Foreign Direct Investments in the Financial Sector: The Engine of Growth for Central and Eastern Europe?

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Abstract

This paper examines the impact of financial-sector foreign direct investment (FSFDI) on economic growth by estimating a panel data model for 11 Central and Eastern European countries (CEECs\textsuperscript{1}) between 1994 and 2003 in a cross-country growth accounting framework. The analysis concentrates on the efficiency channel linking FSFDI to economic growth. The results clearly indicate that there can be a relationship between FSFDI and economic growth – depending on a careful examination of lagged, hump-shaped or interacted effects of FSFDI. Approaching a medium degree of financial M&A is rewarded by higher economic growth after two periods. Beyond it, FSFDI seems to spur economic growth depending on a higher human capital stock. Knowledge-spillovers to domestic banks associated with the inflow of FSFDI can be an explanation for this phenomenon. Besides this positive interaction, the crowding-out of local physical capital caused by the entry of a foreign bank seems to hamper economic growth and has to be analyzed more accurately. The value of the paper lies in modeling hitherto only qualitatively discussed possible relationships into a structural, econometric model that combines two streams of standard economic literature: the FDI-growth-literature and the finance-growth-literature.

Keywords: Financial-sector foreign direct investment, economic growth, financial economics, transitional economies, panel data analysis.

JEL classification: C23, F36, G10, O16, P2

\textsuperscript{1}Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Poland (PL), Romania (RO), Slovenia (SI), Slovakia (SK)
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1. Introduction and Motivation

Banks were inefficient and burdened with large amounts of non-performing loans in former socialist Central and Eastern European countries (CEECs) before 1990. Capital was scarce and overall productivity low. The inflow of foreign capital – in particular foreign direct investment (FDI) – was seen as a key component for a solution of these problems (Sergi 2004). Accordingly, economic research has developed two different streams of literature. On the one hand, various studies have attempted to provide theoretical and empirical answers to the question of the overall impact of general FDI on the host economy. In this context the impact of FDI on economic growth has especially been analyzed (e.g. Borensztein, De Gregorio & Lee 1998, de Mello 1999, Nair-Reichert & Weinhold 2001, Campos & Kinoshita 2002, Mencinger 2003, Dimelis & Louri 2004, Ruschinski & Sturm 2004, Hansen & Rand 2004, Neuhaus 2005). Results respecting CEECs are mixed but they argue that FDI can be a major growth trigger. On the other hand, the finance-growth nexus literature has elaborated meaningful links between the financial sector and economic growth over the last decade. Blum, Federmaier, Fink & Haiss (2004) reviewed this literature and detected five different patterns of interference: a leading role of the financial sector (supply-leading approach), a demand-following, a bi-directional link, negative causality from finance to growth and no link. The direction of the causality link may change with the level of economic development. Patrick (1966) points out that the financial sector plays a supply-leading role in underdeveloped markets. Cross-country studies such as Beck, Levine & Loayza (2000) generally seem to support the supply-leading link. Time-series studies and regional studies as Al-Tamimi, Al-Awad & Charif (2001) provide mixed evidence for this link. The positive view of the finance-led growth hypothesis normally focuses on more open and liberalized financial systems. Banking markets in CEE are an extreme case of openness as they are majority-held foreign.

While there is a plethora of literature on the consequences of financial-sector foreign direct investment (FSFDI) for the host countries’ financial system and also some descriptive analysis especially in the context of CEE countries (e.g. Ilko, Scholtens, Bol, De Haan & De Haas 2003, Baudino, Caviglia, Dorrucci & Pineau 2004, Goldberg 2004, BIS 2004), empirical evidence on the economic impact of sectoral FDI is scarce. This paper is one of the first attempts to fill this gap. The paper adds to the understanding of economic mechanisms by combining the two aforementioned streams of literature: the FDI-growth-literature and the finance-growth-literature. We argue that the effects of FDI might differ depending on the target industry. While government ownership has been investigated respecting its economic implications (La Porta, Lopez-de Silanes & Shleifer 2002 see), the growing importance of foreign ownership and underlying FSFDI has not been treated properly in the literature, too.

Using two different indicators for FSFDI (see Section 3) we are going to estimate their impact on economic growth in 11 CEECs from 1994 to 2003. We are specifically focusing on the FSFDI-induced efficiency-led growth effects and adapt a cross-country growth accounting model. We employ fixed-effects panel data estimations and prepare the econometric setup for a future evaluation with Granger causality methods in order to consider potential bi-directional interference between FSFDI and economic growth.

This paper progresses as follows: Section 2 reviews the results and implications of selected papers concerning the transmission channels between FSFDI and economic growth, Section 3...
presents the stylized facts of the FSFDI-growth nexus in CEE-11, Section 4 develops the theoretical model sticking to latest recommendations of growth theorists, Section 5 emphasizes econometric particularities of the panel data approach used for growth econometrics, Section 6 elaborates the empirical model and presents the estimation results, Section 7 summarizes the main findings and depicts directions for future research.

2. Transmission Channels Between FSFDI and Economic Growth

In a recent contribution, Haiss, Steiner & Eller (2005) elaborated various transmission channels between FSFDI and economic growth in order to give a better causal interpretation of their interference. Technology and know-how spill-over within foreign banks operating in the host market are the basis for direct and indirect transmission channels to financial sector development. Let us state the detected most important channels linking FSFDI to financial sector development and economic growth: financial market development, financial sector efficiency, resource allocation, financial sector stability and overall market-stability, institutional development, employment, and attraction of further foreign direct investment. As the theoretical set-up of this paper sticks primarily to the efficiency-channel connecting FSFDI and economic growth, we would like to raise in this subsection the respective arguments.

