



IMF Working Paper

Sectoral Composition of Foreign Direct Investment and External Vulnerability in Eastern Europe

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European Department

Sectoral Composition of FDI and External Vulnerability in Eastern Europe

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Abstract

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In the run up to the global crisis, countries in Central Eastern and Southeastern Europe attracted large capital inflows and some of them built up large external imbalances. This paper investigates whether these imbalances are linked to the sectoral composition of FDI. It shows that FDI in the tradable sectors leads to an improvement of the external balance. We also find that the countries with large market size, good infrastructure, greater trade integration, and educated labor force are more likely to receive more FDI in the tradable sectors.

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Contents	Page
I. Introduction	3
II. Capital Inflows in the CESE Countries.....	3
A. Composition of Capital Inflows.....	3
B. The Impact of the Sectoral Composition of FDI Inflows on Trade Deficits.....	4
III. Effects of Tradable FDI on Export	6
IV. Determinants of Sectoral FDI.....	8
A. Host Country Determinants of FDI in the Tradable Sector	8
B. Empirical Results	10
V. Conclusions.....	12
References.....	.....
Figures	
1. FDI Inflows in Emerging Economies, 2000–08	19
2. CESE: Composition of FDI Stock, 2007	20
3. CESE: Shares of FDI Stock in the Tradable and Nontradable Sectors, 2007.....	21
4. CESE: Correlations with Tradable and Nontradable FDI Stock to GDP	22
5A. Non-EU Balkans: Share of Tradable FDI and Trade Account Balance, 2000–07	23
5B. Baltics and EU-Balkans: Share of Tradable FDI and Trade Account Balance, 2000–07.....	24
5C. CEE: Share of Tradable FDI and Trade Account Balance, 2000–07	25
6. CESE: Determinants of FDI in the Tradable Sectors, 2003–07	26
Table 1. Determinants of FDI in the Tradable Sectors	27
Appendices	
1. Emerging Europe: Export Equation.....	28
2. Emerging Europe: Import Equation.....	29
3. Descriptive Statistics.....	30
4. Data Descriptions and Sources	31

I. INTRODUCTION

Foreign Direct Investment (FDI) is generally considered to have numerous benefits. FDI brings scarce capital needed in developing countries, new technology and managerial know-how to enhance growth and productivity.² FDI is also believed to be the most stable form of financial flows.³

The countries in Central Eastern and Southeastern Europe (CESE) that had large current account deficits prior to the global financial crisis of 2008–09 were also those that received large FDI inflows in the nontradable sectors.⁴ FDI in the nontradable sectors had boosted current account deficits without contributing to an expansion of export earning capacity.

This paper attempts to answer two questions: does the composition of FDI indeed matter for current account deficits, and can policies influence the composition? For the first question, we examine the effects of sectoral distribution of FDI on the trade balance via exports and imports in fifteen CESE countries in the run-up to the global financial crisis. For the second part, we empirically examine the determinants of FDI in the tradable sector to see what explains different sectoral FDI patterns across the CESE countries. Finally, we attempt to make policy recommendations for the host country to affect sectoral allocation of FDI from the viewpoint of external stability as well as competitiveness.

The paper is organized as follows. The following section gives an overview of FDI in the region and Section III presents the analysis on the effect of sectoral FDI on external vulnerability. Section IV discusses the determinants of sectoral FDI in the region and Section V concludes the paper and suggests future research.

II. CAPITAL INFLOWS IN THE CESE COUNTRIES

A. Composition of Capital Inflows

CESE countries received large capital inflows in the run-up to the crisis. Capital inflows into the CESE countries were already high in 2003, but they were uniform across countries within the region. Since 2003, these capital inflows increased even further, fueled by the prospect of EU accession and further enhanced by ample liquidity and strong growth of the world economy.

² See Mody (2004) for the survey of FDI literature.

³ Levchenko and Mauro (2006), Tong and Wei (2009).

⁴ See Chapter 3 of IMF, *Regional Economic Outlook: Europe*, October 2010.

FDI was generally the largest component of capital inflows in the region.⁵ FDI inflows were large also relative to other emerging economies in Asia and Latin America (Figure 1). Within the region, Bulgaria and Romania (EU Balkans) recorded the largest inflows of FDI relative to GDP.⁶ The Baltics (Estonia, Latvia, and Lithuania) also picked up the momentum upon their EU accession in 2004. Albania, Bosnia & Herzegovina, Croatia, Macedonia, and Serbia (Non-EU Balkans) experienced an increasing trend since 2005 mainly due to large-scale privatization. In contrast, the CEE countries (the Czech Republic, the Slovak Republic, Hungary, Poland, and Slovenia) saw a more moderate increase in FDI after 2003.

The sectoral composition of FDI inflows has been very different among the CESE countries in 2007 (Figures 2 and 3). In Southeastern (SEE) countries, FDI in the nontradable sectors dominated with the exceptions of Macedonia and Romania.⁷ A similar pattern is seen in two of the Baltics (Estonia and Latvia). These two groups of countries received sizable FDI in the financial sector by Western European banks. On the other hand, the CEE countries have more balanced distribution between the tradable and nontradable sectors.

B. The Impact of the Sectoral Composition of FDI Inflows on Trade Deficits

It is plausible that the sectoral composition of FDI matters for the trade deficit. FDI in the tradable sector is likely to increase exports⁸ over time, while no such effect exists for FDI in the nontradable sector. Relatedly, FDI in the nontradable sector may fuel domestic demand booms and boost imports, while FDI in the tradable sector only boosts imports in the short run. This suggests that countries where FDI predominantly flows to the nontradable sector will have a higher trade deficit than countries where it flows to the tradable sector.

⁵ Other investment flows or bank loans became another important category of capital inflows after 2003. See Bakker and Gulde (2010).

⁶ Intercompany loans (i.e., loans between a parent and a subsidiary) are recorded as FDI in some countries, which may exaggerate the size of FDI inflows (Ostry and others, 2010, SPN/10/104).

⁷ In this study, the tradable sectors are defined as manufacturing, agriculture, mining, retail, hotels and restaurants and the nontradable sectors are construction, electricity, transport, communication, real estate, and financial intermediation.

⁸ FDI in the tradable sector can also lead to a reduction in imports, as previously imported goods are now produced domestically.

Cross country evidence

Cross section data support the idea that the countries where FDI in the nontradable sectors dominated also had the largest current account deficits (Figure 4).

- FDI in the tradable sector is associated with higher exports. There is a positive correlation between the stock of FDI in the tradable sector (measured as a percent of GDP) and the export to GDP ratio (Figure 4, upper-left panel). The export to GDP ratio is the highest in the Slovak Republic, the Czech Republic, and Hungary—countries that also record a high stock of tradable FDI.
- FDI in the nontradable sector is associated with higher imports. The stock of FDI in the nontradable sector and the import to GDP ratio are also positively correlated (Figure 4, middle-left panel). Bulgaria and Estonia have the highest stock of nontradable FDI and they also have a high import to GDP ratio.

One reason for the strong link between FDI in the nontradable sector and high imports may be that FDI in the nontradable sector fueled credit booms. The link between nontradable FDI and credit growth is indeed positive as a large share of nontradable FDI is often financial intermediaries (Figure 4, bottom-right).

Time series evidence

Time series data confirm this link. Now we examine how the stock of tradable FDI to total FDI is related to an evolution of trade account balance in each of the CESE countries (Figures 5A–C). We broadly classify the countries into three groups.

- The first group is non-EU Balkans in Figure 5A. We observe a general tendency for little-changed trade balance since 2003 (with an exception of Bosnia and Herzegovina), while the share of tradable FDI is generally declining.
- The negative correlation between share of tradable FDI and trade account balance is seen for the second group of five New Member States (Baltics, Bulgaria, and Romania) in Figure 5B. In Bulgaria, Romania and Latvia, we observe a sharp increase in trade deficits that coincide with a declining share of tradable FDI.
- Three of the CEE countries—Czech Republic, Hungary, and Slovak Republic—have a high share of tradable FDI and improving trade balance (Figure 5C).
- In two of the CEE countries—Poland and Slovenia—the trade balance is worsening as FDI is increasingly going toward the nontradable sectors.

The time-series evidence shows that more FDI in the tradable sectors seems to improve the trade balance in the medium-run. Thus, the sectoral composition of FDI seems to matter a

great deal to the evolution of external balance via export and import performance. In the next section, we will examine the empirical relationship between the composition of FDI and exports and imports, respectively.

