SEE	Upper middle income	Since 2007	
Bosnia and Herzegovina	SEE	Upper middle income		
Kosovo	SEE	Lower middle income		
Macedonia, FYR	SEE	Upper middle income		
Montenegro	SEE	Upper middle income		
Romania	SEE	Upper middle income	Since 2007	
Serbia	SEE	Upper middle income		
Armenia	EEC	Lower middle income		Yes
Azerbaijan	EEC	Upper middle income		Yes
Belarus	EEC	Upper middle income		Yes
Georgia	EEC	Upper middle income		Yes
Moldova	EEC	Lower middle income		Yes
Ukraine	EEC	Lower middle income		Yes
Czech Republic	CEB	High income	Since 2004	
Estonia	CEB	High income	Since 2004	
Croatia	CEB	High income	Since 2013	
Hungary	CEB	High income	Since 2004	
Lithuania	CEB	High income	Since 2004	
Latvia	CEB	High income	Since 2004	
Poland	CEB	High income	Since 2004	
Slovak Republic	CEB	High income	Since 2004	
Slovenia	CEB	High income	Since 2004	
Kazakhstan	CA	Upper middle income		Yes
Kyrgyz Republic	CA	Lower middle income		Yes
Mongolia	CA	Lower middle income		
Tajikistan	CA	Lower middle income		Yes
Turkmenistan	CA	Upper middle income		Yes
Uzbekistan	CA	Lower middle income		Yes
Russian Federation		Upper middle income		Yes
Turkey		Upper middle income		

Sources: The World Bank Classification by Income, European Union information on member states, CIS information on member states

Note: Turkey is not considered a transition country. The information is presented as the country is included in the database used in Chapter 5

Country groups: Central Europe and Baltic States (CEB), Eastern Europe and the Caucasus (EEC), Central Asia (CA), South Eastern Europe (SEE).

Table A.2: Transition Countries: Economic Context

Country	Country Group (EBRD)	GDP growth rate (annual %)					GDP, PPP (billion, constant 2011 international $)					GDP per capita, PPP (thousands, constant 2011 international $)				
		2000	2005	2009	2012	2015	2000	2005	2009	2012	2015	2000	2005	2009	2012	2015
Albania	SEE	6.67	5.72	3.35	1.42	2.56	15.955	21.220	26.329	28.400	30.039	5.165	7.046	8.994	9.792	10.397
Bulgaria	SEE	5.01	7.24	-4.22	0.24	2.97	73.085	96.985	112.807	114.928	121.713	8.945	12.531	15.153	15.731	16.956
Bosnia and Herzegovina	SEE	5.50	8.76	-2.87	-0.93	3.16	23.581	31.110	35.512	35.772	38.194	6.217	8.115	9.253	9.344	10.024
Kosovo	SEE	..	6.03	3.34	2.81	3.62	7.880	11.457	13.625	15.140	16.426	4.635	6.716	7.735	8.387	9.140
Macedonia, FYR	SEE	4.55	4.72	-0.36	-0.46	3.67	17.531	19.326	22.736	23.940	26.448	8.713	9.460	11.043	11.569	12.725
Montenegro	SEE	3.10	4.19	-5.66	-2.72	3.37	5.987	6.877	8.334	8.575	9.342	9.896	11.195	13.479	13.817	15.010
Romania	SEE	2.40	4.17	-7.07	0.64	3.74	230.037	304.330	354.208	357.368	395.171	10.250	14.275	17.391	17.817	19.926
Serbia	SEE	7.76	5.54	-3.12	-1.02	0.73	58.184	78.634	89.168	90.023	91.305	7.741	10.568	12.180	12.505	12.863
Armenia	EEC	5.90	13.87	-14.15	7.20	3.00	8.978	15.969	18.871	21.646	23.838	2.919	5.297	6.362	7.268	7.899
Azerbaijan	EEC	11.10	26.40	9.41	2.20	1.10	35.889	67.568	137.733	147.693	161.133	4.459	8.052	15.394	15.888	16.695
Belarus	EEC	5.80	9.40	0.20	1.73	-3.89	73.033	104.858	138.316	160.007	158.116	7.300	10.851	14.549	16.907	16.621
Georgia	EEC	1.84	9.60	-3.78	6.35	2.77	14.439	20.566	24.881	30.146	33.513	3.268	4.908	6.255	7.881	9.109
Moldova	EEC	2.10	7.49	-5.99	-0.70	-0.50	8.475	11.930	13.055	14.774	16.853	2.329	3.318	3.661	4.151	4.742
Ukraine	EEC	5.90	2.70	-14.80	0.20	-9.90	236.511	342.202	345.318	379.289	319.185	4.809	7.265	7.498	8.319	7.450
Czech Republic	CEB	4.29	6.44	-4.84	-0.90	4.20	215.389	261.112	287.836	297.529	314.483	21.003	25.571	27.560	28.307	29.805
Estonia	CEB	10.57	9.37	-14.72	5.18	1.07	21.371	30.102	28.847	33.447	35.332	15.298	22.219	21.616	25.287	26.930
Croatia	CEB	3.77	4.16	-7.38	-2.19	1.64	69.241	86.262	89.835	86.132	86.305	15.644	19.420	20.283	20.183	20.430
Hungary	CEB	4.23	4.35	-6.56	-1.69	2.94	181.409	223.832	219.866	221.586	240.944	17.766	22.190	21.937	22.337	24.474
Lithuania	CEB	3.83	7.73	-14.81	3.84	1.59	42.075	60.713	63.329	70.877	76.820	12.023	18.273	20.022	23.722	26.397
Latvia	CEB	5.40	10.70	-14.35	4.01	1.89	26.021	38.585	39.202	41.668	44.769	10.991	17.235	18.305	20.483	22.628
Poland	CEB	4.26	3.55	2.63	1.56	3.65	560.105	648.316	787.184	870.572	943.752	14.640	16.987	20.633	22.872	24.836
Slovak Republic	CEB	1.21	6.40	-5.49	1.52	3.60	82.133	104.714	125.720	137.933	148.587	15.242	19.490	23.340	25.507	27.394
Slovenia	CEB	4.16	4.00	-7.80	-2.72	2.88	44.738	53.379	57.445	56.943	59.729	22.494	26.683	28.164	27.680	28.942
Kazakhstan	CA	9.80	9.70	1.20	4.60	1.20	154.364	252.803	318.595	383.323	427.249	10.371	16.690	19.797	22.828	24.353
Kyrgyz Republic	CA	5.43	-0.18	2.89	-0.09	3.47	10.162	12.236	15.273	16.092	19.211	2.075	2.370	2.837	2.870	3.225
Mongolia	CA	1.15	7.25	-1.27	12.32	2.30	11.160	15.278	19.659	27.548	33.944	4.655	6.047	7.364	9.809	11.471
Tajikistan	CA	8.30	6.70	3.80	7.50	4.20	7.334	11.699	15.113	18.583	22.190	1.186	1.719	2.038	2.343	2.616
Turkmenistan	CA	5.47	13.04	6.10	11.10	6.50	24.085	30.883	46.318	64.454	83.437	5.351	6.505	9.303	12.460	15.527
Uzbekistan	CA	3.80	7.00	8.10	8.20	8.00	60.922	79.276	110.173	140.075	176.618	2.471	3.030	3.968	4.705	5.643
Russia		10.00	6.38	-7.82	3.52	-3.73	2059.806	2773.630	3158.676	3562.769	3498.420	14.051	19.326	22.122	24.879	23.895
Turkey [1]		6.77	8.40	-4.83	2.13	3.98	822.851	1028.044	1101.921	1336.178	1491.396	13.012	15.149	15.463	17.852	18.959

Sources: The World Bank Development Indicators
Note: [1] Turkey is not considered a transition country. The information is presented as the country is included in the database used in Chapter 5
Country groups: Central Europe and Baltic States (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South Eastern Europe (SEE).

Figure A.3: Change of GDP in tansition countries in 2007-2009
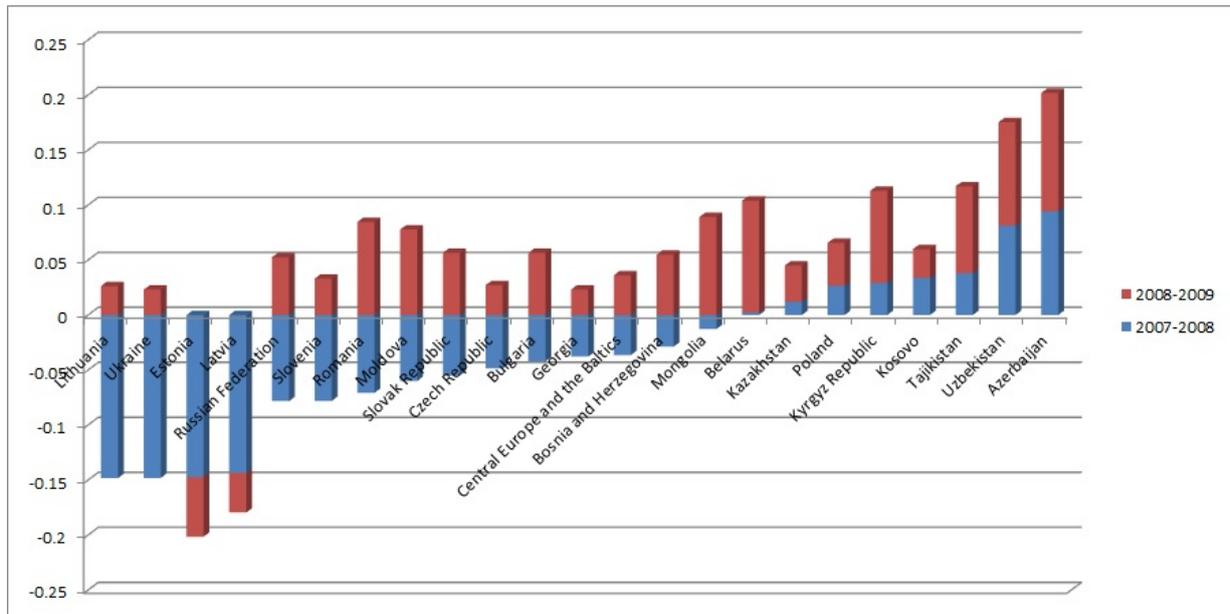
Source: Own calculations based on World Development Indicators of the World Bank
Note: The change of GDP is calculated as the yearly percentage change of the GDP at constant (2005 US$) market prices

Table A.3: The World Justice Project (WJP) Rule of Law Index: Indicators

Factor 1: Constraints on Government Powers
1.1 Government powers are effectively limited by the legislature
1.2 Government powers are effectively limited by the judiciary
1.3 Government powers are effectively limited by independent auditing and review
1.4 Government officials are sanctioned for misconduct
1.5 Government powers are subject to non-governmental checks
1.6 Transition of power is subject to the law
Factor 2: Absence of Corruption
2.1 Government officials in the executive branch do not use public office for private gain
2.2 Government officials in the judicial branch do not use public office for private gain
2.3 Government officials in the police and the military do not use public office for private gain
2.4 Government officials in the legislative branch do not use public office for private gain
Factor 3: Open Government
3.1. Publicized laws and government data
3.2 Right to Information
3.3 Civic participation
3.4 Complaint mechanisms
Factor 4: Fundamental Rights
4.1 Equal treatment and absence of discrimination
4.2 The right to life and security of the person is effectively guaranteed
4.3 Due process of law and rights of the accused
4.4 Freedom of opinion and expression is effectively guaranteed
4.5 Freedom of belief and religion is effectively guaranteed
4.6 Freedom from arbitrary interference with privacy is effectively guaranteed
4.7 Freedom of assembly and association is effectively guaranteed
4.8 Fundamental labor rights are effectively guaranteed
Factor 5: Order and Security
5.1 Crime is effectively controlled
5.2 Civil conflict is effectively limited
5.3 People do not resort to violence to redress personal grievances
Factor 6: Effective Regulatory enforcement
6.1 Government regulations are effectively enforced
6.2 Government regulations are applied and enforced without improper influence
6.3 Administrative proceedings are conducted without unreasonable delay
6.4 Due process is respected in administrative proceedings
6.5 The Government does not expropriate without adequate compensation
Factor 7: Civil Justice
7.1 People have access to affordable civil justice
7.2 Civil justice is free of discrimination
7.3 Civil justice is free of corruption
7.4 Civil justice is free of improper government influence
7.5 Civil justice is not subject to unreasonable delays
7.6. Civil justice is effectively enforced
7.7 ADRs are accessible, impartial, and effective
Factor 8: Criminal Justice
8.1 Criminal investigation system is effective
8.2 Criminal adjudication system is timely and effective
8.3 Correctional system is effective in reducing criminal behavior
8.4 Criminal system is free of discrimination
8.5 Criminal system is free of corruption
8.6 Criminal system is free of improper government influence
8.7. Due process of law and rights of the accused