2.1. Efficiency-Driving Characteristics of Foreign Owned Banks in Transition Economies

Claessens, Demirgüç-Kunt & Huizinga (2001) analyze samples of mature and emerging markets and point out that foreign banks operating in emerging markets have been more efficient with regard to costs and profits than domestic banks, whereas the opposite is true in the case of mature markets.

Strategic issues: As foreign institutions enter new markets, their strategic interests will vary according to their home-market or global activities. Most investors in emerging banking markets have long-term profit interests as these markets offer the potential for strong business volume growth across the various client groups, including retail banking (BIS 2004). Such “going local” strategies may help local financial market development e.g. by the implementation of products new to the host market (Gallego, Herrero & Luna 2003). In case of an acquired bank, the integration into a multinational or even global financial organization leads to a migration of strategic decisions to the foreign headquarters whereas day-to-day responsibilities remain at the local level (BIS 2004, 10). Close ties to the parental institution also derive from the access to parental resources which might be a stable funding base in times of crisis. Possible negative impacts might occur as shocks may be imported from the home market (BIS 2004). With regard to higher efficiency of foreign owned banks, strategic reorientation on the market and technology changes in case of an acquisition may enhance efficiency.

Management issues: Acquired banks usually receive a capital injection from the new owner (Papi & Revoltella 2000, 439), so the ability of the target to bear risk and grant fresh credit
rises. Particularly foreign banks have great interest in implementing sound policies and risk management as they have the capacity to implement group-wide risk assessment techniques (BIS 2004, 15). Furthermore, foreign banks play an important role in reducing the share of non-performing loans that was and still is high particularly in former state owned banks (Sergi & Matoušek 2005). Papi & Revoltella (2000, 459 f.) support this view and argue that the clearing of risky credit-portfolios requires majority interest by the foreign bank and takes time due to restructuring needs. Putting all arguments together, efficiency in risk management is achieved through transfer of know-how and technologies as well as economies of scope due to risk-diversification.

**Operational efficiency:** Foreign banks will have a great interest in implementing internal group-standards at operational level. But standardization across borders may be difficult to achieve. Nevertheless, Goldberg (2004, 6) argues that foreign banks are likely to have more efficient credit allocation as well as sound monitoring and thus less risk; their operating costs are lower. Green, Murinde & Nikolov (2004) point out that foreign and domestic owned financial organizations are not really different with regard to economies of scale and scope. With regard to acquired institutions, Papi & Revoltella (2000, 459) argue that “for operating and thus cost efficiency a majority interest of at least 70 percent in the host bank capital is necessary”. Only after a period of experimental learning in the new market and time for restructuring in case of acquisitions cost efficiency can be realized.

3. **Stylized Facts**

As Figure 1 shows, foreign penetration in the financial sector has particularly increased since 1999 and reached a level of more than EUR mn 25,000 or 6.8% of GDP in 2003 in the respective countries under review. Interestingly, the inward FSFDI stock as percentage of GDP reached 11.2% in Estland averaged over 1996 to 2003, which is an outlying case not only for this sample, but for entire CEE. Except of Estonia, Figure 2 shows that average inward FSFDI stock to GDP ranges between 2.5% and 5% in CEE-10.

![Figure 1: Steady Inflow of FSFDI to CEE-10](image-url)
Figure 2: Average FSFDI Stock in CEE-10, 1996–2003

Figure 2 demonstrates that the financial sector accounts for a quite high share in total FDI. In 2002 the share of FSFDI in total FDI ranged between 9% in Hungary and 28% in Estonia. The overall respective average for CEE-10 increased from 17% in 2001 to 19% in 2002. Thus, the “importance” of FSFDI is increasing, supporting the statement of Vessel (2003) that FSFDI flows into CEE have been “rapid, remarkable and massive”.

Figure 3: Share of FSFDI in Total FDI (Inward Stocks in mn EUR), 2001 and 2002

In this context, the question arises whether FSFDI is linked to economic growth in a certain way. Figures 4 and 5 show simple scatter plots and suggest a slight, but positive link between economic growth and FSFDI. However, the data are quite dispersed. Particular outliers are Croatia and Latvia, showing a rather high (low) growth in FSFDI, but at the same time a low (high) growth rate of real GDP per worker averaged over 1996 to 2003. Figure 5 indicates that FSFDI might not only be related positively to GDP on average, but also concerning annual observations. The latter impact will be tested in the panel data framework. Again, the relatively high dispersion of the data is emphasized by this graph.

Figures 6 and 7 present the second indicator for FSFDI used in this analysis: completed mergers and acquisitions (M&A) in the financial sector. The first figure shows that financial M&A has increased remarkably since 1999. Banks account for the largest share in financial M&A. Recent trends show a decline in financial M&A activities because privatization is
ending in most CEE countries. In 2004, according to Breyer (2004), the share of total bank assets controlled by foreign owners accounted for around 70% in CEE.

Figure 7 indicates a high dispersion of M&A values over the panel observations. The raw data show that M&A are dealt in a stochastic manner across the CEECs with a high variation of volumes leading – at first glance – only to a ambiguous connection with economic growth.

Apparently, the figures presented in this section show that FSFDI has a quite high importance for CEE-11, considering its high share in total FDI. Temporary effects due to changes of FSFDI on growth of real GDP per worker seem to occur, albeit countries are dispersed to a considerable extent. While the change of total FDI and economic growth are inter-related negatively (supporting the findings of Mencinger (2003)), Figure 8 shows that it is promising to test for a potential hump-shaped relationship between (FS)FDI and economic
growth. The subsequent estimations will render these first stylized facts in a more convincing manner.