III. EFFECTS OF TRADABLE FDI ON EXPORT

There is a widely shared view that FDI promotes a host country's export performance by augmenting domestic capital, helping transfer of technology and new products, and providing training for the local workforce and upgrading technical and managerial skills. This potential linkage between inward FDI and export performance is one of the reasons why developing countries compete to attract more FDI.

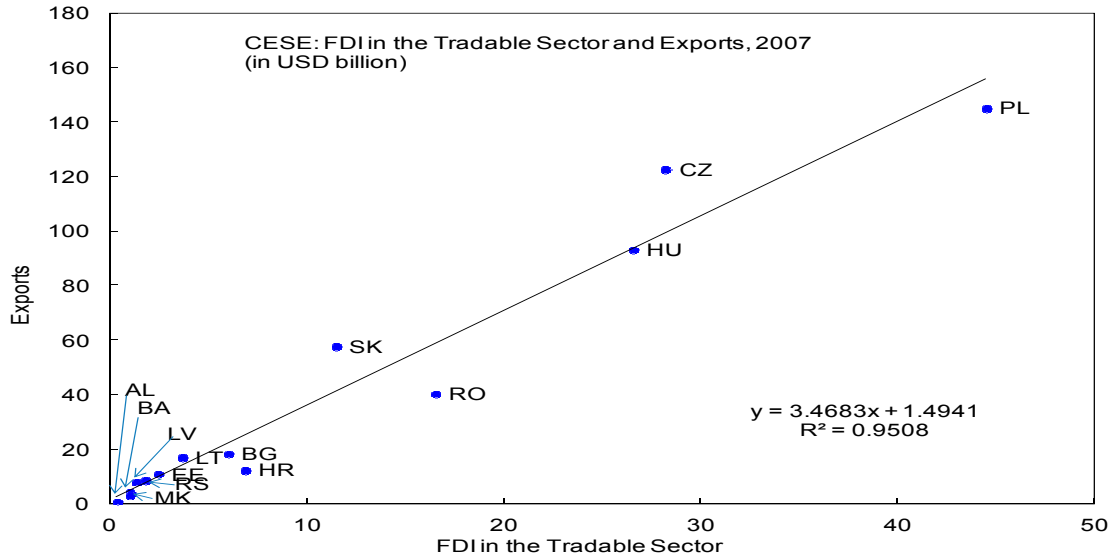
There are notable examples among developing countries in which FDI contributed significantly to rapid economic growth through enhancing export performance. China is considered to be one of the most successful examples of export-led economic growth, aided by substantial FDI inflows. The role of FDI in China's export performance was studied in numerous studies in the past. However, there are few studies that report the contribution of FDI in the tradable sector. For example, the study by Zhang (2005) reports that one dollar of FDI stock raises exports by about 70 cents, using the disaggregate industry level data.

For the CESE countries, the estimate for the link between tradable FDI and exports is substantially higher than those found in the Chinese study, although it is not directly comparable due to a different unit of aggregation. A cross-country correlation coefficient shows that one dollar of FDI in the tradable sector leads to an increase in exports by about 3.5 in the CESE region. (See the upper panel chart on the next page). A one percentage point of GDP increase in tradable FDI leads to about three times as much increase in exports (as shown in the upper-left panel of Figure 4). This is in part due to the self-reinforcing effect that countries with a profitable exporting sector are more likely to attract more FDI in the tradable sector. When we use aggregate FDI including nontradable FDI, the positive relation between FDI and exports still exists but to a lesser extent (e.g., 1.8 dollar as opposed to 3.5). This is because the role of FDI in the nontradable sector in supporting export activities is rather limited. Appendix 1 reports the econometric results from the panel data, showing that there is a positive link between export performance and FDI in the tradable sector after controlling for real exchange rates and market size⁹.

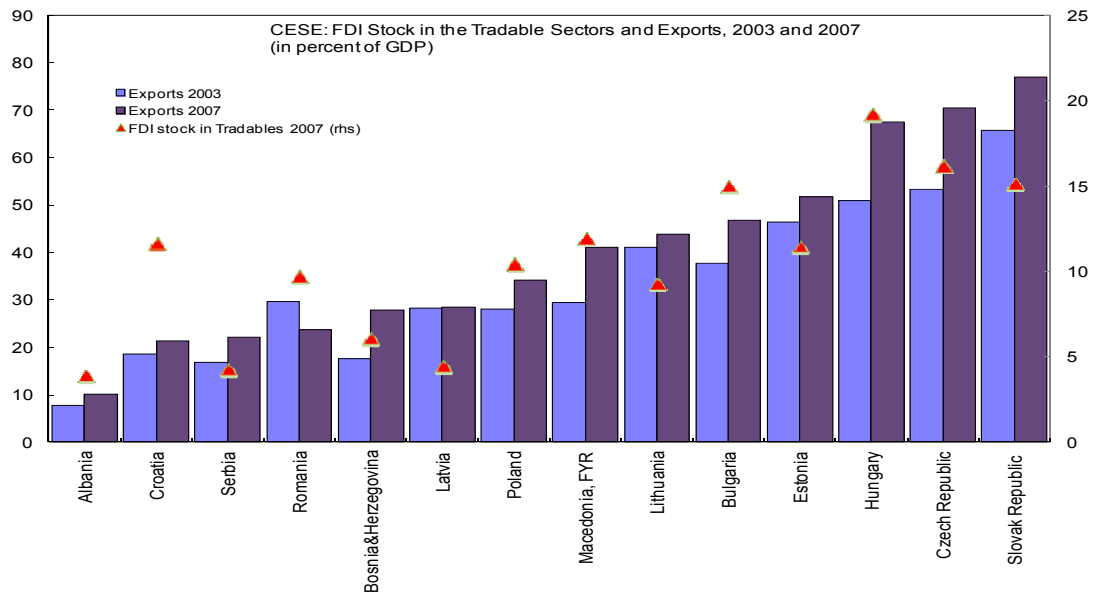
Between 2003 and 2007, there was generally an increase in export propensity in the region. However, there is a large variation across countries in the export-to-GDP ratio (the lower

⁹ The export equation is based on the analytical framework proposed by Goldstein and Khan (1985), in which FDI stock is a proxy of non-price factor.

panel chart). The top three exporters in 2007 are the CEE countries that embarked on transition process early. Exports of CEE countries (except Poland) account for about 70 percent of GDP. FDI stock in the tradable sector is also high in these countries, accounting for over 15 percent of GDP. Countries that saw little or no increase in the export-to-GDP ratio are Albania, Croatia, Latvia, Lithuania, Romania, and Serbia, in which FDI stock in the tradable sectors is lower than in other countries. Notably, the two countries in SEE—Macedonia and Bosnia & Herzegovina—saw a significant improvement in export performance and also a high share of tradable FDI.



Source: IMF WEO Database; WIIW Database on Foreign Direct Investment.



Source: IMF WEO Database; WIIW Database on Foreign Direct Investment.

IV. DETERMINANTS OF SECTORAL FDI

A. Host Country Determinants of FDI in the Tradable Sector

In this sub-section, we examine what determines the sectoral composition of FDI in a country. For example, why did the Slovak Republic mainly attract FDI in the tradable sectors while Bulgaria's FDI was concentrated in the nontradable sectors? Is it due to different macroeconomic policies or factors more indigenous to the country? Or, is it due to the first comer's advantage?

As discussed extensively in past studies on the determinants of FDI, the key determinants of foreign direct investment generally consist of the sources of comparative advantages of the host country, macroeconomic policy, and reform variables and initial conditions.¹⁰

This study differs from the existing studies on FDI determinants as we are interested not in the distribution of aggregate FDI but the distribution of sectoral FDI across countries. We therefore try to relate a share of tradable FDI to total FDI to various determinants. By so doing, we try to identify what the host country can do to tilt FDI more towards the tradable sectors rather than the nontradable sectors for a more sustainable external position. In this specification, we focus on the determinants of FDI in the tradable sector, or export-oriented FDI.¹¹ When firms choose the investment location for an exporting purpose, the factors that affect the expected profitability of foreign investment are relative factor prices of production, availability of resources, and favorable business climate. The factors that matter more to market-seeking FDI are expected to play less important role in export-oriented FDI.¹²

Following Campos and Kinoshita (2003), we run regressions on the panel data, using the initial set of independent variables that are (log of) GDP, income per capita, wage, education, availability of infrastructure, trade integration, quality of bureaucracy and distance from Western Europe.

