CEFTA ISSUES PAPER 3

Trade Integration, Industry Concentration and FDI Inflows: The Experience in Central and South Eastern Europe

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FOREWORD

As we approach the fourth year of implementation of the CEFTA 2006, the challenge for the Parties to the agreement is to ensure full implementation of all commitments. These commitments are important as they provide us with a means of strengthening our economic ties through greater regional trade and investment integration. Our shared goals are EU accession, sustainable long-term economic growth and improved living standards – CEFTA 2006 is a key instrument by which we can attain those goals.

The investment-related clauses of CEFTA 2006 are a novel feature of the trade agreement. The Parties recognised that without providing non-discriminatory treatment to investments from other Parties, co-ordinating our investment policies as much as possible, protecting intellectual property rights and opening our government procurement markets the benefits of closer trade ties would only be partially realised.

As CEFTA chair for 2010, Serbia welcomes the series of publications produced by the OECD Investment Compact for South East Europe on monitoring the implementation of the investment-related clauses in CEFTA 2006. The analysis contained in these series of papers will help the CEFTA Parties understand where progress has been made and where more work needs to be done. These publications would not have been possible without the financial support of the European Commission.

Closer co-operation between the CEFTA institutions, the European Commission and organisations such as the OECD Investment Compact ensure that the benefits of CEFTA 2006 reach their maximum potential.

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INTRODUCTION

The Central European Free Trade Agreement (CEFTA) 2006 represents a significant accomplishment for the economies of the Western Balkans along the path to EU accession. By focussing on greater economic integration through trade and investment, the Parties recognize that CEFTA 2006 is an important stepping stone to sustainable long-term growth and improved standards of living.

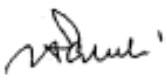
In addition to implementing traditional trade-related liberalisations such as tariff reductions, CEFTA 2006 obligates the Parties to undertake commitments related to investment policy. The investment-related clauses of CEFTA 2006 provide for non-discriminatory treatment of investments underpinned by the principle of national treatment, a commitment by the Parties to broadly co-ordinate their investment policies, progressive opening of their government procurement markets to one another, and effective protection of intellectual property rights (IPRs).

In an effort to monitor implementation of the investment-related clauses, the CEFTA Parties have mandated the CEFTA Secretariat to undertake actions to periodically review these commitments. With the financial support of the European Commission (EC), the CEFTA Secretariat requested the Organisation for Economic Cooperation and Development's Investment Compact for South East Europe (OECD-IC) to assist in this effort.

This publication presents an econometric analysis on the extent that patterns of geographical concentration changed during the original Parties' transition to market based economic systems. It also investigates the underlying determinants of those changes. The publication concludes with an assessment of the impact of broad regional integration, and free trade agreement membership in particular, on countries' ability to generate higher foreign direct investment (FDI) inflows. The results of this report were presented by the OECD-IC during CEFTA week events in Podgorica, Montenegro on 27-28 October 2009.

This publication is part of a series of papers produced by the OECD-IC in the framework of the EC-funded exercise to monitor the implementation of the investment related clauses of CEFTA 2006. The other papers include a review of the IPR legal frameworks found in the CEFTA 2006 Parties, a review of restrictions to national treatment and an assessment of the consistency of bilateral investment treaties signed among the CEFTA Parties. The views expressed in these publications are those of the OECD-IC and do not reflect the official position of CEFTA institutions or CEFTA Parties themselves.

The continued co-operation between CEFTA institutions and the OECD-IC to monitor the investment-related clauses of CEFTA 2006 represents an example of the type of collaboration necessary to ensure that maximum benefits from closer trade and investment integration are reaped across the region.



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The OECD Investment Compact would like to thank all the CEFTA contact points and stakeholders who participated in workshops on the investment related clause during CEFTA week in Podgorica, Montenegro between 27-28 October 2009.

Antonio Fanelli developed the concept and had overall management responsibility for the series of working papers within this report. The individual chapters were prepared by Mr. Adnan Seric from the University of St. Andrews (Chapter 1 and Chapter 2) and Ms. Erin Hengel from the OECD-IC (Chapter 3). The report was edited by Ms. Laura Boutin, Ms. Geraldine Daly of the OECD-IC and Ms. Hengel.

The OECD-IC would like to thank colleagues from who provided valuable comments to these working papers. In particular, we would like to thank Mr. Jeremy Lawson, Senior Economist from the OECD Economics Department and Mr. Alistair Nolan, Head OECD-IC.

The OECD-IC intends to continue providing input into the implementation of CEFTA 2006 and increase debate of benefits of regional trade integration in the broader framework of European economic integration.

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TABLE OF CONTENTS

Tables

Figures

1 EXECUTIVE SUMMARY

The transition period after the fall of communism for Central and South East Europe has not always been smooth. Especially initially, both unemployment and inflation were exceptionally high. In 1994, Central and Eastern Europe (CEE)[1] had inflation above 48%. Unemployment was almost 13%. In South East Europe (SEE),[2] inflation averaged 52.6% between 1997 and 2001. Unemployment averaged 16% over that same time period.[3] Economic uncertainly contributed to political destabilisation, particularly in South East Europe.

However, Central and South East Europe have done much to improve their economic situation over the last two decades. Prudent fiscal and monetary policy and reduced government debt has brought inflation down substantially. Over the past five years, inflation was only about 6% in both CEE and SEE. Interest rates, especially in CEE, are now in line with those found in other OECD countries.

Centrally planned bureaucracies were eliminated and many state-owned businesses were privatised. As a prerequisite for European Union (EU) membership, Central and South East European countries have replaced their previous legal and political regimes with modern legislation and institutions promoting a competitive market-economy supported by high-quality infrastructure.

Perhaps most importantly, barriers to trade with the EU and amongst each other were abolished. In CEE, the Baltic Free Trade Area (BAFTA) and the Central European Free Trade Agreement (CEFTA) led to tariff elimination amongst the signatory countries. The Europe Agreements signed between CEE countries and the EU led to tariff elimination with the EU. Now, each of these countries is a full member of the EU, with almost complete access to the Common Market. Barriers to the free movement of capital and labour are coming down.

SEE countries have also engaged in regional and European integration. Bulgaria and Romania joined the CEFTA in 1999 and 1997, respectively. They eventually acceded to the EU in 2007. In 2007, the Western Balkan economies and Moldova joined a new Central European Free Trade Agreement, the CEFTA 2006. As happened in CEE a decade previously, the CEFTA 2006 called for reduced trade barriers between the signatory countries. It also encouraged further integration on issues related to investment.

1 . CEE refers to Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia.

2 . SEE refers to Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo under UNSCR 1244/99, the former Yugoslav Republic of Macedonia, the Republic of Moldova, Montenegro, Romania and Serbia. Bulgaria and Romania are represented in statistics for both CEE and SEE to reflect the fact that these countries are included in both regional analyses of FDI determinants.

3 . Data from the World Bank World Development Indicators (WDI) database.

Additionally, the EU has either signed or signalled its intention to sign a Stabilisation and Association Agreement in all signatory countries.[4]

Table 1. CEFTA, BAFTA and CEFTA 2006 membership

Countries	BAFTA		CEFTA		CEFTA 2006
	Entry into force	Left	Entry into force	Left	Entry into force
Estonia	1994	2004			
Latvia	1994	2004			
Lithuania	1994	2004			
Hungary			1994	2004	
Czech Republic			1994	2004	
Poland			1994	2004	
Slovak Republic			1994	2004	
Slovenia			1996	2004	
Romania			1997	2007	
Bulgaria			1999	2007	
Croatia			2003	2007	
Former Yugoslav Republic of Macedonia			2006	2007	
Albania					2007
Bosnia and Herzegovina					2007
Kosovo under UNSCR 1244/99					2007
Republic of Moldova					2007
Montenegro					2007
Serbia					2007

Source: CEFTA Secretariat, European Commission.

The myriad reforms have led to a growing gross domestic product (GDP). Average 2007 GDP growth in CEE was 7.1%. In SEE it was 6.3%. Foreign direct investment (FDI) in both regions has also dramatically increased. CEE FDI inflows averaged almost USD 43 billion per year between 2004 and 2007. FDI inflows in SEE during that same period averaged USD 22 billion per year.[5] Such investment has come not only from massive privatisations, but also from prized greenfield investment.

These fundamental changes that CEE and SEE have undergone over the past twenty years have changed the landscape of economic activity in each region. The opening of new markets, the reform process and general economic growth has likely influenced the geographical distribution of economic activity. In the first of the following series of three papers, we investigate how growth has impacted the location of economic activity. Due to data availability, the analysis was conducted only on CEE countries. However, the findings of the study can provide SEE with a clear indication of the evolution of its own geographic distribution of economic activity. Additionally, the policy conclusions that are drawn from the CEE findings can be an important benchmark for SEE countries looking to exploit regional and European integration to its fullest advantage.

Similarly, deeper intra- and inter-regional economic integration combined with significant institutional improvements have also likely influenced the geographical distribution of foreign investment. However, the progress each country has made in implementing these reforms has been uneven. In Chapters 2 and 3 we investigate how the difference in the pace of institutional reform and trade integration has

4 . The exceptions are the Republic of Moldova and Kosovo under UNSCR 1244/99. The Republic of Moldova has a partnership and co-operation agreement giving it autonomous trade preferences and eventually a comprehensive trade agreement with the EU.

5 . Data from the European Bank for Reconstruction and Development (EBRD).

impacted the decision of foreign investors to locate within a country. A complete analysis has been conducted for CEE countries. Although data availability prevents us from fully extending this analysis to SEE, we attempt to determine as much as possible the determinants of FDI location in that region as well.

1.1 Summary of results

Our findings further support conclusions from existing research on the location of manufacturing activity and provide important policy considerations for governments looking to benefit from integration. In particular, they indicate three key findings:

- Cutting trade costs and barriers is an effective means to ensure that economic activity locates where it is most efficient. Contrary to many politicians' fears, this has not led to increasingly clustered economic activity. Instead, economic activity in CEE has largely dispersed, and those industries with the lowest trade costs have dispersed the most. Similarly, FDI has been attracted to more open economies with fewer trade costs.

- Improving the skill base of a workforce as part of overall productivity improvements is important for attracting economic activity and FDI. Industries requiring higher-skilled labour do tend to cluster. Additionally, FDI is attracted to markets with higher worker productivity.

- General investment climate reforms, especially in corporate governance, infrastructure and privatisation, lead to higher levels of FDI. Importantly, investment climate reforms combined with trade integration significantly increase the probability of attracting FDI.

Below is a summary of the findings from each analysis and the policy conclusions to which they point. A more in depth description of the methodology and data used in the analyses can be found in the three chapters that follow.

1.1.1 Determinants of economic location

Does regional integration contribute to industry concentration? According to traditional trade theory, countries will specialise in areas in which they have a comparative advantage. This foretells country specialisation and therefore clustering of productive activities. In newer trade theories, the determinants of the location of industrial activity are more nuanced. Depending on the level of trade costs, economic activity will either cluster or disperse. In general, high trade costs induce economic activity to be relatively evenly spaced across countries. Intermediate trade costs encourage specialisation – firms can locate near their upstream and downstream suppliers and benefit from a source of appropriately skilled labour. Low trade costs and ease in finding appropriately skilled workers allow firms to move away from clusters and their associated negative externalities (*e.g.* pollution and high wages). Thus economic activity disperses.[6]

To determine whether Central and Eastern European countries experienced more economic dispersion because of increased regional and EU integration, we analysed data from those countries over the time period 1995-2005. We found that:

- Industrial activity has largely dispersed between 2001 and 2005.

- Industries with higher non-tariff barriers chose to locate at a greater distance from one another. Those industries that dispersed the most in 2001-2005, a period of accelerated market integration, were characterised by low to medium non-tariff barriers. This provides tentative support to some

6 . For a more in depth discussion on the theory behind the determinants of economic location, see Chapter 1.

of the theoretical predictions coming from new economic geography literature, *i.e.* economic activity disperses at lower trade costs.

- Industries requiring higher skilled labour and characterised as scale intensive tend to cluster.

- High technology industries tend to cluster when marked by high levels of intra-industry linkages. Famous examples include the software industry in Silicon Valley. Firms in such industries benefit from knowledge spillover and other intangible advantages, and hence prefer to locate closer to firms from the same and related industries.

The policy conclusions stemming from our results suggest that, with increasing regional integration, countries should consider simultaneously reducing other trade costs. Theory predicts that economic activity will cluster when faced with intermediate trade costs. Policy makers worried about economic activity clustering away from their own political unit might be encouraged to increase trade costs (*e.g.* through non-tariff barriers). However, the results of our analysis suggest that the industries that in fact dispersed the most in CEE were those with the *lowest* trade costs. This indicates that the more effective means of ensuring a more equitable cross-country distribution of economic activity is to further reduce trade costs.

However, certain firms derive significant gains from being nearer to other firms in their same industry. In particular, industries requiring skilled labour characterised by high-technology and high levels of intra-industry linkages will cluster. Our analysis suggests that to attract this type of economic activity, countries should increase their supply of skilled labour. Improving the education of available workers will improve a country's chances of attracting this type of investment. Additionally, because of the tendency of this type of activity to cluster, an active government sponsored promotion programme might be justified. Encouraging even just one firm from a skill-intensive industry to locate in a country can spark a process of cumulative causation – depending on the weight of this firm among its industrial peers, its relocation might encourage the relocation of its suppliers and even its customers.

1.1.2 Determinants of FDI

In the previous section we investigated the factors that determine the location and concentration of economic activity. A related question, of particular importance to policy makers, concerns the factors that determine the location of FDI. How has further regional integration impacted the location of FDI? Are particular institutional reforms more conducive to increasing FDI? To answer these questions, we investigated the situations in both CEE and SEE.

Attracting FDI in CEE

In order to establish the determinants of FDI, we explored the relationship between FDI and progressive regional and European integration in CEE. In particular, we look at how the regional free trade agreements conducted between CEE countries and economic and institutional reforms impact the location of FDI. Our findings indicate that:

- FDI is, on the one hand, market seeking. The greater the market potential of a particular country, the larger FDI stocks tend to be.

- On the other hand, however, FDI is also efficiency seeking – both lower labour costs and higher labour productivity make a country an attractive destination for FDI.

- The more open an economy is and the fewer trade costs and barriers it incurs, the larger FDI stocks tend to be. Additionally, membership in a regional free trade agreement is associated with

higher levels of FDI. The cumulative effect of both greater trade openness and membership in a free trade agreement is significant.

- Higher quality institutions have a considerable positive impact on FDI.

- Reforms in infrastructure, privatisation and enterprise restructuring can lead to higher levels of FDI.

There are numerous policy conclusions springing from these findings. First of all, and in line with the recommendations in the previous section, countries should strive to improve the productivity of their workforce. This implies improving worker skills and education, but also making it easier for firms to invest in new machinery and/or business processes. Both lower tariffs on capital imports and measures to improve firms' access to finance can go a long way in encouraging firms to make these investments. Programmes to improve the financial education of entrepreneurs – from choosing the correct source of funding to writing a business plan – can also be helpful. Moreover, when firms have more flexibility in hiring and firing workers, they are often better able to allocate resources where they are most productive.

Similar to the finding in the previous section, our analysis suggests that FDI is attracted to more open economies with fewer trade costs and barriers. Not only should hard barriers, such as tariffs and quotas, be removed, but softer barriers – particularly non-tariff barriers – should be removed as well. Additionally, free trade agreements with neighbouring countries appear to have a significant impact on FDI. In fact, the cumulative effect of both greater trade openness and membership in a free trade agreement is significant. Increasing trade openness by 1 percent while being a member of either CEFTA or BAFTA results in a 1.1 percent cumulative increase in FDI.

Our evidence suggests that high quality institutions are important for increasing FDI. To gauge the impact of institutions, we used the Economic Freedom of the World index, published annually by the Fraser Institute. It is a measure of the "consistency of a nation's institutions and policies with economic freedom" (Fraser Institute, 2009). Obviously the institutional quality of a country matters to foreign investors. Functioning market institutions impact the productivity and competitiveness of foreign and domestic producers, alike. In fact, according to our analysis, this measure impacts more than anything else the amount of FDI a country is able to attract.

Finally, reforms in the areas of infrastructure, privatisation and enterprise restructuring seem to be related to a country's ability to attract more FDI. Improvements in any of these three dimensions, but particularly in infrastructure and enterprise reform, impact the location decisions of foreign investors. Additionally, the analysis shows that the effect of privatisation is intensified when implemented simultaneously with infrastructure reform. This suggests that foreign investors demand a comprehensive set of reforms.

Attracting FDI in SEE

The lack of extensive time series data in South East Europe prevented a comprehensive analysis of the determinants of FDI in the region. However, we were able to construct a modified empirical model. In general, the findings are in line with those for CEE. In particular they indicate that:

- FDI in SEE is attracted to markets with greater income.

- The more open an economy is and the fewer trade costs and barriers it incurs, the larger FDI stocks tend to be. Additionally, membership in CEFTA 2006 is associated with higher levels of

FDI.[7] As in the case with CEE countries, the cumulative effect of both greater trade openness and membership in a free trade agreement is large.

- Additionally, when the CEFTA 2006 and greater trade openness were implemented in conjunction with general reforms in the investment climate, FDI increased even more than just the cumulative effect of the two events would suggest. This implies that both reforms mutually reinforce each other to bring the highest levels of FDI.

- Higher levels of reform can lead to higher levels of FDI. In particular, the degree to which a country's government promotes and enforces enterprise restructuring (i.e. corporate governance principles) appears to be especially important to foreign investors.

The policy conclusions stemming from this analysis largely mirror those found in CEE. Both CEFTA 2006 membership and greater trade openness lead to higher levels of FDI. Additionally, general investment climate reforms lead to higher levels of FDI. Thus, greater trade openness, both regionally and in general, combined with investment climate reforms is important for increasing FDI.

Our evidence for SEE also suggests that when CEFTA 2006 is implemented in conjunction with general reforms in the investment climate, countries can expect an even greater impact on FDI. Being a member of CEFTA 2006 and simultaneously implementing broad investment climate reforms brings FDI above and beyond what one might expect without CEFTA 2006. Reforms in competition policy, telecommunications and trade and foreign exchange liberalisation in particular interact with CEFTA 2006 membership to bring higher levels of FDI. In other words, implementing CEFTA 2006 and other investment climate reforms at the same time brings additional benefits in excess of what one would expect if either were implemented in isolation. Conversely, CEFTA 2006 membership by itself cannot be expected to generate significant increases in FDI. Instead, it is most effective in increasing FDI when surrounded by a healthy investment environment.

Additionally, we investigated whether investment climate reforms have a different effect on FDI depending on the level of trade openness in a country. We found that an additional 1% increase in reforms in the general investment climate yields a higher increase in FDI for countries with more trade openness. Similar results were found for other specific investment climate variables including banking reform and interest rate liberalisation, large-scale privatisation, infrastructure reform, telecommunications reform and trade and foreign exchange liberalisation. The findings imply that countries who marry these investment climate reforms with greater trade openness can expect increasing returns.

1.2 Conclusion

Our findings highlight many reforms that policy makers can enact to attract more and better investment and in general encourage a more equitable cross-country distribution of economic activity. However, most importantly, our findings imply that FDI is attracted to the combination of strong institutions and an open market. Trade policy alone will not drive FDI. Instead, it must be implemented in conjunction with an effective and efficient general business climate.

With that in mind, each individual policy recommendation from the study should be recognised as one component within a basket of reforms that should be implemented together or in close succession. Within that set of reforms, we find that countries wishing to attract higher levels of FDI should reduce trade costs, including non-tariff barriers. Additionally, more efforts should be made to increase the supply of skilled

7 . However, our dummy variable to measure the impact of CEFTA 2006 on FDI is only significant at the 0.15 level, above most standard acceptance cut-offs.

labour and improve both capital and labour productivity. We also find substantial support for improvements in the quality of institutions. Finally, we encourage countries to continue the reform process, particularly in the areas of privatisation, infrastructure and enterprise restructuring.

2 REGIONAL INTEGRATION AND GEOGRAPHICAL CONCENTRATION OF MANUFACTURING IN CENTRAL EASTERN EUROPE[8]

2.1 Introduction

Forces at work driving industry location in Central Eastern Europe (CEE) might be different from those frequently observed in developed economies.[9] Historically, centrally planned economies have suffered from misdirected regional integration and inefficient industrial policies. Their economic geography during the Soviet period was largely determined by political forces within the Council of Mutual Economic Assistance (CMEA), with little or no consideration for country-specific advantages (Traistaru *et al.*, 2003).

The collapse of central planning set the stage for a wave of rapid and radical reforms aimed at fundamental re-organisation of existing economic and political structures within the region at large. In this process, government allocation plans have been replaced by market forces, resulting in greater inter-firm competition for resources and markets. While CEE countries have rapidly integrated into global production networks, their stated goal from the start of the transition process has been to institutionally integrate into the European Union (EU). Europe Agreements[10], their EU integration roadmap, have been instrumental in aligning their inherited institutions with those operating in the Common Market. It was especially the move towards formation of smaller regional trade initiatives or free trade agreements (FTAs), interlinked within the pan-European system of cumulation, that significantly contributed to the emergence of market-based economic structures in CEE.[11] In particular, the Central Europe Free Trade Agreement (CEFTA) and Baltic Free Trade Area (BAFTA) have provided a legal framework for the signatory countries and hence further facilitated investment and trade within the region. The fundamental changes that have occurred in CEE following the transition have also likely contributed to changes in the geographical distribution of economic activities in those countries. In other words, we would expect location of productive activity to be increasingly determined by economic incentives rather than political decree.

However, the transition process also entailed heavy costs, primarily for domestic producers. Following the dissolution of the CMEA, most of them lost their previously secure export markets while

8 . This chapter was written by Mr. Adnan Seric, University of St. Andrews, for the Organisation for Economic Co-operation and Development Investment Compact for South East Europe.

9 . CEE countries include: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

10 . The Europe Agreements constituted the legal framework of relations between the European Union and CEEC. These agreements were adapted to the specific situation of each partner state while setting common political, economic and commercial objectives. In the context of accession to the EU, they formed the framework for implementation of the accession process (European Commission, 2009).