4. Analytical Framework

4.1. Informal Growth Regressions Framework

Choosing a theoretical reference model for the empirical analysis of the impact of FDI on economic growth, most authors stick to a MRW-type model (Mankiw, Romer & Weil 1992) and introduce FDI as additional explanatory variable (see, e.g., Campos & Kinoshita 2002, Mencinger 2003, Neuhaus 2005). This kind of regression is usually characterized by the
inclusion of initial income (in order to test conditional convergence), the investment ratio, and measures for human capital (see Temple 1999, 123). In addition, several variables of interest – typically variables concerning political (in)stability, inflation, or the extent of public sector impact – are built into the regression. Thus, this type of regression is driven in its specification mainly by previous results in the literature. Since there is a lack of explicit theoretical derivation of the impact of FDI, this approach can be classified as an “ad-hoc growth regression” in the tradition of Barro (1991).

Strictly speaking, this “crude” extension of MRW is confronted with remarkable problems related to measurement and estimation. “Although simple aggregate models are always dubi-
ous, some important insights are neglected in the absence of a formal theoretical derivation” (Temple 1999, 124). This statement is of particular importance when taking into account that the variable of interest (FSFDI) could be correlated with initial efficiency ($A$). $A$ is an unobserved variable in the MRW-framework and, thus, has to be omitted. Our arguments raised in Subsection 2.1 support the probability that FSFDI is really correlated with $A$. As a consequence, its parameter estimates would be biased due to the omitted variable problem (see Durlauf, Johnson & Temple 2004).

4.2. Cross-Country Growth Accounting

In respect of the deficiencies of the informal growth regression approach, we would like to apply the concept of cross-country growth accounting, or growth accounting with externalities, respectively, following in particular Temple (1999, 124 f.) and Badinger (2003, 180 ff.). Cross-country growth accounting enables the examination of the relative contributions of growth in inputs and growth in efficiency or technical progress, respectively. The change of output is directly regressed on the changes in factor inputs. Let us start with the following (augmented) standard neoclassical production function with constant returns to scale (perfect competition is assumed):

$$Y = AK^\alpha H^\beta L^{1-\alpha-\beta},$$

(4.1)

where $Y$ is the output (GDP), $A$ is technical progress or overall efficiency, respectively, $K$ is the physical capital, $H$ is the human capital and $L$ is the used labor force. Considering the constant returns to scale, the intensive form of equation (4.1) can be written as follows:

$$y = Ak^\alpha h^\beta,$$

(4.2)

where $y$ is the output-labor ratio ($Y/L$), $k$ is the physical capital-labor ratio ($K/L$) and $h$ is the human capital-labor ($H/L$) ratio. Expanding this equation to the cross-section and time dimension and taking logarithms of both sides and time derivatives we get following cross-country growth accounting equation:

$$\Delta \ln y_{it} = \Delta \ln A_{it} + \alpha \Delta \ln k_{it} + \beta \Delta \ln h_{it},$$

(4.3)

where $i = 1, \ldots, N$ (country index), $t = 1, \ldots, T$ (time index). The differenced logarithmic series represents the growth rate in continuous time ($\Delta \ln y_{it} = \frac{\partial \ln y_{it}}{\partial t} = \frac{y_{it}}{y_{it}} \frac{\dot{y}_{it}}{y_{it}}$). This step provides direct estimates of factor shares and there is no term in initial efficiency, which would be difficult to approximate. This notation allows additionally for the estimation of the physical capital elasticity ($\alpha$) and human capital elasticity ($\beta$) of the output. In traditional single country growth accounting these elasticities are usually imposed (see Temple 1999, 124).

How can FSFDI be included into (4.3)? It is a crucial issue to identify the appropriate input factor through which FSFDI may affect the output. The few theoretical approaches modeling explicitly economic growth in dependency of FDI detect three possible ways of influence (see Borensztein et al. 1998, Ruschinski & Sturm 2004). Firstly, FDI is seen as an inflow of foreign capital affecting the domestic physical capital stock $k$ (either positively via greenfield investments, or also negatively via crowding-out of domestic investment). Secondly, FDI influences economic growth via knowledge-spillovers which contribute to the
development of local human capital $h$. Thirdly, FDI spurs economic growth through its positive effects on overall efficiency $A$. One can expect that FSFDI works mainly through the $A$-channel, since greenfield investments are only slightly pronounced in the financial sector. We are going to follow primarily this line in modeling the impact of FSFDI. Nevertheless, the econometric estimations try to consider also the two other effects – inspired primarily by the findings of Borensztein et al. (1998).

Let us assume, that the change in overall efficiency is determined, ceteris paribus, by an exogenous component ($\gamma_{A0}$) and the change in the degree of FSFDI (FSFDI-induced efficiency). Analogous to Badinger (2003, 181), we can specify the subsequent relationship:

$$\Delta \ln A_{it} = \gamma_{A0} + \gamma_{A1} \Delta FSFDI_{it} \quad (4.4a)$$

$$\Delta \ln A_{it} = \gamma_{P0} + \gamma_{A1} FSFDI_{it}. \quad (4.4b)$$

Equation (4.4a) represents temporary efficiency-led growth effects induced by the change of FSFDI. Since the change of FSFDI affects also its level we can test the hypothesis that there are even permanent effects on the efficiency growth rate triggered by the change in the respective level of FSFDI. Thus, substituting (4.4a) and (4.4b) into (4.3) we can distinguish two central models, which form the base for the empirical estimations in Section 6:

$$\Delta \ln y_{it} = \gamma_{A0} + \gamma_{A1} \Delta FSFDI_{it} + \alpha \Delta \ln k_{it} + \beta \Delta \ln h_{it} \quad (4.5a)$$

$$\Delta \ln y_{it} = \gamma_{P0} + \gamma_{A1} FSFDI_{it} + \alpha \Delta \ln k_{it} + \beta \Delta \ln h_{it}. \quad (4.5b)$$

Equation (4.5a) represents the temporary FSFDI-induced efficiency-led growth hypothesis and equation (4.5b) represents the permanent FSFDI-induced efficiency-led growth hypothesis.