Source: The World Justice Project

Figure A.4: External institutions: Enforcing Contracts

Economy	Quality of judicial processes index (0-18)	DTF	Time (days)	DTF	Cost (% of claim)	DTF	Av.DTF
Korea, Rep.	14.5	80.556	290	86.066	12.7	85.827	84.149
Singapore	15	83.333	164	96.393	25.8	71.091	83.606
China, Shanghai	14.5	80.556	406	76.557	15.1	83.127	80.080
Australia	15.5	86.111	395	77.459	21.8	75.591	79.720
United States, New Yor	15	83.333	370	79.508	22.9	74.353	79.065
Norway	11	61.111	280	86.885	9.9	88.976	78.991
China	14.275	79.306	452.8	72.721	16.18	81.912	77.980
Lithuania	14.5	80.556	370	79.508	23.6	73.566	77.877
Croatia	15	83.333	572	62.951	16.7	81.327	75.870
Hungary	12	66.667	395	77.459	15	83.240	75.788
Kazakhstan	13	72.222	370	79.508	22	75.366	75.699
Austria	13	72.222	397	77.295	20.6	76.940	75.486
China, Beijing	14	77.778	510	68.033	17.5	80.427	75.413
Estonia	13.5	75.000	425	75.000	21.9	75.478	75.159
Russian Federation	11	61.111	337	82.213	16.5	81.552	74.959
New Zealand	11	61.111	216	92.131	27.2	69.516	74.253
Luxembourg	8.5	47.222	321	83.525	9.7	89.201	73.316
Georgia	12	66.667	285	86.475	29.9	66.479	73.207
Germany	12	66.667	499	68.934	14.4	83.915	73.172
France	11	61.111	395	77.459	17.4	80.540	73.037
United States	13.8	76.667	420	75.410	30.54	65.759	72.612
Latvia	12.5	69.444	469	71.393	23.1	74.128	71.655
United Arab Emirates	12	66.667	495	69.262	20.1	77.503	71.144
Romania	14	77.778	512	67.869	28.9	67.604	71.084
Belarus	9	50.000	275	87.295	23.4	73.791	70.362
Armenia	11.5	63.889	570	63.115	16	82.115	69.706
Spain	11	61.111	510	68.033	18.5	79.303	69.482
Finland	8.5	47.222	375	79.098	16.2	81.890	69.403
United Kingdom	15	83.333	437	74.016	43.9	50.731	69.360
Turkey	13	72.222	580	62.295	24.9	72.103	68.874
Macedonia, FYR	14	77.778	634	57.869	28.8	67.717	67.788
Brazil	13.585	75.472	731	49.918	20.7	76.828	67.406
Uzbekistan	6	33.333	225	91.393	20.5	77.053	67.260
Switzerland	9.5	52.778	420	75.410	24	73.116	67.101
Mexico	10.095	56.083	340.65	81.914	32.973	63.022	67.007
Montenegro	11.5	63.889	545	65.164	25.7	71.204	66.752
Malaysia	12	66.667	425	75.000	37.3	58.155	66.607
Azerbaijan	5.5	30.556	277	87.131	18.5	79.303	65.663
Kosovo	9.5	52.778	330	82.787	34.4	61.417	65.661
Bhutan	5.5	30.556	225	91.393	23.1	74.128	65.359
Japan	7.5	41.667	360	80.328	23.4	73.791	65.262
Bulgaria	10.5	58.333	564	63.607	23.8	73.341	65.094
Argentina	11.5	63.889	660	55.738	22.5	74.803	64.810
Thailand	7.5	41.667	440	73.770	19.5	78.178	64.538
Tajikistan	8	44.444	430	74.590	25.5	71.429	63.488
Poland	10.5	58.333	685	53.689	19.4	78.290	63.437
Chile	9	50.000	480	70.492	28.6	67.942	62.811
Morocco	8.5	47.222	510	68.033	25.2	71.766	62.340
Serbia	13	72.222	635	57.787	40.8	54.218	61.409
Moldova	9.5	52.778	585	61.885	28.6	67.942	60.868
Peru	8.5	47.222	426	74.918	35.7	59.955	60.698
Uganda	8.5	47.222	490	69.672	31.3	64.904	60.600
Bosnia and Herzegovin	11	61.111	595	61.066	36	59.618	60.598
Kuwait	7	38.889	566	63.443	18.6	79.190	60.507
Czech Republic	10.5	58.333	611	59.754	33	62.992	60.360
Vietnam	6.5	36.111	400	77.049	29	67.492	60.217
Ethiopia	5	27.778	530	66.393	15.2	83.015	59.062
Ukraine	9	50.000	378	78.852	46.3	48.031	58.961
Slovak Republic	10.5	58.333	705	52.049	30	66.367	58.916
Nicaragua	6.5	36.111	490	69.672	26.8	69.966	58.583
Mongolia	5.5	30.556	374	79.180	30.6	65.692	58.476
Kenya	9	50.000	465	71.721	41.8	53.093	58.272
Israel	13	72.222	975	29.918	25.3	71.654	57.931
Ireland	8.5	47.222	650	56.557	26.9	69.854	57.878
Rwanda	13	72.222	230	90.984	82.7	7.087	56.764
Saudi Arabia	6	33.333	575	62.705	27.5	69.179	55.072
Italy	13	72.222	1120	18.033	23.1	74.128	54.794
Guinea	5	27.778	311	84.344	45	49.494	53.872
Albania	6	33.333	525	66.803	34.9	60.855	53.664
Slovenia	10.5	58.333	1160	14.754	12.7	85.827	52.971
Qatar	3.5	19.444	570	63.115	21.6	75.816	52.792
Greece	12	66.667	1580	0.000	14.4	83.915	50.194
Nigeria	7.655	42.528	509.79	68.050	57.722	35.183	48.587
Kyrgyz Republic	4	22.222	410	76.230	47	47.244	48.565
Yemen, Rep.	4	22.222	645	56.967	30	66.367	48.519
Libya	4	22.222	690	53.279	27	69.741	48.414
Senegal	6.5	36.111	740	49.180	36.4	59.168	48.153
Liberia	6.5	36.111	1280	4.918	35	60.742	33.924
Cambodia	5	27.778	483	70.246	103.4	0.000	32.675
Afghanistan	5	27.778	1642	0.000	29	67.492	31.756
Myanmar	3	16.667	1160	14.754	51.5	42.182	24.534
Bangladesh	7.5	41.667	1442	0.000	66.8	24.972	22.213

Source: Doing Business 2017: Distance to Frontier Calculator

Note: Countries are sorted due to their Distance to Frontier (DTF) with respect to average DTF (column 8) across 3 categories: quality of judicial processes (column 2), time (column 4) and costs (column 6) required to enforce a contract. The higher is the % in DTF columns, the shorter is the distance to the frontier

Table A.4: Changes in the manufacturing production by technology intensity in several CEB and SEE countries, 1993-2015

	1993-2001				2001-2006			
	Hgh-tech	Medium-high-tech	Medium-low-tech	Low-tech	Hgh-tech	Medium-high-tech	Medium-low-tech	Low-tech
Czech Republic	1.10	2.70	-0.90	-2.90	1.19	0.73	0.34	-0.02
Estonia	2.70	-12.10	8.00	1.50	1.92	1.11	0.99	0.32
Latvia	0.02	0.27	0.20	0.09	1.07	0.77	0.36	0.31
Lithuania	0.12	0.01	-0.15	0.08	0.66	1.13	1.26	0.52
Hungary	11.80	8.20	-5.20	-14.90	0.96	0.46	0.25	-0.11
Poland	1.70	1.50	-3.10	-0.10	0.77	0.94	0.62	0.32
Romania	-0.11	0.06	0.01	0.04	0.02	0.33	0.09	0.01
Bulgaria	0.04	0.00	0.01	0.02	0.11	0.90	1.08	0.74
	2006-2011				2011-2015			
	Hgh-tech	Medium-high-tech	Medium-low-tech	Low-tech	Hgh-tech	Medium-high-tech	Medium-low-tech	Low-tech
Czech Republic	0.19	0.29	0.04	-0.11	0.13	0.20	0.08	0.05
Estonia	0.80	0.31	-0.11	-0.11	0.12	0.02	0.10	0.14
Latvia	0.01	0.26	0.00	-0.03	0.65	0.26	-0.01	0.12
Lithuania	0.03	0.39	-0.07	0.09	0.77	0.29	0.17	0.34
Hungary	0.13	0.29	-0.03	-0.11	-0.12	0.36	0.09	0.13
Poland	0.36	0.36	0.42	0.20	0.04	0.18	0.21	0.16
Romania	-0.40	0.75	0.08	-0.08	0.75	0.30	0.13	0.13
Bulgaria	0.12	0.12	-0.11	-0.15	0.27	0.24	0.11	-0.03

Source: Own calculations based on the industrial production information of Eurostat and Van den Bulcke et al. (2009)

Note: The ratio of the production changes is calculated using the volume index of production at the end and at the beginning of presented periods. Yellow colour highlight significant increases (initial value almost or more than doubled), while blue colour highlight the drops of production.

Central Europe and Baltics (CEB) include Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland; South-Eastern Europe (SEE) includes Bulgaria, and Romania.

For the period 1993-2001 the growth of value-added is taken from Van den Bulcke et al. (2009) for Czech Republic, Estonia, Hungary, Poland. For the same period calculations of the production growth between 2000 and 2001 are presented for Latvia, Romania, and Bulgaria, while between 1998 and 2001 are presented for Lithuania.

Figure A.5: Change of Imports (% of GDP) in tansition countries in 1990-2015
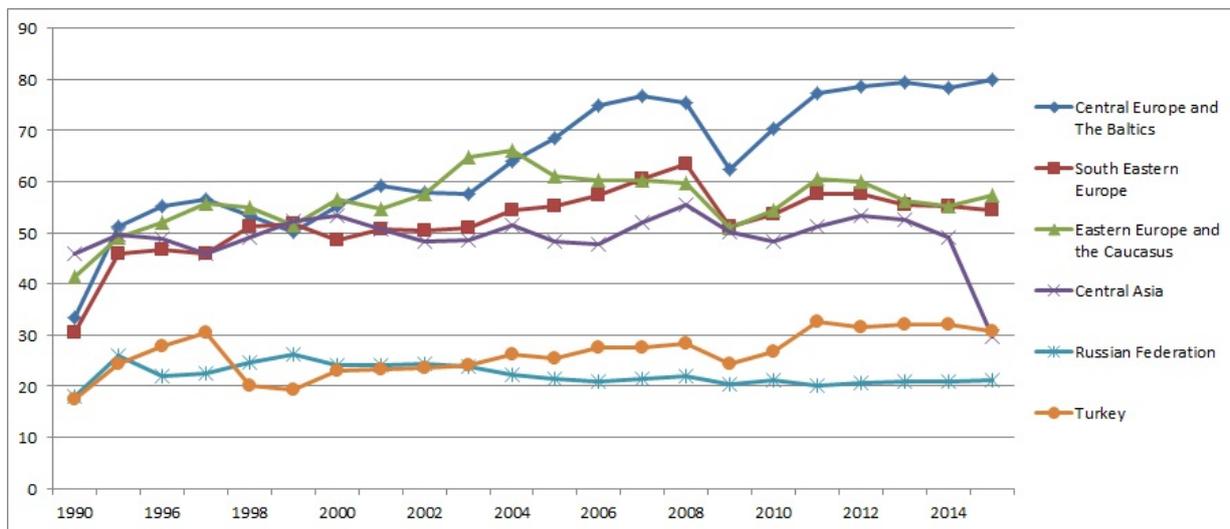
Source: The World Bank Indicators