GDP captures the size of a domestic market which is relevant to market-seeking FDI. Income per capita is included to control for the level of economic development. Low wage costs imply that the countries are competitive compared to their peers and can be one of the main drivers of export-oriented FDI. We would expect a negative sign on the coefficient (e.g., countries with lower labor costs would attract more FDI), particularly if vertical FDI

¹⁰ See Campos and Kinoshita (2003) for the literature review.

¹¹ As a share of tradable FDI and nontradable FDI add up to one, the coefficients of each determinants of nontradable FDI are one minus the coefficients obtained from tradable FDI. For export-oriented FDI, see Hanson, Mataloni, and Slaughter (2001).

¹² See Campos and Kinoshita (2003) for further discussion on different types of FDI.

predominates. At the same time, foreign investors are concerned not only with the cost of labor but also with its quality. A more educated labor force can learn and adopt technology faster and the cost of training local workers would be less for foreign investors. We control for the quality of labor force by using the general tertiary education enrollment rate. Availability of infrastructure such as road, rail and electricity is also an important domestic country attribute especially in the manufacturing sector. We use a composite index for infrastructure from EBRD.

Proximity to the home country can be an advantage for the host country in vertical FDI: the closer it is to the home country, the less transportation and communication costs it incurs. Thus, distance can be also viewed as a measure of the transaction costs. We use the physical distance in kilometers from Dusseldorf (“distance from Dusseldorf”) to the capital city of each country as a proxy for the ease of access to the major Western European markets and also a historical tie to Germany.

Host country institutions also influence investment decisions because they directly affect business operating conditions. The cost of investment should include not only economic costs but also non-economic costs such as bribery and time lost in dealing with bureaucracy and local authorities. Therefore, we use for the institutional quality the indexes of quality of the bureaucracy and the rule of law from ICRG.

Trade openness should also be positively related with FDI in the tradable sectors because FDI is often encouraged in more liberal trade regimes (Helpman, 1984). As a process of EU integration, CESE’s trade became increasingly integrated with the West. Western European manufactures (notably German producers) had become active in outsourcing the production of components and intermediate goods to the East. Therefore, the level of trade integration can be an important driver for export-oriented FDI. We measure trade openness as the sum of exports and imports as a share of GDP. We predict a positive coefficient for this variable in vertical FDI.

To take into account initial conditions for transition-specific factors, we include a share of industry in 1989 and a dummy variable for early transition. A share of industry in 1989 reflects the level of industrialization prior to the beginning of the transition process, drawn from de Melo and others (1997). A dummy for early transition is based on Blanchard (1997): a dummy equals one if the countries started transition in 1991 or earlier and zero, otherwise.

For policy variables, we include three policy measures: restrictions on capital inflows, privatization revenue and fiscal balance. Restrictions on capital inflows reflect the extent of capital controls on capital inflows drawn from Schindler (2009). Privatization revenue as a share of GDP reflects the progress in privatization process, drawn from EBRD. Finally, overall fiscal balance to GDP reflects the strength of the host country’s public finance.

The plots of the key variables confirm our initial predictions of the ratio of FDI in the tradable sectors to total FDI (Figure 6). Market size, trade openness, and infrastructure all show positive correlations with FDI in the tradable sector as predicted. The plots show that the CEE countries have large domestic markets with better infrastructure and greater trade openness, while the SEE countries have small domestic markets with insufficient infrastructure and less trade integration. One could argue that these variables may be simultaneously determined with FDI in the tradable sectors: they could be the results of FDI inflows into the tradable sector rather than the determinants of FDI inflows. On the right side of the panel, education and wage do not show a clear relationship with FDI in the tradable sector. Distance, on the other hand, is negatively related to FDI in the tradable sector. Again, the CEE countries seem to have an advantage of being physically close to the West as an export platform in contrast to the SEE and Baltics.

B. Empirical Results

The panel data estimation results in Table 1 show that larger market size, sufficient infrastructure, greater trade openness, and a highly educated labor force all positively affect a share of FDI in the tradable sector. We report in the table both fixed effects and GMM results for robustness. The countries that attract large inflows of FDI in the tradable sector are known as a main destination of the outsourcing by German exporters. We would thus predict the main determinants of FDI in the tradable sector to be those of vertical FDI. Our results are indeed consistent with the hypothesis of vertical FDI.

The coefficient of infrastructure is positive and significant throughout regressions, suggesting that availability of sufficient infrastructure is a key determinant of tradable FDI in the CESE region. This is consistent with the findings of the past studies.¹³ For Central and Eastern Europe, Bellak and others (2009) find that production-related tangible infrastructure has a significant impact on FDI inflows.¹⁴ Sufficient infrastructure endowment can compensate for higher corporate tax rates for investing foreign firms.

Interestingly, foreign investors in the region seem to care less about low labor cost—often the main driver of vertical FDI after controlling for labor quality (i.e., education). Recall in Figure 6 that wage has little or no relation with the share of tradable FDI. This result confirms that foreign investors in the tradable sectors value a productive and educated labor force rather than simply a low cost labor force.

¹³ See Wheeler and Mody (1992) and Chen and Kwang (2000), and Globerman and Shapiro (2003)

¹⁴ Their study is based on a gravity model between seven European source countries and eight host countries i.e., Czech Republic, Hungary, Poland, Slovakia, Slovenia, Bulgaria, Croatia, and Romania for the period of 1995–2004.

We also find that the countries located close to Germany are likely to receive more FDI inflows in the tradable sectors (e.g., the Czech Republic and the Slovak Republic) as shown in negative and significant coefficients of distance to Dusseldorf throughout regressions. This result implies that the transaction cost proxied by distance is particularly important when FDI goes to the tradable sectors, consistent with the findings in the past studies (Bevan and Estrin, 2004).

Better institutional quality (i.e., quality of bureaucracy) generally helps attract FDI as it lowers the cost of doing business for foreign investors but it was not the case in our results.¹⁵ However, the regression results fail to support the role of good institution in attracting FDI inflows in the tradable sectors. This is not to say that good institutions do not matter to FDI. Rather, institutional quality does not necessarily determine the sectoral composition of FDI. Other institutional variables from ICRG such as rule of law show similar results.¹⁶

In columns 5 and 6, we find that initial conditions such as the share of industry in 1989 (at the beginning of the transition) and the dummy variable for earlier transition did not play a role in attracting tradable FDI. The coefficients of both variables have even wrong signs. Contrary to our predictions, they fail to account for the sectoral composition of FDI. A negative sign on the coefficient of early transition indicates that the late comers to the transition can still attract FDI in the tradable sector (e.g., Romania and Macedonia).

Various policy variables turn out to be statistically insignificant, suggesting that capital controls, privatization efforts, and fiscal policy stance do not affect the sectoral distribution of FDI. Controls on capital inflows reflect the measure of financial liberalization.¹⁷ A higher index of controls on capital inflows reflects greater capital control. We also included control on capital outflows as well as aggregate capital control index from the same data source but they fail to bear any statistical significance. The studies on capital controls in emerging economies generally conclude that the effectiveness of capital controls is often short-lived in limiting capital inflows. However, there is some evidence that controls on capital inflows can lengthen the maturity of inflows, alter the composition, and create some room for monetary independence in the short run (GFSR, April 2010; Chapter 4).¹⁸ We find that the presence of capital controls on inflows is not necessarily a deterrent to FDI in the tradable sectors.

¹⁵ Wei (2000) finds that business environment such as low corruption and high quality of bureaucracy is the key reason for foreign investors to choose a investment location.

¹⁶ Results are available upon request.

¹⁷ The source data on financial integration also include the sub-category of restrictions on FDI. However, the CESE countries have mostly no restrictions on FDI for 2003-07. Instead, we use an aggregate measure of controls on capital inflows (including FDI).

¹⁸ The country case studies on controls on capital inflows include Chile, Columbia, and Brazil. See Gosh et al (2010) for more details.

(continued)

Privatization is not a good predictor of the share of FDI in the tradable sectors, even after controlling for its possible endogeneity in the GMM estimation. Privatization revenues are generally ‘lumpy’ often owing to a one-off large-scale privatization. Western Balkans embarked on mass privatization on a later stage of transition than the CEE and Baltics.¹⁹ We split the sample into two groups, Western Balkans and other countries in the region to see if privatization has any impact on the share of FDI in the tradable sector. However, the privatization variable is statistically insignificant in both groups.

Finally, overall fiscal balance does not have any effect on the sectoral composition of FDI. Another policy variable as a proxy of stable monetary policy—inflation rate—was also included as an explanatory variable. But it failed to bear statistical significance.