11 . Specifically, Czech Republic, Hungary, Poland and Slovakia signed the CEFTA in 1992. The agreement entered into force in 1994 and has been geographically expanded to include Slovenia (1996), Romania (1997) and Bulgaria (1999). In parallel, the three Baltic countries of Estonia, Latvia and Lithuania established BAFTA in 1994.

being faced with growing competition from often more efficient foreign producers (Kaminski, 1993). As a consequence, there has been a noticeable trend towards application of implicit vertical or sector-specific industrial policies that have been frequently introduced as a way to relax negative effects of increased competition (Torok, 2007; Fink, 2001). When implemented, such policies entail a remarkable protectionist component and are expected to have a profound impact on geographical location of economic activity. Hence, in addition to examining the effects of market incentives and integration on location of production, we also aim to test the potential impacts of policy intervention on location of economic activity in CEE.

Our study is structured as follows. First, using data for the period 1995 to 2005 we assess whether (and to what extent) patterns of geographical concentration (agglomeration) have changed during CEE's transition to market-based economic systems. Second, we aim to uncover underlying determinants of those changes as we consider traditional location factors but also include some more specific components, such as the effect of targeted industrial policies. In particular, we would like to provide answers to the following questions:

Have CEE manufacturing industries become more geographically concentrated or dispersed over time? In other words, we would like to examine how industrial spatial structures have changed during the period under consideration by providing a detailed account of individual industries' location patterns. Next, what determines spatial patterns of industry location in CEE? Here, we consider relevant economic theories and their implications when devising relevant proxy variables and empirically estimating their predictive power. More specifically, however, we would like to know whether the CEFTA and the BAFTA, in parallel to the EU accession process, have made a difference in the spatial distribution of CEE manufacturing. Finally, have vertical industrial policies discouraged the geographical concentration of those targeted industries in CEE?

There are a limited number of studies examining spatial concentration patterns of manufacturing industries in transition economies. Though they have greatly contributed to our understanding of factors influencing industry location, there remain a number of gaps in the literature. First, the time period under consideration has so far been limited to the 1990s. In contrast, we focus on the period 1995 to 2005 and hence treat the time component as an indicator of overall regional integration within the region but also between CEE and the EU. Though the CEFTA and the BAFTA were signed during the 1990s, it is reasonable to assume that the full effects of complete trade liberalisation became apparent only after a certain time lag. This effect may have been in the post-2000 period, as the declarations envisaged stepwise market liberalisation between the signatory countries. Moreover, trade liberalisation in industrial goods between CEE and the EU has been asymmetric; equal market access provisions were only achieved in 2001 (Dangerfield, 2004). In other words, our time series enables us to examine potential structural breaks in geographical concentration patterns that are directly related to different stages of regional integration.

Second, previous studies used a rather restricted number of explanatory variables in describing spatial location patterns. This has been mainly due to a lack of reliable data sources. Instead, we make use of a new data set that enables us to construct somewhat more reliable measures of spatial concentration as well as proxies for various theoretical concepts that have been put forward in explaining industry agglomeration. The EU KLEMS data set provides a detailed industry account at an adequately aggregated level for almost all countries in our sample.

Finally, to the best of our knowledge, there is no systematic study that accounts for the potential impact of industrial policies on geographical location in the Eastern European context of transition.

The remainder of the chapter is organised as follows. In Section 2.2 we introduce the theoretical concepts and summarise existing empirical evidence on industry location in CEE. In Section 2.3 we propose suitable statistical measures of geographical concentration and examine the temporal changes in

location patterns across industries. In Section 2.4, we estimate an econometric model of factors determining spatial concentration of manufacturing activity. Finally, we conclude our discussion and suggest some avenues for related research.

2.2 Theory and evidence

2.2.1 Market forces and industry location

Market forces exhibit significant influence on the location of economic activity. Scholarly work has examined industrial location and other geographic concentrations based on theoretical frameworks guided by, among others, the neoclassical trade, new trade and new economic geography models (see, for instance, Wolfmayr-Schnitzer, 2000).

The neoclassical trade theory, embraced by Ricardo and Heckscher-Ohlin, postulates that industry location is determined exogenously by what has been labelled as "first nature" factors (Krugman, 1993). In other words, the observed production landscape may be explained by comparative advantage. Hence, emerging agglomeration patterns are dominated by inter-industry specialisation whose extent depends on the actual size of existing trade costs. Though intuitive, comparative advantage alone is insufficient to explain observed geographical concentration as it fails to explain why seemingly identical countries (or regions) in terms of factor proportions develop different production structures. Moreover, empirical evidence suggests that intra-industry trade flows by far outweigh inter-industry exchange of goods (Greenaway and Torstensson, 1997).

New trade models advocate the presence of internal scale economies in relation to market access as the main determinants of industry concentration (Krugman, 1980; Helpman and Krugman, 1985). Krugman and Venables (1990) show that more firms are willing to set up production in a country with a larger market in order to minimise transportation costs. Generally speaking, the combination of increasing returns to scale and trade costs encourages firms to locate close to large markets, which in turn are those with more firms. New trade models describe the evolution of industrial location as a process driven by differences in market size. However, that is restrictive as it prevents us from understanding why seemingly identical locations do not all develop the same way.

New economic geography (NEG) models formalise the so-called cumulative causation process that can even explain diverging concentration patterns in locations with identical initial structures, *i.e.*, market sizes (Ottaviano and Puga, 1997). Contrary to previous theories, the process of industrial location is determined endogenously in NEG models by interaction between demand and cost linkages on the one side and the level of trade costs on the other (Krugman, 1991a; Venables, 1996). We will discuss the mechanisms of agglomeration as well as their implications in greater detail below.

Existing empirical research on Eastern European economies supports the view that location became increasingly determined by market forces following the transition. For instance, Hildebrandt and Woerz (2004) study determinants of geographical concentration of industries in ten CEE countries over the period 1993 to 2000. They show that CEE countries' trade re-orientation toward Western European markets had a significant impact on geographical concentration of their respective manufacturing industries. In particular, relative concentration has increased over time and has been mainly driven by comparative advantages and location of demand, while absolute concentration was determined by differences in countries' human capital endowments. More interestingly, however, is the fact that neither scale economies nor transportation costs are part of the explanation. Such a finding is rather surprising and may be attributed to aggregation problems that have frequently been highlighted in the literature (see Ottaviano and Thisse, 2004).

Longhi *et al.* (2005) use a finer scale of spatial aggregation, NUTS III classification level of European regions, and conclude that overall geographic concentration of manufacturing in five CEE countries has not changed considerably during the 1990s. In contrast to the previous study, however, industries reliant on scale economies are more concentrated than industries exhibiting low use of technology. Here again, factor endowments and market size are determinants of industry agglomeration.

Country studies, such as the one by Iara and Traistaru (2003) on Hungary for the period 1994 to 1998, find that market integration has led to an increase in regional disparities. Specifically, internal regions bordering the EU as well as the metropolitan regions exhibited the highest levels of manufacturing concentration, while those bordering the other candidate countries exhibited the lowest. Their findings may be directly related to those of Altomonte and Resmini (2002), who studied location decisions of foreign firms in transition countries and concluded that foreign direct investment (FDI) plays a significant role in shaping industry concentration in transition economies. Moreover, location decisions of foreign firms are biased towards Western and metropolitan regions, as well as those with strong industrial bases.

In sum, over the past two decades there has been a major shift away from politically motivated location choices towards industry-specific responses to market forces. In line with predictions from theoretical models above, we would therefore expect the location patterns of CEE manufacturers be determined by the presence of comparative advantage, scale economies and linkages. Our first hypothesis is therefore as follows:

H1: Eastern European industries are expected to have become more geographically concentrated since firms are motivated to exploit comparative advantages, scale economies and linkages.

2.2.2 Regional integration and industrial location

Economic integration is often the balancing force between agglomeration and dispersion of economic activity. For instance, Venables (2003) considers elements from traditional trade theory and shows that deeper regional integration can significantly contribute to industry concentration. His conclusion is derived by comparing the intensities of relative comparative advantages within an integrating region (in his case, a custom union (CU)) and between the CU and the rest of the world. The general prediction is one of unequal division of costs and benefits within the CU. In particular, it is the country with "intermediate" comparative advantage that is expected to become a net exporter of skilled labour-intensive goods while the country with the "extreme" comparative advantage will specialise in exports of unskilled labour-intensive goods.[12] As a result, the model implies that there is a high likelihood of regional integration leading to growing economic disparities among the signatory countries, being especially pronounced in the so-called South-South agreements of low-income countries (Venables, 2003). In turn, and as anecdotal evidence suggests, South-South regional integration may lack government commitment to implementation of provisions and as such may lead to abandonment.[13]

The emergence of regional inequalities following economic integration is examined in the context of NEG models as well. However, contrary to contributions from traditional and new trade theories, location

12 . More formally, factor endowments in the model are formalised as availability of skilled labour. It follows that the country with the "intermediate" comparative advantage in skilled labour has higher factor endowments compared to other CU members, though still inferior to the rest of the world, while the one with "extreme" comparative advantage has lower factor endowments compared to everyone within the CU as well as the rest of the world.

13 . For instance, the East African Common Market collapsed in 1977 partly because of excessive concentration of manufacturing in a single country. In fact, Kenya produced more than 70% of manufactures within the CU (Venables, 2003).

of economic activity in NEG models is endogenous and described by a process in which inequalities first rise and then fall with progressive market integration. Several different mechanisms may explain theoretical agglomeration patterns though, in general, they all refer to the cumulative causation process first described by Krugman (1991a). In particular, he borrows established concepts from new trade theory, *i.e.*, the presence of increasing returns and trade costs, while additionally assuming the existence of labour migration between the regions. The latter may be interpreted as the result of greater regional integration and turns out to be crucial in explaining the model's dynamics. In particular, a rise in the number of local establishments in one of the regions increases demand for labour and results in higher wages which in turn tend to attract more workers to the region. This creates a demand linkage through increased local spending on the one side, while it reduces competition in the labour market on the other. Attracted by higher local profits, additional firms decide to locate close to that market resulting in the cumulative causation process and ultimately a core-periphery pattern of industry location. Venables (1996) considers the relationship between imperfectly competitive upstream and downstream industries as an alternative to labour migration. His framework provides results in line with Krugman's core-periphery structure in which the differences in market size of initially identical regions are explained through the presence of strong vertical linkages between industries.

However, trade integration may result in greater industry dispersion. Krugman and Elizondo (1996) argue that a reduction in trade costs increases the influence of external markets. The dispersion process is thus primarily driven by weakening cost and demand linkages, as a significant part of output is to be sold abroad and a considerable part of consumption is to be imported. Moreover, firms producing in locations with more firms face stronger competition in the local product and factor markets. Overall, the gains associated with being settled closer to the largest local market decline. As a result, the industry spreads to peripheral, often less-developed regions. The tendency to locate at a greater distance from the core may be further intensified if in addition there are some immobile or non-tradable factors which are particularly important for production (such as labour), or consumption (such as housing).

In general, as further integration reduces the importance of externalities, differences in the prices of those factors take over. Puga (1999) develops a unified framework that captures both inter-regional migration and input-output linkages as forces which may drive agglomeration, but also takes into consideration the impact of non-tradable factors (such as local wages) on clustering of firms and workers. In particular, he shows that for high trade costs, firms split between identically endowed regions to meet the final demand. Interestingly however, there will also be a greater tendency for firms to disperse towards peripheral regions at low trade costs. He shows in his model that if equilibrium wage differences are not eliminated by migration, they act as a dispersion force by increasing production costs for firms producing in locations with relatively more firms. In fact, firms find higher local wages increasingly discouraging as regions become more integrated, so for low trade costs it is the price of non-tradable factors that determines location. It follows then that it is only for intermediate trade costs that firms choose to agglomerate, as cost and demand linkages dominate the other two cases.

In sum, NEG models predict that high trade costs encourage firms to disperse and settle in different regions, so as to be able to supply markets locally. For low values of trade costs, location is determined by the price of those factors and goods that are considered to be immobile; hence firms have an incentive to locate away from the core. Finally, an agglomeration of economic activity is expected to take place only at intermediate trade costs as demand and cost linkages take over.

Nevertheless, most of the models reviewed so far illustrate fairly dramatic pictures whereby the whole of manufacturing activity moves together into and out of regions. This clearly ignores the possibility of regional specialisation characterised by agglomeration at a more disaggregated level than overall manufacturing. Krugman and Venables (1996) model the process of regional specialisation by highlighting the importance of differences in buyer-supplier relationships between different industries. In particular,

they consider two imperfectly competitive industries characterised by higher ratios of intra-industry trade in intermediate inputs with comparatively little inter-industry trade taking place. The forward and backward linkages operating in this case are essentially the same as in Venables (1996). The prediction from the model can be summarised as follows: Assuming that an additional firm decides to locate in a particular region, the beneficial cost and demand linkages more intensely affect other firms in the same sector, while the increased product and labour market competition harms firms in both sectors equally. As a result, integration leads each region to become specialised in the production of one sector. Summarising the discussion above we are able to set up our second hypothesis:

H2a: Following trade integration, industries characterised by comparatively high or low trade costs are expected to be more dispersed than industries with intermediate trade costs.

H2b: Moreover, industry linkages are an important factor in explaining industry agglomeration. In particular, we expect intra-industry linkages to dominate inter-industry linkages.

In CEE, clustering may have been further reinforced by strong FDI inflows following investment liberalisation and comprehensive privatisation programmes. A relatively cheap and skilled labour force as well as proximity to core EU markets allowed foreign investors to benefit from the best utilisation of resources and endowments. Indeed, empirical evidence suggests that FDI in CEE has followed a strategy of international vertical integration. Foreign investors have exploited differences in comparative advantage for different stages of production while their location has been concentrated around strong industrial bases (Altomonte and Resmini, 2002).

However, Markusen and Venables (1999) show that foreign investments may facilitate geographical concentration even in the absence of existing industrial areas. Specifically, the location decision of a foreign investor may create demand for locally produced intermediate inputs and as such improve efficiency of the whole industry. In turn, further entry is encouraged, intensifying the centripetal forces and hence generating agglomeration. However, results depend on the assumption that foreign entry is generally characterised by positive externalities. Yet, as theory and growing empirical evidence suggest, foreign firms can also impose negative externalities on domestic firms. From the theoretical perspective, occupational choice models can provide some guidance here. Grossman (1984) concludes that FDI results in decreasing numbers of local entrepreneurs, as lower prices on the product market reduce the entrepreneurial income more than the wage income. Though a number of studies confirm the existence of the crowding-out effect, empirical evidence with respect to the effects of FDI on industry agglomeration remains nevertheless inconclusive.

2.2.3 Vertical industrial policy and industrial location

From the theoretical point of view, and under the assumption of absent economic growth, agglomeration of firms in one region implies also relocation or closure of firms in another. All else equal, it is to be anticipated that consumers in the region that loses firms will be faced with higher costs in addition to increasing unemployment and decreasing revenues. Hence, governments may impose rules that make the relocation of firms between countries either costly or impossible. For instance, Martin and Rogers (1995) point out that one very common way to restrict the relocation of firms is through labour laws.[14] Labour laws represent an example of horizontal industrial policy at the disposal of national policy makers. Alternatively, vertical (or targeted) policies may be offered to a selected number of industries in order to artificially create a competitive advantage for the recipients. It is expected that the application of

14 . According to the authors, in the EU-15 member states, Portugal, Spain, Italy and Greece have the most restrictive policies while UK, Ireland and Denmark are the most laissez-faire countries (Martin and Rogers, 1995).

such policies will have an impact on the location of economic activity. Studies of China, another transition economy, find that provincial governments have been increasingly providing protection to a few local industries in order to increase provincial tax revenues and generate economic development (*e.g.*, Bai *et al.*, 2004). They conclude that policy-induced protectionism through the application of non-tariff barriers has also led to a greater dispersion of protected industries.

In the context of the Eastern European enlargement, progressive institutional integration with the EU has lowered CEE tariffs on manufactures so that they are generally comparable to those in other EU member states (Neck *et al*., 2000). Deeper institutional integration has therefore limited the possibility of the application of explicit protectionist measures. However, countries with comparative disadvantages might be still geared towards choosing an economic policy mix that can exert substantial influence on the location of economic activity without discretionary restrictive practices (Forslid and Wooton, 2003). For instance, there are viable policy tools at governments' disposal that may not be entirely eliminated following deeper regional integration, such as indirect subsidies, credit guarantees and government procurement laws, among others.

Brulhart and Trionfetti (2004) study the effect of government procurement on the likelihood and intensity of industrial agglomeration whereby national governments are characterised as being home-biased, *i.e.*, they have a strong preference for domestic over foreign suppliers irrespective of cost and quality considerations.[15] They maintain that whether dispersion or agglomeration forces prevail is determined not only by trade costs but also by the parameters of government procurement intensity. With respect to the latter, biased government procurement may lead to the so-called "spread effect," or industry dispersion (Brulhart and Trionfetti, 2004).[16] The authors find empirical support for the existence of the effect in a sample of European countries. Specifically, industries that are subject to a relatively large share of public expenditure tend also to be less concentrated (*ibid*).[17] In general, it could be argued that any sort of targeted government spending, when conducted by more than two agents at the same time, may intensify the centrifugal forces. For instance, governments may invoke explicit subsidies in the form of cash payments to compete for new investments and foreign investors in particular.

Indeed, CEE countries have been actively involved in providing various incentive schemes to foreign investors (for an overview see Cass, 2007). Egger and Falkinger (2006) formally consider such a scenario and conclude that it is always beneficial for a government to provide some sort of financial incentive to foster entry of foreign producers.[18] Their model predicts, all else equal, that the country with the largest

15 . Discrimination by public purchasers in favour of local suppliers is a pervasive phenomenon and has been extensively examined in the past (for an overview see, for instance, Mattoo, 1996).

16 . In a nutshell, an increase of firms in one region (call it region R1) reduces government expenditure on each variety produced in R1 and increases government spending on each variety produced in the other region (R2). This in turn discourages further entry of firms in R1 (while it encourages entry in R2), and therefore acts as a dispersion force.

17 . Mardas (2005) examines public procurement clauses ("buy national" clauses) in a set of Eastern European countries and finds evidence of targeted support for a selected number of industries. Though the range of industries and associated products varies across countries, the following industry-specific goods may be associated with above-average protection from foreign competition: electrical wires and cables, electrical machinery and equipment, rubber products, chemical products, pharmaceuticals, footwear, clothing, machine tools for metal products, telecommunication equipment, medical and pharmaceutical equipment and motor vehicles.

18 . The authors assume that two small industrialised economies characterised by identical production technologies form a free trade agreement (FTA). The idea that firms are located at some place implies that there are fixed costs which are incurred at a certain location and not at another. Hence, the attractiveness of a country depends on the fixed costs for setting up a firm. A higher level of public infrastructure (*e.g.* a

payment towards the fixed cost of setting up a production facility will also be the one with the best prospects for generating industry concentration within its borders. However, such a conclusion may be overly simplistic if we consider the mechanism through which the spread effect operates. In other words, targeted FDI subsidies may reverse the cumulative causation process that has been present in a particular region towards those that offer larger lump sum payments as opposed to comparative advantages and similar incentives. In addition, implicit subsidies may be used to create competitive advantage for firms in targeted industries. Besley and Seabright (1999) show that indirect subsidies often aim at inducing less aggressive behaviour on the part of more efficient competitors. Hence, they potentially act as a dispersion force by dissuading rivals from locating close to markets in which those government-favoured establishments operate.

In fact, direct and indirect subsidies were widely used in CEE prior to their transition to market economies as a way to systematically correct for persistent enterprise losses caused by non-market determined prices for goods and resources. Reforms in the early 1990s significantly reduced the value of direct subsidies flows, however large-scale changes in the economic environment and the associated adverse effects on domestic industries frequently forced governments to step in with different types of state aid (Mulas-Granados *et al*. 2008). The existence of subsidies in the form of debt relief programmes, debt-equity swaps and preferential credits has been documented for a number of transition economies (Torok, 2007). According to a report by the European Commission, when compared to the old EU member states, transition economies showed a tendency to spend a bigger proportion of their GDP on subsidies and use less transparent instruments to finance state aid for manufacturing (Blauberger, 2007). Indeed, the study concludes that over three quarters of total state aid in CEE was directed toward potentially more distortive sectoral aid (*ibid*).

However, what criteria do national policy makers use to determine which industries are supported? There is some evidence to suggest that selective vertical policies in transition and developing economies have favoured profitable but also labour-intensive industries. From the theoretical standpoint, profitable and cash-rich firms have more bargaining power than firms in declining industries and hence are able to demand more protection and resources from national policy makers. This argument is in line with the private interest hypothesis which has been empirically confirmed for a number of developed and developing countries (see, *e.g.*, Kroszner and Strahan, 1999).

Moreover, protecting profitable industries is also consistent with the efficiency-maximising objective that governments may have. Evidence from emerging economies suggests that once domestic industries are exposed to potentially more efficient foreign competition, governments become more eager to protect the most profitable of them (see, *e.g.*, Chari and Gupta, 2008). Studies on China, for instance, confirm that both national and provincial governments are more inclined to offer protection to industries that provide higher tax revenues and significantly contribute to economic development (Young, 2000).

Krugman (1993), on the other hand, observes that protection in traditional, labour-intensive industries producing low externalities is still stronger than in technology-intensive ones. Labour-intensive industries may be regarded as strategic from the policy makers' perspective, as it is in their own interest to avoid political consequences resulting from large-scale unemployment. This argument holds especially true for countries undergoing massive structural changes during the period of economic transition (in other words, it fully applies to CEE). We would therefore expect labour-intensive industries to be more dispersed, as they may be more insulated from competition than other industries.

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lump sum payment) reduces the fixed cost of setting up a firm in this economy and therefore raises the attractiveness of a country.

In sum, while we acknowledge that CEE industries have increasingly integrated into the global production networks following the transition process, there seems to be evidence that targeted government intervention has potentially resulted in the fragmentation of markets in industries receiving state aid. As a consequence, we would expect to observe increasing dispersion of industries favoured by such vertical policies. Our last hypothesis can therefore be defined as follows:

H3: Vertical industrial policies in favour of profitable and strategically important domestic industries may have resulted in greater geographic dispersion of those industries.

To summarise, economic transition has replaced central planning with market forces, while increased regional integration has led to higher trade and investment flows in CEE. At the same time, economic transition has introduced competition for markets and resources. This has often resulted in increased demand for protection of efficiency-constrained domestic industries. These processes are expected to have a significant effect on the location of economic activity in the region. Broadly speaking, market forces are expected to stimulate industry agglomeration, while the effects of deeper regional integration seem to be ambiguous. Conversely, vertical industrial policies may lead to greater dispersion of industries under protection. In the next section, we provide suitable measures of geographic concentration and examine the temporal aspects of deeper regional integration.