Appendix B

Appendix to Chapter 2

B.1 Data description

Table B.1: Data distribution by country

(a) Firm-level data

	N	Percent	Cum
Bulgaria	258	3.47	3.47
Albania	185	2.49	5.96
Croatia	217	2.92	8.88
Belarus	307	4.13	13.01
Georgia	178	2.39	15.40
Ukraine	528	7.10	22.50
Russia	527	7.09	29.59
Poland	935	12.58	42.17
Romania	554	7.45	49.62
Kazakhstan	534	7.18	56.80
Moldova	339	4.56	61.36
Bosnia and Herzegovina	178	2.39	63.75
FYR Macedonia	177	2.38	66.13
Armenia	318	4.28	70.41
Kyrgyz Republic	174	2.34	72.75
Estonia	165	2.22	74.97
Czech Republic	298	4.01	78.98
Hungary	566	7.61	86.59
Latvia	176	2.37	88.96
Lithuania	170	2.29	91.24
Slovak Republic	184	2.47	93.72
Slovenia	203	2.73	96.45
Serbia and Montenegro	264	3.55	100.00
Total	7435	100.00	

(b) Aggregated data

	N	Percent	Cum
Albania	39	3.51	3.51
Armenia	33	2.97	6.49
Belarus	57	5.14	11.62
Bosnia and Herzegovina	35	3.15	14.77
Bulgaria	56	5.05	19.82
Croatia	37	3.33	23.15
Czech Republic	48	4.32	27.48
Estonia	32	2.88	30.36
FYR Macedonia	30	2.70	33.06
Georgia	53	4.77	37.84
Hungary	47	4.23	42.07
Kazakhstan	65	5.86	47.93
Kyrgyz Republic	34	3.06	50.99
Latvia	34	3.06	54.05
Lithuania	34	3.06	57.12
Moldova	56	5.05	62.16
Poland	56	5.05	67.21
Romania	41	3.69	70.90
Russia	98	8.83	79.73
Serbia and Montenegro	52	4.68	84.41
Slovak Republic	31	2.79	87.21
Slovenia	42	3.78	90.99
Ukraine	100	9.01	100.00
Total	1110	100.00	

Source: Own calculation based on the BEEPS (2005)

Table B.2: Data distribution by activity

(a) Firm-level data

	N	Percent	Cum
Construction	796	10.71	10.71
Manufacturing	3255	43.78	54.49
Transport storage and communication	534	7.18	61.67
Wholesale and retail trade	1967	26.46	88.12
Real estate, renting and business services	452	6.08	94.20
Other services	431	5.80	100.00
Total	7435	100.00	

(b) Aggregated data

	N	Percent	Cum
Construction	60	6.51	6.51
Manufacturing	372	40.39	46.91
Transport storage and communication	73	7.93	54.83
Wholesale and retail trade	257	27.90	82.74
Real estate, renting and business services	99	10.75	93.49
Other services	60	6.51	100.00
Total	921	100.00	

Source: Own calculation based on the BEEPS 2005

Table B.3: Variables and Sources

Variable	Variable Calculation	Description	Source
Integration incidence	$\dfrac{N_{ic}^{int}}{N_{ic}}$	The share of firms that integrated at least one important activity N_i^{int} in the total number of firms interviewed N_i in industry i in country c	BEEPS 2005 (question q60a7)
Capital-intensity	$K_{ic} = barK_{ic}^j,$ where $K^j = ln(\dfrac{replK^j}{L^j})$	the mean capital-intensity of firms in industry i and country c	BEEPS 2005 (questions q57b, q66a)
Trust	$T_{ic} = \dfrac{N_{ic}^{noprep}}{N_{ic}}$	The share of firms that do not need to prepay their inputs in the total number of firms N_i in industry i in country c	BEEPS 2005 (question q29a)
Export	$Exp_{ic} = \dfrac{N_{ic}^{exporter}}{N_{ic}}$	The share of exporters in the total number of firms N_i in industry i in country c	BEEPS 2005 (questions q7b, q7c)
Labour productivity (sd)	$Lprod_{ic} = sd(Lprod_{ic}^j)$ where $Lprod_{ic}^j = \dfrac{salses(USD)}{Employment}$	Standard deviation of firm-level productivity within an industry i in country c	BEEPS 2005 (questions q57a, q66a)
GDP per capita	$ln(\dfrac{GDP}{Population})$	Logarithm of the GDP per capita	World Data Bank: GDP per capita (current US$)
SME	$SME_{ic} = \dfrac{N_{ic}^{SME}}{N_{ic}}$	The share of small (2-49 employees) and medium (50-249 employees) firms in the total number of firms N_i in industry i in country c	BEEPS 2005 (question s4b)
MES	$MES_{ic} = \dfrac{N_{ic}^{MES}}{N_{ic}}$	The share of firms that have more than one national establishment in the total number of firms N_i in industry i in country c	BEEPS 2005 (question s10)
Import competition	$ImpH_{ic} = \dfrac{N_{ic}^{Himp+EHimp}}{N_{ic}}$	The share of firms, for whose main product import competition is highly or extremely important, in the total number of firms N_i in industry i in country c	BEEPS 2005 (question q10)
Without Import competition	$ImpNone_{ic} = \dfrac{N_{ic}^{NOimp}}{N_{ic}}$	The share of firms, whose main product cannot be imported, in the total number of firms N_i in industry i in country c	BEEPS 2005 (question q10)
High competition	$E_{ic}^h = \dfrac{N_{ic}^{Comp}}{N_{ic}}$	The share of firms, whose 10% increase in price would result in loosing clients, in the total number of firms N_i in industry i in country c	BEEPS 2005 (question q11)
Finance acc. difficulty (major)	$FinA_{ic} = \dfrac{N_{ic}^{FinA=majordiff.}}{N_{ic}}$	The share of firms, for which access to financing is a major difficulty, in the total number of firms N_i in industry i in country c	BEEPS 2005 (question q54a)
Borrowing from local banks	$BL_{ic} = barBL_{ic}^j,$	the mean share of firm borrowing from local banks in industry i and country c	BEEPS 2005 (question q45a3)
Borrowing from foreign banks	$BF_{ic} = barBF_{ic}^j,$	the mean share of firm borrowing from foreign banks in industry i and country c	BEEPS 2005 (question q45a4)

Figure B.1: Measuring Capital-Intensity: Investments vs. Replacement Value
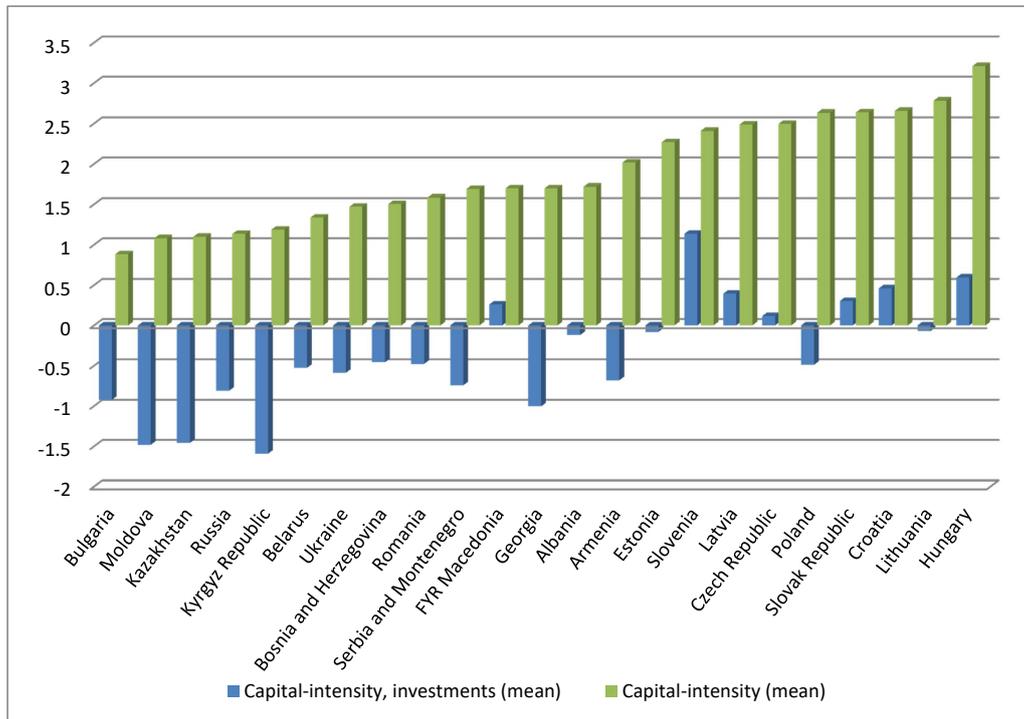
Source: Own calculation based on the BEEPS 2005

Table B.4: Sensitivity Analysis

	Albania	Armenia	Belarus	Bosnia	Bulgaria	Croatia	Czech Republic	Estonia	FYR Macedonia	Georgia	Hungary
Capital-intensity	0.184**	0.198**	0.180**	0.138*	0.191**	0.150*	0.205***	0.179**	0.156*	0.202***	0.194**
	(0.017)	(0.012)	(0.023)	(0.070)	(0.014)	(0.071)	(0.009)	(0.020)	(0.055)	(0.008)	(0.014)
Likelihood	-189.83	-189.43	-187.75	-190.52	-187.20	-186.82	-183.65	-193.60	-187.57	-187.58	-188.06
p-value(Wald)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	806	810	791	813	792	801	789	806	818	805	791

	Kazakhstan	Kyrgyzstan	Latvia	Lithuania	Moldova	Poland	Romania	Russia	Serbia	Slovenia	Ukraine
Capital-intensity	0.143*	0.183**	0.168**	0.199***	0.199**	0.188**	0.178**	0.146*	0.228***	0.176**	0.155*
	(0.062)	(0.018)	(0.026)	(0.008)	(0.011)	(0.014)	(0.022)	(0.059)	(0.003)	(0.026)	(0.057)
Likelihood	-190.84	-190.65	-192.26	-189.33	-183.75	-191.99	-186.88	-186.48	-183.92	-188.43	-162.51
p-value(Wald)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	792	806	807	803	801	786	798	779	800	800	750

B.2 Robustness checks

Table B.5: Robustness check. Measuring capital-intensity through investments

Specifications[1]	All		EU		non-EU	
	(2)	(4)	(2)	(4)	(2)	(4)
Capital-intensity (investments)	0.302***	0.101*	0.248*	0.237**	0.255***	0.079
	(0.058)	(0.052)	(0.141)	(0.117)	(0.063)	(0.056)
Trust	-0.584***	-0.770***	-0.565	-0.895**	-0.644***	-0.815***
	(0.204)	(0.195)	(0.434)	(0.402)	(0.219)	(0.214)
International trade and competition						
Export	0.534***	0.260	0.525	0.461	0.325	0.065
	(0.206)	(0.195)	(0.421)	(0.362)	(0.218)	(0.216)
Import competition	0.585**	0.503**	-0.135	-0.045	0.850***	0.764**
	(0.255)	(0.255)	(0.475)	(0.458)	(0.271)	(0.298)
Without import competition	-0.253	-0.212	-12.513***	-14.052***	1.428	1.862
	(1.812)	(1.587)	(3.940)	(3.764)	(1.902)	(1.487)
High competition	-0.861***	-0.862***	0.797	0.710*	-1.378***	-1.478***
	(0.297)	(0.284)	(0.487)	(0.413)	(0.323)	(0.321)
Other controls						
EU transition countries	-0.200	0.275				
	(0.176)	(2.484)				
Labour productivity (sd)	0.294*	0.302**	1.063***	1.020***	0.132	0.151
	(0.171)	(0.130)	(0.301)	(0.301)	(0.200)	(0.144)
GDP per capita	-0.421***	-0.652	0.777*	-0.639	-0.412***	-0.569
	(0.075)	(1.157)	(0.466)	(1.098)	(0.076)	(0.430)
SME[2]	-0.437	-0.332	-0.715	-1.131*	-0.383	-0.244
	(0.310)	(0.282)	(0.619)	(0.629)	(0.347)	(0.300)
MES[3]	0.373	0.056	-0.056	-0.718	0.446	0.319
	(0.249)	(0.260)	(0.543)	(0.554)	(0.285)	(0.291)
Finance acc. difficulty (major)	0.669**	0.266	0.109	0.449	0.728**	0.101
	(0.281)	(0.305)	(0.613)	(0.592)	(0.302)	(0.336)
Borrowing from local banks	0.008	0.011**	0.022**	0.018*	0.002	0.007
	(0.005)	(0.005)	(0.009)	(0.009)	(0.005)	(0.006)
Borrowing from foreign banks	-0.027	-0.015	0.022	0.023	-0.024	-0.014
	(0.017)	(0.014)	(0.056)	(0.034)	(0.018)	(0.015)
Country dummies	No	Yes	No	Yes	No	Yes
Constant	1.277*	3.398	-10.340**	3.541	1.353*	2.909
	(0.709)	(8.670)	(4.544)	(10.526)	(0.741)	(3.224)
Likelihood	-808.123	-733.373	-189.439	-174.796	-589.462	-537.487
Likelihood_C	-909.0568	-909.0568	-223.2973	-223.2973	-664.6377	-664.6377
Pseudo-R2	.1110314	.1932594	.1516268	.2172072	.1131085	.1913083
Chi2	173.3432	341.9192	71.30324	95.1459	136.9589	271.7571
P-value	1.44e-29	1.59e-52	4.62e-10	4.01e-12	8.55e-23	8.83e-43
N	807	807	279	279	528	528