What country attributes explain different sectoral distribution of FDI? Our results indicate that geographical proximity to the main manufactures in the West and overall economic development attract more export-oriented FDI. For those countries that are far from the West, they should upgrade infrastructure and the skill level of local labor force. Progress in trade liberalization always helps attract more FDI in the tradable sectors. Poor institutional quality (i.e., quality of bureaucracy and corruption) is not necessarily a deterrent to the shift of FDI inflows towards the tradable sectors, though better institutional quality is likely to increase aggregate FDI.

V. CONCLUSIONS

This paper argues that the composition of FDI matters: too much FDI in the nontradable sector can exacerbate external imbalances. To illustrate this point, we study the experience of fifteen CESE countries with FDI inflows in the run-up to the global crisis between 2000 and 2007. From 2003 onwards, FDI flows in many countries largely went to the nontradable sectors rather than the tradable sectors and fueled domestic demand rather than supply.²⁰ This led to a surge in imports and large current account deficits. These large current account imbalances turned out to be dangerous. The countries with large external imbalances were hit hardest during the global financial crisis.

In the first half of this paper, we relate the sectoral composition of the FDI stock to export performance. The cross-country evidence shows that FDI in the tradable sector is positively related to exports. The effect of FDI in the tradable sector on imports is not clear-cut perhaps

¹⁹ The averages of EBRD large-scale privatization index in 2008 are 4 (CEE exc. Poland), 3.8 (Bulgaria and Romania), and 3.9 (Baltics), and 3.1 (Western Balkans exc. Bulgaria and Romania). See also EBRD (2004), *Spotlight on South-eastern Europe: An Overview of Private Sector Activity and Investment*.

²⁰ In the Czech Republic and the Slovak Republic, growth during the boom was much more balanced than in the other countries. See Bakker and Gulde (2010) and WIIW(2010).

because part of imports is also used as intermediate input for exportable. Thus, we conclude that FDI in the tradable sector affects external balance mainly by the export channel.

The second half of the paper asks what host country factors can tilt FDI inflows towards the tradable sectors. Our regression results show that large domestic size, good infrastructure, educated labor force, and deeper trade integration are conducive to attracting FDI in the tradable sector. The initial conditions and fiscal policy generally do not affect the composition of FDI, though the countries physically close to Western Europe have an advantage of having a lower transportation cost to attract export-platform FDI.

Our results imply that a country can diversify capital inflows away from the nontradable to the tradable sectors. In the countries that received much FDI in the nontradable sector before the crisis, a shift towards the tradable sector is helpful for more sustainable path of external balance. In the short run, this entails a further progress toward greater trade integration. In the medium to long term, a country also needs to address bottlenecks in infrastructure and upgrade human capital to tilt a level-playing field towards the tradable sector.²¹

²¹ See Chapter 2 in IMF (2010c), REO: Europe, October 2010.

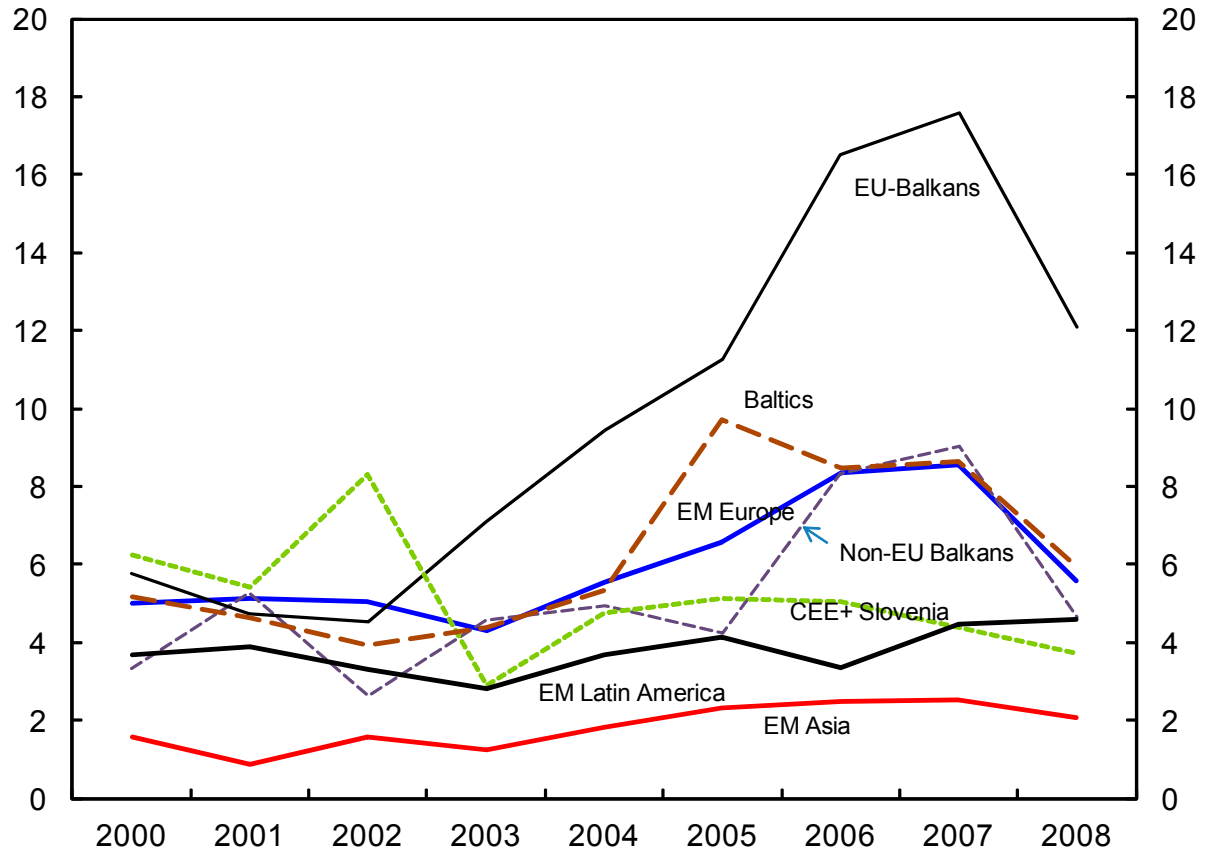
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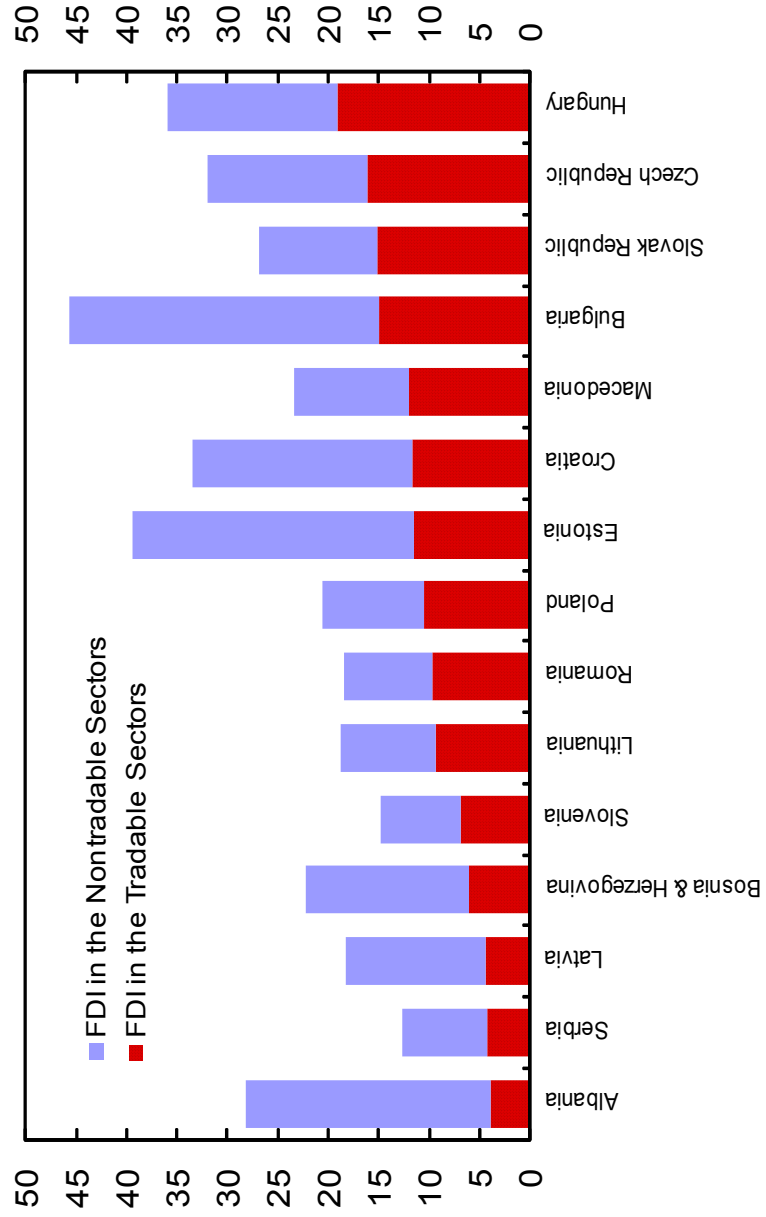
Figure 1. FDI Inflow in Emerging Economies, 2000-08
(Percent of GDP)