2.3 Descriptive statistics

2.3.1 Measurement and data

To examine changes in the location patterns of industries, we construct geographical concentration indices for each industry during the period 1995 to 2005. For this purpose, we first compute location Gini coefficients (see Krugman, 1991b). More recently, generalised entropy (GE) indices have been used in describing industry location patterns. A particularly useful feature of this new class of distribution measures is that they can be broken down into components measuring the dissimilarities within and between groups of industries. In order to test our results, we compute the Theil index of industry concentration as well.[19] Other indices relating to the spatial concentration of economic activity have been frequently used in the literature, such as the Herfindahl Index, Krugman Specialisation Index and Balassa Index; however they will not be further discussed here. For a thorough explanation of computational methods as well as properties of the Gini coefficient and Theil index, see for instance Bickenbach and Bode (2008).

We consider an industry to be geographically concentrated if only a few spatial units (in our case, countries) hold a large share of that industry's total employment, gross output or value added. The interpretation of the location Gini coefficient is straightforward: if an industry is equally represented in all units, then its Gini coefficient is equal to 0 (lower boundary). In other words, that industry is thought to be entirely dispersed across space. If instead, the Gini coefficient approaches 1 (upper boundary), the industry is considered to be completely concentrated in a single unit. In constructing the concentration measures, spatial units are assumed to be of same size. Hence we examine absolute concentration of industries instead of relative agglomeration.[20]

19 . However, given the high correlation coefficient between the two calculated measures, we focus on the properties of the Gini coefficient, probably the most widely used measure in the literature.

20 . For a more thorough discussion on the choice between absolute and relative measures, see Haaland *et al.* (1999) and Midelfart-Knarvik *et al.* (2000).

Our main data source for constructing spatial concentration indices is the EU KLEMS database. This is a new source of industry-level data aimed at facilitating productivity analyses in the EU-25 countries.[21] It provides official statistics while covering a wide range of industries in an internationally comparable way (NACE codes of industry classification). Nonetheless, it should be emphasised that the EU KLEMS database is still a work in progress. The level of detail varies across countries, industries and variables, while data on most CEE countries is only available from 1995 onwards. The database covers eight out of ten CEE countries; Bulgaria and Romania are not represented in the current version of the database. Instead, we have sourced data for those two countries from the EUROSTAT Structural Business Statistics (SBS) database.

In sum, our sample covers 23 manufacturing industries according to the NACE Rev. 1.1 classification (DA15 to DN37) for the ten CEE countries. The time period under consideration is limited to 1995 to 2005. In particular, we use data on industry employment, gross output and value added when examining the changes in geographic concentration of industries. Gross output and value added data are expressed in current prices and in a common currency (USD). In the following two sub-sections, we first utilise averaged location Gini coefficients across all industries to uncover broad trends of geographical concentration in CEE. Next, we examine industry-specific concentration patterns.

2.3.2 Temporal trends of geographical concentration

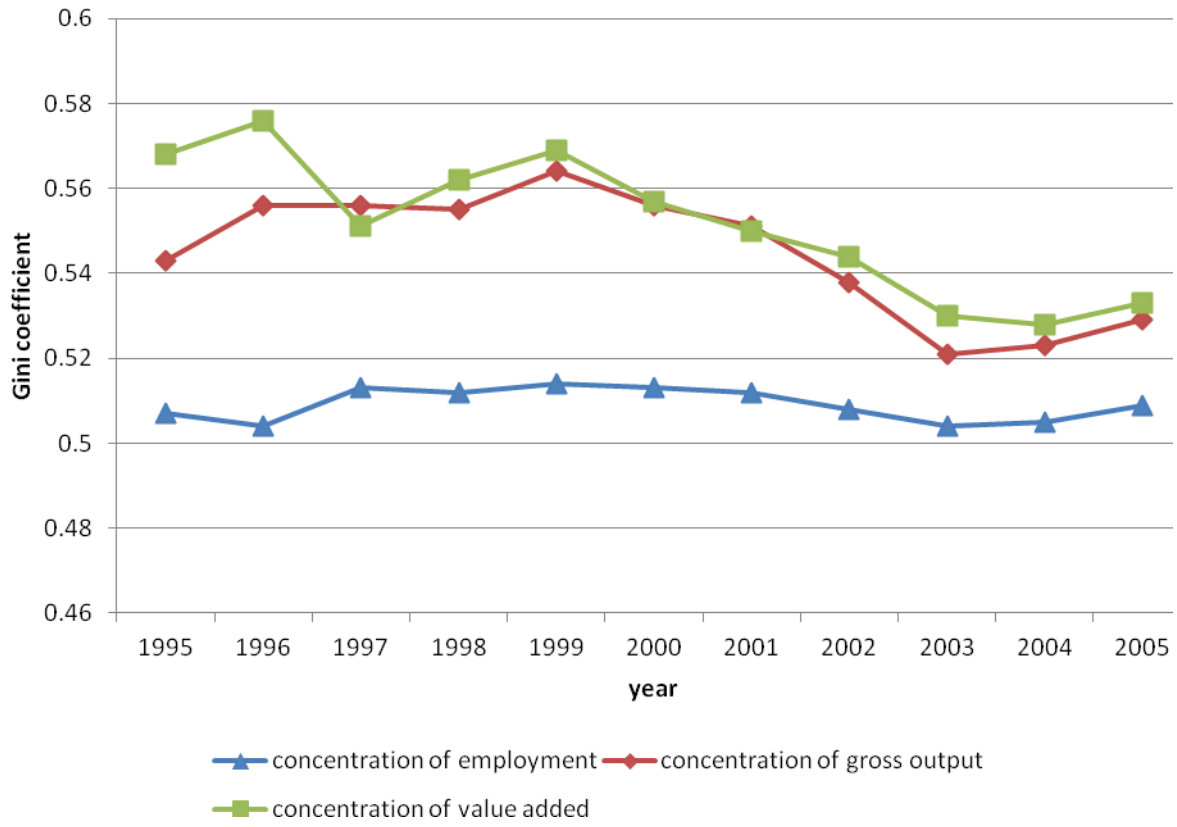
As shown in Figure 1, the average concentration of manufacturing as measured by gross output data increased during the second half of the 1990s and has been decreasing since the early 2000s. A similar trend could be observed in terms of value added, while employment appears to remain constant throughout the period.[22] Respectively, gross output and value-added based Ginis decreased by 2.8% and 6.6% between 1995 and 2005, in contrast to a mere 0.5% increase in employment Gini over the same period. In other words, analysis based on gross output and value added suggests a process of industrial dispersion, while there seems to be tentative evidence of geographical concentration in terms of industry employment.[23]

21 . It is the result of a project carried out by a consortium of research institutes and financially supported by the European Commission (for more information, see www.euklems.net).

22 . However, results in terms of value added may be affected by data limitations and hence should be carefully treated. Value-added data is missing for Romania and Bulgaria in the initial period.

23 . Though dissimilar, employment, gross output and value-added Gini coefficients seem to be rather strongly correlated (Pearson correlation coefficients of 0.37, 0.43 and 0.82 respectively).

Figure 1. Average Gini coefficients of employment, value added and gross output, 1995-2005



Source: EU KLEMS, EUROSTAT.

Although indicative, an analysis of long-term trends based on data points associated with the start and end of the period could be biased, considering that the two years under examination might turn out to be outliers relative to the trend. In Table 2, we make full use of our annually calculated Gini indices by regressing them on a time trend. We report the results of pooled regression as well as panel estimates with industry fixed effects.

Table 2. Temporal trends in the Gini index, 1995-2005 (ordinary least squares (OLS) with/without industry fixed effects)

	POOLED			PANEL		
Variable	Gross output	Value added	Employment	Gross output	Value added	Employment
Year	-0.013**	-0.018***	-0.001	-0.013***	-0.018***	-0.001
	-0.005	*-0.005*	*-0.004*	*-0.003*	*-0.003*	*-0.002*
Constant	26.189**	35.615***	1.583	26.232***	35.541***	1.519
	-10.289	*-9.504*	*-8.362*	*-6.351*	*-5.815*	*-4.608*
Industry fixed effects (FE)	No	No	No	Yes	Yes	Yes
R-squared	0.02	0.06	0.00	0.81	0.75	0.77
observations	253	253	253	253	253	253

Note: heteroskedasticity corrected standard errors; *p<0.1, **p<0.05, ***p<0.001.

Clearly, assuming identical intercepts across industries is too restrictive, as indicated by significant improvement in the overall fit of the regression following our panel estimation. More importantly, we find statistically significant evidence of a decreasing trend in Gini gross output and value-added coefficients. The coefficients on time trend suggest that, on average, industry concentration in terms of gross output and value added decreased by 1.3% and 1.8% annually. In contrast, Gini coefficients based on employment data remain constant over time. We therefore confirm the apparent diverging trends in industry concentration. CEE countries seem to have experienced industrial dispersion in terms of gross output and value added, however no such process is evident in employment terms during the period under examination.

In addition to exploring changes of industry concentration over the entire period, we are also interested in examining predictions associated with potential structural breaks that may be present in our time series. However, we do not make an attempt to statistically isolate such breaks in our data. Instead, we choose to impose them by establishing a link to significant changes in economic policy at a particular point in time: we consider the effects of the EU accession announcement and full trade liberalisation between CEE and the EU as our reference point.[24] We have therefore split our data set into two sub-periods, namely 1995 to 2000 (pre-2001) and 2001 to 2005 (post-2000), according to the underlying process of wider regional integration. Table 3 summarises the results from our estimations featuring separate time trends for each interval.

Table 3. Pre/post trade liberalisation trends in Gini index (OLS with industry fixed effects)

	Gross output		Value added		Employment	
Variable	1995-2000	2001-2005	1995-2000	2001-2005	1995-2000	2001-2005
Year	0.011	-0.025***	-0.008	-0.020**	0.007	-0.003
t	*-0.008*	*-0.005*	*-0.005*	*-0.008*	*-0.005*	*-0.004*
Constant	-22.024	49.321***	15.113	40.692**	-14.778	6.366
t	*-15.449*	*-10.412*	*-10.546*	*-16.304*	*-10.082*	*-8.633*
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.79	0.95	0.80	0.88	0.85	0.94
N	138	115	138	115	138	115

Note: heteroskedasticity corrected standard errors in italics; *p<0.1, **p<0.05, ***p<0.001.

Source: EU KLEMS, EUROSTAT.

There is strong evidence that industry dispersion trends accelerated in the post-2000 period. For instance, the sign on parameter coefficient for gross output turns from being positive though not significant in the pre-2001 estimation, to negative and highly significant in the post-2000 period. Overall, annual percentage decreases in the average location Gini indices for gross output and value added in the latter strongly contrast the concentration pattern observed in the earlier years. There is thus conflicting evidence in our data set, which contests predictions of some analysts that continuous integration within the European borders will encourage formation of more clustered industrial geography. Nevertheless, it might be misleading to attribute industry concentration tendencies, represented as averages across industries, to the impact of a single policy measure. Instead, we acknowledge that the evolution of concentration patterns

24 . At their June 2001 summit in Gothenburg, Sweden, EU members stated that the "enlargement process is irreversible....the road map should make it possible to complete negotiations by the end of 2002 for those candidates that are ready. The objective is that they should participate in the European Parliament elections of 2004 as members." On 1 May 2004, the eight CEE countries became full members of the EU, increasing the EU's population to roughly 450 million. Bulgaria and Romania followed in 2007. Moreover, CEFTA member states have made a significant effort to fully liberalise trade between them in a timescale that paralleled the EU accession announcement (Dangerfield, 2004).

will be rather influenced by a multitude of other relevant factors, most of them expected to be industry specific. We therefore proceed by describing industry-specific location patterns prior to examining their general determinants.

2.3.3 Geographic concentration across industries

In order to simplify our analysis we continue our discussion by focusing on location Gini coefficients based solely on gross output data.[25] As a first step, we aim to highlight and contrast industries that appear to be highly concentrated in the initial year of observations with those in the last year. Industries with the highest level of geographic concentration in 1995 were: DM35 – Other transport equipment (Gini: 0.63), DN37 – Recycling (0.63), DM34 – Motor vehicles, trailers and semi-trailers (0.59), DN36 – Manufacturing n.e.s. (0.58) and DH25 – Rubber and plastic products (0.57).

Interestingly, industries that belonged to the group of most dispersed industries in 1995, namely DL30 – Office machinery and computers and DL32 – Radio, television and communication equipment and apparatus, ranked as the most concentrated in 2005. Over the period under consideration they achieved significant increases in their Gini coefficients (from 0.50 to 0.72 and 0.51 to 0.65, respectively) as they have increasingly come to concentrate in a limited number of countries. For instance, approximately 80% of total output in office machinery and computers (DL30) has been produced by the Czech Republic and Hungary alone, while Hungary produced half of the total industry output for radio, television and communication equipment and apparatus (DL32) in 2005. Other spatially concentrated industries in 2005 included manufacturers of transport equipment (DM34 and DM35) as well as food and beverages producers (DA15). The striking difference between the two examination points in time is that increased geographical concentration in the latter is almost exclusively associated with industries frequently referred to as medium- to high-technology intensive. However, the food and beverages industry remains a notable exception as it is frequently characterised as low-technology intensive. Overall, Krugman's (1991a) finding for the United States (that traditional, labour-intensive industries dominate geographical concentration) is not supported in our data. In fact, traditional industries belong to the most dispersed manufacturing activities in our sample. In 2005, the five least concentrated industries are: DB18 – Wearing apparel, dressing and dying of fur (0.40), DB17 – Textiles (0.43), DA16 – Tobacco products (0.43), DD20 – Wood and products of wood and cork (0.44) and DC19 – Tanning, dressing of leather and footwear (0.47).

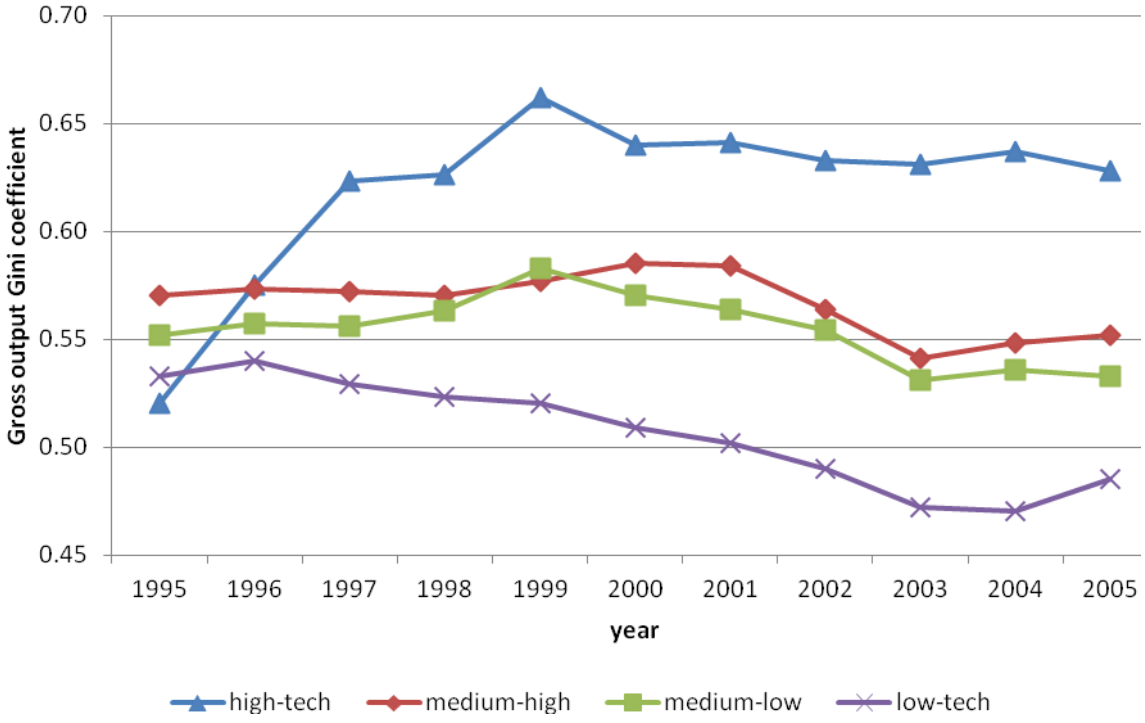
In order to further examine the apparent differences in agglomeration patterns between technology and labour-intensive industries, we proceed by grouping industries according to the OECD classification of technology intensity in production and compute group-wise average Gini coefficients (OECD, 2003). In general, use of such aggregated measures is not without problems as its interpretation may be influenced by what Krugman highlights as potentially obsolete merger of industries into statistical headings (Krugman, 1991a).[26] In other words, relatively higher levels of industry aggregation potentially mask pronounced differences within and between defined industries. For instance, technology-intensity of an industry as used in this chapter is usually calculated with reference to the main activity of the firms making up that industry. As a consequence, certain sub-industries that rely purely on manual labour may be overestimated while others may be underestimated with respect to their own technology intensity in production. Still, we believe that certain useful insights can be derived from our approach, though we refrain from broad generalisation of the results. Our analysis lends itself to graphical representation. In

25 . In fact, there is high and statistically significant correlation between gross output, value added and employment Gini coefficients.

26 . Normally, one would prefer product-level to industry-level data, yet the nature of our inquiry as well as data limitations associated with such a low level of aggregation prevent us from doing so.

Figure 2 we compare temporal trends of geographic concentration according to the degree of technology intensity in the production process.

Figure 2. Gini coefficients of gross output by technology intensity in production, 1995-2005



Source : EU KLEMS, EUROSTAT, OECD(2003).

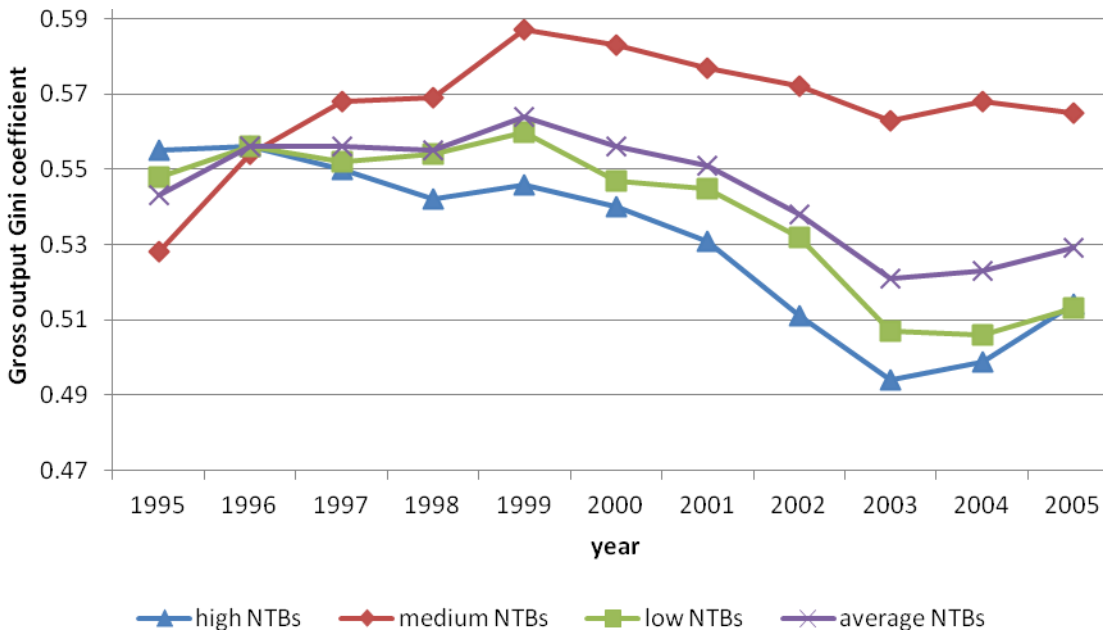
The strongest concentration appears in the non-traditional, high-technology industries. They have been increasingly concentrated in the pre-2001 period while their concentration levels remain constant thereafter. This finding is not particularly surprising but rather in line with theoretical predictions that provide a rationale for technology-intensive industries to cluster following regional integration and market expansion.

Labour-intensive industries, on the other hand, experienced a process of continual dispersion throughout the period under consideration. The observed pattern might be partially due to increased FDI inflows and technological upgrades that have been experienced in those industries across CEE. An alternative, not mutually exclusive, explanation however may be related to the significant labour component these industries maintain. Therefore these industries are of strategic interest to national policy makers. As previously outlined, CEE industries have faced global competition for markets and resources relatively early in the transition process. At the same time, the introduction of market forces demanded restructuring of their inefficient organisational structures and production methods. They have been particularly affected by broad economic changes and have frequently demanded greater protection from domestic policy makers as documented by, among others, Torok (2007).

While deeper institutional integration has limited scope for application of explicit measures, governments have frequently responded to industry demands by introducing (alternatively, not removing)

non-tariff barriers (NTBs). In order to examine the effects such policies may have on geographical concentration, we categorise industries according to their specific level of NTBs. In the absence of relevant data for CEE, our proxies are sourced from Lee and Swagel (1997) with the potentially restricting assumption that NTB levels in CEE countries' industries have broadly followed global trends. The measure reports coverage ratios for core NTBs including all non-tariff restrictions applied at the border, quantitative restrictions, voluntary export restraints and advanced payment requirements as documented in UNCTAD's (United Nations Conference on Trade and Development) trade control measures data set (Lee and Swagel, 1997). Figure 3 shows the development of Gini coefficients according to the degree of industry-specific NTBs.

Figure 3. Gini coefficients of gross output by experienced level of NTBs, 1995-2005



Source: EU KLEMS, EUROSTAT, Lee and Swagel (1997).

Overall, industries frequently considered to feature high NTBs have been considerably dispersed during the period under consideration. The decrease in geographical concentration is especially pronounced in the period preceding the first round of EU accession in 2004. An interesting fact, however, is that some of the industries belonging to this group have featured prominently in recent bilateral and multilateral trade disputes such as the textiles, apparel and metals industries. Industries characterised by intermediate trade costs have been increasingly concentrated in the pre-2001 period, while showing rather constant agglomeration patterns thereafter. Still, it needs to be emphasised that the results for the latter group are to some extent driven by strong agglomeration in two previously mentioned industries (DL30 and DL32).[27]

Interestingly, industries facing low NTBs have been increasingly dispersed over time, though the changes in their Gini coefficients have not been as significant as in the two previous groups. In general, our

27 . The potential effects of the increases in Gini coefficients for these two industries will be taken into consideration when analysing determinants of industry concentration in CEE.

observations are in line with the main predictions coming from NEG models. We find preliminary support for our hypothesis (H2a) that industries characterised by relatively high or low trade costs are more geographically dispersed than industries facing intermediate trade costs. Overall, the market integration process seems to be an uneven one and potentially industry-specific. In other words, certain industries enjoy sufficiently low trade costs that may induce dispersion, while others remain burdened by high trade costs and yet experience the equivalent effect.