Note: Dependent variable is the share of integrationg firms in an industry. Coefficients, rather than marginal effects are presented

[1] SME is the share of small and medium enterprises within population (firms with 2-49 employees and firms with 50-249 employees);

[1] MES is the share of firms with multiple establishments in an industry;

*$p < 0.10$,** $p < 0.05$,*** $p < 0.01$

Table B.6: Robustness check. Including Ireland and Spain

	All		EU		non-EU	
	(1)	(2)	(1)	(2)	(1)	(2)
Integration incidence						
Capital-intensity	0.262***	0.110*	0.184*	0.195*	0.186***	0.048
	(0.059)	(0.059)	(0.104)	(0.106)	(0.066)	(0.068)
Trust	-0.535***	-0.799***	-0.802**	-0.876***	-0.647***	-0.864***
	(0.183)	(0.180)	(0.349)	(0.340)	(0.213)	(0.209)
Export	0.394**	0.199	0.626*	0.431	0.144	-0.024
	(0.190)	(0.176)	(0.323)	(0.295)	(0.220)	(0.211)
EU	-0.446***	-2.823				
	(0.169)	(2.426)				
Labour productivity (sd)	0.277*	0.214*	0.268	0.251	0.087	0.139
	(0.152)	(0.122)	(0.201)	(0.183)	(0.231)	(0.150)
GDP per capita	-0.190***	0.744	0.251	0.590	-0.331***	-0.496
	(0.072)	(0.947)	(0.186)	(0.993)	(0.072)	(0.429)
SME	-0.561*	-0.654**	-0.750	-0.993**	-0.417	-0.459
	(0.292)	(0.262)	(0.463)	(0.476)	(0.364)	(0.303)
MES	0.269	0.063	-0.208	-0.454	0.360	0.310
	(0.215)	(0.230)	(0.359)	(0.385)	(0.265)	(0.277)
Import competition	0.394	0.188	-0.425	-0.302	0.792***	0.570*
	(0.248)	(0.243)	(0.391)	(0.364)	(0.275)	(0.311)
High competition	-0.767***	-0.627**	0.361	0.332	-1.445***	-1.314***
	(0.258)	(0.245)	(0.359)	(0.318)	(0.333)	(0.321)
Without import competition	-0.415	-0.783	-7.810*	-8.873**	0.995	1.007
	(1.619)	(1.453)	(4.274)	(4.500)	(1.624)	(1.277)
Finance access difficulty (major)	0.325	0.009	-0.292	-0.030	0.584*	-0.086
	(0.283)	(0.294)	(0.545)	(0.521)	(0.304)	(0.345)
Borrowing from local banks	0.013***	0.012***	0.016**	0.013*	0.004	0.009
	(0.004)	(0.004)	(0.008)	(0.007)	(0.005)	(0.005)
Borrowing from foreign banks	-0.019	-0.011	0.047	0.034	-0.016	-0.012
	(0.014)	(0.012)	(0.033)	(0.028)	(0.016)	(0.014)
Country dummies	No	Yes	No	Yes	No	Yes
Constant	-0.875	-6.868	-4.980***	-8.194	0.459	2.535
	(0.625)	(7.118)	(1.593)	(9.958)	(0.690)	(3.204)
Likelihood	-955	-852.4	-304.3	-285.8	-613	-551.3
Likelihood_C	-1036.2	-1036.2	-344.5	-344.5	-676.9	-676.9
Pseudo-R2	0.078	0.177	0.116	0.171	0.094	0.186
Chi2	151.9	370.7	81.5	107.4	114.7	279.4
P-value	3.02e-25	3.61e-57	5.80e-12	1.39e-13	2.20e-18	2.67e-44
N	949	949	401	401	548	548

Note: Dependent variable is the share of integrationg firms in an industry. Coefficients, rather than marginal effects are presented
[1] SME is the share of small and medium enterprises within population (firms with 2-49 employees and firms with 50-249 employees);
[1] MES is the share of firms with multiple establishments in an industry;
*$p < 0.10$,** $p < 0.05$,*** $p < 0.01$

Table B.7: Robustness check. Capital-intensity through investments including Ireland and Spain

	All		EU		non-EU	
	(1)	(2)	(1)	(2)	(1)	(2)
Integration incidence						
Capital-intensity (investments)	0.312***	0.106**	0.215**	0.170**	0.255***	0.079
	(0.051)	(0.047)	(0.088)	(0.082)	(0.063)	(0.056)
Trust	-0.512***	-0.764***	-0.727**	-0.904**	-0.644***	-0.815***
	(0.187)	(0.184)	(0.351)	(0.351)	(0.219)	(0.214)
Export	0.591***	0.336*	0.771**	0.614**	0.325	0.065
	(0.188)	(0.179)	(0.340)	(0.305)	(0.218)	(0.216)
EU	-0.239	-4.228*				
	(0.159)	(2.446)				
Labour productivity (sd)	0.320**	0.238**	0.338	0.296	0.132	0.151
	(0.144)	(0.120)	(0.213)	(0.193)	(0.200)	(0.144)
GDP per capita	-0.297***	1.288	0.123	1.475	-0.412***	-0.569
	(0.076)	(0.949)	(0.206)	(1.015)	(0.076)	(0.430)
SME	-0.508*	-0.440*	-0.764	-1.005**	-0.383	-0.244
	(0.293)	(0.267)	(0.470)	(0.486)	(0.347)	(0.300)
MES	0.296	0.064	-0.166	-0.481	0.446	0.319
	(0.226)	(0.240)	(0.357)	(0.387)	(0.285)	(0.291)
Import competition	0.502**	0.378	-0.301	-0.243	0.850***	0.764**
	(0.237)	(0.237)	(0.382)	(0.369)	(0.271)	(0.298)
High competition	-0.707***	-0.707***	0.477	0.471	-1.378***	-1.478***
	(0.259)	(0.250)	(0.375)	(0.339)	(0.323)	(0.321)
Without import competition	-0.383	-0.318	-8.211*	-9.267**	1.428	1.862
	(1.814)	(1.605)	(4.470)	(4.671)	(1.902)	(1.487)
Finance access difficulty (major)	0.483*	0.128	-0.236	-0.110	0.728**	0.101
	(0.275)	(0.288)	(0.536)	(0.524)	(0.302)	(0.336)
Borrowing from local banks	0.012***	0.010**	0.016**	0.014**	0.002	0.007
	(0.005)	(0.005)	(0.008)	(0.007)	(0.005)	(0.006)
Borrowing from foreign banks	-0.027*	-0.014	0.043	0.034	-0.024	-0.014
	(0.016)	(0.013)	(0.039)	(0.030)	(0.018)	(0.015)
Country dummies	No	Yes	No	Yes	No	Yes
Constant	0.334	-11.031	-3.559*	-16.818*	1.353*	2.909
	(0.695)	(7.138)	(1.854)	(10.195)	(0.741)	(3.224)
Likelihood	-928.5	-841.7	-302.9	-285	-589.5	-537.5
Likelihood_C	-1022.8	-1022.8	-343.7	-343.7	-664.6	-664.6
Pseudo-R2	0.092	0.177	0.119	0.170	0.113	0.191
Chi2	168.02	349.58	78.26	99.45	137	271.76
P-value	1.72e-28	5.09e-53	2.34e-11	3.62e-12	8.55e-23	8.83e-43
N	922	922	419	419	639	639

Note: Dependent variable is the share of integrationg firms in an industry. Coefficients, rather than marginal effects are presented
[1] SME is the share of small and medium enterprises within population (firms with 2-49 employees and firms with 50-249 employees);
[1] MES is the share of firms with multiple establishments in an industry;
*$p < 0.10$,** $p < 0.05$,*** $p < 0.01$

Appendix C

Appendix to Chapter 3

C.1   Tables and figures

Table C.1: Average capital-intensity and labor productivity by country

Country	Capital-intensity as investments		Labour productivity	
	Mean	Median	Mean	Median
Bulgaria	0.7	0.2	26.0	18.6
Albania	1.3	0.7	30.4	25.0
Croatia	2.9	1.3	97.4	66.5
Belarus	1.0	0.3	16.4	11.7
Georgia	0.4	0.0	20.6	9.3
Ukraine	0.7	0.5	18.9	13.2
Russia	0.5	0.3	17.2	11.7
Poland	0.8	0.3	45.7	33.0
Romania	0.7	0.4	23.8	15.2
Kazakhstan	0.4	0.1	9.3	6.1
Moldova	0.3	0.1	7.6	5.8
Bosnia and Herzegovina	1.2	0.4	44.5	33.1
FYR Macedonia	2.3	0.7	43.4	39.5
Armenia	1.0	0.4	14.2	9.8
Kyrgyz Republic	0.3	0.1	7.2	5.0
Estonia	1.1	0.9	64.1	48.4
Czech Republic	1.6	0.8	47.3	43.3
Hungary	2.5	1.1	69.3	52.0
Latvia	2.6	0.8	39.9	28.3
Lithuania	2.0	0.9	40.3	33.1
Slovak Republic	1.9	0.6	63.3	49.6
Slovenia	4.8	2.3	98.3	77.2
Spain	3.2	1.5	151.9	100.0
Ireland	9.8	1.9	1330.1	125.0
Serbia and Montenegro	0.8	0.4	42.8	29.9
Total	2.0	0.5	125.3	27.5

Source: Own calculations based on the BEEPS (2005)

Table C.2: Average logged capital-intensity and labor productivity by country

Country	Capital-intensity as investments (ln)		Labour productivity (ln)	
	Mean	Median	Mean	Median
Bulgaria	-0.6	-0.6	2.9	2.9
Albania	-0.3	-0.2	3.3	3.2
Croatia	0.5	0.6	4.3	4.2
Belarus	-0.9	-1.0	2.5	2.5
Georgia	-0.8	-0.7	2.4	2.2
Ukraine	-0.7	-0.6	2.6	2.6
Russia	-1.2	-1.1	2.6	2.5
Poland	-0.4	-0.4	3.6	3.5
Romania	-0.7	-0.5	2.8	2.7
Kazakhstan	-1.3	-1.2	1.9	1.8
Moldova	-1.6	-1.6	1.8	1.8
Bosnia and Herzegovina	-0.5	-0.5	3.5	3.5
FYR Macedonia	0.1	0.1	3.6	3.7
Armenia	-0.5	-0.6	2.4	2.3
Kyrgyz Republic	-1.5	-1.5	1.7	1.6
Estonia	-0.1	-0.0	3.9	3.9
Czech Republic	0.0	0.0	3.7	3.8
Hungary	0.3	0.3	4.0	4.0
Latvia	0.3	0.2	3.4	3.3
Lithuania	0.2	0.3	3.5	3.5
Slovak Republic	0.2	0.2	3.9	3.9
Slovenia	0.7	0.9	4.4	4.3
Spain	0.6	0.5	4.7	4.6
Ireland	1.0	1.0	4.9	4.8
Serbia and Montenegro	-0.7	-0.6	3.5	3.4
Total	-0.2	-0.2	3.3	3.3

Source: Own calculations based on the BEEPS (2005)