Before applying this analytical framework on the central question of research, we have to bear in mind potential shortcomings of this approach. Firstly, we require information on the stocks of physical and human capital. Because of relatively short time series for investment series, the approximation of the initial values – we are going to start with 1994 – will be a crucial issue when constructing the data set for the examined CEE countries. Secondly, while the efficiency channel through which FSFDI affects economic growth can be specified in this way, other channels as elaborated in Haiss et al. (2005) need to be investigated. Further work on the theoretical front is obviously warranted.

Additionally, the application of the finance-growth-nexus to the transition economies warrants some caution. Due to rather short time series available and difficulties to model the evolution of output in transition economies, findings on transition economies should be treated as rather preliminary (Mehl & Winkler, 2003). The possible impact of inflation, of bad loans and the possible association of fast credit growth with financial distress are worth mentioning in this context. The inclusion of inflation as conditioning variable may be of special relevance during the early stages of economic transition, which are usually characterized by high inflation. Mamatzakis, Staikouras & Koutsomanoli-Fillipaki (2005) and Cottarelli, Dell’ Ariccia & Vladkova-Hollar (2005) thus control for the inflation rate in their investigation of banking concentration and financial deepening in transition economies (for a similar argument see also Fink, Haiss & Ugljesic, 2005).
5. Empirical Methodology

5.1. Panel Data Regressions

This subsection discusses the econometric particularities of panel data regressions for estimating the impact of FSFDI on economic growth. We will finally show that a variable-intercept panel data model with country- and time-fixed effects is the most appropriate one for our question of research.

5.1.1. Why Panel Data Regressions?

One of the most important strengths of the panel data approach (PDA) is the combination of both the time dimension and the cross-section dimension. This combination leads to more observations, “increasing the degrees of freedom and reducing the collinearity among explanatory variables – hence improving the efficiency of econometric estimates” (Hsiao 2003, 3). Using only time-series models, conversely, would imply to include long lags in order to prevent short-run fluctuations to drive apparent long-run correlations. This, in turn, would lead to fewer observations since the cross-section variation is for the most part ignored (see Temple 1999, 133). Thus, long-run growth effects can be addressed with a higher degree of confidence using panel data regressions. But we have to consider that panel data regressions based on annual frequency data, without controlling for time-specific effects, are often determined by short-run movements or by business cycle fluctuations (see Eller 2004). As a consequence, it is broadly acknowledged to construct perennial averages or to use annual data with time-specific dummies in order to capture the likelihood of short-run effects (see Davoodi & Zou 1998).

Furthermore, the PDA enables to control for omitted variables that are persistent over time. “By utilizing information on both the inter-temporal dynamics and the individuality of the entities being investigated, one is able to control in a more natural way for the effects of missing or unobserved variables” (Hsiao 2003, 5). Unobservable differences that are systematically related across countries and are fairly constant over time – think about the characteristics of FSFDI – can be considered within the PDA by the implementation of country-specific effects. The inclusion of these effects is not only an optional tool in order to get more information about individual- or time-specific characteristics of the examined countries, it is also an econometric necessity in order to inhibit correlation between the regressors purely because of contemporaneous time or country shocks. Ignoring these effects can lead to parameter heterogeneity in the model specification, what, in turn, “could lead to inconsistent or meaningless estimates of interesting parameters” (Hsiao 2003, 8).

5.1.2. Dynamic or Static Panel?

The inclusion of lagged dependent variables as regressors helps to control for omitted variable bias. The ability to lag explanatory variables may also help to control for endogeneity bias. Along these lines, a dynamic specification of the model can be used to test for Granger causality or joint determination of the variables (see Nair-Reichert & Weinhold 2001, Hansen & Rand 2004). Although we recognize these advantages of a dynamic panel model, in this version of the paper we would like to stick strictly to the theoretical model, which does not explicitly call for an inclusion of a lagged dependent variable. In a future step, when we are
going to employ Granger causalities, we will impose the inclusion of the lagged dependent variable. In this paper we specify the empirical panel data model in a static way. The impact of lagged values of FSFDI can still be tested.

5.1.3. Homogeneous or Heterogeneous Coefficients?

Since we are primarily interested in testing whether the behavioral relationship predicting economic growth is the same across the 11 CEE countries and over the 10 years period, the slope coefficients of the prediction equation are assumed to not vary neither from one country to the other nor from one year to the other (see also Baltagi 2001, 47). Assuming that the slope coefficients are independently distributed, their values can be restricted to be constant across countries within a given year (for a similar reasoning see Bottasso & Sembenelli 2001, 173). In this manner, one can still exploit the main advantage of the PDA, namely high degree of freedoms. Beyond it, we can capture differences across the countries in differences in the constant term. While the slope coefficients are assumed to be constant, the intercept is assumed to vary over the cross-section units and absorbs in this way country-specific, unobservable particularities. These assumptions lead us to the application of the variable-intercept model (see Hsiao 2003).