Since greater regional integration may be instrumental in explaining the latter phenomenon, we use time once again as an overall indicator in assessing the effect of progressive regional integration on geographical concentration of individual industries (Table 4). Moreover, considering the discussion above, we include classification of technology intensity in production along with the industry level NTBs (columns 2 and 3).

Table 4. Absolute concentration of industries based on gross output Gini coefficients

Industry indicators			Temporal changes			Pre/post trade liberalisation	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NACE	NTB	SCALE	1995	2005	T-change	1995 - 2000	2001 - 2005
15	3	4	0.55	0.56	0.01	0.004*	-0.007
16	1	4	0.47	0.43	-0.04	-0.010**	0.001
17	3	4	0.48	0.43	-0.05	-0.010**	-0.005
18	3	4	0.52	0.40	-0.12	-0.036***	-0.015
19	2	4	0.50	0.46	-0.04	-0.022**	0.014***
20	1	4	0.50	0.44	-0.07	-0.014**	-0.019
21	1	4	0.54	0.54	0.00	0.007***	-0.014
22	1	4	0.56	0.52	-0.04	0.009**	-0.035*
23	1	3	0.50	0.51	0.01	0.026*	-0.006
24	2	2	0.52	0.53	0.02	0.010**	-0.005
25	1	3	0.57	0.56	-0.02	0.012**	-0.022**
26	2	3	0.56	0.54	-0.02	0.010***	-0.024**
27	3	3	0.56	0.52	-0.04	-0.006	0.000
28	1	3	0.56	0.54	-0.02	0.004	-0.020**
29	2	2	0.55	0.52	-0.03	-0.004	-0.014
30	2	1	0.50	0.72	0.22	0.076**	-0.006
31	2	2	0.56	0.53	-0.03	0.011***	-0.025***
32	2	1	0.51	0.65	0.14	0.040***	0.026
33	1	1	0.56	0.52	-0.04	0.006	-0.033**
34	3	2	0.59	0.61	0.03	0.009***	-0.006
35	3	2	0.63	0.56	-0.07	-0.004	-0.021
36	1	4	0.59	0.55	-0.03	-0.003	-0.008
37	1	4	0.63	0.52	-0.11	-0.035**	-0.012**

Note: heteroskedasticity corrected standard errors (not reported here); *p<0.1, **p<0.05, ***p<0.001. NACE: 15: Food and beverages; 16: Tobacco; 17: Textiles; 18: Wearing apparel; 19: Leather and footwear; 20: Wood and wood products; 21: Pulp and paper; 22: Publishing and printing; 23: Coke and petroleum 24: Chemicals; 25: Rubber and plastic; 26: Non-metallic mineral products; 27: Basic metals; 28: Fabricated metals 29: Machinery and equipment n.e.s; 30: Office machinery and computers; 31: Electrical machinery and apparatus; 32: Radio, TV and communication equipment; 33: Medical and precision tools; 34: Motor vehicles and trailers; 35: Other transport equipment; 36: Manufacturing n.e.s; 37: Recycling; NTB: 1: low; 2: medium; 3: high; SCALE: 1: high; 2: medium-high; 3: medium-low; 4: low.

Source: EU KLEMS, EUROSTAT, Lee and Swagel (1997), OECD (2003).

Our particular interest applies to columns 7 and 8 that show results from log-linear OLS regressions on pre-2001 and post-2000 time trends. Overall, there seems to be a tendency towards industry dispersion

as a consequence of advanced regional integration and trade liberalisation. In particular, we find evidence of a slowdown in geographical concentration of CEE industries in the post-2000 period, as 12 out of 23 industries switch signs on their Gini coefficients from positive to negative (however, the latter remained mostly insignificant). Industries marked by decreasing Gini coefficients in the pre-2001 period continued, on average, to exhibit the same pattern although at a lower rate. As can be seen from the third column, these are mainly labour-intensive industries. A notable exception is the leather and footwear industry (DC19) which experienced an estimated 2.2% annual decrease in Gini coefficients followed by an estimated 1.4% annual increase in Gini in the post-2001 period. This may be explained by the emergence of Romania and Bulgaria as global hubs for low-cost manufacturing in this particular industry, following substantial FDI inflows from old EU member states.

Overall, the results from our preliminary analysis are mainly in line with the theoretical predictions described in the previous section. Progressive regional integration has led to greater geographical dispersion of industries when measured in terms of gross output and value added. NEG models in particular seem to entail some explanatory power in relating to observed geographical concentration patterns. Next, we empirically estimate the relationship between industry agglomeration and a number of proxy variables that conceptualise predictions from the theoretical frameworks outlined above.

2.4 Econometric model

In this section, we aim to further understand the significant variations in agglomeration levels of industries by performing a systematic test of the factors determining geographical concentration. In the following section, we discuss the choice of our proxy variables and subsequently derive the general specification of the model to be estimated.

Traditional trade theories emphasise the role of factor intensities in explaining spatial concentration of individual industries. Under the assumption of lumpy distribution of factor endowments, the level of concentration of an industry is directly related to the intensity of its use of a certain production factor. For instance, raw material-dependent industries will be drawn to locations rich in natural resources while industries reliant on a skilled labour force will be attracted to locations with comparatively larger skilled labour pools.[28] In particular, we consider the intensity of energy use in production (NRG) as well as skilled labour intensity in production (LABS) as proxies for comparative advantages. We expect to observe a positive sign on both variables.

New trade theories maintain that the presence of scale economies in production positively correlates with agglomeration of industries. In order to account for the impact of internal scale economies (SCALE) on industry concentration, we apply a commonly used measure of scale intensity in the production (for details, see Haaland *et al.,* 1999). In addition to SCALE, we further consider technology intensity in production (TECH) as a potential indicator of industry-level scale economies (OECD, 2003). In general, both variables are expected to relate positively to greater industry agglomeration. New economic geography highlights the importance of industrial linkages in stimulating industrial agglomeration. A large number of downstream firms attract upstream firms due to demand linkages, while upstream firms are encouraged to locate close to downstream firms for cost reasons. Following He *et al.* (2008), we construct proxy variables for intra-industry linkages (INTRA) and inter-industry linkages (INTER). In particular, we use the latest available input-output matrices in defining the proxies and only consider industrial linkages

28 . Though our analysis is based on measures of absolute concentration, we have to also consider factors primarily explaining relative geographical concentration as presence of time invariant variables prevent us from estimating our specified equation with the inclusion of industry fixed effects. Hence, by considering those additional variables, we aim to enrich our model and account for a greater share of industry specific characteristics.

within the manufacturing sector.[29] Moreover, due to data limitations we assume the linkages to remain constant over the period under consideration. Given the relatively short time series, this is not necessarily a restrictive assumption.

As previously argued, deeper regional integration is expected to have impacted geographical concentration of industries. With respect to CEE, increased economic and institutional integration has led to larger investment and trade flows in all countries under consideration. To test for potential integration effects, we construct a number of proxy variables. In particular, we account for industry-level FDI intensity (FDI) by assuming that industries with comparatively higher shares of foreign investors are also more regionally and globally integrated. However, data limitations with respect to country and time coverage result in a rather restrictive assumption of equal industry-level FDI shares across countries. In parallel, we also use the ratio of imported intermediate inputs (IMPO) as a way of capturing the degree of vertical integration of industries into global value chains. Industries sourcing higher shares of production components from non-domestic markets are expected to be more interlinked with the regional or global economy.[30]

In a similar vein, we argue that export-intensive industries as indicated by higher shares of exports in their total gross output (EXPO) are also more integrated than industries producing for domestic markets. The expected signs on the integration proxies are ambiguous, as theoretical predictions and empirical evidence remain inconclusive. From the theoretical perspective, FDI may entail positive externalities for the recipient location triggering the cumulative causation process and hence agglomeration. Nevertheless, as growing empirical evidence suggests, it may also exhibit negative externalities reversing the agglomeration process and resulting in greater dispersion of economic activity.

Moreover, increasing regional integration may lead export-oriented industries to locate at greater distance from each other in order to enjoy benefits from locations with lower factor costs (Krugman and Elizondo, 1996). Yet at the same time, there is empirical evidence for developed and developing countries indicating that trading establishments tend to locate close to each other (Shelburne and Bednarzik, 1993 for the United States; Sjoberg and Sjoholm, 2004 for Indonesia). Finally, non-tariff barriers are considered in our empirical model as a proxy for industry-level trade costs. The variable may be regarded as a versatile indicator. First, it accounts for the extent of regional integration across industries. Second, it provides us with an indication of the industries in which vertical industrial policies may be occurring.

In general, national governments may exercise a variety of measures to protect productive activities at home. The sheer size of options makes it impossible for us to consider all of them in our approach (neither is this the aim of our exercise here). Instead, we are concerned with providing an alternative and rather indirect way of examining potential effects of government intervention. Our discussion above rested on the assumption that, all else being equal, policy makers in transition economies chose to offer support to profitable industries as they usually can commit more resources to lobby for protection. We construct an indicator of industry-level profitability by computing the ratio of value added in gross industrial output (VAL).

However, policy makers may be as well tempted to take the initiative and offer protection to what they consider to be industries of strategic importance. In CEE, opening up formerly protected markets to competition along with large-scale enterprise restructuring has threatened the hegemony of established domestic industries and may have resulted in high social costs, as revenues declined and unemployment increased. We would therefore anticipate that policy makers may be tempted to offer protection to labour-intensive industries in particular, as a way of easing the effects of increased competition and economic

29 . The latest available input-output matrices for CEE refer to year 2000 and are provided by EUROSTAT.

30 . Here again, we use latest available (2000) input-output matrices from EUROSTAT.

restructuring. To account for this, we provide a proxy of industries' strategic importance by calculating the ratio of industries' employment in total manufacturing employment (EMPO). In sum, high value-added and employment-rich industries are expected to enjoy comparatively higher protection in CEE. As a result, we expect negative coefficients on these variables indicating increased geographical dispersion.

Finally, we control for the extraordinary increase in geographical concentration of two high-technology industries, namely DL30 and DL32, by introducing a dummy variable. Moreover, we consider an industry-invariant time trend that accounts for any time-specific effect not accounted for by the regression, as failing to do so may result in a biased assessment of geographical concentration of industries.

Since Gini coefficients have values ranging between 0 and 1, we conduct a logistic transformation of the dependent variable in order to avoid the truncated variable problem. More formally, we consider the following panel structure:

Equation 1

$$GINI = \beta_0 + \beta_1 FDI_{it} + \beta_2 IMPO_{it} + \beta_3 EXPO_{it} + \beta_4 NTB_{it} + \beta_5 NRG_{it} + \beta_6 LABS_{it} + \beta_7 SCALE_{it} + \beta_8 INTER_{it} + \beta_9 INTRA_{it} + \beta_{10} EMPO_{it} + \beta_{11} VAL_{it} + \lambda_t + \varepsilon_{it}$$

where *i* denotes industry, *t* denotes time, λ_t is the unobservable time effect, and ε_{it} is the remainder stochastic disturbance term. Table 5 summarises the above discussion, also providing a detailed description of variables used, along with the relevant data sources.

Table 5. Description of key variables

Variable	Description	Economic force	Expected sign	Source
NRG	Ratio of intermediate energy inputs in gross output	Market forces	+	EU KLEMS, EUROSTAT
LABS	Ratio of highly skilled labour compensation in total compensation	Market forces	+	EUKLEMS
SCALE	Coefficient of industry-specific scale intensity in production	Market forces	+	Haaland *et al.* (1999)
TECH	Binary variable for industry-specific technology intensity in production	Market forces	+	OECD STAN
INTRA	Ratio of intermediate inputs from own industry	Market forces	+	EURSTAT – IO Tables
INTER	Ratio of intermediate sale to and inputs from other industries	Market forces	+	EUROSTAT – IO Tables
FDI	Share of industry FDI stock in total manufacturing FDI stock	Integration	+/-	WIIW; Central Banks
EXPO	Share of exports in gross output	Integration	+/-	OECD, UNIDO
IMPO	Share of imported intermediate inputs in total intermediates	Integration	+/-	EUROSTAT – IO Tables
NTB	Coefficient of industry-specific non-tariff barriers to trade	Integration/industrial policy	-	Lee and Swagel (1997)
VAL	Share of value added in gross output	Industrial policy (vertical)	-	EU KLEMS
EMPO	Share of total industry employment in total manufacturing employment	Industrial policy (vertical)	-	EU KLEMS

2.5 Econometric specification

The variables above are calculated for each industry as averages across ten CEE countries, resulting in a balanced, pooled time-series cross-section (PTCS) data set featuring 22 industries over six years. The

dependent variable is the industry location Gini coefficient calculated using gross output data.[31] Data limitations, in particular lack of industry-level FDI data, limit our estimations to the period 2000-2005. In addition, recycling (DN37) has been excluded from the analysis due to insufficient data availability.

Equation 1 is first estimated using OLS. Generally speaking, its parameter estimates will be consistent though inefficient in the presence of non-spherical errors, such as heteroskedasticity and autocorrelation. As a result, the probability of a Type I error increases in estimations with inefficient estimators. Given the presence of non-spherical errors in our approach, we consider two alternative estimation methods that simultaneously correct for the presence of group-wise heteroskedasticity and temporally correlated error terms. The Parks-Kmenta feasible generalised least squares (FGLS) method is based on GLS (generalised least squares) and yields unbiased and efficient parameter estimates (see, *e.g.*, Greene, 2003). Moreover, Beck and Katz (1995, 1996) propose a less complex method, which retains OLS parameter estimates but replaces its standard errors with the so-called panel corrected standard errors (PCSE).

Our estimation approach can be described as general-to-specific, *i.e.,* we start with the full model that initially considers all location factors and test down until only statistically significant variables remain (at the 10% significance level). This leads us to our baseline model. Such an approach is expected to reduce the possibility of an omitted variable bias, and in addition shows the robustness of our results to the inclusion and exclusion of particular location factors. Table 6 shows summary statistics. Table 6 presents the correlation matrix featuring all abovementioned right-hand side variables. As expected, there seems to be rather high correlation between technology and scale intensity variables (TECH and SCALE, respectively). To avoid multicollinearity problems, we therefore decide to exclude TECH from our estimation and assess its potential impact when examining the location determinants of technology and labour-intensive industries separately.

Table 6. Summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
FDI	overall	0.04	0.04	0.00	0.20	N =	138
	between		0.04	0.00	0.15	n =	23
	within		0.01	0.02	0.09	T =	6
IMPO	overall	0.52	0.18	0.01	0.80	N =	253
	between		0.19	0.01	0.80	n =	23
	within		0.00	0.52	0.52	T =	11
EXPO	overall	0.72	1.11	0.04	14.61	N =	242
	between		0.62	0.10	2.79	n =	22
	within		0.93	-1.86	12.54	T =	11
NTB	overall	0.16	0.17	0.01	0.63	N =	242
	between		0.17	0.01	0.63	n =	22
	within		0.00	0.16	0.16	T =	11
NRG	overall	0.06	0.09	0.01	0.52	N =	253
	between		0.10	0.01	0.46	n =	23
	within		0.01	-0.01	0.12	T =	11
LABS	overall	14.11	3.46	8.64	21.14	N =	253
	between		3.16	9.71	17.14	n =	23
	within		1.54	11.45	18.11	T =	11
SCALE	overall	0.96	0.49	0.41	1.91	N =	242
	between		0.50	0.41	1.91	n =	22
	within		0.00	0.96	0.96	T =	11

31 . We have also estimated the same equation featuring gross value added obtaining similar results (here not reported).

TECH	overall	0.35	0.48	0.00	1.00	N =	253
	between		0.49	0.00	1.00	n =	23
	within		0.00	0.35	0.35	T =	11
INTER	overall	0.15	0.07	0.04	0.38	N =	253
	between		0.07	0.04	0.38	n =	23
	within		0.00	0.15	0.15	T =	11
INTRA	overall	0.12	0.05	0.03	0.21	N =	253
	between		0.05	0.03	0.21	n =	23
	within		0.00	0.12	0.12	T =	11
EMPO	overall	0.04	0.03	0.00	0.15	N =	253
	between		0.04	0.00	0.15	n =	23
	within		0.00	0.03	0.06	T =	11
VAL	overall	0.30	0.06	0.17	0.47	N =	253
	between		0.05	0.21	0.38	n =	23
	within		0.02	0.21	0.40	T =	11
TREND	overall	2000	3.17	1995	2005	N =	253
	between		0.00	2000	2000	n =	23
	within		3.17	1995	2005	T =	11

Note: between variation is constructed by calculating the means over time for every industry; within variation represents the deviation of individual observations from the industry's average and can naturally be negative. Data refer to the sample used in estimations: 23 manufacturing industries (NACE code: D), 1995 to 2005.

Table 7. Correlation matrix

	FDI	IMPO	EXPO	NTB	NRG	LABS	SCALE	TECH	INTER	INTRA	EMPO	VAL
FDI	1.00											
IMPO	0.13	1.00										
EXPO	0.13	0.06	1.00									
NTB	0.05	0.02	0.03	1.00								
NRG	0.15	-0.07	0.38	-0.10	1.00							
LABS	0.33	0.21	0.20	-0.48	0.30	1.00						
SCALE	0.40	0.34	0.32	-0.11	0.36	0.45	1.00					
TECH	0.15	0.62	0.01	-0.10	-0.21	0.17	0.60	1.00				
INTER	-0.12	-0.38	-0.02	-0.01	-0.09	0.02	-0.18	-0.34	1.00			
INTRA	0.07	-0.25	-0.12	0.13	-0.32	0.04	0.03	-0.09	0.36	1.00		
EMPO	0.30	-0.14	-0.14	0.46	-0.17	-0.19	-0.26	-0.16	-0.10	-0.08	1.00	
VAL	-0.27	-0.08	-0.34	-0.04	-0.35	-0.18	-0.45	-0.05	0.01	-0.24	0.13	1.00

Table 7 displays the results of the OLS estimation performed on our full model as specified in Equation 1. Column 1 refers to the variables used in the regression while columns 2 and 3 report the estimate of the responsiveness of industries' geographical concentration to the joint impact of considered location determinants. We conduct a number of diagnostic tests. In particular, we report the mean Variance Inflation Factor (VIF) as we are interested in detecting cases of near-collinearity between pairs of regressors. Near-collinearity usually arises when pair-wise correlations of explanatory variables are high. Failure to account for its presence in a regression may lead to inaccurate coefficients, frequently characterised by very high standard errors, incorrect signs or implausibly large magnitudes (Greene, 2003). Our mean VIF statistic is rather low (2.68), with the maximum VIF still below 5, suggesting that collinearity may not represent an issue in our specification of the model.

Furthermore, we test our assumption of a correctly specified model by conducting Ramsey's RESET test (regression specification error test). The test statistic in column 2 rejects the null hypothesis of no misspecification and we re-specify Equation 1 to include time-lagged explanatory variables instead. This

seems plausible, as it allows us to additionally consider the transitory time period it takes for an explanatory variable to affect the level of geographical concentration. An additional advantage offered by the lagged-variable approach is that it reduces the likelihood of estimation being plagued by endogeneity issues (Wooldridge, 2002). We adjust and re-estimate the model in column 3 of Table 8. The repeated RESET test now indicates correct specification of the model as we fail to reject the null hypothesis of no misspecification. In sum, the results coming out of the model are broadly in line with theoretical predictions. In particular, availability of skilled labour force, FDI and scale economies positively contribute to geographical concentration of manufacturing industries in CEE, while industries marked by higher levels of NTBs tend to be more dispersed across space. Surprisingly, strong intra- and inter-industry linkages seem to act as a centrifugal (rather than predicted centripetal) force in our sample. Though we have considered the presence of group-wise heteroskedasticity in our initial estimation, our conclusions about the statistical significance of the parameter estimates are dependent on the assumption of non-temporally correlated error terms. To test this assumption we present results from further residual tests, namely Arellano-Bond (1991) and Wooldridge (2002) tests for first-order autocorrelation (AR1). The null hypothesis of no serial correlation is soundly rejected suggesting use of FGLS and PCSE methods instead of OLS. Next, we proceed with detailed discussion of the results based on the two estimation methods.

Table 8. Estimation results from OLS

(1) Variables	(2) FULL	(3) FULL (L-1)
FDI	1.58***	*1.84***
	-0.60	*-0.64*
IMPO	-0.03	-0.00
	-0.17	*-0.18*
EXPO	-0.01	-0.04*
	-0.01	*-0.02*
NTB	-0.34***	-0.28**
	-0.12	*-0.12*
NRG	-1.26***	-1.42***
	-0.27	*-0.27*
LABS	0.02*	0.02**
	-0.01	*-0.01*
SCALE	0.17***	0.14**
	-0.05	*-0.06*
INTER	0.04	-0.18
	-0.41	*-0.44*
INTRA	-1.51***	-1.77***
	-0.5	*-0.51*
EMPO	0.10	-0.21
	-0.84	*-0.92*
VAL	-1.48***	-1.97***
	-0.53	*-0.52*
DL3032	0.47***	0.43***
	-0.10	*-0.10*
TREND	-0.05***	-0.05***
	-0.01	*-0.02*
Constant	99.79***	110.26***
	-25.84	*-30.84*
R-squared	0.73	0.76
F stat	42.35	58.45
Mean VIF	2.68	2.63
RESET (Prob > F)	0.001	0.123

Arellano Bond AR1 (p-val)	8.54 (0.001)	7.19 (0.001)
Wooldridge AR1 (p-val)	45.93 (0.001)	-
Observations	132	110
Groups	22	22

Note: heteroskedasticity corrected standard errors in italics; *p<0.1, **p<0.05, ***p<0.001.

2.6 Estimation results

Table 9 features results from FGLS and PCSE estimations. In particular, columns 2 and 3 report FGLS estimates for the fully specified model and the baseline model (*i.e.*, full model stripped of statistically insignificant variables). In addition, in column 4 we present results from the baseline model with two-year lagged variables in order to test the robustness of our parameter estimates. Columns 5 to 7 repeat the exercise for the PCSE. Overall, the results from the two different estimation methods provide very similar results with only minor variations in the magnitude of their respective parameter coefficients. We therefore proceed with the discussion of our results from the FGLS estimation.