Table C.3: Probit model of decision to integrate with Heckman selection

	Full sample		EU countries		Non-EU countries	
	Integr vs. Other	Integr vs. Outsourc	Integr vs. Other	Integr vs. Outsourc	Integr vs. Other	Integr vs. Outsourc
Integration						
Capital-intensity (normalized)	0.072***	0.025	0.042	-0.009	-0.020	-0.047
	(0.027)	(0.030)	(0.140)	(0.048)	(0.112)	(0.109)
Trust	-0.199***	-0.118*	-0.063	-0.049	0.413	0.411
	(0.066)	(0.071)	(0.374)	(0.124)	(0.373)	(0.483)
Export	0.255***	0.211***	0.053	0.115	-0.062	-0.018
	(0.069)	(0.075)	(0.512)	(0.125)	(0.466)	(0.507)
Labor productivity (normalized)	0.117***	0.166***	0.066	0.158*	0.174*	0.244**
	(0.039)	(0.043)	(0.242)	(0.093)	(0.102)	(0.098)
Ownership concentration	-0.002*	-0.002*	0.003	0.000	-0.002	-0.003
	(0.001)	(0.001)	(0.007)	(0.002)	(0.004)	(0.005)
Moderate import competition pressure	0.136	0.177*	0.221	0.062	-0.003	0.153
	(0.088)	(0.100)	(0.358)	(0.154)	(0.299)	(0.370)
High import competition pressure	0.252***	0.329***	0.309	0.094	-0.047	0.221
	(0.090)	(0.100)	(0.510)	(0.164)	(0.498)	(0.624)
Similar products can not be imported	-0.064	0.065	-0.473	-0.242	-0.025	0.322
	(0.202)	(0.215)	(1.152)	(0.470)	(0.457)	(0.474)
Not elastic demand	-0.084	-0.151	0.139	-0.327	-0.245	-0.305
	(0.090)	(0.100)	(0.546)	(0.217)	(0.201)	(0.199)
Moderately elastic demand	-0.270***	-0.333***	-0.348	-0.199	-0.015	-0.129
	(0.093)	(0.103)	(0.509)	(0.164)	(0.430)	(0.494)
Highly elastic demand	-0.259***	-0.307***	-0.264	-0.141	-0.261	-0.362
	(0.084)	(0.091)	(0.468)	(0.143)	(0.354)	(0.332)
Constant	-1.307***	-1.489***	-0.547	-1.523***	0.478	-0.146
	(0.092)	(0.103)	(3.538)	(0.174)	(1.941)	(2.394)
Selection: Change						
Capital-intensity (normalized)	0.088***	0.061**	0.077**	0.036	0.097***	0.077**
	(0.024)	(0.024)	(0.039)	(0.041)	(0.031)	(0.032)
Trust	-0.347***	-0.310***	-0.187**	-0.125	-0.414***	-0.386***
	(0.056)	(0.059)	(0.091)	(0.096)	(0.075)	(0.078)
Export	0.288***	0.261***	0.253***	0.219**	0.435***	0.414***
	(0.060)	(0.062)	(0.096)	(0.101)	(0.080)	(0.083)
Labor productivity (normalized)	0.084**	0.107***	0.130*	0.166**	0.018	0.036
	(0.034)	(0.035)	(0.067)	(0.072)	(0.041)	(0.042)
Ownership concentration	-0.002**	-0.002**	-0.001	-0.001	-0.003**	-0.003**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Moderate import competition pressure	0.128*	0.147*	-0.019	-0.023	0.209**	0.246**
	(0.075)	(0.079)	(0.120)	(0.125)	(0.096)	(0.102)
High import competition pressure	0.244***	0.274***	-0.070	-0.096	0.444***	0.496***
	(0.077)	(0.081)	(0.125)	(0.133)	(0.099)	(0.104)
Similar products can not be imported	0.081	0.156	0.281	0.248	-0.072	0.055
	(0.160)	(0.164)	(0.256)	(0.269)	(0.211)	(0.213)
Not elastic demand	-0.017	-0.048	-0.117	-0.268	-0.036	-0.035
	(0.077)	(0.081)	(0.150)	(0.167)	(0.093)	(0.097)
Moderately elastic demand	-0.226***	-0.250***	0.048	-0.008	-0.350***	-0.367***
	(0.081)	(0.084)	(0.127)	(0.134)	(0.108)	(0.114)
Highly elastic demand	-0.147**	-0.155**	0.077	0.046	-0.227**	-0.217**
	(0.072)	(0.074)	(0.113)	(0.119)	(0.099)	(0.103)
Constant	-0.952***	-1.051***	-1.138***	-1.184***	-0.904***	-1.032***
	(0.077)	(0.081)	(0.134)	(0.140)	(0.095)	(0.102)
athrho						
Constant	2.972	2.934	0.506	8.088	-0.231	-0.008
	(2.619)	(2.801)	(2.614)	(138.442)	(1.429)	(1.533)
Ownership structure	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood	-1669.63	-1495.71	-607.25	-537.85	-1026.69	-922.29
Pseudo-R2						
p-value(Wald)	0.000	0.000	0.935	0.574	0.107	0.050
Rho(eq.depend)	0.995	0.994	0.467	1.000	-0.227	-0.008
N	3028	2954	1349	1323	1679	1631

Note: For all the specifications the coefficients rather than marginal effects are presented. The values of ρ, not of regressors, is of higher interest here.

Table C.4: The difference between integrating and non-integrating firms in two country groups

	European countries Diff (nonInt-Int)		Non-European countries Diff (nonInt-Int)	
% of the total profits in 2003 invested in the firm in 2004	-0.513	(-0.12)	-9.025**	(-2.78)
Operating profits	1131.4	(1.40)	-74.69	(-0.53)
Operating profits (ln)	0.436	(1.92)	-0.366*	(-2.23)
Labour productivity	49.03	(1.13)	-7.814	(-1.88)
Labour productivity	0.0529	(0.56)	-0.339***	(-3.56)
Capital-Intensity	10.29	(0.87)	-5.622*	(-2.38)
Capital-intensity	0.0469	(0.32)	-0.270	(-1.82)
Capital investments per worker	-0.398	(-0.70)	-0.439	(-1.88)
Capital-intensity as investments (ln)	-0.106	(-0.62)	-0.200	(-1.38)
Trust	-0.00767	(-0.14)	-0.135***	(-3.65)
Prepayment levels	-0.0152	(-0.49)	0.0878**	(2.92)
Current number of permanent, full-time employees	100.9*	(2.44)	16.00	(0.36)
Size	0.325	(1.71)	-0.0149	(-0.12)
Age	3.651	(1.79)	1.185	(0.73)
Export	0.0190	(0.36)	0.0295	(0.78)
% of sales exported directly	4.139	(1.39)	0.982	(0.49)
% of sales exported indirectly	2.617*	(2.21)	0.495	(0.60)
Import (dum)	0.0160	(0.32)	0.0357	(0.98)
% of material inputs and supplies imported directly	4.987	(1.52)	-1.127	(-0.42)
% of material inputs and supplies imported indirectly	-2.093	(-0.67)	5.495*	(2.32)
% owned by private domestic company/organisation	-7.363	(-1.91)	-2.036	(-0.68)
% owned by private foreign company/organisation	7.160*	(2.24)	1.684	(0.74)
% owned by government/state	0.943	(0.42)	0.796	(0.37)
% of the firm owned by the largest shareholder(s)	-2.306	(-0.73)	-1.180	(-0.51)
Observations	356		676	

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix D

Appendix to Chapter 4

D.1 Survey questions

The information on the number of both directly reporting and directly managed employees were obtained through direct questions to a representative of a firm, e.g. the questions of the questionnaire with respect to the HQ top manager subordinates sounded as "Number of employees that report directly to the Top Manager?" and "How many employees does the Top Manager directly manage – i.e., how many does he directly meet and supervise on a daily or weekly basis?".

Figure D.1: Questions on the reporting relationships

In order to determine the number of layers the strategy of the interview consisted of iterative questioning of an interviewee on reporting structure starting from who a typical production employee report to, and going further to who his/her boss report to, till arriving to the national HQ top manager. An example of the possible conversation is presented in the Figure D.2

In this way the interviewer was able to count the number of layers of interest, which was further confirmed by an interviewee. In the case presented in the example the number of layers was 1 between production employee and FM and 4 for the HQ top manager.

The information on the changes of the depth of control (CEO organizational distance) is based on the answer to the following question of the survey.

A big share of firms have the same organizational distance from top managers and factory managers to production employees [1]. However, the information we possess on organizational

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[1] More than 75% of firms in Bulgaria have the top manager and factory manager at the same level of organizational hierarchy. The group of countries with big share of firms having top managers and factory managers on the same organizational level also includes Kazakhstan (more than 85% of firms) and Romania

Figure D.2: Question on the number of layers

S.10 INSTRUCTION: INTERVIEWER: IN ORDER TO DETERMINE THE NUMBER OF LEVELS, PLEASE DO THE FOLLOWING:

PLEASE SAY "NOW I WANT TO TALK ABOUT THE FIRM HIERARCHY."
THEN ITERATIVELY ASK:
1. **"WHO DOES A TYPICAL PRODUCTION EMPLOYEE REPORT TO?"**
2. **"WHO DOES [THEIR BOSS] REPORT TO?"**
KEEP ASKING UNTIL YOU REACH THE TOP MANAGER.
PLEASE TAKE NOTES ON ACTUAL NAMES OF THE LEVELS IN THE SPACE PROVIDED IN THE MARGIN.

FOR EXAMPLE, THE CONVERSATION MIGHT GO AS FOLLOWS:
Interviewer: "Who does the typical production employee report to?"
Manager: "The factory manager."
Interviewer: "Who does the factory manager report to?"
Manager: "The operations manager."
Interviewer: "Who does the operations manager report to?"
Manager: "The Vice President of Operations."
Interviewer: "Who does the Vice President of Operations report to?"
Manager: "The Top Manager."

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

S.10	**(INTERVIEWER: IN SPACE PROVIDED WRITE DOWN THE ACTUAL NAME OF LEVELS BETWEEN THE TYPICAL PRODUCTION EMPLOYEE AND THE TOP MANAGER BASED ON THE CONVERSATION ABOVE. THEN, COUNT THE NUMBER OF LEVELS AND CHECK THEM WITH THE RESPONDENT BEFORE WRITING THE NUMBER IN ANSWER CELLS BELOW.)** To confirm, there are **[insert number of levels between the typical production employee and the Top Manager]** levels in the firm BETWEEN the typical production employee and the Top Manager?

Number of levels in the firm between the typical production employee and the Top Manager		
Don't know (SPONTANEOUS)	**-9**	**GO TO QUESTION S.12**
Refusal (SPONTANEOUS)	**-8**	**GO TO QUESTION S.12**
		mois10

INTERVIEWER: NOTE THAT IN THE FIRM IN THE ABOVE EXAMPLE, THERE ARE 3 LEVELS BETWEEN TOP MANAGER AND TYPICAL PRODUCTION EMPLOYEE (I.E., THE VICE PRESIDENT OF OPERATIONS, OPERATIONS MANAGER AND FACTORY MANAGER).

Figure D.3: Question on the flattening

S.11	Has the number of levels BETWEEN the typical production employee and the Top Manager changed in the last three years?

Yes, it increased	1
Yes, it decreased	2
No	3
Don't know (SPONTANEOUS)	**-9**
	mois11

hierarchy gives us no possibility to verify whether the factory manager and the national HQ top manager is the same person or they have the same organizational distance from production employees.

D.2 Tables and figures

Table D.1: Size of firms in the sample by country

Country	Number of employees in the firm(establishment)			
	Min	Max	Mean	Median
Belarus	50	4800	728.1	400.0
Ukraine	40	4000	293.0	140.0
Uzbekistan	40	1948	174.7	81.0
Russia	35	3000	222.5	120.0
Poland	50	4200	336.7	218.5
Romania	23	2330	183.2	100.0
Serbia	13	2500	170.9	100.0
Kazakhstan	50	1700	224.0	140.0
Lithuania	30	650	153.9	110.0
Bulgaria	45	700	142.5	94.0
Germany	16	2000	245.2	160.0
India	8	1200	191.2	145.0
Total	8	4800	238.7	120.0

Source: Own calculations based on the MOI survey

Table D.2: Main markets of firms

Country	Markets											
	Local	National	Export	Total	Local	National	Export	Total	Local	National	Export	Total
	Number of firms				Column percentages				Row percentages			
Belarus	8	49	16	73	2.4	6.8	4.9	5.3	11.0	67.1	21.9	100.0
Ukraine	30	86	14	130	9.2	12.0	4.3	9.5	23.1	66.2	10.8	100.0
Uzbekistan	47	56	12	115	14.4	7.8	3.6	8.4	40.9	48.7	10.4	100.0
Russia	112	125	6	243	34.3	17.4	1.8	17.7	46.1	51.4	2.5	100.0
Poland	4	43	27	74	1.2	6.0	8.2	5.4	5.4	58.1	36.5	100.0
Romania	18	63	49	130	5.5	8.8	14.9	9.5	13.8	48.5	37.7	100.0
Serbia	17	65	22	104	5.2	9.1	6.7	7.6	16.3	62.5	21.2	100.0
Kazakhstan	41	52	8	101	12.5	7.2	2.4	7.4	40.6	51.5	7.9	100.0
Lithuania	9	36	43	88	2.8	5.0	13.1	6.4	10.2	40.9	48.9	100.0
Bulgaria	20	52	70	142	6.1	7.2	21.3	10.3	14.1	36.6	49.3	100.0
Germany	16	67	54	137	4.9	9.3	16.4	10.0	11.7	48.9	39.4	100.0
India	5	24	8	37	1.5	3.3	2.4	2.7	13.5	64.9	21.6	100.0
Total	327	718	329	1374	100.0	100.0	100.0	100.0	23.8	52.3	23.9	100.0

Source: Own calculations based on the MOI survey

(more than 80%).