Source: IMF WEO Database

1/ Each regional group is defined as follows: EU-Balkans (Bulgaria and Romania); Non-EU Balkans (Albania, Bosnia and Herzegovina, Croatia, Macedonia and Serbia); Baltics (Estonia, Latvia, and Lithuania); CEE (the Czech Republic, the Slovak Republic, Hungary, Poland and Slovenia); EM Asia (India, Malaysia, Philippines, Thailand, and Korea); EM Latin America (Brazil, Chile, Columbia, Mexico, and Peru).

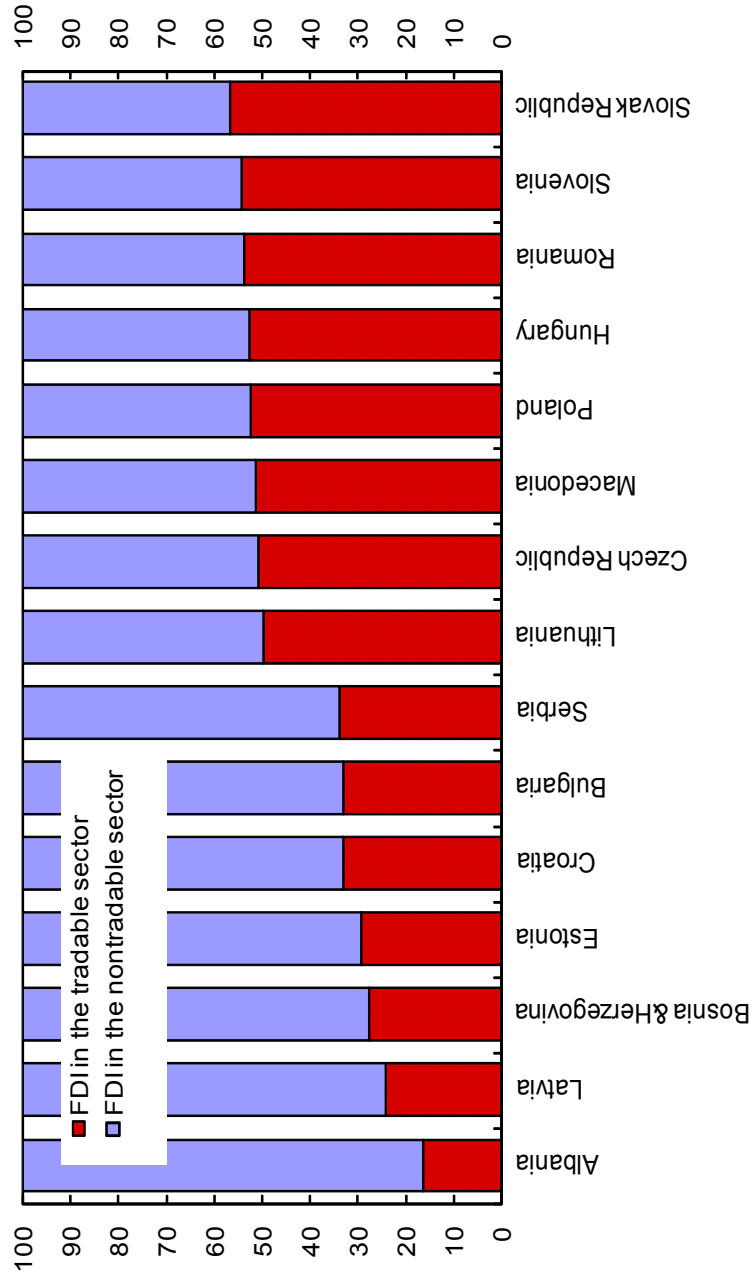
Figure 2. CESE: Composition of FDI Stock, 2007 1/
(Percent of GDP)



Source: WIW Database on Foreign Direct Investment

1/ Data refers to 2006 for Slovak Republic.

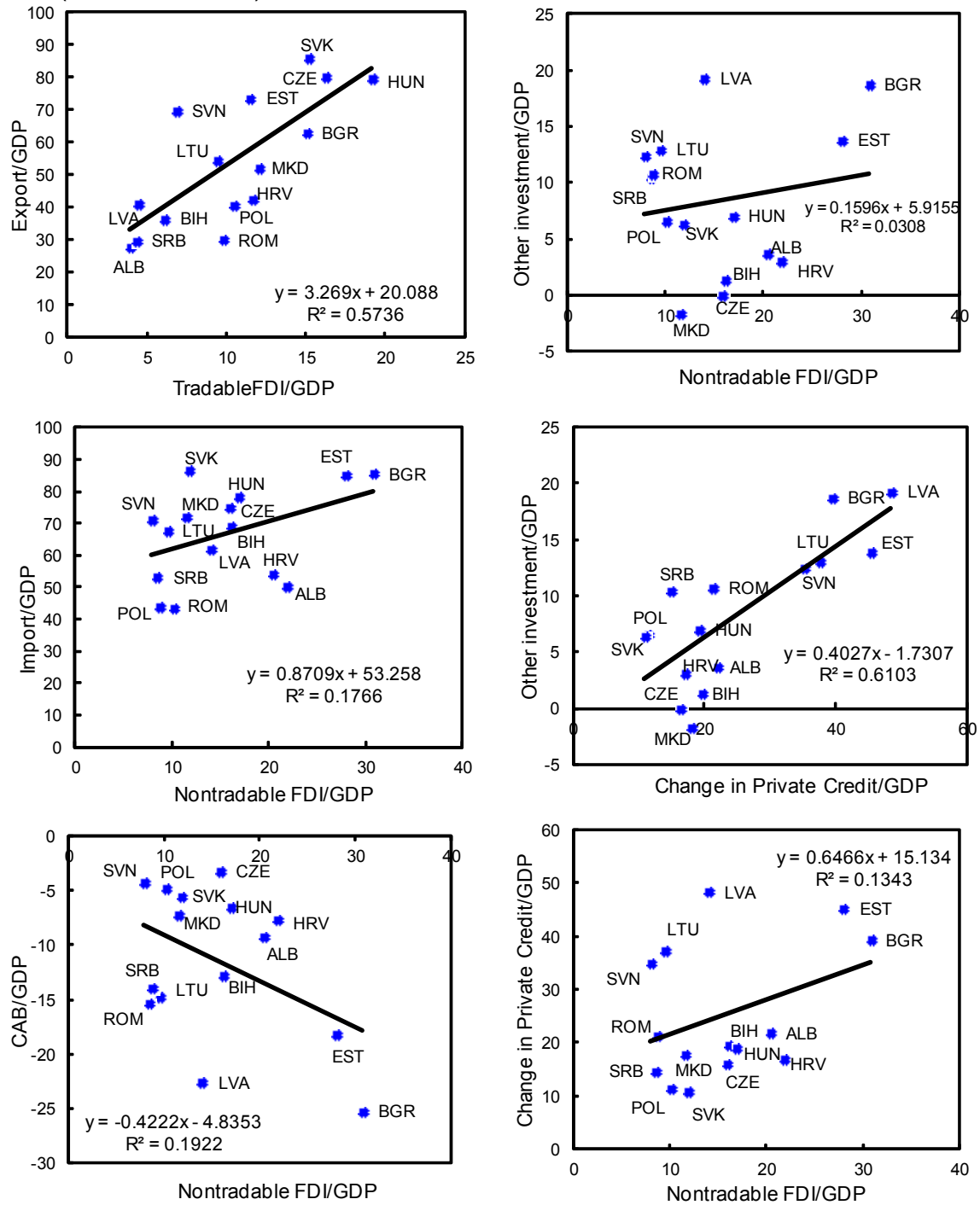
Figure 3. CESE: Shares of FDI stock in the Tradable and Nontradable Sectors, 2007 1/
(Percent of Total FDI)



Source: WIW Database on Foreign Direct Investment; national authorities.