Analysis-of-covariance tests help to identify the source of sample variation and to detect the homogeneity of slope and intercept coefficients among different cross-sectional units at different times (see Hsiao 2003, 14 ff.). Accordingly, our estimations of the variable-intercept model are encompassed by covariance tests for intercept homogeneity across cross-sectional units. The null hypothesis of homogeneous (common) coefficients across the countries is tested against the alternative hypothesis of a heterogeneous (country-specific) intercept conducting simple F-tests with and without restrictions. A significant F-value indicates country-specific intercepts.

5.1.4. Fixed or Random Effects?

Once detected country-specific intercepts in the sample, one has to decide whether to treat them as fixed constants over time (fixed effects) or as random variables (random effects). A respective assessment is necessary.

One can think about the possibility that FSFDI attempts may induce international external effects. They are difficult to measure, remain persistent over time and vary across countries. Country-specific effects within the fixed-effect approach can take such externalities into account. In the variable-intercept model with fixed effects omitted individual-specific variables are treated as fixed constants over time.

Another argument supports the fixed-effect approach: this examination focuses differences between specific CEE countries. The situation is not that each country is randomly sampled from a pool of worldwide countries. The sole interest lies in the mentioned CEE countries and therefore a panel with random effects does not seem to be appropriate. Against this background, we have finally given exclusive priority to the fixed-effects estimation procedure.
6. Estimation


6.1.1. Specification

With respect to the previously discussed methodological requirements, the following static variable-intercept panel data model with country-fixed and time-fixed effects forms the starting point for the empirical estimations (see Hsiao 2003):

\[ y_{i,t} = \alpha_i^* + \beta' x_{i,t} + \lambda_t + u_{i,t}, \]  

(6.1)

where \( i = 1, \ldots, N \) (cross-section units), \( t = 1, \ldots, T \) (time index), \( y_{i,t} \) is the dependent variable (economic growth), \( \beta' \) is a \( 1 \times K \) vector of constants representing the slope coefficients of the explanatory variables, \( x_{i,t} \) is a \( K \times 1 \) vector of explanatory variables (growth of FSFDI, growth of physical and human capital stock per worker, growth of government consumption to GDP as control variable), \( \alpha_i^* \) is a \( 1 \times 1 \) scalar representing the unobserved individual-specific effects, and \( u_{i,t} \) is the error term representing the effects of those unobserved variables that vary over \( i \) and \( t \); it is assumed to be an independently identically distributed random variable with mean zero and variance \( \sigma_u^2 \) \( (u_{it} \sim IID(0, \sigma_u^2)) \). Additional \( T - 1 \) dummy variables \( \lambda_t \) are included, whereby one of the time effects must be dropped to avoid perfect collinearity (see Greene 2000, 564).

As long as the slope coefficients remain homogeneous and the intercept remains heterogeneous over the cross-section units, the subsequent estimations, conducted in EViews 5.0, follow equation (6.1).

6.1.2. Procedure

The equations of the previous section are estimated in the following way: we start from a panel data model where all the variables (inclusive intercept) are homogeneous across the countries and over time. In a first step, \( F \)-tests for the heterogeneity of the intercept are run. We follow the procedure presented in Section 5.1.3 and in the case of significant country-specific effects, they are treated as fixed ones (remind the reasoning in Section 5.1.4). Time-fixed effects are included per assumption in each equation because of the likelihood of short-run business cycle fluctuations (remember the discussion in Section 5.1).

In a second step, the country-specific residuals of the model (at this point a variable-intercept panel model, given the significant heterogeneous intercept) are examined. Considerable differences in all the standard deviations of the country-specific residuals indicate group-specific heteroskedasticity. Since heteroskedasticity leads to biased standard errors, we use White heteroskedasticity-robust standard errors and covariance to allow for reliable significance interpretations.

Finally, all the estimations are accompanied by several sensitivity checks. Overall pure cross-section regressions are run. Control variables (government consumption to GDP) are built into the economic growth equations. Outliers are separated from the model. The
various indicators for FSFDI – shown in Section 3 – are tested and last, but not least, the time span is varied (1994–2003 vs. 1996–2003).

6.2. Estimation Results

The estimation output is summarized in the Tables 1–2 (see Appendix B). Using the inward FSFDI stock per employee or per GDP, respectively (Table 1), or using cross border financial M&A as indicator for FSFDI (Table 2) yields more or less the same results. The standard growth regression variables behave as predicted: the change of physical capital stock per employee is related positively and highly significant to economic growth. The change of human capital per employee shows in all but one specification the expected positive sign, albeit not significant. The control variable government consumption to GDP is included when it entered the equation significantly and when its inclusion did not change the diagnostic results incisively. As expected, GOVGDP is related negatively to economic growth, confirming the negative impact of the size of the public sector on economic growth.

However, the temporary and permanent FSFDI-induced efficiency-led growth hypotheses cannot be confirmed by direct estimates of the two FSFDI indicators. Although FSFDI shows the expected positive impact on economic growth, the coefficient is not statistically significant. Accordingly, more careful handling of the variables is necessary.