Table 9. Estimation results from FGLS and PCSE

	FGLS			PCSE		
(1) Variables	(2) FULL (L-1)	(3) PREF (L-1)	(4) PREF (L-2)	(5) FULL (L-1)	(6) PREF (L-1)	(7) PREF (L-2)
FDI	2.69***	2.48***	1.93***	1.78***	1.79***	1.98***
IMPO	-0.18	dropped		-0.01	dropped	
EXPO	-0.03***	-0.02**	-0.02**	-0.03**	-0.03**	-0.03**
NTB	-0.32***	-0.39***	-0.30***	-0.32***	-0.32***	-0.31***
NRG	-1.22***	-1.02***	-1.37***	-1.26***	-1.23***	-1.31***
LABS	0.02***	0.02***	0.02***	0.02**	0.02***	0.02***
SCALE	0.10**	0.10**	0.10***	0.17***	0.17***	0.15***
INTER	0.13	dropped		-0.07	dropped	
INTRA	-1.82***	-1.49***	-2.01***	-1.51***	-1.50***	-1.66***
EMPO	-1.12	dropped		-0.02	dropped	
VAL	-1.36***	-1.26***	-1.99***	-1.53***	-1.50***	-1.73***
DL3032	0.60***	0.60***	0.49***	0.47***	0.47***	0.49***
TREND	-0.04***	-0.04***	-0.04***	-0.05***	-0.05***	-0.04***
Constant	83.83***	82.01***	80.82***	92.18***	90.88***	75.06***
R-squared	-	-	-	0.72	0.72	0.78
Wald Chi-sq	606.6	605.3	1381	450.8	405.1	581.6
rho	0.473	0.476	0.433	0.473	0.476	0.433
Observations	110	110	88	110	110	88
Groups	22	22	22	22	22	22

Note: heteroskedasticity corrected standard errors (not reported here); *p<0.1, **p<0.05, ***p<0.001.

The results on variables that stand for factor intensities in production deliver rather mixed results, with NRG having an unexpected negative sign. A potential explanation for the apparent negative relationship may lie in our choice of spatial aggregation. Previous classification of natural resource endowments in the region places the countries featured in our sample on an equal footing (de Melo *et al.*, 1997). Nevertheless, it may be reasoned that CEE industries have generally followed less mobile resources as firm location became dominated by market forces and comparative advantages as opposed to politically motivated decisions. Conversely, LABS has the expected positive sign and is highly significant in all specifications. In other words, locations endowed with skilled labour forces are able to attract larger

number of firms resulting in increased agglomeration. Dumais *et al.* (1997) found that, since the 1970s, manufacturing establishments in the United States have attempted to locate near similar firms, on the grounds of requiring the same type of labour. Our findings are also in line with previous studies on CEE. Hildebrandt and Woerz (2004) found that industries characterised by higher ratios of skilled labour have been marked by a comparatively stronger trend toward spatial agglomeration.

In addition, we find a positive and statistically significant impact of scale economies (SCALE) on location of manufacturing industries. Other things being equal, industries experiencing internal economies of scale in production are more geographically concentrated. Our finding lends support to results from other studies stating that in the process of regional integration (*i.e.*, falling trade cost) scale-intensive industries choose a smaller number of locations from which to supply a larger number of markets.

NEG models assign particular value to pecuniary externalities in explaining observed agglomeration patterns. We proxy for industry linkages by constructing measures of intermediate goods flows within individual industries (INTRA) as well as between industries (INTER). Contrary to our expectations, both variables feature negative coefficient. Though insignificant, INTER suggests that stronger inter-industry linkages prevent industries from locating close to each other. More surprising, however, is the highly significant negative coefficient on (INTRA), implying that intra-industry linkages do not contribute to spatial concentration at country level. After all, this finding may not be surprising. In particular, Krugman and Elizondo (1996) showed that the importance of industry linkages might be weakened by the opening up of a closed economy to international trade. When the economy is closed, firms located in industrial cores have the best access to both domestically produced inputs and the domestic market, while opening up the economy by allowing firms to import inputs and sell goods abroad weakens the linkage advantages of those core areas. The significant trade re-orientation that has taken place in CEE following the opening up of their economies may explain the observed weakening of intra-industry linkages, as domestic producers started trading higher proportions of intermediate inputs and finished goods with the rest of the world. Our results may also be blurred by not distinguishing between technology- and labour-intensive firms. We further inquire into this below.

There seems to be rather mixed evidence with respect to the impact of greater regional integration on spatial concentration of manufacturing industries in CEE. Parameter coefficients on the variable FDI remain positive and highly significant in all specifications pointing towards the presence of positive externalities associated with location of foreign investors. It seems that FDI triggers increased agglomeration of industrial activity in CEE and our findings are broadly in line with existing empirical evidence on CEE. However, greater trade liberalisation may have contributed to increased dispersion of manufacturing activity as well, according to the significant and negative coefficient on the variable EXPO. In other words, industries that export a higher share of their gross output seem to be locating at a greater distance from each other. This finding may not be surprising after all. Taking the level of trade costs as a starting point, deeper integration characterised by continuous reduction in transportation costs may foster dispersion, as it allows industries to serve markets by exporting while exploiting comparative advantages of periphery regions (Puga, 1999). Indeed, industries featured in our sample that exhibit the highest export to gross output ratios are also characterised by comparatively lower trade costs. In general, it appears that industries faced with higher non-tariff barriers as indicated by the variable NTB also chose to locate at a greater distance from each other. In sum, the theoretical predictions from NEG models with respect to the impact of trade costs on agglomeration of economic activity find support in our sample of CEE transition economies.

Interestingly, our exploratory proxies for likelihood of an industry being favoured by vertical industrial policies, VAL and EMPO, hold the expected signs, with only the former being also statistically significant. Taken together, these results confirm our cautious hypothesis that vertical industrial policies might indeed favour industries with a higher value added component in the production but potentially also

industries with a higher share of total workforce. In turn, this might prevent those industries from agglomeration and realisation of efficiency improvements that are assumed to be positively correlated with co-location of economic activity.

Finally, the inclusion of our dummy variable for industries DL30 and DL32 proves to hold significant explanatory power in our model specification. A previous study by Hildebrandt and Woerz (2004) comes to the same conclusion. In particular, they argue that increased spatial agglomeration of these two industries is due to the effect of FDI inflows being biased towards only two locations in our sample, namely Hungary and the Czech Republic. In order to ensure that our results are not affected by influential observations related to these two industries, we re-estimated all equations presented in Table 9 by excluding DL30 and DL32 from our data set. The alternation does not change the overall quality of our results and hence we do not report them here.

Still, there are some remaining limitations to our study. Most importantly, we are not able to fully account for industry fixed effects given the time-invariant element of a significant number of explanatory variables. To further examine differences among industries, we proceed by classifying our 22 manufacturing industries according to their labour- and technology-intensity in production. We believe that technology use is a major factor in distinguishing between industry types and proceed by dividing industries into two groups according to the aforementioned OECD classification. The first group features technology-intensive industries classified as either high-tech or medium-high tech, while the second group consists of labour-intensive industries classified as either low-tech or medium-low tech (OECD, 2003). In Table 10, we present the results of the regression.

Table 10. Estimation results from FGLS and PCSE by technology-intensity in the production

	FGLS		PCSE	
(1)	(2)	(3)	(4)	(5)
Variables	PREF_TECH	PREF_LAB	PREF_TECH	PREF_LAB
FDI	-2.32***	3.75***	-2.27***	3.50***
EXPO	0.03	-0.03***	0.03	-0.04***
NTB	-2.39***	-0.42***	-1.57	-0.40***
NRG	-5.68***	-0.77***	-4.54**	-1.11***
LABS	0.04***	0.01***	0.04**	0.01*
SCALE	0.60***	0.04	0.39	0.16
INTRA	1.63*	-1.20**	0.79	-1.52**
VAL	-2.07***	-1.61***	-2.68***	-1.43**
TREND	-0.06***	-0.03***	-0.07***	-0.04***
Constant	123.07***	58.16***	133.31***	70.69***
R-squared	-	-	0.78	0.61
Wald Chi-sq	164.3	328.2	158.1	279.3
rho	0.371	0.485	0.371	0.485
Observations	40	70	40	70
Groups	8	14	8	14

Note: heteroskedasticity corrected standard errors (not reported here); *p<0.1, **p<0.05, ***p<0.001.

Although the results generally support our previous findings, there are also some marked differences between the designated industry groups. In particular, FDI acts as a centrifugal force in technology-intensive industries while it operates as a centripetal force in labour-intensive ones. Such a result might imply that FDI in technology-intensive industries is market-seeking and hence the induced competition effect may lead foreign firms to locate at a greater distance from each other. There might also be some evidence for the crowding out effect, given foreign firms' superiority in the use of technology. FDI in labour-intensive industries, however, may be regarded as efficiency seeking whereby foreign investors

prefer locations endowed with certain production factors representing the comparative advantage of the particular location. Furthermore, opposing signs are to be found with respect to industry export intensity (EXPO) and intra-industry linkages (INTRA). In particular, labour-intensive industries that trade more tend to be more dispersed. Intra-industry linkages have a positive though weakly significant effect on the clustering of technology-intensive industries while they significantly discourage spatial concentration of labour-intensive industries. Indeed, CEE labour-intensive industries have been more heavily involved in global and regional production networks and, hence, are characterised by a greater reliance on external linkages. As a consequence, a reduction in their dependence on local intra-industry linkages is to be expected. The positive relationship between technology and scale intensity is confirmed; as expected, SCALE is not a significant determinant of agglomeration in labour-intensive industries. The remaining variables are in line with our previous findings: both groups of industries have followed less mobile resource inputs and their spatial concentration patterns have been driven by the availability of a skilled workforce. Interestingly, industries in both groups that are considered to be more profitable as indicated by VAL seem to be locating at a greater distance from each other. This finding provides further support to our tentative hypothesis and certainly requires further inquiry.

2.7 Conclusion

Our analysis has given an account of geographical concentration patterns in 23 manufacturing industries across ten CEE countries, covering the period 1995 to 2005. In particular, we have examined the broad temporal trends of geographical concentration patterns based on location Gini coefficients. These have been calculated using employment, gross output and value added data from a relatively new data set, EU KLEMS. Our major results can be summarised as follows. First, industrial concentration has been decreasing over the period under consideration, though no significant changes in geographical concentration of employment could be detected. Second, there is strong evidence that industry dispersion trends accelerated in the post-2000 period following greater intra- and inter-regional integration. In our attempt to identify the driving forces behind the patterns of geographical concentration in CEE we referred to traditional trade theory, new trade theory and new economic geography (NEG).

We find that over the period of observation, technology-intensive industries have been more geographically concentrated compared to the non-technology intensive ones. Moreover, CEE industries that are characterised by high or low trade costs have been more geographically dispersed than industries characterised by intermediate trade costs. Predictions from the NEG models appear to have some explanatory power in our sample, as geographic agglomeration seems to only take place if cost and demand linkages outweigh opposing dispersion forces.

To explain the geographic concentration pattern in CEE, we estimate FGLS and PCSE models, correcting for non-spherical errors present in the data. In a nutshell, we find support for the positive impact of deeper regional integration on geographical concentration. Specifically, FDI seems to be a significant force contributing to industry clustering, yet other integration proxies point towards greater industry dispersion following deeper market liberalisation. In general, industries that have experienced higher trade costs also located at a greater distance from each other. Moreover, CEE industries have followed less mobile sources over the period under examination. In line with previous empirical findings, the availability of skilled labour and scale economies has a significant and positive effect on industrial agglomeration. Interestingly, we find tentative support for our hypothesis that vertical industrial policies might indeed favour industries with a higher value added component in production, as well as industries with a higher share of the total workforce. The negative and partially significant signs on these two variables point towards a dispersion process in industries that are potentially under the auspices of national policy makers.

In a further step, we investigated the determinants of geographical concentration across technology- and labour-intensive groups of industries. Our findings suggest that FDI acts as a centrifugal force for

technology-intensive industries while it operates as a centripetal force on labour-intensive ones. This finding may well be due to the different nature of investments in these two distinct groupings (market seeking vs. efficiency seeking). As anticipated, intra-industry linkages have some explanatory power with respect to the agglomeration of technology-intensive industries, yet they apparently induce labour-intensive industries to disperse. We argue that the latter may have become more reliant on intra-industry linkages with regional and global suppliers and buyers. Thus, they have become less reliant on domestic suppliers and buyers.

With respect to potential future research, it would be interesting to examine industry location patterns in transition economies on a finer scale. It is a frequently made observation that regions which used to be power houses of industrial development in the centrally planned system have fallen behind, while others have been successfully integrated into cross-border production networks. What is the success of the latter? Moreover, provided that industrial policy matters, what is the role for horizontal industrial policies such as infrastructure programmes and institutional improvements in attracting investment and generating regional growth? These questions will be dealt with in our subsequent work.

2.8 Bibliography

Altomonte, C. and L. Resmini (2002), "The Geography of Foreign Direct Investment in Transition Countries: A Survey of Evidence", in A. Tavidze (ed.), *Progress in International Economics Research*, Nova Science Publishers, New York, pp. 1-35.

Arellano, M. and S. Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies*, Vol. 58, pp. 277-297.

Bai, C., Y. Du, Z Tao and S. Tong (2004), "Local Protectionism and Regional Specialization: Evidence from China's Industries", *Journal of International Economics*, Vol. 63, pp. 397-417.

Beck, N. and J. Katz (1995), "What to Do (and Not to Do) With Time-Series Cross-Section Data", *American Political Science Review*, Vol. 89, pp. 634-647.

Beck, N. and J. Katz (1996), "Nuisance vs. Substance: Specifying and Estimating Time- Series-Cross-Section Models", *Political Analysis*, Vol. 6, pp. 1-34.

Besley, T. and P. Seabright (1999), "The Effects and Policy Implications of State Aids to Industry: An Economic Analysis", *Economic Policy*, Issue 28.

Bickenbach, F. and E. Bode (2008), "Disproportionality Measures of Concentration, Specialization, and Localization", *International Regional Science Review*, Vol. 31, pp. 359-388.

Blauberger, M. (2007), "European State Aid Control in the New Member States: The Examples of Poland and the Czech Republic", paper prepared for the EUSA Tenth Biennial International Conference, Montreal, 17-19 May 2007.

Brulhart, M. and F. Trionfetti (2004), "Public Expenditure, International Specialisation and Agglomeration", *European Economic Review*, Vol. 48, pp. 851-881.

Cass, F. (2007), "Attracting FDI to Transition Countries: The Use of Incentives and Promotion Agencies", *Transnational Corporations*, Vol. 16, pp. 77-122.

Chari, A. and N. Gupta (2008), "Incumbents and Protectionism: The Political Economy of Foreign Entry Liberalization", *Journal of Financial Economics*, Vol. 88, pp. 633-656.

Dangerfield, M. (2004), "CEFTA: between the CMEA and the European Union", *Journal of European Integration*, Vol. 26, pp. 309 – 338.

De Melo, M., C. Denizer, A. Gelb and S. Tenev (1997), "Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies", Policy Research Working Paper, WP1866, World Bank.

Dumais, G., G. Ellison and E. Glaeser (1997), "Geographic Concentration as a Dynamic Process", *Review of Economics and Statistics*, Vol. 84, pp. 193-204.

Egger, H. and J. Falkinger (2006), "The Role of Public Infrastructure and Subsidies for Firm Location and International Outsourcing", *European Economic Review*, Vol. 50, pp. 1993-2015.

European Commission Enlargement (2009), http://ec.europa.eu/enlargement/glossary/terms/europe-agreement_en.htm.

Fink, G. (2001), "Trade Protection in Five EU Member Candidate Countries by Exchange Rate Adjustment, Customs Tariffs and Non-Tariff Measures", *Open Economics Review*, Vol. 12, pp. 95-116.

Forslid, R. and I. Wooton (2003), "Comparative Advantage and the Location of Production", *Review of International Economics*, Vol. 11, pp. 588-603,

Greenaway, D. and J. Torstensson (1997), "Back to the Future: Taking Stock on Intra-Industry Trade", *Weltwirtschaftliches Archiv*, 133 (2), pp. 249-269.

Greene, W. (2003), *Econometric Analysis*, Prentice-Hall, New Jersey.

Grossman, G. (1984), "International Trade, Foreign Investment, and the Formation of the Entrepreneurial Class", *American Economic Review*, Vol. 74, pp. 605-614.

Haaland, J., H. Kind, K. Midelfart-Knarvik and J. Torstensson (1999),"What Determines the Economic Geography of Europe?", Discussion Paper 2072, CEPR.

He C., Y. Wei and X. Xiuzhen (2008), "Globalization, Institutional Change, and Industrial Location: Economic Transition and Industrial Concentration in China", *Regional Studies*, Vol. 42, pp. 923-945.

Helpman, E., and P. Krugman (1985), *Market Structure and Foreign Trade*, Harvester Wheatsheaf, Brighton.

Hildebrandt, A and J. Woerz (2004), "Patterns of Industrial Specialization and Concentration in CEEs: Theoretical Explanations and their Empirical Relevance", in A. Wziatek-Kubiak and P. Welfens (eds.), *Structural Change and Exchange Rate Dynamics in the Context of EU Eastern Enlargement*, Springer, Berlin, pp. 119-146.

Iara, A. and I. Traistaru (2003), "Integration, Regional Specialization and Growth Differentials in EU Accession Countries: Evidence from Hungary", in C. Hausen *et al.* (eds.), *Determinants of Growth and Business Cycles: Theory, Empirical Evidence and Policy Implications*, Verlag für Wissenschaft und Forschung, Berlin, pp. 181-202.

Kaminski, B. (1993), "How the Market Transition Affected Export Performance in the Central European Economies", Policy Research Working Paper, WPS1179, World Bank.

Kroszner, R. and P. Strahan (1999), "What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions", *Quarterly Journal of Economics*, Vol. 114, pp. 1437-1467.

Krugman, P. (1980), "Scale Economies, Product Differentiation, and the Pattern of Trade", *American Economic Review*, Vol. 70, pp. 950-959.

Krugman, P. (1991a), "Increasing Returns and Economic Geography", *Journal of Political Economy*, Vol. 99, pp. 483-499.

Krugman, P. (1991b), *Geography and Trade*, MIT Press, Cambridge, U.S.A.

Krugman, P. (1993), "The Narrow and Broad Arguments for Free Trade", *American Economic Review*, Vol. 83, pp. 23-26.

Krugman, P. and R. Elizondo (1996), "Trade Policy and the Third World Metropolis", *Journal of Development Economics*, Vol. 49, pp. 137-150.

Krugman, P., and A. Venables (1990), "Integration and the Competitiveness of Peripheral Industry", in C. Bliss and J. B. de Macedo (eds.), *Unity with Diversity in the European Economy: The Community's Southern Frontier*, Cambridge University Press, Cambridge.

Krugman, P. and A. Venables (1996), "Integration, Specialization, and Adjustment", *European Economic Review*, Vol. 40, pp. 959-967.

Lee, J. and P. Swagel, P. (1997), "Trade Barriers and Trade Flows Across Countries and Industries", *Review of Economics and Statistics*, Vol. 79, pp. 372-382.

Longhi, S., P. Nijkamp and I. Traistaru (2005), "Economic Integration and Manufacturing Location in EU Accession Countries", *Journal of International Business and Economy*, Vol. 6, pp. 1-22.

Mardas, D. (2005), "The Latest Enlargement of the EU and 'Buy National' Rules", *The World Economy*, Vol. 28, pp. 1633-1650.

Markusen, J. and A. Venables (1999), "Foreign Direct Investment as a Catalyst for Industrial Development", *European Economic Review*, Vol. 43, pp. 335-356.

Martin, P. and C. Rogers (1995), "Industrial Location and Public Infrastructure", *Journal of International Economics*, Vol. 39, pp. 335-351.

Mattoo, A. (1996), "The Government Procurement Agreement: Implications of Economic Theory", *World Economy*, Vol. 19, pp. 695-720.

Midelfart-Knarvik, K., H. Overman, S. Redding and A. Venables (2000), *The Location of European Industry*, European Commission Working Paper 142, DG ECFIN.

Mulas-Granados, C., T. Koranchelian and A. Segura-Ubiergo (2008), *Reforming Government Subsidies in the New Member States of the European Union*, IMF Working Paper, WP/08/165.

Neck, R., G. Haber and W. McKibbin (2000), "Macroeconomic Impacts of European Union Membership of Central and Eastern European Economies", *Atlantic Economic Journal*, Vol. 28, pp. 71-82.

OECD (2003), Science, Technology and Industry Scoreboard, OECD, Paris.

Ottaviano, G. and D. Puga (1997), *Agglomeration in a Global Economy: A Survey of the New Economic Geography*, CEPDP, 356, Centre for Economic Performance, London School of Economics and Political Science, London.

Ottaviano, G. and J-F. Thisse (2004), "Agglomeration and Economic Geography", in J. Henderson and J-F. Thisse (eds.), *Handbook of Regional and Urban Economics Volume 4: Cities and Geography*, Elsevier, Amsterdam, pp. 2564-2608.

Puga, D. (1999), "The Rise and Fall of Regional Inequalities", *European Economic Review*, Vol. 43, pp. 303-334.

Shelburne, R. and R. Bednarzik (1993), "Geographic Concentration of Trade-Sensitive Employment", *Monthly Labor Review*, Vol. 116, pp. 3-13.

Sjoberg, O. and F. Sjoholm (2004), "Trade Liberalization and the Geography of Production: Agglomeration, Concentration, and Dispersal in Indonesia's Manufacturing Industry", *Economic Geography*, Vol. 80, pp. 287-310.

Torok, A. (2007), "Industrial Policy in the New Member Countries of the European Union: A Survey of Patterns and Initiatives Since 1990", *Journal of Industry, Competition and Trade*, Vol. 7, Numbers 3-4.

Traistaru I., P. Nijkamp and L. Resmini (2003), *The Emerging Economic Geography in EU Accession Countries*, Ashgate Publishing, Aldershot, UK.

Venables, A. (1996), "Equilibrium Location of Vertically Linked Industries", *International Economic Review*, Vol. 37, pp. 341-359.

Venables, A. (2003), "Winners and Losers from Regional Integration Agreements", *Economic Journal*, Vol. 113, pp. 747-761.

Wolfmayr-Schnitzer, Y. (2000), "Economic Integration, Specialisation and the Location of Industries. A Survey of the Theoretical Literature", *Austrian Economic Quarterly*, Vol. 5, pp. 73-80.

Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, USA.

Young, A. (2000), "The Razor's Edge: Distortions and Incremental Reform in the People's Republic of China", *Quarterly Journal of Economics*, Vol. 115, pp. 1091-1135.