1/ Data for the Slovak Republic are from 2006.

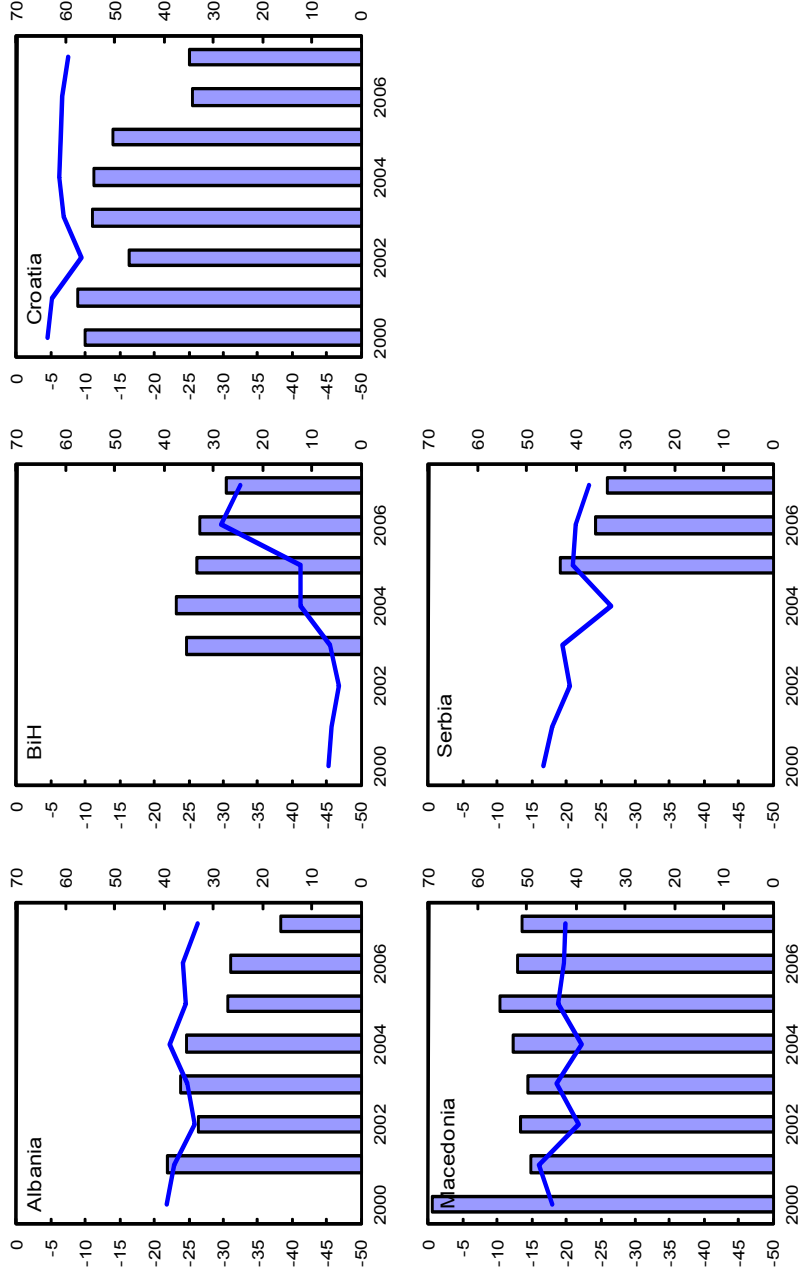
Figure 4. CESE: Correlations with Tradable and Nontradable FDI Stock to GDP 1/ (Percent of GDP)



Source: IMF WEO Database; WIW Database for Foreign Direct Investment.

1/ All variables are values in 2007. FDI stock for Slovak Republic is the 2006 value. Change in private credit to GDP is the difference between 2003 and 2007.

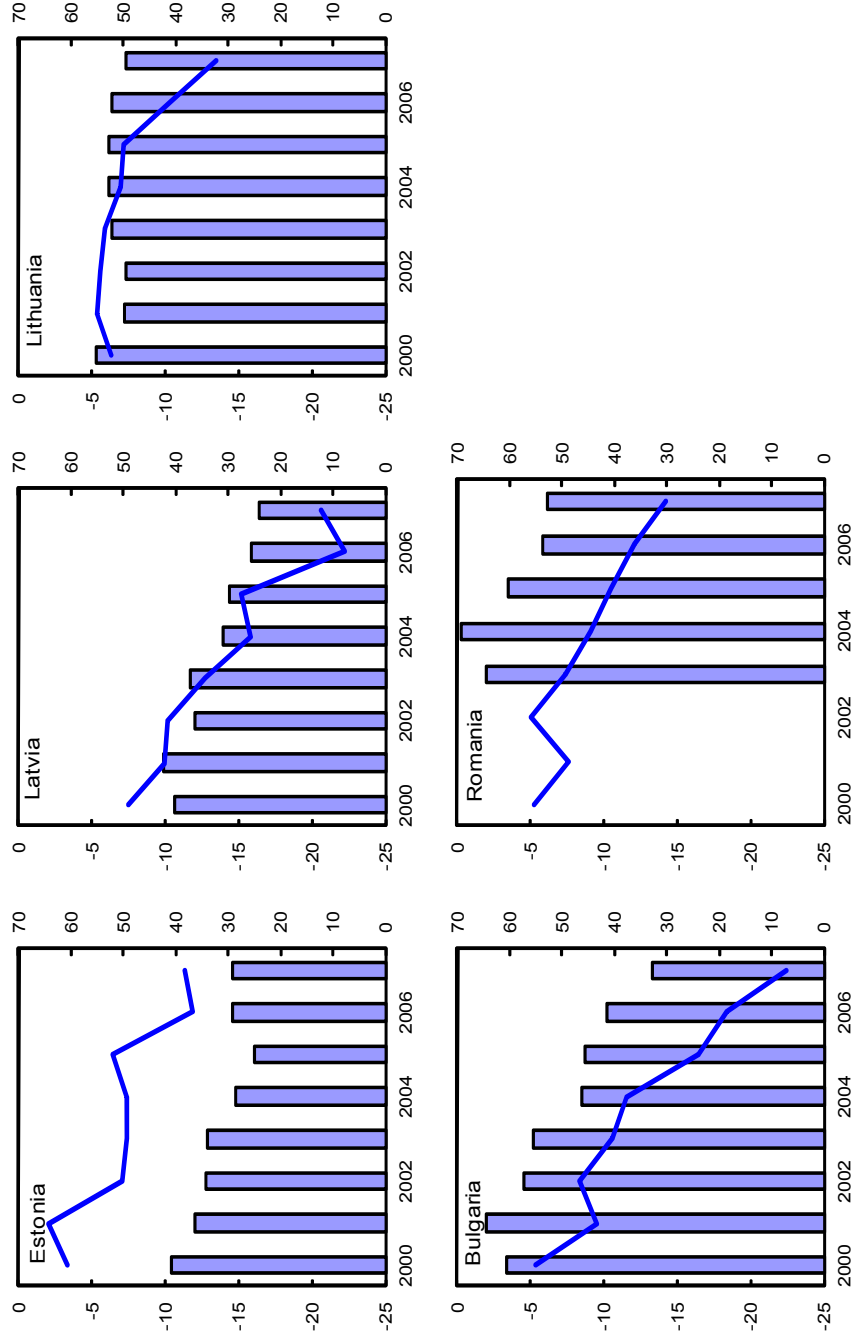
Figure 5-A. Non-EU Balkans: Share of Tradable FDI and Trade Account Balance, 2000-07 1/
 (Percent of GDP; Percent of total FDI)



Source: WIW Database on Foreign Direct Investment and IMF WEO Database.

1/ Columns show the share of tradable FDI to total FDI in percent (right axis) and lines show trade account balance to GDP in percent (left axis).