Table D.3: The span of control of the national HQ top manager

| Country | Number of employees reporting directly to the HQ top manager | | | |
	Min	Max	Mean	Median
Belarus	4	100	12.3	10.0
Ukraine	2	80	12.4	10.0
Uzbekistan	2	65	9.2	6.0
Russia	1	164	15.9	10.0
Poland	2	40	11.3	9.0
Romania	1	69	9.8	6.0
Serbia	1	100	16.4	7.0
Kazakhstan	2	35	8.6	7.0
Lithuania	1	200	9.9	5.0
Bulgaria	2	50	9.5	7.0
Germany	1	300	33.2	8.0
India	1	20	4.5	4.0
Total	1	300	13.9	7.0

Source: Own calculations based on the MOI survey

Table D.4: The span of control of the factory manager

| Country | Number of employees reporting directly to the factory manager | | | |
	Min	Max	Mean	Median
Belarus	2	62	10.1	8.0
Ukraine	2	100	10.9	7.0
Uzbekistan	1	65	7.2	4.0
Russia	1	500	23.1	10.0
Poland	2	100	32.3	10.0
Romania	1	100	10.4	5.0
Serbia	1	87	28.2	23.0
Kazakhstan	1	30	7.8	7.0
Lithuania	1	120	9.1	5.0
Bulgaria	1	50	8.6	6.0
Germany	2	800	60.4	19.0
India	1	20	5.3	4.0
Total	1	800	19.3	7.0

Source: Own calculations based on the MOI survey

Table D.5: Number of workers national HQ top manager directly manage

| Country | Number of employees HQ top manager directly manage | | | |
	Min	Max	Mean	Median
Belarus	6	50	19.0	10.0
Ukraine	15	70	30.3	27.0
Uzbekistan	10	65	34.6	25.0
Russia	6	60	22.0	20.0
Poland	8	40	22.6	20.0
Romania	6	74	31.3	28.0
Serbia	2	62	17.6	10.0
Kazakhstan	10	15	12.5	12.5
Lithuania	14	200	55.0	17.5
Bulgaria	10	50	29.4	25.0
Germany	2	90	19.9	10.0
India				
Total	2	200	24.4	20.0

Source: Own calculations based on the MOI survey

Table D.6: Number of workers factory manager directly manage

| Country | Number of employees factory manager directly manage | | | |
	Min	Max	Mean	Median
Belarus	6	50	18.6	12.0
Ukraine	15	60	30.6	27.0
Uzbekistan	15	65	36.3	29.5
Russia	1	230	31.7	30.0
Poland	3	100	16.7	7.0
Romania	23	64	42.4	43.0
Serbia	2	87	32.9	30.0
Kazakhstan	50	50	50.0	50.0
Lithuania	9	66	25.0	12.5
Bulgaria	15	50	32.1	25.0
Germany	2	590	51.7	29.5
India				
Total	1	590	36.0	29.0

Source: Own calculations based on the MOI survey

Table D.7: The depth of control of the national HQ top manager

| Country | Number of layers between the HQ top manager and production employees | | | |
	Min	Max	Mean	Median
Belarus	1	6	3.2	3.0
Ukraine	1	12	2.9	3.0
Uzbekistan	1	5	2.6	2.0
Russia	1	9	3.1	3.0
Poland	1	5	2.9	3.0
Romania	0	14	3.6	3.0
Serbia	1	5	2.5	2.0
Kazakhstan	1	11	3.3	3.0
Lithuania	0	6	2.5	2.0
Bulgaria	0	6	2.3	2.0
Germany	0	5	2.9	3.0
India	2	8	4.0	4.0
Total	0	14	2.9	3.0

Source: Own calculations based on the MOI survey

Table D.8: The depth of control of a factory manager

| Country | Number of layers between the factory manager and production employees | | | |
	Min	Max	Mean	Median
Belarus	0	5	2.4	2.0
Ukraine	0	7	2.4	2.0
Uzbekistan	0	4	0.9	1.0
Russia	0	8	2.4	2.0
Poland	0	4	1.7	2.0
Romania	0	10	3.3	3.0
Serbia	0	4	1.2	1.0
Kazakhstan	1	7	3.0	3.0
Lithuania	0	3	1.1	1.0
Bulgaria	0	6	2.0	2.0
Germany	0	5	2.2	2.0
India	1	5	2.5	2.0
Total	0	10	2.1	2.0

Source: Own calculations based on the MOI survey

Table D.9: The change of the depth of control of the national HQ top manager in the three years previous to the interview

| Country | Organizational distance in previous three years | | | | | | | | | | | |
	Increased	Decreased	Did not change	Total	Increased	Decreased	Did not change	Total	Increased	Decreased	Did not change	Total
	Number of firms				Column percentages				Row percentages			
Belarus	1	4	53	58	1.3	3.6	4.6	4.3	1.7	6.9	91.4	100.0
Ukraine	7	12	111	130	9.3	10.9	9.7	9.7	5.4	9.2	85.4	100.0
Uzbekistan	6	12	96	114	8.0	10.9	8.4	8.5	5.3	10.5	84.2	100.0
Russia	19	11	213	243	25.3	10.0	18.5	18.2	7.8	4.5	87.7	100.0
Poland	5	8	58	71	6.7	7.3	5.0	5.3	7.0	11.3	81.7	100.0
Romania	7	6	105	118	9.3	5.5	9.1	8.8	5.9	5.1	89.0	100.0
Serbia	6	16	83	105	8.0	14.5	7.2	7.9	5.7	15.2	79.0	100.0
Kazakhstan	3	9	87	99	4.0	8.2	7.6	7.4	3.0	9.1	87.9	100.0
Lithuania	7	6	74	87	9.3	5.5	6.4	6.5	8.0	6.9	85.1	100.0
Bulgaria	5	5	126	136	6.7	4.5	11.0	10.2	3.7	3.7	92.6	100.0
Germany	9	19	108	136	12.0	17.3	9.4	10.2	6.6	14.0	79.4	100.0
India	0	2	35	37	0.0	1.8	3.0	2.8	0.0	5.4	94.6	100.0
Total	75	110	1149	1334	100.0	100.0	100.0	100.0	5.6	8.2	86.1	100.0

Source: Own calculations based on the MOI survey

Table D.10: The connection between trade liberalization and profit margins

| Profit margin	OLS	OLSpos
Import penetration change (3years)	-0.034**	-0.043*
	(0.015)	(0.022)
Import penetration 4 years ago	0.045**	0.063**
	(0.022)	(0.032)
Profit margin 4 years ago	-0.030	-0.340***
	(0.044)	(0.069)
Constant	0.280	2.701*
	(1.045)	(1.512)
R2	0.020	0.100
P-value	.008194	6.16e-07
N	589	304

$*p < 0.10, **p < 0.05, ***p < 0.01$

Figure D.4: The changes of import penetration rate in manufacturing

(a) Final goods
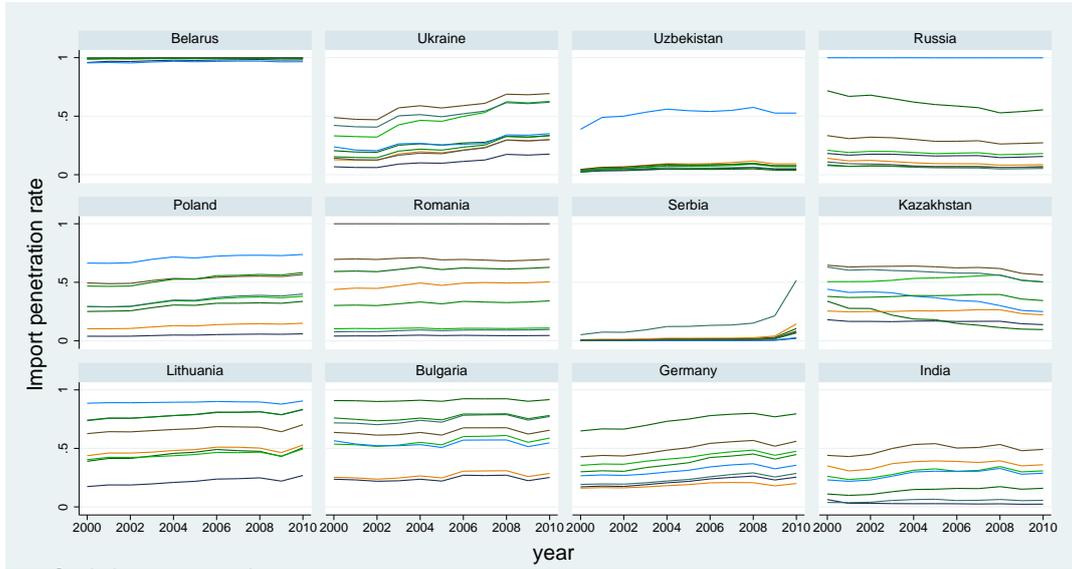
(b) Intermediate goods
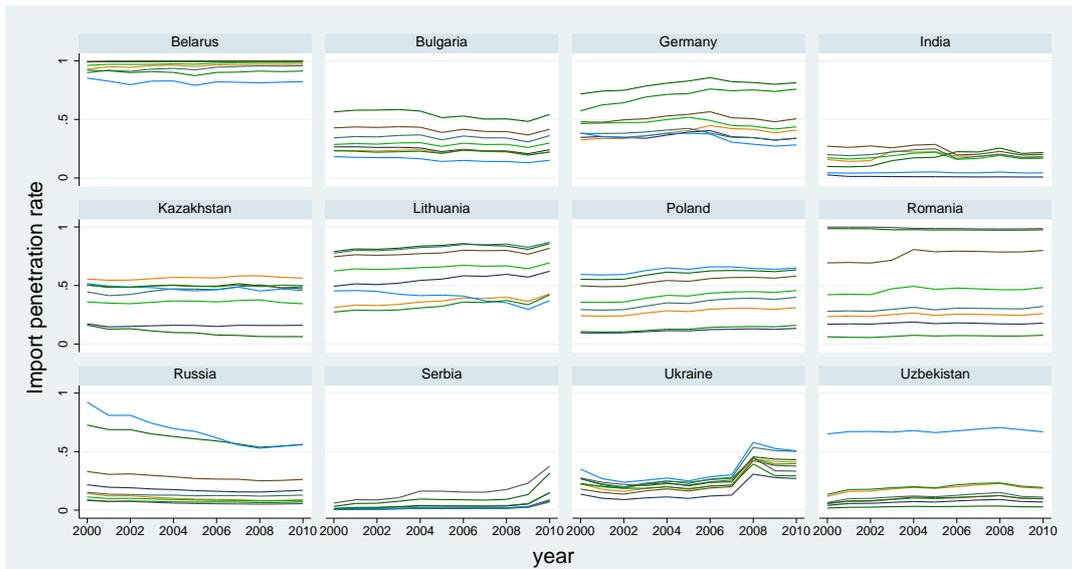