The theoretical pros and cons of FSFDI for the host economy (see Goldberg 2004) suggest that there are limits for economic gains from FSFDI. Thus, the optimal degree of FSFDI lies somewhere in between an extremely high and an extremely low one. One can think about a hump-shaped relationship between economic growth and FSFDI, which is in part also suggested by the stylized facts presented in Section 3. As a consequence, we constructed a transformed index of FSFDI per GDP representing a hump-shaped impact of FSFDI on economic growth (for details see the data appendix). This index is related positively to economic growth with a lag of two periods (see regressions 4.5ad, 4.5bc, and 4.5be). While it is highly significant for the estimation sticking to the financial M&A indicator, it is not significant for the estimations with the inward FSFDI stock indicator (although it shows a higher t-statistic than the direct estimates for this indicator). Further analysis should strengthen this estimation approach in order to detect potential non-linearities between (FS)FDI and growth.

Borensztein et al. (1998) detected a positive and significant interaction between the stock of human capital and FDI. They interpret this finding with the observation that “the flow of advanced technology brought along by FDI can increase the growth rate of the host economy only by interacting with that country’s absorptive capability”. Following this line of research, we implement as a second improvement interaction terms between the stock of FSFDI and the stock of human and physical capital.

We enclose the products of FSFDI and human and physical capital simultaneously in three different regressions. While the interaction of the FSFDI stock with the index of employees’ education has a positive impact on economic growth, the interaction of the FSFDI stock

\footnote{For alternative possibilities to estimate a hump-shaped relationship see Crespo-Cuaresma & Silgner (2004), who detected a non-linear relationship between inflation and growth in Europe and try to estimate in particular the thresholds where the inflation rate is correlated negatively or positively, respectively, with economic growth.}
with the stock of physical capital is associated negatively to growth. Both effects together can explain the insignificant impact of FSFDI in the other equations. The specification in regressions 4.5bb and 4.5bd (financial M&A per employee or to GDP, respectively) replaces the FSFDI variable by the mentioned interaction terms and yields coefficients that are highly statistically significant. The high significance of the interaction terms may be the effect of the omission of other relevant factors, in particular, the FSFDI variable by itself. Therefore we include FSFDI, human capital, and physical capital individually alongside their product in regression 4.5ab (change of inward FSFDI stock per employee). In that way, we can test jointly whether these variables affect growth by themselves or through the interaction term (see Borensztein et al. 1998). Compared to other equations of Table 1 with the same amount of total observations, this regression delivers the highest adjusted $R^2$. The two interaction terms do not change their sign and are still significant, albeit only at the 10% level. FSFDI by itself enters the equation positively but is still not statistically significant.

Let us try to interpret these findings more accurately. Firstly – considering the positive human capital-related interaction term – we can detect complementary effects between FSFDI and human capital on economic growth. FSFDI seems to spur economic growth depending on a higher human capital stock. Knowledge-spillovers to domestic banks associated with the inflow of FSFDI can be an explanation for this phenomenon. These spillovers can take place if domestic banks are able to cope with the increasing competition induced by foreign owners. However, strong evidence on such spillovers has not been found yet (UNECE 2001, 209). Furthermore, foreign banks seeking to mitigate their own risk might act as a catalyst for regulatory changes and implementation of international corporate standards. Consequently, improvements in accounting standards and auditing practices have to follow (BIS 2004, 13). Such implemented higher standards create the need for adoptions and further human capital formation of employees in all industries and companies, not only those seeking for external bank finance. In this context, the particular role of the financial industry within an economy needs to be considered.

Secondly – considering the negative physical capital-related interaction term – substitutive effects between FSFDI and physical capital on economic growth are indicated. On the one hand, FSFDI may have a weaker impact on economic growth in the case of a higher physical capital stock. On the other hand, the physical capital stock may have a weaker impact on economic growth in the case of a higher FSFDI stock. The latter effect can be interpreted by the crowding-out of local physical capital caused by the entry of a foreign bank. Schumpeterian effects of creative destruction seem to be at work. The first effect, however, which is probably the stronger one, cannot be interpreted that straightforward. Analogously to Carkovic & Levine (2002), we could argue that FSFDI is only growth enhancing in countries with low physical capital stocks. In any case, respective analysis deserves more attention. In general, the mode of entry (greenfield vs. M&A), the kind of business and operation of foreign owners and their target groups (retail vs. wholesale) has to be considered respecting the impact on local physical capital formation.

As mentioned before, the panel data estimations have also been encompassed by overall cross-section regressions. The positive impact of FSFDI on economic growth as suggested by Figure 4 can be broadly confirmed by the cross-section results, where the trend growth rate of FSFDI per employee between 1996 and 2003 is related positively and highly significant to economic growth. Nevertheless, the small sample of 11 CEE countries could lead to small
sample biases and therefore these results have to be interpreted with caution.

Finally, first attempts have been initiated to address potential endogeneity and simultaneity problems in the estimation equations (in particular important for variables where bi-directional interference – as for FSFDI and growth – is suggested). Preliminary general method of moments (GMM) estimations with instrumental variable techniques confirm more or less the aforementioned results. In particular the negative effect of the interaction between the physical capital stock and FSFDI is still significant, while in a few equations the human capital-related interaction term is not significant anymore, albeit still positive.

7. Concluding Remarks

The results indicate that there can be a relationship between FSFDI and economic development – depending on a careful examination of lagged, hump-shaped or interacted effects of FSFDI. While we concentrate on one aspect of the relationship between FSFDI and growth – the efficiency channel – further channels need to be investigated. Does FSFDI trigger growth in private domestic credit (whereas credit volume frequently is mentioned as a likely cause for GDP growth in the literature)? Does FSFDI trigger shrinking interest rate margins (whereas credit price again should have an impact on investment and growth according to common assumptions)? Does FSFDI also attract FDI in the real sector or portfolio investment into the host country stock exchange (i.e. are there spillover effects)?