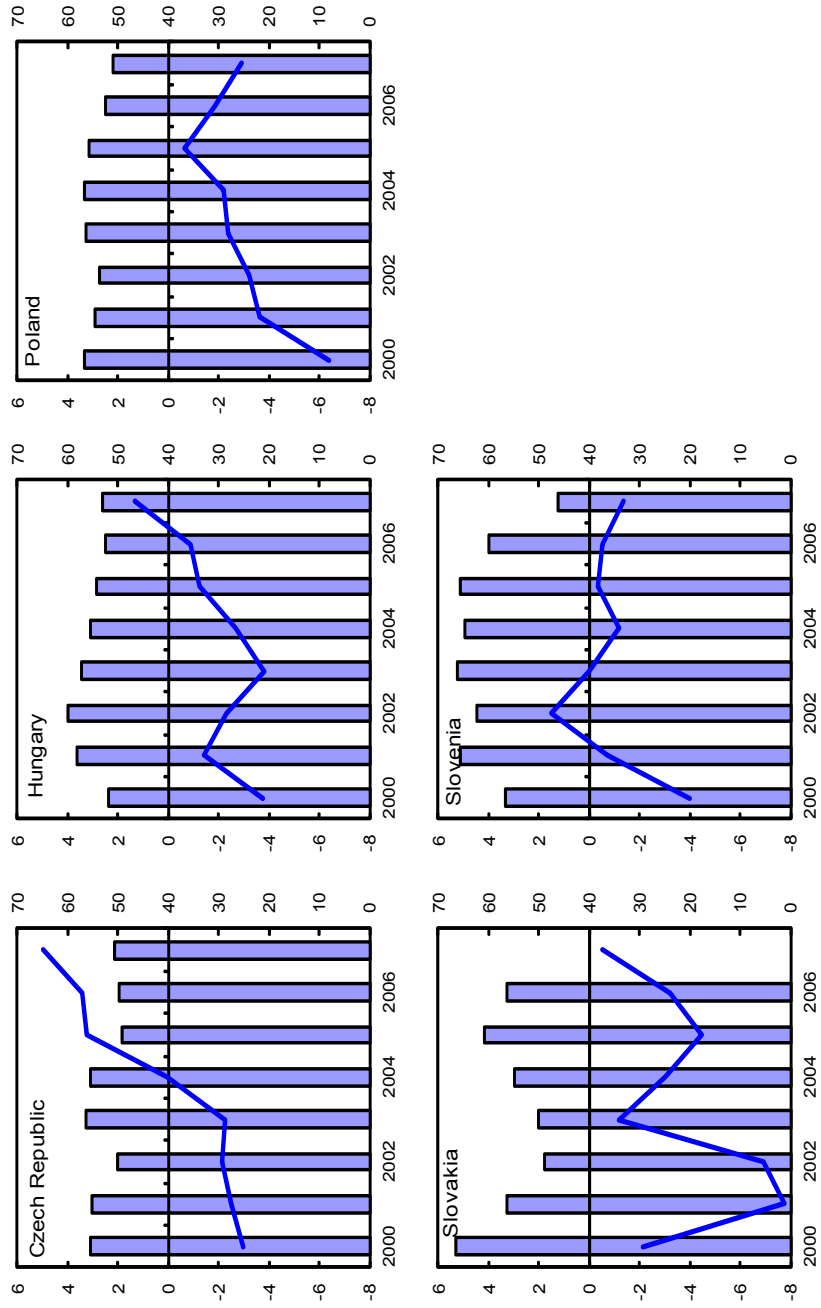
Figure 5-B. Baltics and EU-Balkans: Share of Tradable FDI and Trade Account Balance, 2000-07 1/
 (Percent of GDP; Percent of total FDI)



Source: WIW Database on Foreign Direct Investment and IMF WEO Database.

1/ Columns show the share of tradable FDI to total FDI in percent (right axis) and lines show trade account balance to GDP in percent (left axis).

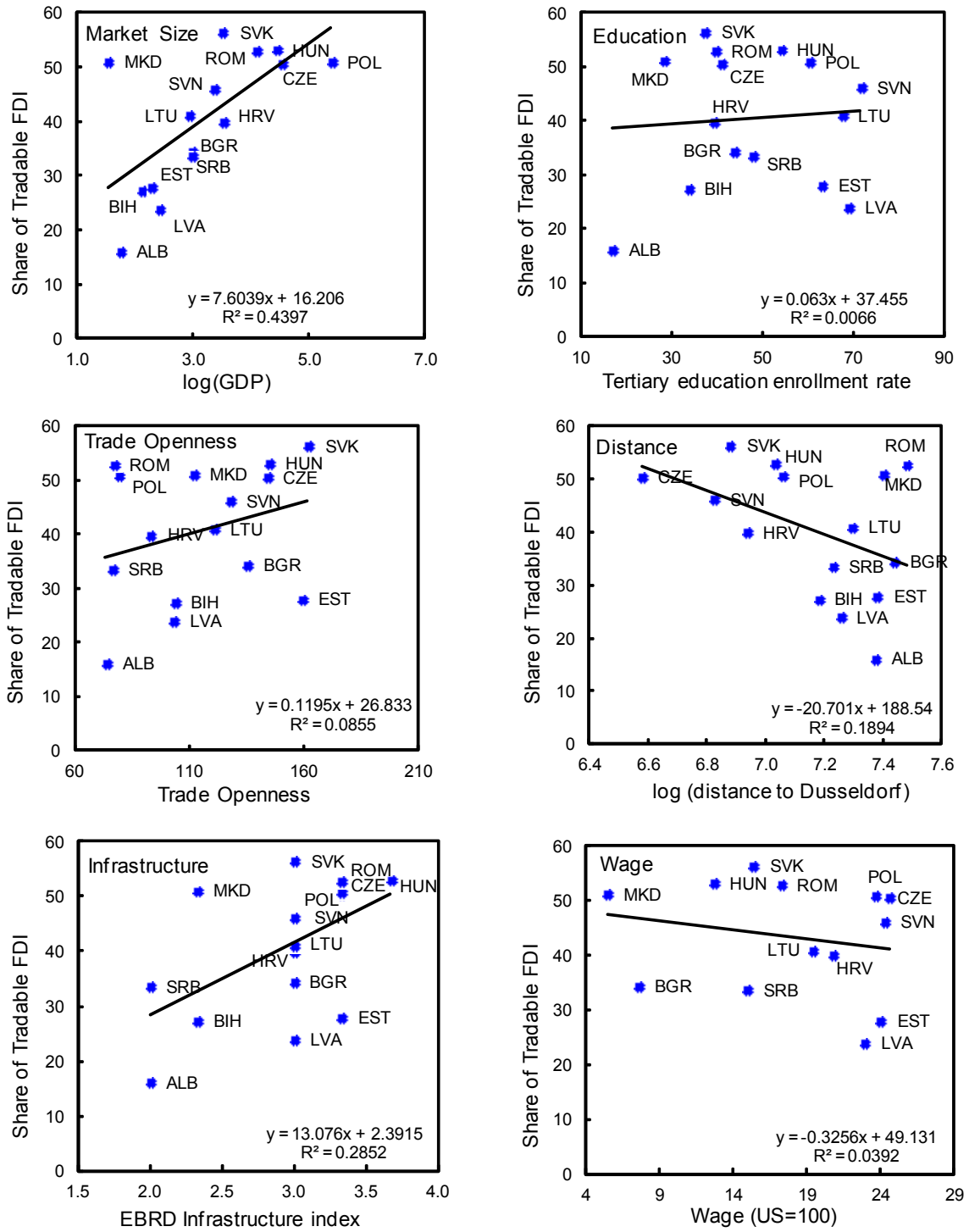
Figure 5-C. CEE: Share of Tradable FDI and Trade Account Balance, 2000-07 1/
 (Percent of GDP; Percent of total FDI)



Source: WIIW Database on Foreign Direct Investment and WEO.

1/ Columns show the share of tradable FDI to total FDI in percent (right axis) and lines show trade account balance to GDP in percent (left axis).

Figure 6. CESE: Determinants of FDI in the Tradable Sectors, 2003-07
(Percent of total FDI)



Source: IMF WEO Database, WIIW Database on Foreign Direct Investment.