(c) Capital goods
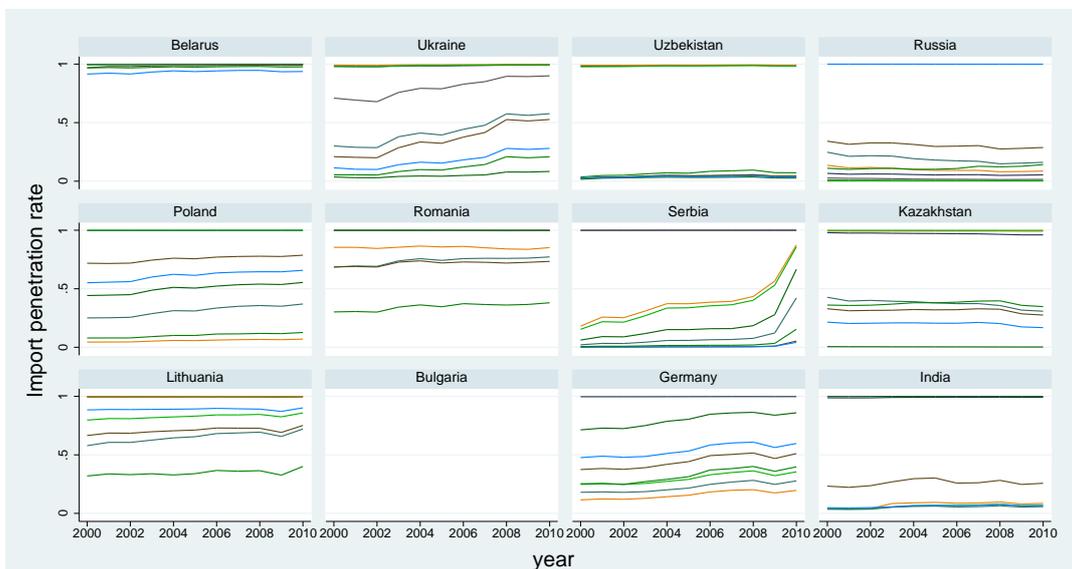
Table D.11: The connection between trade liberalization and labor productivity

	Labour Productivity[+]	Labour Productivity[+]
Import penetration change (3years)[1]	-0.120***	-0.106***
	(0.024)	(0.026)
Labour productivity 4 years ago [2]	0.673***	0.657***
	(0.028)	(0.029)
Import penetration level 4 years ago [3]	-0.077***	-0.079***
	(0.024)	(0.024)
No single ownership		0.048
		(0.100)
Foreign family/private ownership		-0.024
		(0.149)
Foreign firm ownership		0.110
		(0.161)
Foreign state ownership		-0.029
		(0.512)
Domestic family ownership		0.380***
		(0.145)
Domestic State ownership		-0.192
		(0.126)
Other ownership		-0.054
		(0.183)
Year 2009		0.022
		(0.082)
Year 2010		0.000
		(.)
Constant	-0.036	-0.069
	(0.037)	(0.058)
R2	0.617	0.628
P-value	1.07e-83	1.68e-77
N	407	406
Effect of import penetration change being 10 % higher than mean	-.068	-.061

$*p < 0.10, **p < 0.05, ***p < 0.01$

[+] Standardized logarithm of sales per employee

[1] Standardized logarithm of $\triangle MP^3_{zjct}$

[2] Standardized logarithm of sales per employee 4 years ago

[3] Standardized logarithm of $\triangle MP^3_{zjct}$ 4 years ago

Appendix E

Appendix to Chapter 5

E.1 Management Quality: Questions and Scores

The following details on the survey questions and management practice scoring is based on the questionnaire of the BEEPS innovation manufacturing module:

> **(INTERVIEWER: PLEASE READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:)**
> And now I would like to ask you about management practices in this establishment.

Management Area: OPERATIONS

R.1 Over the last complete fiscal year **[insert last complete fiscal year],** what best describes what happened at this establishment when a problem in the production process arose? **(INTERVIEWER: CODE "DOES NOT APPLY" (-7) IF THERE WERE NO PROBLEMS IN THE PRODUCTION PROCESS IN THE LAST COMPLETE FISCAL YEAR)**

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
DOES NOT APPLY (SPONTANEOUS)	**-7**	**.**
We fixed it but did not take further action	1	**2**
We fixed it and took action to make sure it did not happen again	2	**3**
We fixed it and took action to make sure that it did not happen again, and had a continuous improvement process to anticipate problems like these in advance	3	**4**
No action was taken	4	**1**

Management Area: MONITORING

R.2 Over the last complete fiscal year **[insert last complete fiscal year],** how many production performance indicators were monitored at this establishment?

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
1-2 production performance indicators	1	**2**
3-9 production performance indicators	2	**3**
10 or more production performance indicators	3	**4**
No production performance indicators	4	**1**

Management Area: INCENTIVES

R.11 Over the last complete fiscal year **[insert last complete fiscal year]**, what were managers' performance bonuses usually based on?
 (INTERVIEWER: ANY TYPE OF TARGETS: TARGETS BASED ON PRODUCTION, SALES, FIRM'S STOCK PRICE, ETC. USE "DOES NOT APPLY" (-7) ONLY IF FIRM HAS NO TARGETS)

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
DOES NOT APPLY (SPONTANEOUS)	**-7**	**.**
Their own performance as measured by targets	1	**5**
Their team or shift performance as measured by targets	2	**4**
Their establishment's performance as measured by targets	3	**3**
Their company's performance as measured by targets	4	**2**
No performance bonuses	5	**1**

R.13 Over the last complete fiscal year **[insert last complete fiscal year]**, what was the primary way non-managers were promoted at this establishment?
 (INTERVIEWER: CODE DOES NOT APPLY (-7) IF NO PROMOTIONS OF NONMANAGERS IN THE LAST COMPLETE FISCAL YEAR)

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
DOES NOT APPLY (SPONTANEOUS)	**-7**	**.**
Promotions were based solely on performance and ability	1	**4**
Promotions were based partly on performance and ability, and partly on other factors (for example, tenure or family connections)	2	**3**
Promotions were based mainly on factors other than performance and ability (for example, tenure or family connections)	3	**2**
Non-managers are normally not promoted	4	**1**

R.15 Over the last complete fiscal year **[insert last complete fiscal year]**, when was an underperforming non-manager reassigned or dismissed?
 (INTERVIEWER: CODE DOES NOT APPLY (-7) IF NO UNDER-PERFORMING NON-MANAGERS IN THE LAST COMPLETE FISCAL YEAR)

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
DOES NOT APPLY (SPONTANEOUS)	**-7**	**.**
Within 6 months of identifying non-manager under-performance	1	**3**
After 6 months of identifying non-manager under-performance	2	**2**
Rarely or never	3	**1**

Management Area: TARGETS

R.6 Over the last complete fiscal year **[insert last complete fiscal year]**, what best describes the time frame of production targets at this establishment? Examples of production targets are: production, quality, efficiency, waste, on-time delivery.

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
Main focus was on short-term (less than one year) production targets	1	**2**
Main focus was on long-term (more than one year) production targets	2	**3**
Combination of short term and long term production targets	3	**4**
No production targets *GO TO R.11*	4	**1**

R.7 Over the last complete fiscal year **[insert last complete fiscal year]**, how easy or difficult was it for this establishment to achieve its production targets?

	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
Possible to achieve without much effort	1	**1**
Possible to achieve with some effort	2	**2**
Possible to achieve with normal amount of effort	3	**3**
Possible to achieve with more than normal effort	4	**4**
Only possible to achieve with extraordinary effort	5	**5**

R.8 Over the last complete fiscal year **[insert last complete fiscal year]**, who was aware of the production targets at this establishment?

|	Score in Questionnaire	Management Score
DON'T KNOW (SPONTANEOUS)	**-9**	**.**
Only senior managers	1	**1**
Most managers and some production workers	2	**2**
Most managers and most production workers	3	**3**
All managers and most production workers	4	**4**

E.2   Tables and figures

Figure E.1: Management quality across practices and countries (MOI)
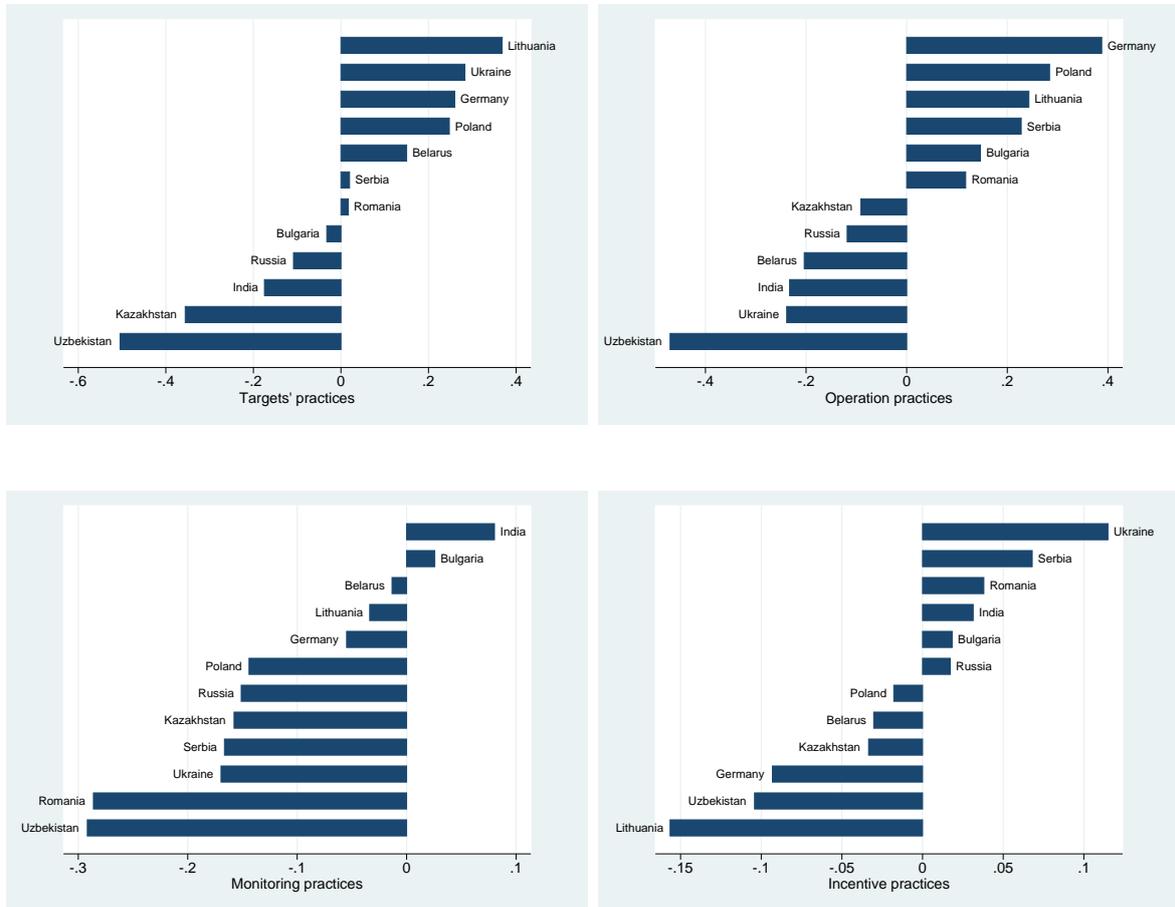

Source: Own calculations based on the BEEPS V

Figure E.2: Management practices across countries (BEEPS V)
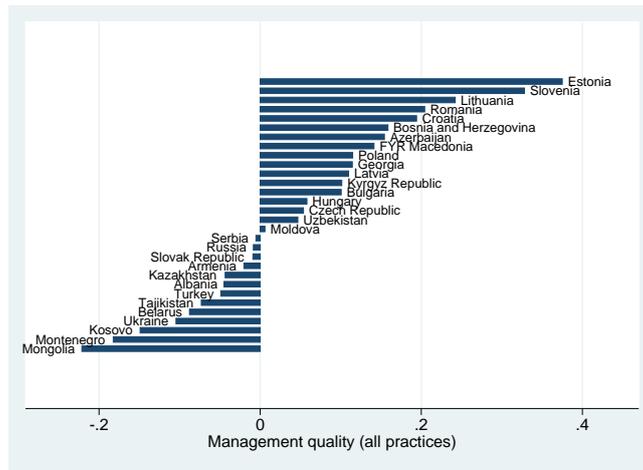