The above research also clearly calls for a regional broadening. While we concentrated on “emerging Europe” (i.e. the New EU Member and Candidate Countries from CEE) here, the model could be replicated for Latin America and South-East Asia which show many similarities in transition efforts. The true value of the paper lies in modeling hitherto only qualitatively discussed possible relationships into a structural, econometric model that follows the standard forward of two streams of related literature.

The connection between FSFDI and economic growth is very sample- and channel-dependent. The investigation of different country samples and different causal linkages appears to be a fruitful avenue for further research. From an econometric point of view, it is a promising approach to conduct GMM estimations in order to control for endogeneity of explanatory variables. In addition, the analysis of Granger causalities for the variables where the panel results showed a significant relationship shall contribute to a better interpretation of potential bi-directional interference between FSFDI and economic growth.
References


Crespo-Cuaresma, J. & Silgoner, M. A. (2004), ‘Growth Effects of Inflation in Europe: How low is too low, how high is too high?’. Vienna Economics Papers No. 0411, University of Vienna, Department of Economics.


Hunya, G. & Stankovsky, J. (2005), ‘Foreign Direct Investment in Central and Eastern Europe with Special Attention to Austrian FDI Activities in this Region’. WIW–WIFO Database.


A. Data Appendix

**Growth rates:** for the calculation of growth rates we follow Temple (1999, 119) and apply his trend growth conception. Using only initial and final output for the calculation of the growth rate may be misleading since either of these may be at some distance from the trend path of output (due to short-run instabilities, as business cycle fluctuations). Therefore, it may be preferable to use the least squares growth rate, obtained by regressing the natural log output series on a constant and a time trend. We use this calculation method for the pure cross-section regressions and for several interpolations. In regressions based on annual values we are using the log first-differences for the growth rate.

**RGDPL:** real GDP at 1995 domestic market prices divided by the number of employed persons of the total economy. The values for Croatia between 1994 and 1999 are interpolated with the trend growth rate between 2000 and 2005. Source: AMECO (annual macro-economic) database of the European Commission’s Directorate General for Economic and Financial Affairs (DG ECFIN), April 2005.

**NGDP:** (nominal) GDP at current market prices in mn EUR. Source: AMECO database.

**Physical capital stock:** real physical capital stock per employee at 1995 domestic market prices. Time series on the physical capital stock \((K)\) were calculated by using perpetual inventory methods. The initial capital stock values \((K_0)\) were calculated following Easterly & Levine (2001) by \(K_0/y_0 = (I/Y)^{\phi}/g^{\phi} + \delta\), where \((I/Y)^{\phi}\) represents annual average investment rates (gross fixed capital formation (GFCF) of the business sector) over a ten year period, 

\(g^{\phi}\) denotes output growth averaged over a ten year period, and \(\delta\) is a constant rate of depreciation assumed to be 0.07. Assuming that the growth rate of the capital stock can be approximated by the growth rate of GFCF, further values of the capital stock are calculated by taking the initial value, using annual real changes of GFCF and dividing the values by the number of employed persons of the total economy. Source: WIIW Research Reports 314, March 2005; International Financial Statistics (IFS) of the IMF; AMECO database.

**Human capital stock:** constructed index using reported education levels of employees 1996–2003 (low educated: ISCED-classification 0-2, weight 1; medium educated: ISCED 3-4, weight 1.4; high educated: ISCED 5-6, weight 2). Source: EUROSTAT, labour force surveys, primarily 2nd quarter 1998–2003 (no data for Croatia). Data for 1996–1997 are interpolated using the trend growth rate between 1998 and 2003. Data for Lithuania are adjusted because of a structural break 2000–2001 which has given rise to overestimated high educated and underestimated low educated employees. The EUROSTAT data have been favored respecting educational attainment rates of the Barro and Lee (2000) database, since the latter one does not provide sufficient data for the Baltic countries.

**Employment:** number of employed persons of the total economy. Source: AMECO database (national accounts).
**GOVGDP:** Real final consumption expenditure of the general government to real GDP at 1995 domestic market prices, representing the size of the public sector. *Source:* AMECO database.


**FINMA – total financial cross border M&A:** flow data relating to completed M&A (mn EUR) in the financial sector for all eleven CEECs (except Croatia) from 1994 to 2002. The data exclude corporate transactions involving less than 5% of ownership of banks and non-bank financial institutions or less than 3% if the transaction value is greater than 1 million US-$. Although, in practice, all transactions referred to are acquisitions, the acronym M&A is used. *Source:* European Central Bank (Baudino et al. 2004).


**Hump-shaped index for FSFDI:** is constructed analogously to Eller (2004): in a country ranking the lowest and highest values of FSFDI per GDP get a value of one. The next lowest and highest values get higher values and this procedure is continued up to the medium range values of FSFDI per GDP, which get the highest values. This procedure is repeated for each year within the estimation period.