3 DETERMINANTS OF FDI LOCATION IN CEE[32]

Our empirical model from the previous model indicates that foreign direct investment (FDI) seems to have a significant impact on the location of manufacturing industries in Central and Eastern Europe (CEE). Hence, the auxiliary regressions that we present in this chapter make an attempt at determining factors that influence the location of FDI in particular. Though our intention is to conduct a broad assessment of various factors, we are especially interested in evaluating the effects of two particular components of the transition process. First, we explore the relationship between FDI and progressive regional integration. Most of the CEE countries have concluded free trade agreements with their geographical neighbours at the start of the transition. The establishment of the Central European Free Trade Agreement (CEFTA) and the Baltic Free Trade Area (BAFTA) created formal intra-regional trade platforms while at the same time provided a training ground where CEE countries could get accustomed to the rules of free trade on their way towards full European Union (EU) membership. As a result, the induced enlargement of regional markets has made the formerly planned economies in CEE an especially attractive location for foreign investors.[33] We therefore aim to assess the impact of broad regional integration, and free trade agreement (FTA) membership in particular, on countries' ability to generate higher FDI inflows within their respective borders.

Second, besides deeper intra- and inter-regional economic integration, CEE countries have also initiated major steps towards institutional integration. Guided by the Europe Agreements, their EU accession road maps, the countries have been required to bring their institutions and policies in line with those dictating the operations of the EU Common Market. The incompatible structure of their inherited system required almost all countries in the region to embark on a complex process of institution building. In general, the progress in reform implementation has been uneven across countries due to various socio-economic reasons related to transition. This has been discussed at length in vast literature on economic transition in Eastern Europe and does not represent the core of our exercise here. Instead, we are much more interested in assessing the impact such policy and institutional reforms have had on FDI location.

In sum, our focus in the empirical model below is to uncover determinants of FDI location in CEE. In that respect, we consider a number of factors that have been put forward in the relevant economic literature (for a review see, *e.g.*, Bloningen, 2005). More specifically, we intend to examine the effects regional integration and the investment climate have on the location decision of foreign investors.

In the next section, we construct and describe variables to be used in our empirical model. In the following sections, we discuss data and estimation methodology. Finally, we summarise the results.

3.1 Variables

In order to understand factors guiding FDI location in transition economies, we specify an empirical model that considers a combination of traditional and transition-specific determinants. In general, it may be

32 . This chapter was written by Mr. Adnan Seric, University of St. Andrews, for the Organisation for Economic Co-operation and Development Investment Compact for South East Europe.

33 . The Pan-European cumulation system that has been introduced in 1997 merged the EFTA with the two FTAs in CEE, creating an even larger free trade area.

argued that foreign investors' choice of a location is closely related to a country's comparative advantage, as the latter determines the profitability of the investment. The conventional sources of comparative advantage include, among others, market potential, factor prices and natural resource endowments.

Our first explanatory variable, market potential (MPOT), provides us with a proxy of actual market size (demand) in a given location. All else being equal, market-seeking FDI in particular will be attracted to locations that are also characterised by comparatively larger or faster-growing domestic markets. Several different measures have been used so far in approximating market size such as gross domestic product (GDP), GDP per capita and population. On their own, these measures may not sufficiently account for market potential, as vast populations without purchasing power or extremely small populations with high purchasing power do not actually imply large market sizes. We therefore construct a measure of market potential based on an index featuring an economic performance indicator (GDP) and geographical market size (internal distances). The data is sourced from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and the World Bank World Development Indicators (WDI) database. We expect MPOT to have a positive impact on the location of foreign investment. In addition, we also consider the other two potential proxies in our estimation, GDP per capita (GDPcap) and population (POP). Our data on actual value of countries' GDP comes from the latest edition of the World Bank's WDI database, while population data is sourced from EUROSTAT.

Next, we consider labour cost along with labour productivity as a source of potential comparative advantage. Efficiency-seeking foreign investment is often driven by differences in labour costs, suggesting that the availability of a cheap workforce is an important determinant of FDI. In fact, there is ample evidence that FDI in CEE has been primarily efficiency seeking. Our measure of experienced labour costs (LABCOST) is constructed by dividing total employment compensation by total hours worked. We expect higher values of LABCOST to negatively impact foreign investors' decisions to locate in a particular country.

However, efficiency-seeking investors may also derive a competitive advantage by locating in places with comparatively higher labour productivity (LABPROD). Higher labour productivity decreases production costs and hence increases the profitability of investment. Similar to the LABCOST variable, we proxy for labour productivity by diving total gross value added in production by total hours worked. In general, we would expect countries that are endowed with comparatively higher labour productivity to be also more densely populated by foreign investors. We therefore anticipate a positive sign on the variable LABPROD. Data on employment compensation and gross value added comes from the EUROSTAT database. Data on total hours worked is sourced from the International Labour Organisation's (ILO) LABOURSTA database.

Prior to proceeding with our discussion of other determinants of FDI location, it should be highlighted that high correlation between the two distinct variables may lead to inconsistencies in our empirical estimation of the model. In particular, high correlation between explanatory variables often leads to multicollinearity issues that reduce the consistency of the estimation results. In order to account for any potential multicollinearity issues, we construct a variable that simultaneously takes into consideration the effects of labour cost and productivity. Our labour competitive advantage index (LABCAI) is the ratio of LABPROD over LABCOST and has a straightforward interpretation. All else equal, countries that feature comparatively higher labour productivity, while at the same time having lower labour costs, are expected to have a competitive advantage over rival investment locations. We expect a positive sign on LABCAI.

We also consider the effects of natural resource endowments. Campos and Kinoshita (2003) show that transition economies in the Commonwealth of Independent States (CIS) receive most of their FDI in resource-based industries (*e.g.*, oil and natural gas). According to the authors, focus on attracting resource-based FDI may potentially divert investments from manufacturing and services. In our model, we want to

account for the potential effect of natural resources on location of FDI even though CEE seems to be scarcely endowed with them (De Melo *et al.*, 1997). Still, we construct our proxy variable for natural resource endowments (NATRES) based on country level production of primary energy. The effects of NATRES on the location of FDI are ambiguous. On the one side, resource endowments create a comparative advantage for jurisdictions overseeing them. That alone may result in large FDI inflows, especially in sectors dependent on inputs coming from those resources. On the other side, Beck and Laeven (2006) show that transition economies considered to be endowed with natural resources have suffered from higher rent-seeking behaviour at the highest political levels resulting in overall lower institutional development and economic growth. These effects may deter foreign investors from locating in those countries. Here again, our primary data source is EUROSTAT.

In addition to comparative advantage determinants of FDI we also consider the effects of macro-economic policies on the location of investments. Real effective exchange rates (REER) aim to assess a country's price or cost competitiveness relative to its principal competitors in international markets. REER is calculated based on the assumption that changes in cost and price competitiveness not only depend on exchange rate movements but also on cost and price trends. In general, a rise in the index means a loss of competitiveness. Furthermore, we introduce the value of implicit tax rate on corporations (TAXCORP) in our estimation. We conjecture that investments driven by general cost savings will be discouraged from locating in countries with comparatively higher corporate tax rates. Yet, at the same time, higher tax rates may also serve as a signalling device to foreign investors choosing to locate in an unfamiliar environment. For instance, higher taxes to finance infrastructural projects may be associated with overall higher infrastructural development in a location. Hence, given the potential presence of positive externalities associated with higher taxation, we are not able to predict the sign on our TAXCORP variable. Both variables, REER and TAXCORP, have been taken from EUROSTAT.

Finally, we consider some newer and transition specific factors of FDI in CEE. In the first place, we want to examine the impact of greater regional integration on the location of FDI. In that respect, a standard gravity type variable such as trade openness (OPEN) is used as a proxy for trade-related costs and barriers. Given our focus on a rather narrowly defined region, OPEN may therefore be interpreted as the overall degree of economic and institutional integration. Theoretically speaking, the smaller the incurred trade cost (or the lower the experienced trade barriers), the larger the anticipated volume of trade between countries, increasing investors' incentives for choosing locations with comparative advantages. Scale-intensive industries may especially profit from closer integration as the enlarged market ensures higher profits by locating production in a smaller number of locations, *i.e.*, supplying the rest of markets via exporting.

In general, greater openness to trade is expected to positively influence the location decisions of foreign investors, as enlarged markets and less costly movement of production inputs across borders should almost equally benefit market-seeking and efficiency-seeking FDI. Our measure of trade openness (OPEN) is taken directly from the European Bank for Reconstruction and Development (EBRD) structural change indicators and is represented as the share of trade (exports plus imports) in GDP.

In addition, we explicitly test for the effect of membership in an FTA by using a binary variable called FTAEAST, whereby a value of 1 indicates that a country is a member of an FTA (either CEFTA or BAFTA) over a particular period of time while a 0 indicates otherwise. We expect to observe a positive effect of membership in an FTA on the location of FDI for the same reasons outlined in our preceding discussion of OPEN.

As previously mentioned, the creation of market-based institutions has been a determining factor of the successful conversion to a market economy. In fact, transformation of inherited and inefficient institutions has been crucial for CEE countries' economic and institutional integration with the EU. With

respect to FDI, institutions and the resulting investment climate provide important locational advantages as they significantly influence the overall transaction costs faced by foreign investors. Estrin and Bevan (2001) empirically confirm the high relevance of the investment climate in attracting FDI for a number of Eastern European countries. Our approach here is in line with their research.

Firstly, we use an aggregate index of overall institutional quality in the host countries. In particular, our variable of choice is the Economic Freedom of the World (EFW) index, published annually by the Fraser Institute. According to the authors, the index is designed "to measure consistency of a nation's institutions and policies with economic freedom." (Fraser Institute, 2009, pp. 3). The key components of the index include the following four freedoms: personal choice, voluntary exchange co-ordinated by markets, competition in the markets and protection of property rights (*ibid*). Specifically, we anticipate a positive sign on EFW as locations endowed with better functioning institutions are expected to have lower transaction costs and hence should be favoured by foreign investors. We collect data from various publications of the report for all CEE countries during the period 1995 to 2005. Due to data limitations, we use linear interpolation to account for the sub-period 1995 to 2000.

Secondly, it is frequently stated that the observed variation of institutional frameworks in CEE may be explained by the countries' progress in transition. Hence, in addition to our variable EFW we use measures from the EBRD's annual reports to account for relevant transition indicators (EBRD, 2009). The advantage here is that the EBRD's overall index of progress in reform is based on a number of individual indices, each measuring a distinct component of the investment climate, we are, therefore, able to discriminate between them with respect to their importance in attracting FDI. Among others, profound reforms in the following areas are deemed to be crucial in creating a positive investment climate for foreign investors: infrastructure, competition, privatisation and enterprise restructuring.[34] In particular, it is expected that the availability of better quality of infrastructure (INFRAREF) reduces operating costs and raises profitability of investments. Moreover, comparatively higher levels of privatisation (PRIVREF) and enterprise restructuring (ENTREST) create opportunities for foreign investors. First, there is a wider pool of formerly state-owned enterprises that may be acquired through FDI (alternatively, joint ventures can be formed). Second, a higher share of the private sector in total economic activity likely provides foreign investors with more comprehensive production inputs and other linkages. Finally, progress in competition policy reform (COMPREF), *i.e.* a move away from promoting national champions and instead creating equal rules for all market participants, is expected to positively impact the location decision of foreign investors. Overall, we expect to observe positive signs on each of the aforementioned investment climate variables.

In sum, the existing economic literature indicates that the Eastern European process of transition has significantly affected the location choice of foreign investors. Investors choose locations according to the underlying principle of profitability associated with each location. Traditionally, FDI inflows have been linked to a country's comparative advantage. In addition, we consider the effects of deeper regional integration and improvements in institutional quality in CEE (investment climate) and expect them to positively influence foreign investors' choice of an investment location. Table 11 summarises the above discussion. In the next section, we empirically estimate our theoretical claims.

34 . For more information on these indicators, please refer to www.ebrd.com/country/sector/econo/stats/timeth.htm.

Table 11. Description of key variables

Variable	Definition	Relevance	Expected sign	Source
FDI	Inward FDI stock in millions of USD	Dependent		UNCTAD
MPOT	Own market potential (GDP/internal distance)	Traditional	+	World Bank WDI, CEPII
GDPcap	GDP per capita in USD	Traditional	+	World Bank WDI
POP	Population in millions	Traditional	+	EUROSTAT
OPEN	Ratio of trade in GDP	Traditional	+	EBRD
REER	Real effective exchange rate	Traditional	+/-	EUROSTAT
TAXORP	Implicit tax rate on corporations	Traditional	-	EUROSTAT
LABCOST	Compensation of employment (in millions of USD) / Total hours worked (in millions of hours)	Traditional	-	EUROSTAT, ILO
LABPROD	Gross value added (in millions of USD) / Total hours worked (in millions of hours	Traditional	+	EUROSTAT, ILO
LABCAI	Competitive advantage index (LABPROD/LABCOST)	Traditional	+	EUROSTAT, ILO
NATRES	Total production of primary energy (in millions of tonnes)	Traditional	+/-	EUROSTAT
FTAEAST	Dummy variable for duration of membership in CEFTA/BAFTA	Traditional	+	European Commission
INFRAREF	EBRD index of infrastructural reform	Transition	+	EBRD
PRIVREF	EBRD index of privatisation reform	Transition	+	EBRD
COMPREF	EBRD index of competition reform	Transition	+	EBRD
ENTREST	EBRD index of enterprise restructuring	Transition	+	EBRD
EFW	Index of the overall quality of institutions (investment climate)	Newer	+	Fraser Institute

3.2 Empirical methodology

Our model specification is based on a standard gravity model approach (see for instance, Bellak *et al.*, 2010). The dependant variable is countries' annual FDI stock and has been sourced from the UNCTAD (United Nations Conference on Trade and Development) FDI database. More formally, we relate our dependent variable to the above specified determinants of foreign investment location (independent variables). All variables are logged and enter Equation 2 in the following form:

Equation 2

$$FDI_{ct} = \beta_0 + \beta_1 MPOT_{ct} + \beta_2 OPEN_{ct} + \beta_3 REER_{ct} + \beta_4 TAXCORP_{ct} + \beta_5 LABCOST_{ct} + \beta_6 LABPROD_{ct} + \beta_7 LABCAI_{ct} + \beta_8 NATRES_{ct} + \beta_9 FTAEAST_{ct} + \beta_{10} INFRAREF_{ct} + \beta_{11} PRIVREF_{ct} + \beta_{12} COMPREF_{it} + \beta_{13} ENTREST_{ct} + \beta_{14} EFW_{ct} + \gamma_c + \lambda_t + \varepsilon_{ct}$$

where *c* and *t* indicate country and year respectively, γ is the country-specific fixed effect while λ is the matrix of time dummies. The remaining error terms are represented by ε. As we are interested in extracting the relevant determinants of FDI location, and in line with previous studies, we assume that a foreign investor given a choice of *k* number of alternative locations will decide to locate where after-tax profits are highest compared to the rest of prospective location sites (Devereux and Griffith, 1998; Bellak *et al.*, 2010).

Our estimation method is similar to the one conducted in the previous chapter. In particular, we proceed by first estimating a general model containing all explanatory variables. We then exclude

explanatory variables whose coefficients were insignificant and re-estimate the corresponding restricted specification. The exclusion level is fixed at the standard 10% significance level. Hence, we obtain our baseline model that may also be labelled our "preferred model". According to Bellak *et al.* (2010), such an approach is expected to reduce the possibility of an omitted variable bias and generally increases the efficiency of the estimates. Moreover, it also shows the robustness of our results to the inclusion and exclusion of particular location determinants. All explanatory variables enter the regression in logarithmic form, which at the same time also reduces the likelihood of outliers.

We proceed by first fitting the general model featuring both random- and fixed-effects, whereby the standard Hausman test is used to test whether the orthogonality assumption is violated in the former. If the regressors are correlated with the error term, the fixed effect estimator is consistent while the random effects estimator is not. Otherwise, both are consistent, though the latter is more efficient. Next, we check whether all dynamics have been captured as we re-estimate our preferred model allowing for first-order autocorrelation (AR1) disturbances.

Finally, the inclusion of the market potential (MPOT) variable in our regression may lead to an issue of endogeneity. Hence, we also report estimates from a two step least squares regression that treats MPOT as an endogenous explanatory variable. As a further robustness check, we account for potential endogeneity of other explanatory variables by introducing a one period lag in a separate regression model (Wooldridge 2002). The latter entails an additional benefit as it allows us to also take into consideration the time gap that it takes for a foreign investor to react to changes in location determinants.

Table 11 provides a summary of all variables while Table 12 produces correlation coefficients from the matrix featuring all explanatory variables.

Table 12. Summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
MPOT	Overall	5.55	0.89	3.82	7.28	N =	110
	Between		0.86	4.43	6.80	n =	10
	Within		0.34	4.87	6.31	T =	11
LABCOST	Overall	0.64	0.64	-0.90	1.96	N =	106
	Between		0.60	-0.35	1.73	n =	10
	Within		0.31	-0.33	1.27	T =	11
LABPROD	Overall	1.39	0.57	0.04	2.50	N =	106
	Between		0.49	0.56	2.24	n =	10
	Within		0.32	0.45	2.00	T =	11
LABCAI	Overall	2.12	0.25	1.54	2.65	N =	106
	Between		0.24	1.67	2.48	n =	10
	Within		0.10	1.89	2.37	T =	11
NATRES	Overall	2.20	1.18	0.34	4.60	N =	110
	Between		1.24	0.48	4.44	n =	10
	Within		0.09	1.94	2.42	T =	11
REER	Overall	4.63	0.17	4.05	5.16	N =	110
	Between		0.09	4.51	4.76	n =	10
	Within		0.14	4.14	5.04	T =	11
TAXCORP	Overall	2.71	0.48	1.22	3.48	N =	109
	Between		0.45	2.01	3.11	n =	10
	Within		0.21	1.92	3.45	T =	11
OPEN	Overall	4.46	0.31	3.62	4.93	N =	110
	Between		0.29	3.90	4.74	n =	10
	Within		0.13	4.07	4.76	T =	11

FTAEAST	Overall	0.86	0.34	0.00	1.00	N =	110
	Between		0.09	0.64	0.91	n =	10
	Within		0.33	-0.05	1.23	T =	11
EFW	Overall	1.81	0.14	1.38	2.06	N =	110
	Between		0.10	1.61	1.95	n =	10
	Within		0.10	1.56	2.06	T =	11
INFRAREF	Overall	0.98	0.25	0.00	1.31	N =	110
	Between		0.14	0.78	1.24	n =	10
	Within		0.22	0.13	1.33	T =	11
PRIVREF	Overall	1.23	0.17	0.69	1.39	N =	110
	Between		0.13	1.08	1.39	n =	10
	Within		0.12	0.77	1.46	T =	11
ENTREST	Overall	1.04	0.17	0.69	1.30	N =	110
	Between		0.15	0.71	1.18	n =	10
	Within		0.08	0.72	1.21	T =	11
COMPREF	Overall	0.95	0.20	0.00	1.19	N =	110
	Between		0.14	0.68	1.12	n =	10
	Within		0.15	0.26	1.19	T =	11
TREND		2000	3.18	1995	2005	N =	110
			0.00	2000	2000	n =	10
			3.18	1995	2005	T =	11

Note: between variation is constructed by calculating the means over time for every industry; within variation represents the deviation of individual observations from an industry's average and can naturally be negative.

Table 13. Correlation matrix

	MPOT	OPEN	REER	TAX-CORP	LAB-COST	LAB-PROD	LAB-CAI	NAT-RES	INFRA-REF	PRIV-REF	COMP-REF	ENT-REST	EFW	FTA-EAST
MPOT	1.00													
OPEN	-0.06	1.00												
REER	0.51	0.15	1.00											
TAXCORP	0.52	-0.01	0.21	1.00										
LABCOST	0.53	0.45	0.44	0.05	1.00									
LABPROD	0.59	0.42	0.45	0.04	0.99	1.00								
LABCAI	-0.07	-0.39	-0.25	-0.06	-0.68	-0.56	1.00							
NATRES	0.67	-0.52	0.23	0.45	-0.02	0.02	0.21	1.00						
INFRAREF	0.37	0.15	0.54	-0.13	0.29	0.35	0.11	0.13	1.00					
PRIVREF	0.27	0.48	0.42	-0.06	0.58	0.57	-0.44	0.06	0.58	1.00				
COMPREF	0.49	0.31	0.44	-0.04	0.80	0.83	-0.35	0.08	0.65	0.61	1.00			
ENTREST	0.45	0.40	0.21	-0.17	0.67	0.69	-0.33	-0.03	0.54	0.55	0.63	1.00		
EFW	0.27	0.50	0.45	-0.36	0.73	0.75	-0.35	-0.18	0.74	0.76	0.74	0.74	1.00	
FTAEAST	-0.03	-0.06	0.05	-0.03	0.03	0.00	-0.15	-0.02	0.29	0.26	0.17	0.05	0.15	1.00

In particular, we need to highlight two specific observations. First, variables LABCOST and LABPROD are almost perfect linear functions of each other. We therefore have to anticipate and probably deal with multicollinearity in our regression model. Second, as might be expected, there is also a significant degree of correlation within the group of investment climate variables. As a potential remedy to both problems, we consider an auxiliary estimation featuring the competitive advantage index instead of LABCOST and LABPROD. We approach the second issue by introducing one investment climate variable at a time and estimating its respective effects.

3.3 Results

Table 14 presents the results of our econometric analysis. In columns 2 and 3, we show the results from our general model, *i.e.*, the full model, differentiated by the use of random- and fixed-effects respectively.[35] As evident, the Hausman test's null hypothesis, that the random estimator is consistent, is soundly rejected. Hence, we proceed by examining the results stemming from the fixed effects regression in column 4.