Source: Own calculations based on the BEEPS V

Figure E.3: Management quality across practices and country groups (BEEPS V)
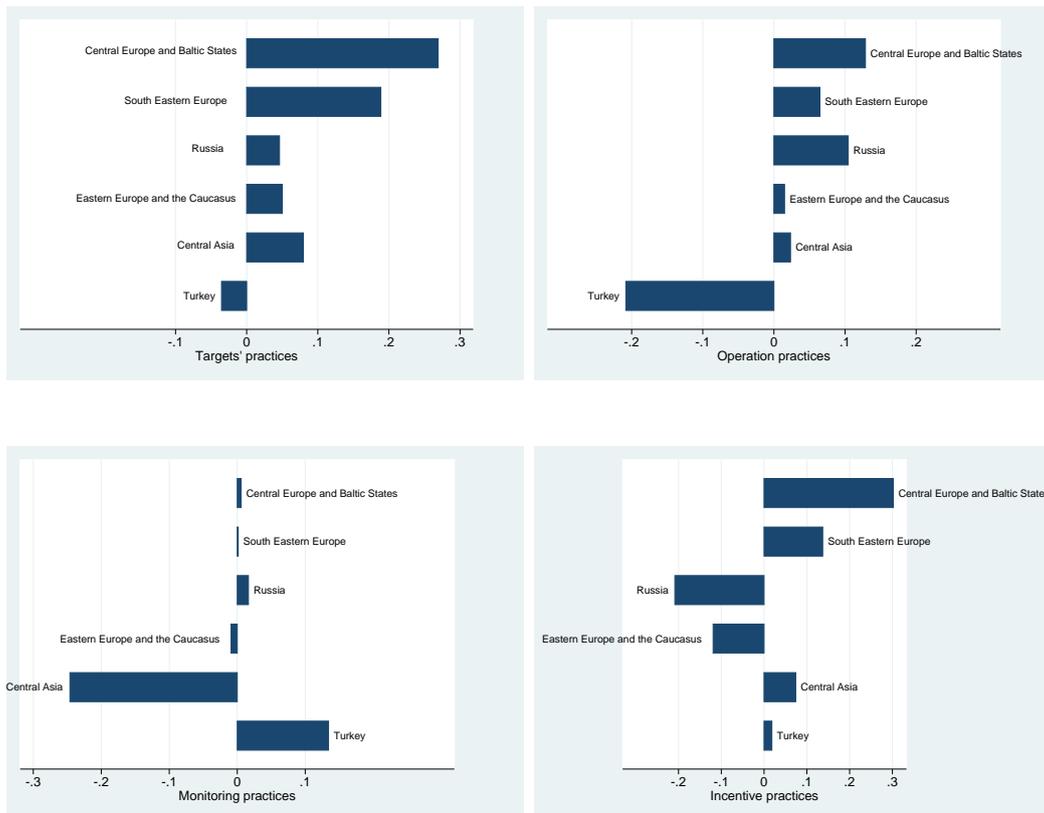
Source: Own calculations based on the BEEPS V
Note: Country groups: Central Europe and Baltic States (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South Eastern Europe (SEE). Western Balkans include Serbia, Bosnia and Herzegovina, Kosovo, Albania, FYR Macedonia, Montenegro.

Figure E.4: Management quality across practices and countries (BEEPS V)
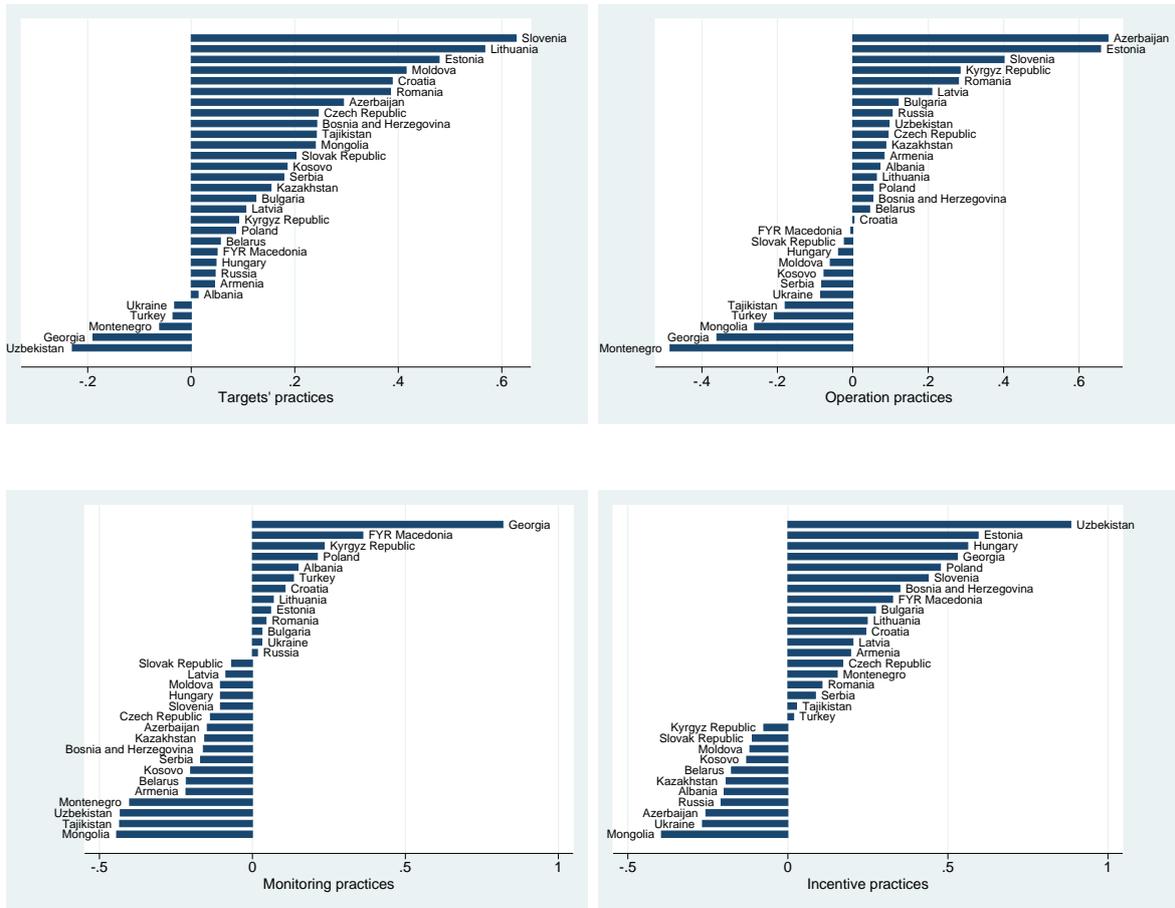
Table E.1: Main Variables

Endogenous variable		
Management Quality	$MQ_{ijc} = \frac{1}{4}\sum_{n=4}^{1}(\frac{1}{N}\sum_{p=N}^{1}\frac{(Y_{ijc}-\bar{Y})}{sd(Y)})$	, where Y_{ijc} is the performance of a firm i in terms of a particular management practice$Y$ in sector j in country c; p - number of practices per area of management, n=4 are four areas of management: targets, incentives, monitoring and operations
Exogenous variables		
Administrative corruption	$Corr_{ijc} = \frac{(X_{ijc}-\bar{X})}{sd(X)}$	, where X_{ijc} is the frequency of corruption reported by a firm i to be characteristic for firms similar to itself in sector j in country c. The level varies between 1 (Never) to 6 (Always).
Types of administrative corruption	$Corr_{ijc}^{tax} = \frac{(X_{ijc}^{t}-\bar{X}^{t})}{sd(X^{t})}$	, where X_{ijc}^{t} is the frequency of corruption in dealing with taxes and tax collection reported by a firm i to be characteristic for firms similar to itself in sector j in country c in dealing with taxes and tax collection
	$Corr_{ijc}^{courts} = \frac{(X_{ijc}^{c}-\bar{X}^{c})}{sd(X^{c})}$	, where X_{ijc}^{c} is the frequency of corruption in dealing with courts reported by a firm i to be characteristic for firms similar to itself in sector j in country c in dealing with taxes and tax collection
	$Corr_{ijc}^{customs} = \frac{(X_{ijc}^{u}-\bar{X}^{u})}{sd(X^{u})}$	, where X_{ijc}^{u} is the frequency of corruption in dealing with customs and/or imports reported by a firm i to be characteristic for firms similar to itself in sector j in country c in dealing with taxes and tax collection
Corruption as an obstacle	$CorrObst_{ijc}^{1} = 1$ $CorrObst_{ijc}^{1} = 0$	if corruption is *not an obstacle* for a respondent's firm, otherwise.
	$CorrObst_{ijc}^{2} = 1$ $CorrObst_{ijc}^{2} = 0$	if corruption is a *minor obstacle* for a respondent's firm, otherwise.
	$CorrObst_{ijc}^{3} = 1$ $CorrObst_{ijc}^{3} = 0$	if corruption is a *moderate obstacle* for a respondent's firm, otherwise.
	$CorrObst_{ijc}^{4} = 1$ $CorrObst_{ijc}^{4} = 0$	if corruption is a *major obstacle* for a respondent's firm, otherwise.
	$CorrObst_{ijc}^{5} = 1$ $CorrObst_{ijc}^{5} = 0$	if corruption is a *very obstacle* for a respondent's firm, otherwise.

Figure E.5: Administrative Corruption by types and Management Quality (BEEPS V)
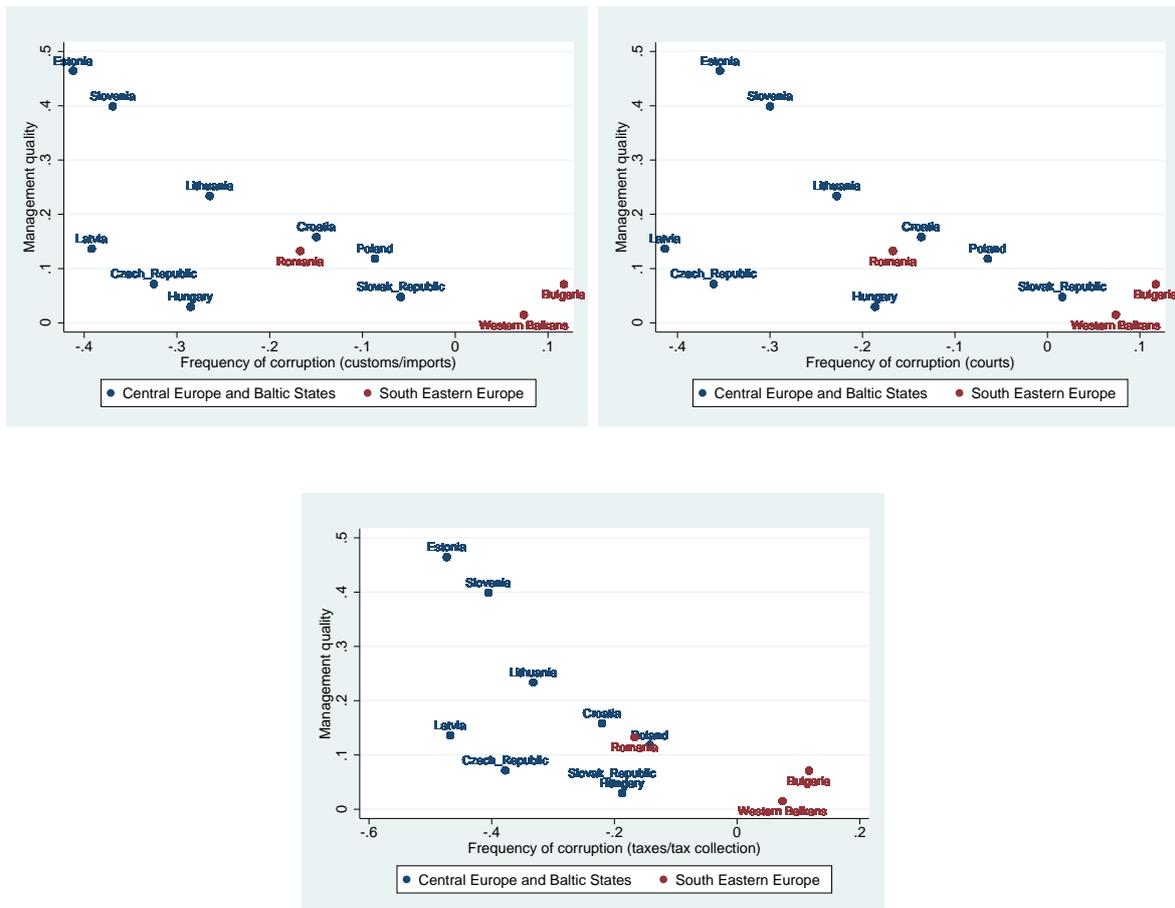

Source: Own calculations based on the BEEPS V
Note: Country groups: Central Europe and Baltic States (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South Eastern Europe (SEE). Western Balkans include Serbia, Bosnia and Herzegovina, Kosovo, Albania, FYR Macedonia, Montenegro.

Figure E.6: Administrative Corruption by types and Management Quality (BEEPS V)

Source: Own calculations based on the BEEPS V
Note: Country groups: Central Europe and Baltic States (CEB), Eastern Europe and the Caucasus (EEC), Central Asia, South Eastern Europe (SEE). Western Balkans include Serbia, Bosnia and Herzegovina, Kosovo, Albania, FYR Macedonia, Montenegro.