**B. Estimation Output Tables**
### TABLE 1: PANEL DATA RESULTS FOR THE IMPACT OF FSFDI ON ECONOMIC GROWTH IN SELECTED CEE COUNTRIES, 1996-2003

Cross-Country Growth Accounting, Annual Data, Whole Sample

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Equations</th>
<th>Temporary Effects</th>
<th>Permanent Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(4.5aa)</td>
<td>(4.5ab)</td>
<td>(4.5ac)</td>
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<tr>
<td>Constant</td>
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<tr>
<td></td>
<td>(10.308)</td>
<td>(1.536)</td>
<td>(12.193)</td>
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<tr>
<td>FSFDI&lt;sub&gt;it&lt;/sub&gt;</td>
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<td>0.002</td>
<td>-0.0012</td>
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<tr>
<td></td>
<td>(0.073)</td>
<td>(0.241)</td>
<td>(-0.131)</td>
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<tr>
<td>Δln(k&lt;sub&gt;it&lt;/sub&gt;)</td>
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<td>0.102***</td>
<td>0.103***</td>
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<td>Δln(h&lt;sub&gt;it&lt;/sub&gt;)</td>
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<td>0.078</td>
<td>-0.008</td>
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<tr>
<td></td>
<td>(0.030)</td>
<td>(0.272)</td>
<td>(-0.007)</td>
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<tr>
<td>Δln(GOVGDP&lt;sub&gt;it&lt;/sub&gt;)</td>
<td>-0.123*</td>
<td>-0.113*</td>
<td>-0.119*</td>
</tr>
<tr>
<td></td>
<td>(-1.808)</td>
<td>(-1.733)</td>
<td>(-1.765)</td>
</tr>
<tr>
<td>ln(FSFDI&lt;sub&gt;it&lt;/sub&gt;)×ln(h&lt;sub&gt;it&lt;/sub&gt;)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(1.802)</td>
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</tr>
<tr>
<td>ln(FSFDI&lt;sub&gt;it&lt;/sub&gt;)×ln(k&lt;sub&gt;it&lt;/sub&gt;)</td>
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<td></td>
</tr>
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<td></td>
<td>(-1.859)</td>
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<tr>
<td>Adj. R²</td>
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<tr>
<td>No. of Total Observations</td>
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<td>63</td>
<td>63</td>
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<td>Not Included Countries</td>
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<td>RO</td>
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<tr>
<td>Prob &gt; F</td>
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<td>0.0006</td>
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</table>

**Notes:** Estimation method: LSDV, static variable-intercept panel data model with country-fixed and time-fixed effects. t-statistics are in parentheses, basing on heteroskedasticity-robust standard errors (White diagonal s.e. & covariance; no d.f. correction). Asterisks indicate variables whose coefficients are significant at the 10%(*), 5%(**), and 1% (***), level, respectively. Time-fixed effects are included per assumption in each equation because of the likelihood of short-run business cycle fluctuations. For the variable definitions and sources see the data appendix. All regressions are calculated with EViews 5.0.

**Source:** For the variable definitions and sources see the data appendix. All regressions are calculated with EViews 5.0.
# TABLE 2: PANEL DATA RESULTS FOR THE IMPACT OF FINMA ON ECONOMIC GROWTH IN SELECTED CEE COUNTRIES, 1996-2002

Cross-Country Growth Accounting, Annual Data, Whole Sample

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Equations</th>
<th>Dependent Variable: Δln(RGDPL&lt;sub&gt;it&lt;/sub&gt;)</th>
<th>Permanent Effects</th>
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<td></td>
<td>(4.5ba) FINMA&lt;sub&gt;it&lt;/sub&gt; = ln(FINMAEMP&lt;sub&gt;it&lt;/sub&gt;)</td>
<td>(4.5bb) FINMA&lt;sub&gt;it&lt;/sub&gt; = ln(FINMAEMP&lt;sub&gt;it&lt;/sub&gt;)</td>
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<tr>
<td>Constant</td>
<td></td>
<td>0.035*** (5.058)</td>
<td>0.024*** (3.304)</td>
</tr>
<tr>
<td>FINMA&lt;sub&gt;it&lt;/sub&gt;</td>
<td></td>
<td>-0.002 (-0.595)</td>
<td>-0.002 (-0.704)</td>
</tr>
<tr>
<td>Δln(k&lt;sub&gt;it&lt;/sub&gt;)</td>
<td></td>
<td>0.125*** (5.299)</td>
<td>0.113*** (4.899)</td>
</tr>
<tr>
<td>Δln(h&lt;sub&gt;it&lt;/sub&gt;)</td>
<td></td>
<td>0.919 (1.482)</td>
<td>0.292 (0.459)</td>
</tr>
<tr>
<td>Δln(GOVGDP&lt;sub&gt;it&lt;/sub&gt;)</td>
<td></td>
<td>-0.204*** (-3.530)</td>
<td>-0.170*** (-3.076)</td>
</tr>
<tr>
<td>ln(FINMA&lt;sub&gt;it&lt;/sub&gt;)×ln(h&lt;sub&gt;it&lt;/sub&gt;)</td>
<td></td>
<td>0.007*** (3.433)</td>
<td>0.006*** (2.988)</td>
</tr>
<tr>
<td>ln(FINMA&lt;sub&gt;it&lt;/sub&gt;)× ln(k&lt;sub&gt;it&lt;/sub&gt;)</td>
<td></td>
<td>-0.003*** (-3.597)</td>
<td>0.006*** (2.988)</td>
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<tr>
<td>Adj. R²</td>
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<td>No. of Total Observations</td>
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<tr>
<td>F-Value</td>
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<td>Prob &gt; F</td>
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<td>0.007</td>
<td>0.002</td>
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</table>

**Notes:** Estimation method: LSDV, static variable-intercept panel data model with country-fixed and time-fixed effects. t-statistics are in parentheses, basing on heteroskedasticity-robust standard errors (White diagonal s.e. & covariance; no d.f. correction). Asterisks indicate variables whose coefficients are significant at the 10% (*), 5% (**), and 1% (***) level, respectively. Time-fixed effects are included per assumption in each equation because of the likelihood of short-run business cycle fluctuations. **Source:** For the variable definitions and sources see the data appendix. All regressions are calculated with EViews 5.0.