Table 14. Regression results

(1) Variables	(2) FULL_RE	(3) FULL_FE	(4) PREF_FE	(5) GLS_HAC_FE	(6) GMM_HAC_FE	(7) GLS_HAC_FE_(L-1)
MPOT	0.59***	0.96***	1.01***	1.03***	1.06***	1.03***
LABCOST	-0.63*	-2.35***	-2.36***	-2.05***	-1.61*	-1.33**
LABPROD	0.53	2.11***	2.34***	2.14***	1.78**	1.70***
NATRES	0.30***	-0.41*	-0.41*	-0.24	-0.32	0.01
REER	1.10***	1.57***	1.43***	1.09***	1.07**	0.32
TAXCORP	0.11	0.06				
OPEN	-0.02	0.91***	0.82***	0.71***	0.85***	0.83***
FTAEAST	-0.14	0.16**	0.13*	0.12**	0.20***	0.21***
EFW	2.04***	0.63				
INFRAREF	1.39***	0.73***	0.89***	0.92***	0.87***	0.93***
PRIVREF	0.56*	0.51**	0.57**	0.43*	0.19	0.26
ENTREST	0.31	0.99**	0.97**	0.63**	0.85**	0.81**
COMPREF	0.5	0.52				
Constant	-7.29***	-12.80***	-10.72***	-8.41***		-5.34***
R-squared		0.96	0.96		0.95	
Chi-squared	4286.5			4135.5		3463.4
Breusch-Pagan LM						
Hausman test (p-val)	0.001					
AIC		-59.5	-61.2	-89.4	-67.0	-47.8
Hansen J-test (p-val)					0.24	
Endog-test (p-val)					0.45	
Observations	106	106	106	106	98	96
Number of groups	10	10	10	10	10	10

Note: heteroskedasticity corrected standard errors; *p<0.1, **p<0.05, ***p<0.001.

Generally speaking, almost all variables enter the regression with the expected signs in addition to having satisfactory levels of statistical significance. In particular, market potential (MPOT), labour costs (LABCOST) and productivity (LABPROD) have the expected signs and are highly significant. On the one side, our finding suggests that FDI in CEE may be characterised as market-seeking, as foreign investors seem to be attracted to larger markets. However, opposing values on labour cost and productivity imply that FDI might also be efficiency-seeking. Rather interesting signs appear in connection with the variables TAXCORP and NATRES, though only the latter is weakly significant. TAXCORP features positively, suggesting that foreign investors may be attracted to locations with higher corporate tax levels. As previously mentioned, this may not be surprising as investors might potentially interpret higher taxes as an indicator of better infrastructure in a particular location. The negative and weakly significant coefficient on

35 . We have also estimated two-way RE/FE general model testing for joint significance of time fixed effects. The time effects seem to be jointly insignificant as indicated by the F test, suggesting that they do not need to be considered in a properly specified model.

NATRES is in line with previous studies suggesting that investments in natural resource intensive industries may crowd out investments in other sectors, notably manufacturing and services. As expected, the positive and significant coefficients on our two regional integration variables (OPEN and FTAEAST) suggest that deeper regional integration and membership in an FTA has tangible effects on attracting FDI. Interestingly, our variable signalling overall institutional quality does not feature significantly in the general model though it holds the expected sign. All the other investment climate variables hold positive signs and are significant, with the exception of COMPREF. As outlined before, relatively high correlation between those indicators may mask the actual impact of individual variables when introduced simultaneously. In the following section, we continue with our empirical analysis by examining the statistical efficiency of our results.

As a first step, we exclude the explanatory variables whose coefficients were insignificant and re-estimate the corresponding restricted model. This leads us to our preferred model in column 4 of Table 14. All the variables retain their signs and significance levels in the restricted specification. Moreover, changes in magnitude of their respective coefficients are minimal, providing further support to our previous findings.

So far, we have examined our model under the assumption of uncorrelated error terms. However, if error terms are correlated, the fixed effects estimator is biased and inconsistent. Hence, we re-estimate our preferred model corrected for AR1 disturbances in the residuals.[36] In particular, we re-estimate the model using GLS with HAC, *i.e.*, generalised least square with heteroskedasticity and autocorrelation consistent standard errors. We report our results in column 5 of Table 14. In general, the results are largely consistent with our previous findings, the exception being that NATRES loses its significance, although it remains negative. Overall, there seem to be no particular signs of omitted dynamics in our model.

So far, we have used least squares regression techniques on the grounds that all variables can be assumed to be weakly exogenous. However, we have also emphasised that our proxy variable for market potential (MPOT) is potentially endogenous. Therefore, in column 6 of Table 14, we report our results from two stage least squares (2SLS) estimation that allows us to instrument for the potentially endogenous variable MPOT.[37] Specifically, our choice of instruments includes the following variables: the first lag of MPOT as well as the logged variables of GDP per capita (GDPcap) and population (POP). Hansen's J test confirms the validity of our instruments while at the same time we cannot reject the null hypothesis of weak exogeneity of variable POT. In other words, we may continue to regard MPOT as weakly exogenous in our data set. Finally, we would like to account also for potential endogeneity in the other explanatory variables in our data. In addition, we would also like to account for the time gap it takes a foreign investor to react to changes in location determinants. Hence, we introduce a one period lag to all our explanatory variables. In sum, most of the variables retain their explanatory power, although with smaller absolute coefficients. Variables REER and PRIVREF, however, lose their significance altogether.

As previously indicated, our results may suffer from multicollinearity given the high correlation coefficients between certain variables (*i.e.* LABCOST and LABPROD and the investment climate variables). As a potential solution to the problem we create an index – the labour competitive advantage index (LABCAI). LABCAI is calculated as the ratio of labour productivity to labour cost. In a separate exercise, we introduce highly correlated investment climate variables to the regression one at a time.

36 . In addition, we perform the Wooldridge test for autocorrelation in panel data that seem to confirm its presence in our data set (Wooldridge, 2002). Also, the LR test indicates the presence of panel-level heteroskedasticity.

37 . We also account for the HAC characteristics of our data set; hence the estimation method is GMM (2SLS) with HAC standard errors.

In Table 15, we present the results from the regressions featuring the LABCAI variable.

Table 15. Estimation results with LABCAI

(1)	(2)	(3)	(4)	(5)	(6)
Variables	FULL_RE (L-1)	FULL_FE (L-1)	PREF_FE (L-1)	PREF_GMM (L-1)	PREF_GMM_HAC (L-1)
MPOT	0.53***	1.07***	1.08***	1.20***	1.19***
LABCAI	0.58	1.75**	1.50**	1.49**	1.52**
NATRES	0.37***	-0.03	dropped		
REER	0.82**	0.70**	0.64**	0.68**	0.69**
TAXCORP	0.08	0.09	dropped		
OPEN	0.04	0.90***	0.94***	0.95***	0.94***
FTAEAST	-0.08	0.25***	0.26***	0.27***	0.27***
EFW	2.22***	1.39**	1.34**	1.18**	1.18*
INFRAREF	1.33***	0.62**	0.71**	0.61**	0.62**
PRIVREF	0.52	0.19	dropped		
ENTREST	-0.07	1.05*	1.07*	0.86*	0.86
COMPREF	0.26	-0.01	dropped		
Constant	-5.56***	-10.44***	-9.78***	-	-
Breusch-Pagan LM (p-val)	0.001				
Hausman test (p-val)	0.022				
R-squared	-	0.95	0.95	0.94	0.95
F-statistic	-	127.5	183.2	196.4	156.7
AIC	-	-52.5	-58.8	-59.0	-59.3
Hansen J-test (p-val)	-	-	-	0.35	0.41
Endog-test (p-val)	-	-	-	0.53	0.49
Observations	96	96	96	96	96
Number of groups	10	10	10	10	10

Note: heteroskedasticity corrected standard errors (not reported here); *p<0.1, **p<0.05, ***p<0.00. Note: two-way FE version of the model estimated before, time-specific effects insignificant.

Our preferred specification of the model is found in column 4 of Table 15. All the variables retain their expected signs and most of them are also significant. The variable LABCAI, in particular, has high explanatory power with respect to location of FDI as indicated by its high coefficient. In other words, a 1% increase in competitive advantage, all else being equal, leads to an approximately 2.1% increase in additional FDI stock. This finding has significant policy implications as it predicts that relatively minor improvements in terms of labour productivity and cost can lead to comparatively large additional FDI inflows. Likewise, market size retains its importance in all specifications. However, it remains unclear how policy makers can affect the variable in the short to medium term. The cumulative effect of greater trade openness and membership in an FTA is significant. In sum, increasing trade openness by 1% while being a member of either CEFTA or BAFTA would result in a cumulative 1.1% increase in inward FDI stock. Moreover, the investment climate variables INFRAREF and ENTREST show positive and highly significant signs in all specifications, implying that improvements in infrastructure and enterprise restructuring positively impact the location decision of foreign investors. In Table 16, we examine in greater depth the effects of the investment climate variables on FDI location.

Table 16. Estimation results from PREF_FE model with IC variable

(1)	(2)	(3)	(4)	(5)	(6)
Variables	INFRAREF	PRIVREF	COMPREF	INTREST	EFW
MPOT	1.36***	1.62***	1.69***	1.60***	1.32***

LABCAI	2.11***	3.02***	2.53***	2.95***	1.88**
REER	0.87***	1.16***	0.96***	1.03***	0.76**
OPEN	0.99***	1.07***	1.30***	1.11***	1.06***
FTAEAST	0.31***	0.42***	0.54***	0.48***	0.40***
INFRAREF	1.10***				
PRIVREF		0.69			
COMPREF			0.60**		
ENTREST				1.26*	
EFW					2.13***
Constant	-10.01***	-13.59***	-13.59***	-13.54***	-12.22***
R-squared	0.94	0.92	0.92	0.92	0.93
F-statistic	233.1	181.7	182.3	166.7	200.5
Observations	96	96	96	96	96
Number of groups	10	10	10	10	10

Note: heteroskedasticity corrected standard errors (not reported here); *p<0.1, **p<0.05, ***p<0.001.

In particular, we introduce one investment climate variable at a time, in addition to our traditional variables. The overall results are interesting. All variables have positive signs and are significant. Infrastructure retains its relatively high coefficient, indicating that a 1% increase in reform results in an approximately 1.1% increase in FDI stock. The effect of privatisation is intensified when taken together with reform in infrastructure, indicating that foreign investors demand a comprehensive set of reforms that often need to go hand in hand. Finally, the coefficient on institutional quality offers particularly interesting results, as the magnitude of its coefficient outperforms that of all the other variables. Specifically, a 1% increase in EFW results in a nearly 2.7% increase in total inward FDI stock. We therefore offer additional support to the claim that institutional quality matters immensely for foreign investors. However, functioning market institutions not only affect the operations of foreign investors, but also significantly impact the productivity and competitiveness of domestic producers. Improvements in institutional quality can be achieved in the short to medium term, and hence open potential avenues to generate additional investments. Policy makers can therefore significantly impact the location decision of foreign (and potentially also domestic) investors by adjusting their institutions to market requirements.

3.4 Bibliography

Beck, T. and L. Laeven (2006), "Institution building and growth in transition economies", *Journal of Economic Growth*, Vol. 11, pp. 157–186

Bellak, C., M. Leibrecht and R. Stehrer (2010), "The role of public policy in closing foreign direct investment gaps: an empirical analysis", *Empirica*, Vol. 37, pp. 19-46.

Bevan, A. and Estrin, S. (2000), "Determinants of FDI in Transition Economies", Centre for New and Emerging Market, Working Paper No. 342, London Business School.

Blonigen, B. (2005), "A Review of the Empirical Literature on FDI Determinants", *Atlantic Economic Journal*, Vol. 33, pp. 383-403.

Campos, N. and Y. Kinoshita (2003), "Why Does FDI Go Where it Goes? New Evidence from the Transition Economies", International Monetary Fund Working Paper, WP/03/228, IMF.

De Melo, M., C. Denizer, A. Gelb and S. Tenev (1997), "Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies", Policy Research Working Paper, WP1866, World Bank.

Devereaux, M., R. Griffith (1998), "The taxation of discrete investment choices", Institute for Fiscal Studies Working Paper, W98/16, IFS.

European Bank for Reconstruction and Development (2009), *Transition Report 2009*, EBRD, London.

Fraser Institute (2009), *Economic Freedom of the World: 2009 Annual Report*, Economic Freedom Network, Vancouver.

Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, USA.

4 DETERMINANTS OF FDI LOCATION IN SEE[38]

4.1 Introduction

In the previous chapter we investigated the relationship between foreign direct investment (FDI), progressive regional integration and institution building in Central and Eastern Europe (CEE). In this final section we extend the analysis to produce a series of auxiliary regressions that attempt to establish how institution building and regional integration have influenced the location of FDI in South East Europe (SEE).

As in CEE, SEE countries have concluded numerous free trade agreements (FTAs) with their neighbours. In 2007, the over 30 bilateral FTAs in place were consolidated into a regional free trade agreement covering Albania, Bosnia and Herzegovina, Croatia, Kosovo under UNSCR 1244/99, the former Yugoslav Republic of Macedonia, the Republic of Moldova, Montenegro and Serbia. This new Central European Free Trade Agreement (CEFTA 2006) provided for the immediate liberalisation of trade in industrial products and the gradual liberalisation of trade in agricultural products. It also incorporated advanced provisions on trade in services, national treatment, intellectual property rights and government procurement. Bulgaria, Croatia and Romania were members of the original CEFTA agreement, although Bulgaria and Romania left the agreement in 2007 once they became EU member states (see Chapter 2 for more information).

Simultaneously, SEE countries have been implementing institutional reforms. Led by the Stabilisation and Association Agreements, SEE economies have been upgrading their institutions and policies to bring them in line with EU standards.[39]

The aim of our empirical work in this final chapter is to illustrate how trade integration and institution building are conducive to higher FDI in South East Europe. It is to be viewed as a complement to the work in the previous chapter by extending the analysis to SEE countries.[40] In the next section we describe the variables used in our empirical research. Following this is a description of our empirical methodology. We conclude by presenting the results of our main regressions and ancillary regressions which investigate in more detail the impact of trade and investment climate variables on FDI.

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38 . This chapter was written by Ms. Erin Hengel, Organisation for Economic Co-operation and Development, Investment Compact for South East Europe.

39 . Stabilisation and Association Agreements have been signed with Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro and Serbia. Kosovo under UNSCR 1244/99 has not yet begun negotiations. The Republic of Moldova has a partnership and co-operation agreement giving it autonomous trade preferences and eventually a comprehensive trade agreement with the EC. Although not governed by an EU membership agreement, the Republic of Moldova has engaged in many comprehensive reform programmes to improve its investment climate.

40 . The countries included in the analysis are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the former Yugoslav Republic of Macedonia, the Republic of Moldova, Serbia and Romania. Kosovo under UNSCR 1244/99 and Montenegro were excluded from the analysis due to data availability.

4.2 Variables

Our methodology for choosing which variables to include in the analysis follows the same logic as that presented in the previous chapter. We include a variable for market potential. In the analysis on CEE countries, a measure of market potential was constructed to reflect both economic performance and geographical market size. However, this indicator was only available for a select group of SEE countries and over a limited time series. Instead, we rely on gross domestic product (GDP) per capita (GDPcap) from the World Bank's World Development Indicators (WDI) database. We expect the sign on GDPcap to be positive: all things equal, market-seeking FDI will be attracted to larger domestic economies.

We also include a variable of trade openness (OPEN) measured as the ratio of a country's imports and exports to GDP. As illustrated in the previous chapter, OPEN is used as a proxy for trade costs and barriers. All else equal, foreign investors will chose to locate where trade costs and barriers are the lowest. Therefore, we expect a positive relationship between FDI and OPEN. Our data on OPEN is sourced from the WDI database.

We also explicitly test for the effect of membership in the original CEFTA and the new CEFTA 2006. We construct a dummy variable CEFTA which equals one if a country was a member of CEFTA or CEFTA 2006 in time *t*.[41] For the same reason we expect a positive relationship between FDI and OPEN, we also expect a positive relationship between CEFTA and FDI. CEFTA and CEFTA 2006 serve to reduce trade related costs and barriers, providing an incentive for foreign investors to chose to locate in the signatory countries.

In the previous chapter, real effective exchange rates were used in the analysis to account for the effects of macro-economic policies on the location of investments. Due to data unavailability, we were unable to construct a similar indicator for SEE. However, we do include a measure of inflation to proxy for the effects of macro-economic policies on FDI. Typically, an inverse relationship has been found between inflation and FDI (see *e.g.* Sayek, 1999) and Greene and Villanueva, 1991).

Finally, we also include indicators on the reform process of SEE countries. A healthy investment climate can significantly reduce enterprise transaction costs; conversely, a weak investment climate can increase the cost of doing business to the extent that foreign investors are reluctant to enter a market, irrespective of other benefits it provides. To account for this, we use various European Bank for Reconstruction and Development (EBRD) Transition Indicators.[42] For the same reasons outlined in the previous chapter, we use the Transition Indicators on better quality infrastructure (INFRAREF), privatisation reform (PRIVREF), enterprise restructuring (ENTREST) and competition policy reform (COMPREF). All else equal, reforms in these areas should reduce the transaction costs faced by foreign investors. Therefore, we expect a positive relationship between them and FDI. Due to relatively high correlation between each of these indicators, we sum these indicators into a composite indicator of the investment climate – IC. In subsequent sections we also analyse the impact that each indicator has individually on FDI.

Table 17 summarises the above discussion.

41 . We have allocated Romania and Bulgaria a 1 for the CEFTA variable even post 2007 to signify their deeper EU integration and continued intra-regional trade. We also performed our main regression on a restricted dataset of only current CEFTA 2006 members. The results still hold with similar magnitudes and levels of significance.

42 . For more information on the methodology used to construct the EBRD's Transition Indicators, please see: www.ebrd.com/country/sector/econo/stats/timeth.htm.

Table 17. Description of key variables

Variable	Definition	Relevance	Expected sign	Source
FDI	Inward FDI stock in millions of USD	Dependent		World Bank WDI
GDPcap	GDP per capita in USD	Traditional	+	World Bank WDI
OPEN	Ratio of trade in GDP	Traditional	+	World Bank WDI
INFLATION	Inflation, GDP deflator (annual %)	Traditional	-	World Bank WDI
CEFTA	Dummy variable for duration of membership in CEFTA or CEFTA 2006	Traditional	+	European Commission
INFRAREF	EBRD index of infrastructural reform	Transition	+	EBRD
PRIVREF	EBRD index of privatisation reform	Transition	+	EBRD
COMPREF	EBRD index of competition reform	Transition	+	EBRD
ENTREST	EBRD index of enterprise restructuring	Transition	+	EBRD
IC	Sum of INFRAREF, PRIVREF, COMPREF, ENTREST	Transition	+	EBRD

Because data were either not available or not available for a long enough time period, we were unable to construct variables on labour cost and productivity, implicit tax rates or natural resources. In the case of the latter two, we do not expect the omission to seriously affect our analysis. Both variables were found to be insignificant in the analysis of FDI determinants in CEE countries. Additionally, SEE countries have very few natural resource endowments. For example, energy production is only about 0.1 kilotons of oil equivalent per capita, compared to almost 0.2 in the rest of the world.[43] When compared to other countries, SEE ranks about 120th among energy producers. Additionally, de Melo, *et al.* (1997) find that SEE countries have few natural resources.

The fact that we were unable to construct variables on labour cost and productivity is a serious drawback on our analysis. To the extent that wage and productivity differs across countries but are time invariant, their absence from our analysis will be caught by the entity fixed effects. However, if countries are more likely to change wage and productivity levels across time periods and at faster or slower rates, the omission of labour productivity and labour cost could result in significant omitted variable bias.

4.3 Empirical methodology

The methodology specified in this annex is identical to the methodology described in Chapter 2. It is based on the standard gravity model approach. The dependant variable is countries' annual net FDI stock from their balance of payment statistics (in current USD). As in the previous chapter, we relate our dependent variable to the independent variables described in the previous section. All variables are logged and enter the equation in the following form:

43 . Energy production in kilo tons of oil equivalent divided by total population. Data sourced from the World Bank WDI database.

Equation 3

$$FDI_{ct} = \beta_0 + \beta_1 GDPcap_{ct} + \beta_2 OPEN_{ct} + \beta_3 CEFTA_{ct} + \beta_4 IC_{ct} + \beta_5 INFLATION_{ct} + \gamma_c + \varepsilon_{ct}$$

where *c* and *t* indicate country and year, respectively; ε is the error term. Similar to the model in the previous chapter, we assume that foreign investors will chose to locate where profits are the highest. Table 18 provides a summary of all variables while Table 19 produces correlation coefficients from the matrix featuring all explanatory variables.

Table 18. Summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
GDPcap	overall	7.32	0.67	5.71	8.82	N = 160
	between		0.63	6.05	8.50	n = 9
	within		0.25	6.09	7.99	T = 17.8
OPEN	overall	4.45	0.33	3.55	5.10	N = 149
	between		0.26	4.07	4.72	n = 9
	within		0.22	3.66	5.02	T = 16.6
INFLATION	overall	2.73	1.60	-1.36	7.29	N = 142
	between		0.67	1.67	3.69	n = 9
	within		1.48	-0.84	7.67	T = 15.8
CEFTA	overall	0.27	0.45	0.00	1.00	N = 193
	between		0.20	0.15	0.70	n = 10
	within		0.40	-0.43	1.12	T= 19.3
INFRAREF	overall	0.57	0.38	0.00	1.20	N = 180
	between		0.14	0.39	0.78	n = 9
	within		0.35	-0.16	1.07	T = 20
PRIVREF	overall	0.98	0.36	0.00	1.39	N = 180
	between		0.15	0.76	1.21	n = 9
	within		0.33	-0.05	1.39	T = 20
COMPREF	overall	0.42	0.39	0.00	1.10	N = 180
	between		0.26	0.09	0.80	n = 9
	within		0.31	-0.39	1.02	T = 20
ENTREST	overall	0.54	0.38	0.00	1.10	N = 180
	between		0.19	0.26	0.79	n = 9
	within		0.34	-0.25	1.07	T = 20
IC	overall	2.05	0.33	1.39	2.55	N = 180
	between		0.16	1.83	2.27	n = 9
	within		0.30	1.22	2.49	T = 20
TREND	overall	10.67	5.70	1.00	20.00	N = 193
	between		0.79	10.50	13.00	n = 10
	within		5.67	1.17	20.17	T = 19.3

Note: between variation is constructed by calculating the means over time for every industry; within variation represents the deviation of individual observations from an industry's average and can naturally be negative.