Table 1. Determinants of FDI in the Tradable Sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
In(GDP)	0.105*** [0.0109]	1.304* [0.757]	0.0873*** [0.0184]	0.0873*** [0.0184]	0.134*** [0.0371]	0.287** [0.124]	0.0997*** [0.0277]	0.0755*** [0.0272]	0.0616* [0.0350]
In(income per capita)	0.0148 [0.0564]	-1.191* [0.712]	0.103 [0.197]	0.103 [0.197]	0.15 [0.240]	0.05 [0.250]	0.424 [0.356]	-0.195 [0.331]	0.274 [0.295]
In(wage)	0.482 [0.0598]	-0.202 [0.155]	-0.0342 [0.168]	-0.0342 [0.168]	-0.257 [0.248]	-0.512 [0.360]	-0.325 [0.311]	0.207 [0.277]	-0.162 [0.241]
infrastructure	0.0820*** [0.0190]	0.0608*** [0.0208]	0.169*** [0.0360]	0.169*** [0.0360]	0.211*** [0.0513]	0.194*** [0.0479]	0.181*** [0.0525]	0.249*** [0.0759]	0.202*** [0.0553]
Quality of bureaucracy	-0.102 [0.259]	-0.0265 [0.0724]	-0.140*** [0.0475]	-0.140*** [0.0475]	-0.170*** [0.0604]	0.131 [0.175]	-0.0819 [0.0788]	-0.256** [0.100]	-0.126** [0.0579]
Trade integration	0.00204*** [0.000467]	0.000979 [0.00114]	0.00199*** [0.000580]	0.00199*** [0.000580]	0.00276*** [0.000859]	0.00457*** [0.00173]	0.00150* [0.000908]	0.00295*** [0.00101]	0.00182*** [0.000707]
Education_tertiary	0.00165** [0.000778]	0.00124 [0.00229]	0.00354** [0.00157]	0.00354** [0.00157]	0.00372* [0.00191]	0.00407** [0.00201]	0.00205 [0.00246]	0.00731** [0.00340]	0.00236 [0.00224]
Distance to Dusseldorf			-0.192* [0.103]	-0.192* [0.103]	-0.401*** [0.182]	-0.397** [0.179]	-0.0921 [0.164]	-0.401* [0.230]	-0.0957 [0.159]
Share of industry in 1989					-1.122 [0.716]				
Dummy for early transition						-0.411* [0.250]			
Restrictions on capital inflows							0.198 [0.126]		
Privatization								0.0145 [0.00904]	
Fiscal balance									-0.0223 [0.0238]
Observations	89	89	77	77	77	77	76	73	77
Number of id	13	13	11	11	11	11	11	11	11
R-squared	.	0.6	.	.	.	.	.	.	.
Sargan	.	.	0.303	0.303	0.795	0.895	0.964	0.561	0.485
AR(2)	.	.	0.84	0.84	0.63	0.58	0.13	0.79	0.96
Estimation methods	RE	FE	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM
Number of lags of endogenous variables used in IV			three	three	three	three	three	three	three

1/ All regressions include a constant and year dummies. ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively.

2/ In system-GMM, endogenous IV are lagged dependent variable and secondary education. Exogenous IV include FDI stock in the region, political risk, quality of bureaucracy, rule of law, inflation, and trade integration.

Appendix 1. Emerging Europe: Export Equation

Dependent variable = EXY

	(1) 1/	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EXY(-1)	0.548*** [0.0936]	0.570*** [0.0805]	0.583*** [0.0947]	0.866*** [0.0545]	0.872*** [0.0584]	0.866*** [0.0525]	0.962*** [0.0343]	0.804*** [0.0819]
log(REER)	-0.125*** [0.0557]	-0.107*** [0.0535]	-0.108* [0.0551]	-0.141* [0.0831]	-0.100 [0.137]	-0.0202 [0.120]	-0.344*** [0.111]	-0.13 [0.123]
log(EU income)				-0.220*** [0.0778]	-0.313*** [0.0939]	-0.263*** [0.0869]	0.0164 [0.190]	-0.324*** [0.0899]
FDI_tradable/GDP	0.00239** [0.00109]			0.00388** [0.00153]	0.00371** [0.00154]	0.00428*** [0.00135]		
FDI_tradable/FDI		0.193*** [0.0599]					0.106* [0.0635]	0.189*** [0.0679]
FDI/GDP			0.000722 [0.000437]					0.00214** [0.000983]
Observations	96	115	96	83	83	83	89	83
R-squared	0.746	0.675	0.739	.	.	.	.	0.638
Number of id	15	17	15	13	13	13	13	13
Sargan				0.003	0.307	0.482	0.101	0.406
AR(2)				0.096	0.157	0.119	0.168	0.24
Estimation methods	Fixed Effects	Fixed Effects	Fixed Effects	Sys-GMM 2/	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM
Number of lags				two	three	four	three	three

1/ All regressions include a constant and year dummies. ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively.

2/ In system-GMM, endogenous IV are log(REER) and lagged EXY. Exogenous IV include FDI stock in the region, political risk, corruption, rule of law, inflation and overall fiscal balance.

Appendix 2. Emerging Europe: Import Equation

Dependent variable = IM/Y

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IM/Y(-1)	0.502*** [0.0995]	0.555*** [0.0846]	0.503*** [0.0975]	1.001*** [0.0592]	0.983*** [0.0561]	0.973*** [0.0552]	0.953*** [0.0774]	0.895*** [0.0949]
log(REER)	0.156** [0.0642]	0.120* [0.0639]	0.175*** [0.0639]	0.0570 [0.0732]	-0.188** [0.0947]	-0.0742 [0.106]	-0.155 [0.106]	-0.137 [0.103]
log(income)	-0.0145 [0.0398]	-0.0124 [0.0401]	-0.0128 [0.0390]	0.00132 [0.00555]	-0.000762 [0.00595]	-0.000485 [0.00488]	0.00145 [0.00921]	0.00277 [0.00682]
FDI nontradable/GDP	-0.00152** [0.000619]			0.00124 [0.00103]	0.0000185 [0.00101]	0.000324 [0.00100]		
FDI nontradable/FDI		0.0260 [0.0645]					0.0125 [0.0798]	0.0289 [0.0569]
FDI/GDP			-0.00140*** [0.000470]					-0.000768 [0.000829]
Observations	88	107	88	73	73	73	78	73
R-squared	0.760	0.683	0.770					
Number of id	15	17	15	12	12	12	12	12
Sargan				0.752	0.392	0.409	0.325	0.278
AR(2)				0.191	0.106	0.128	0.13	0.126
Estimation methods	Fixed Effects	Fixed Effects	Fixed Effects	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM
Number of lags				two	three	four	three	three

1/ All regressions include a constant and year dummies. ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively.

2/ In system-GMM, endogenous IV are log(REER) and lagged IM/Y. Exogenous IV include FDI stock in the region, political risk, corruption, rule of law, inflation and quality of bureaucracy.

Appendix 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
log(FDI_tradable)	126	0.9	1.6	-2.4	5.0
log(FDI_non-tradable)	126	1.0	1.5	-2.9	3.8
log(REER)	189	4.6	0.1	4.0	5.0
log(income per capita)	186	2.7	0.8	0.7	4.1
export/GDP	186	0.5	0.2	0.2	0.9
import/GDP	186	-0.6	0.2	-1.0	-0.2
Wage	132	25.7	15.0	2.0	77.0
Distance from Dusseldorf	162	1240	313	559	1673
Infrastructure	153	2.7	0.6	1.3	3.7
Share of industry in 1989	144	0.5	0.1	0.4	0.6
Education_tertiary	142	49.9	17.4	16.1	85.5
Trade openness	189	105.3	35.6	0.0	173.8
Restrictions on capital inflows	158	0.6	0.3	0.0	1.0
Quality of bureacracy	153	2.2	0.9	1.0	4.0

Appendix 4. Data Descriptions and Sources

Variable	Definition	Source
FDI_tradable	FDI in the tradable sectors (= total FDI* share of tradable FDI)	WEO, WIW Database on Foreign Direct Investment
FDI_nontradable	FDI in the non-tradable sectors (=total FDI* share of nontradable FDI)	WEO, WIW Database on Foreign Direct Investment
REER	Real effective exchange rate	WEO
EXY	Export to GDP ratio	WEO
IMY	Import to GDP ratio	WEO
EU income	EU-15 real GDP	WEO
Income	GDP in constant prices, in US dollars	WEO
GDP	GDP in current prices, in US dollars	WEO
Income per capita	GDP per capita in current prices, index (euro area = 100)	WEO
Wage	Average gross wage in euro, index (US=100)	WEO
Infrastructure	EBRD transition index of infrastructure reform	Haver Analytics
Education_tertiary	Gross enrollment rate of the tertiary school	EBRD
Quality of bureaucracy	The extent to which the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services.	WDI
Distance to Dusseldorf	Great circle distance from Dusseldorf to the capital city (km)	ICRG
Share of industry in 1989	Share of industrial production in 1989	CIA factbook
Dummy for early transition	= 1 if year of introducing stabilization program is before 1991, = 0 otherwise	De Melo and others (1997)
Restrictions on capital flows	Index on capital controls on inflows	Fisher and Sahay (2000)
Privatization	Privatization revenue as a share of GDP	Schindler (2009)
Fiscal balance	General government balance as a share of GDP	EBRD
Trade integration	=(Exports +Imports)/GDP	WEO