Table 19. Correlation matrix

	FDI	GDP-cap	OPEN	INFLA-TION	CEFTA	INFRA-REF	PRIV-REF	COMP-REF	ENT-REST	IC
FDI	1.00									
GDPcap	0.54	1.00								
OPEN	0.18	-0.19	1.00							
INFLATION	-0.27	-0.24	-0.20	1.00						

CEFTA	0.75	0.34	0.15	-0.13	1.00					
INFRAREF	0.77	0.35	0.39	-0.54	0.62	1.00				
PRIVREF	0.56	0.23	0.24	-0.58	0.40	0.75	1.00			
COMPREF	0.60	0.15	0.32	-0.20	0.54	0.66	0.52	1.00		
ENTREST	0.62	0.38	0.18	-0.56	0.43	0.67	0.81	0.56	1.00	
IC	0.74	0.33	0.33	-0.55	0.58	0.90	0.90	0.78	0.87	1.00

4.4 Results

The results of our econometric analysis are presented in Table 20. Columns 2 and 3 contain the fixed effects and random effects estimates, respectively. We perform a robust Hausman test using the method proposed by Wooldridge (2002). The test leads us to strongly reject the null hypothesis that the random effects model is appropriate.[44]

Examining the fixed effects results in the first column, we see that GDPcap, OPEN and IC all enter the equation significantly with the expected sign. FDI in SEE is attracted to markets with higher income, greater trade openness and a higher degree of investment climate reforms. The coefficient on CEFTA is positive, as expected; however it is not significant. Contrary to expectations, inflation is positive, although it is not significant. The positive coefficients on our two regional integration variables – OPEN and CEFTA – suggest that deeper regional integration has a tangible effect on attracting FDI. This is in line with the findings for Central and Eastern Europe outlined in Chapter 2.

We next exclude INFLATION from the regression and re-estimate our model.[45] The results are presented in the fourth column. GDPcap, OPEN and IC remain significant while CEFTA is still insignificant. The magnitude of the coefficients on the independent variables does not change much by omitting INFLATION. In the fifth column we re-estimate our fixed effects model from column four to allow for autocorrelated errors up to four lags. In particular, we re-estimate the fixed effects model by applying the method of Driscoll and Kraay (1998). The results mirror those in our previous fixed effects model, although GDPcap becomes significant at the 0.01 level. These results are our preferred model (PREF_FE).

The results in columns 4 and 5 suggest that IC has high explanatory power with respect to attracting FDI in SEE. In other words, a one percent increase in reforms to the investment climate, all else equal, leads to an almost 3.5 percent increase in additional FDI stocks. Likewise, market size as represented by GDPcap is important in attracting FDI to SEE. Similar to the situation in CEE (Chapter 2), the cumulative effect of greater trade openness and membership in CEFTA is important. Increasing trade openness by one percent while being a member of CEFTA, all else equal, results in a cumulative 2 percent increase in FDI stocks.[46]

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44 . Tested on the random-effects model with GDPcap, OPEN and CEFTA. Sargan-Hansen statistic: 46.037, p-value = 0.0000.

45 . Our decision to exclude INFLATION follows the same methodology employed in the two previous chapters. We proceed first by estimating a 'general model' containing all explanatory variables. We then exclude explanatory variables whose coefficients were insignificant and re-estimate the corresponding restricted specification. The exclusion level is fixed at the 10 per cent significance level. Despite its insignificance, we include CEFTA due to our particular interest in the impact that agreement has had on FDI flows in SEE.

46 . However, according to our fixed effects regression results in the fifth column, CEFTA has a p-value of 0.14, just above the 0.1 significance cut-off.

We also introduce one period lags to each of our explanatory variables. This allows us to account for both potential endogeneity of our explanatory variables and the time it often takes foreign investors to adjust to changes in the policy and general economic environment (Wooldridge 2002). The results of this analysis are presented in the sixth column of Table 20. All variables retain their significance levels. The coefficients' explanatory power is roughly equivalent to what is found in our preferred fixed effects model with Driscoll and Kraay (1998) standard errors.

Table 20. Estimation results

(1)	(2)	(3)	(4)	(5)	(6)
				Driscoll and Kraay (1998) standard errors	
Variables	Fixed effects	Random effects	Fixed effects	Fixed effects (PREF_FE)	Fixed effects with lags
GDPcap	1.569*	1.200***	1.526*	1.526***	1.853***
	(0.774)	(0.425)	(0.779)	(0.402)	(0.508)
OPEN	1.918***	1.575***	1.869***	1.869***	1.541***
	(0.439)	(0.398)	(0.451)	(0.282)	(0.255)
CEFTA	0.219	0.461***	0.229	0.229	0.322
	(0.248)	(0.170)	(0.258)	(0.139)	(0.254)
IC	3.550***	3.578***	3.469***	3.469***	2.649***
	(0.363)	(0.393)	(0.360)	(0.260)	(0.175)
INFLATION	0.0397	0.0464			
	(0.0371)	(0.0461)			
Constant	-22.28***	-18.09***	-21.48***	-21.48***	-20.37***
	(5.207)	(3.326)	(5.323)	(2.276)	(4.448)
Observations	109	109	110	110	109
Number of groups	8	8	8	8	8

Note: standard errors in parentheses. All standard errors have been corrected for heteroskedasticity. *** p<0.01, ** p<0.05, * p<0.1.

As mentioned earlier, the omission of productivity and cost measures from our analysis potentially biases our estimates. We showed in Chapter 2 that labour productivity and cost had significant impacts on foreign investment in Central and Eastern Europe. It is natural to conclude that the same situation prevails in SEE. To the extent that such measures vary across country but not across time, they will have been picked up by our country fixed effects. However, it is more probable that wages and productivity levels change across time periods and at faster or slower rates. Thus, the omission of labour productivity and labour cost likely results in omitted variable bias.

Another issue concerns the particular endogeneity of GDPcap. It is likely that higher levels of GDP per capita increase FDI and conversely higher levels of FDI increase GDP per capita. However, due to a lack of a suitable instrument, we are unable to control for this fact. The same argument could be made for our variable OPEN. Combined with our omission of labour cost and productivity estimates, care should be taken when interpreting our coefficient estimates, as they are likely biased.

4.5 Effects of investment climate variables

Until this point, we have used IC, the sum of the EBRD Transition Indicators on the quality of infrastructure, privatisation, enterprise restructuring and competition policy reform. Because of high multicollinearity between these variables (see Table 19), we estimated the previous equations by creating one variable as the log of the sum of the individual indicators. Here, we introduce the investment climate variables all together and one at a time to examine in more depth the effect of location on investment.

Column 2 shows the regression with all four investment climate variables. The coefficients on GDPcap and OPEN remain significant and roughly the same size as in PREF_FE. The CEFTA variable remains positive with roughly the same coefficient value, but is insignificant. Infrastructure reforms are positive, but insignificant.[47] Privatisation, competition and enterprise restructuring reforms are positive and significant, the latter two at the 0.01 level. The magnitude of the coefficient on enterprise reform outperforms that of all other variables. The enterprise restructuring indicator (ENTREST) measures the degree to which a country's government promotes and enforces corporate governance principles, including bankruptcy legislation. Our findings suggest that when controlling for other investment climate reforms, a 1% increase in enterprise restructuring reforms leads to a 1.3% increase in FDI.

In columns 3 through 6 we introduce each investment climate variable separately. Both GDPcap and OPEN are highly significant. Additionally, the magnitude of their coefficients increases compared to PREF_FE and the model presented in column 2. The magnitude of the coefficients on the CEFTA dummy variable increases and in fact turns significant. Each investment climate variable is positive and significant at the 1% level. The magnitude of the coefficient on ENTREST again surpasses the coefficients on the other investment climate variables.

Our analysis offers additional support to the claim that investment climate reforms are important for foreign investors. We offer evidence that reforms in infrastructure, competition policy, privatisation and enterprise restructuring can lead to noteworthy increases in FDI. In particular, reforms in corporate governance appear to be particularly valued by foreign investors. Policy makers can therefore appreciably impact the location decisions of investors by implementing reforms in their investment climate.

Table 21. Estimation results from PREF_FE model with IC variables

(1)	(2)	(3)	(4)	(5)	(6)
Variables	ALL	INFRAREF	PRIVREF	COMPREF	ENTREST
GDPcap	1.517***	1.937***	2.273***	2.097***	2.007***
	(0.407)	(0.445)	(0.272)	(0.421)	(0.268)
OPEN	2.007***	1.617***	1.792***	2.277***	2.707***
	(0.319)	(0.354)	(0.233)	(0.510)	(0.462)
CEFTA	0.244	0.405**	0.476**	0.575**	0.481*
	(0.133)	(0.148)	(0.188)	(0.239)	(0.211)
INFRAREF	0.542	1.954***			
	(0.306)	(0.334)			
PRIVREF	0.838		2.498***		
	(0.374)		(0.280)		
COMPREF	0.761***			1.756***	
	(0.198)			(0.352)	
ENTREST	1.267***				2.533***
	(0.280)				(0.428)
Constant	-17.09***	-17.17***	-21.89***	-21.04***	-23.09***
	(2.339)	(2.520)	(1.632)	(3.413)	(2.041)
Observations	110	110	110	110	110
Number of groups	8	8	8	8	8

Note: Driscoll-Kraay standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

47 . This may be explained by relatively high correlation between the investment climate variables.

4.6 Interactions with investment climate variables

In our final section, we introduce interaction variables. First we investigate whether CEFTA membership yields a greater impact on FDI when implemented in conjunction with investment climate reforms. To do so, we interact the dummy variable CEFTA with the EBRD Transition Indicators. The new equation for these regressions is:

Equation 4

$$FDI_{ct} = \beta_0 + \beta_1 GDPcap_{ct} + \beta_2 OPEN_{ct} + \beta_3 CEFTA_{ct} + \beta_4 EBRD_{ct} + \beta_5 CEFTA_{ct} \times EBRD_{ct} + \gamma_c + \varepsilon_{ct}$$

where EBRD represents an EBRD Transition Indicator. If a country is not a member of CEFTA in time *t* then $CEFTA_{ct} = 0$ and the impact of EBRD on FDI will be represented by β_4. However, if a country is a member of CEFTA in time *t* then $CEFTA_{ct} = 1$ and the impact of EBRD on FDI will be represented by $\beta_4 + \beta_5$.[48]

The second column shows the regression run with the interaction between CEFTA and COMPREF, the EBRD Transition Indicator of Competition Policy. Here we see that if $CEFTA_{ct} = 0$ then an increase in the Competition Policy Indicator by 1% will increase FDI by about 1.6%. But if a country is a member of CEFTA, then an increase in the Competition Policy score by 1% will increase FDI by 3.3%. The second column shows the regression run with the interaction between CEFTA and TELEREF, the EBRD Transition Indicator of Telecommunications.[49] In this case, if a country is not a member of CEFTA in time *t* then an increase in the EBRD Telecommunications score by 1% will increase FDI by 1%. If a country is a member of CEFTA, an increase in the EBRD Telecommunications score by 1% will increase FDI by 1.74%. Finally, the fourth column shows the regression with the interaction between CEFTA and TRADEREF, the EBRD Transition Indicator of Trade and Foreign Exchange.[50] If a country is a not a member of CEFTA, then increasing the EBRD Trade and Foreign Exchange score by 1% will increase FDI by about 2.6%. On the other hand, CEFTA member countries that increase their Trade and Foreign Exchange score by 1% can expect to see FDI increase by roughly 4.8%.

In the preceding section, CEFTA proved to have a positive impact on FDI in South East Europe. Here we have shown that when implemented in conjunction with general reforms on the investment climate, countries can expect an even greater impact on FDI. Being a member of CEFTA and simultaneously implementing broad investment climate reforms brings FDI above and beyond what one might expect without CEFTA. Reforms in competition policy, telecommunications and trade and foreign exchange liberalisation in particular interact with CEFTA membership to bring higher levels of FDI. The analysis suggests that implementing CEFTA and other investment climate reforms at the same time brings additional benefits in excess of what one would expect if either were implemented in isolation. Conversely, CEFTA membership by itself cannot be expected to generate significant increases in FDI. Instead, it is most effective in increasing FDI when surrounded by a healthy investment environment.

48 . Interaction regressions were performed on all EBRD Transition Indicators. Only the significant terms are presented here.

49 . The EBRD Transition Indicator on Telecommunications rates transition countries on the extent they have liberalised and effectively regulate their telecommunications sector.

50 . The EBRD Transition Indicator on Trade and Foreign Exchange systems evaluates transition countries on the extent to which they have liberalised their foreign exchange regime and eliminated restrictions on trade (e.g. tariffs).

Table 22. Estimation results from PREF_FE model with CEFTA interactions

(1) Variables	(2) COMPREF	(3) TELEREF	(4) TRADEREF
GDPcap	2.008***	1.909***	2.961***
	(0.365)	(0.472)	(0.241)
OPEN	2.180***	2.026***	1.297***
	(0.445)	(0.468)	(0.318)
CEFTA	-0.709	-0.0275	-2.500*
	(0.757)	(0.414)	(1.208)
COMPREF	1.585***		
	(0.395)		
CEFTA×COMPREF	1.687*		
	(0.849)		
TELEREF		1.033**	
		(0.328)	
CEFTA×TELEREF		0.702*	
		(0.348)	
TRADEREF			2.591***
			(0.486)
CEFTA×TRADEREF			2.244*
			(1.032)
Constant	-19.90***	-18.40***	-25.57***
	(2.193)	(3.319)	(2.593)
Observations	110	110	110
Number of groups	8	8	8

Note: Driscoll-Kraay standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The coefficient on the CEFTA variable in this regression should be interpreted as the amount the constant term would change in the event that a country is a member of CEFTA in time *t*. In this equation, it should not be interpreted as the impact of CEFTA membership on FDI. See Wooldridge (2009).

Next we interact the variable OPEN with the EBRD Transition Indicators. The new equation for these regressions is:

Equation 5

$$FDI_{ct} = \beta_0 + \beta_1 GDPcap_{ct} + \beta_2 OPEN_{ct} + \beta_3 CEFTA_{ct} + \beta_4 EBRD_{ct} + \beta_5 OPEN_{ct} \times EBRD_{ct} + \gamma_c + \varepsilon_{ct}$$

The interaction term allows us to determine if investment climate reforms have a different effect on FDI depending on the level of trade openness in a country. If $\beta_5 > 0$, then an additional 1% increase in the EBRD Transition Score yields a higher increase in FDI for countries with more trade openness. On the other hand, if $\beta_5 > 0$ then an additional 1% increase in the EBRD Transition Score yields a lower increase in FDI for countries with more trade openness.

We present our results in Table 23. In the second column, we show the regression run with the interaction between OPEN and IC, the natural logarithm of the sum of the EBRD Transition Scores on enterprise restructuring, competition policy, privatisation reform and infrastructure reform. The coefficient on the interaction term is positive and significant at the 0.05 level. This implies that an additional 1% increase in IC will yield a greater increase in FDI for countries with higher levels of trade openness. Similar results were found for other investment climate variables, including the EBRD Banking Reform and Interest Rate Liberalisation Indicator (BANKREF),[51] the indicator on Large-Scale Privatisation

51 . The EBRD's indicator on Banking Reform and Interest Rate Liberalisation rates transition countries on their implementation of banking reform and supervision and their degree of interest rate liberalisation.

(PRIVREF), the Infrastructure Reform Indicator (INFRAREF), the Telecommunications Indicator (TELEREF) and the indicator on Trade and Foreign Exchange Systems (TRADEREF). The findings suggest that countries who marry these investment climate reforms with greater trade openness can expect increasing returns. Put another way, additional reforms yield a higher increase in FDI to countries with a higher level of trade openness than to countries with a lower level.

Interestingly, the coefficient on the interaction term of PRICEREF, the indicator on price liberalisation, is negative. This implies that an improvement in the investment climate yields a lower increase in FDI for countries with more trade openness. In other words, countries that benefit the most (in the form of FDI) from price liberalisation will be those that are not open to trade at all. One possible explanation is that price liberalisation, more than other investment reforms, is a minimum condition for foreign investors to be willing to enter a country; its marginal impact on investment thereafter is decreasing.

Our analysis suggests that simultaneously opening trade and improving the investment climate reaps the highest levels of FDI. With the exception of price liberalisation, the marginal effect of investment climate reforms increases when a country has a higher degree of trade openness. This reinforces the idea that broad reforms in trade liberalisation and the investment climate should be implemented together to attract the highest levels of FDI.

Table 23. Estimation results from PREF_FE model with OPEN interactions

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	IC	BANKREF	PRIVREF	INFRAREF	PRICEREF	TELEREF	TRADEREF
GDPcap	1.279**	1.648***	1.772***	1.798***	3.018***	1.525**	2.693***
	(0.445)	(0.295)	(0.448)	(0.460)	(0.209)	(0.505)	(0.299)
OPEN	-1.817	1.068*	0.446	1.099**	4.704***	1.301**	-2.614
	(1.394)	(0.474)	(1.054)	(0.405)	(1.156)	(0.448)	(1.555)
CEFTA	0.170	0.384**	0.535**	0.356**	0.814**	0.536**	0.657*
	(0.123)	(0.144)	(0.203)	(0.145)	(0.269)	(0.175)	(0.308)
IC	3.716***						
	(0.254)						
OPEN×IC	1.806**						
	(0.643)						
BANKREF		2.547***					
		(0.247)					
OPEN×BANKREF		1.292*					
		(0.647)					
PRIVREF			2.094***				
			(0.283)				
OPEN×PRIVREF			2.034*				
			(0.996)				
INFRAREF				2.064***			
				(0.332)			
OPEN×INFRAREF				1.121**			
				(0.390)			
PRICEREF					2.066***		
					(0.381)		
OPEN×PRICEREF					-2.118*		
					(0.993)		
TELEREF						1.432***	

						(0.245)	
OPEN×TELEREF						1.761**	
						(0.523)	
TRADEREF							3.978***
							(0.907)
OPEN×TRADEREF							2.851**
							(1.136)
Constant	-3.832	-13.65***	-11.63**	-13.95***	-40.49***	-12.71**	-8.080
	(7.366)	(2.521)	(4.629)	(2.591)	(5.634)	(3.910)	(7.461)
Observations	110	110	110	110	110	110	110
Number of groups	8	8	8	8	8	8	8

Note: Driscoll-Kraay standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The coefficients on each EBRD Transition Indicator represent the partial effect of the Transition Indicator on FDI, *i.e.* $\Delta FDI/\Delta EBRD = \beta_4 + \beta_5 \mu_{OPEN}$, where μ_{OPEN} is the mean value for OPEN. The standard errors have been adjusted accordingly.

4.7 Bibliography

de Melo, M., C. Denizer, A. Gelb, and S. Tenev (1997), "Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies", Policy Research Working Paper, WP1866, World Bank.

Driscoll, J., and A. Kraay (1998), "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data", *The Review of Economics and Statistics*, Vol. 80, pp. 549-560.

Greene, J., and D. Villanueva (1991), "Private Investment in Developing Countries: An Empirical Analysis", *IMF Staff Papers*, Vol. 38, pp. 33-58.

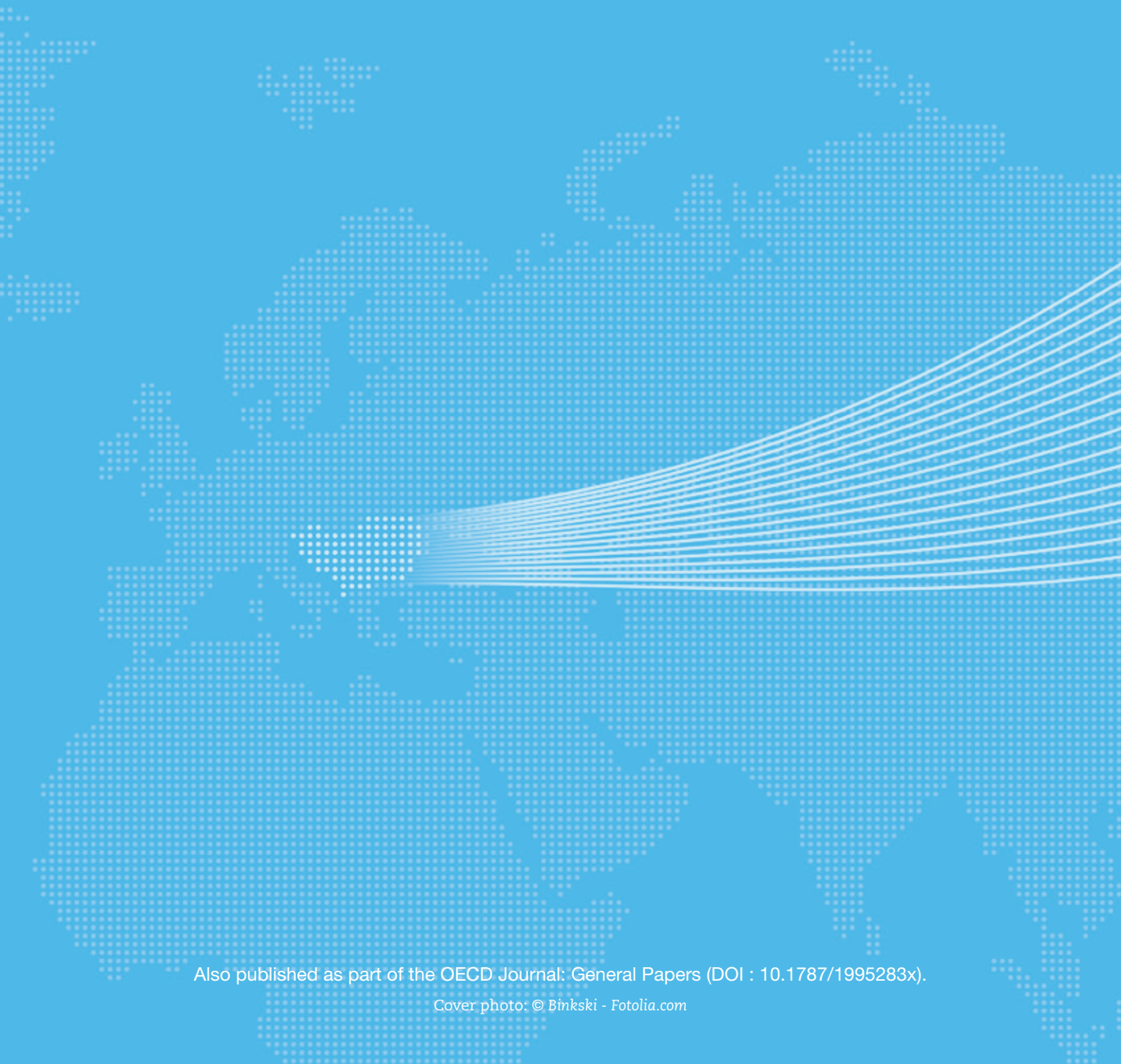
Sayek, S. (1999), "Foreign Direct Investment and Inflation: Theory and Evidence", PhD Thesis.

Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, MA.

Wooldridge, J. (2009), *Introductory Econometrics.* South-Western Cengage Learning, Mason, OH.

www.investmentcompact.org

www.cefta2006.com



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