Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Comparative Economics 32 (2004) 3–22
Journal of COMPARATIVE ECONOMICS
www.elsevier.com/locate/jce

Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis

Kai Carstensen [a,*] and Farid Toubal [b]

[a] *Institute for World Economics, Duesternbrooker Weg 120, 24105 Kiel, Germany*
[b] *University of Kiel, 24098 Kiel, Germany*

Received 7 November 2002; revised 31 October 2003

Carstensen, Kai, and Toubal, Farid—Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis

This paper uses dynamic panel data methods to examine the determinants of foreign direct investment (FDI) into Central and Eastern European countries (CEECs). Our empirical model shows that the traditional determinants, such as market potential, low relative unit labor costs, a skilled workforce and relative endowments, have significant and plausible effects. In addition, transition-specific factors, such as the level and method of privatization and the country risk, play important roles in determining the flows of FDI into the CEECs and help to explain the differing attractiveness of the individual countries to foreign investors. *Journal of Comparative Economics* **32** (1) (2004) 3–22. Institute for World Economics, Duesternbrooker Weg 120, 24105 Kiel, Germany; University of Kiel, 24098 Kiel, Germany.

JEL classification: F21; F23; P33

Keywords: Transition economies; FDI; Panel estimation

1. Introduction

This paper examines the determinants of foreign direct investment (FDI) into Central and Eastern European countries (CEECs) during their transition towards a market economy. The last decade has seen a remarkable growth of European but also US outward direct investments in CEECs. This growth is often thought to be driven by the process

* Corresponding author.
E-mail address: carstensen@ifw.uni-kiel.de (K. Carstensen).

0147-5967/$ – see front matter
doi:10.1016/j.jce.2003.11.001

of integration of CEECs into the European Union and the associated elimination of the barriers to FDI and by the acceleration of the transition process in those economies. However, the CEECs are far from homogeneous and both the level and growth of FDI differ across countries. While the Central European countries, i.e., Czech Republic, Hungary, Poland, Slovak Republic, and Slovenia, have attracted substantial foreign capital, the South Eastern European countries, i.e., Bulgaria and Romania, lag far behind. We argue that this discrepancy cannot be explained fully by traditional FDI determinants because transition-specific factors play an important role in the investment decision of a multinational company in so far as they reflect the actual state of the transition process, the overall policy stance, or even future prospects.

To focus on the transition process, we supplement the traditional determinants, e.g., market potential and trade costs, derived from endowment-based theories of the multinational firm with transition-specific factors, e.g., the level and method of privatization. By using both traditional and transition-specific variables, we extend the work of Lansbury et al. (1996) and Holland and Pain (1998); these authors focus on the business environment and the privatization process as primary determinants of FDI in CEECs. The impacts of these variables are estimated within a dynamic panel data framework using an appropriate generalized method of moments (GMM) estimation technique.[1] By employing a dynamic panel data approach, we incorporate all available information in the cross section and time series dimensions and also distinguish between the short-run and long-term evolution of FDI in CEECs. Only a few studies of FDI have used panel data at all, and these estimated static models only (Bevan and Estrin, 2000). By stressing the dynamic nature of FDI, we make the analysis of FDI in Eastern Europe more realistic.

The structure of this paper is as follows. Section 2 contains some relevant stylized facts to motivate the subsequent analysis and a review of the theoretical literature, from which we derive factors having a potential impact on FDI in Eastern Europe. The econometric specification and estimation strategy are presented in Section 3. Section 4 reports and discusses the empirical results, while Section 5 concludes with a policy discussion and some suggestions for extensions.

2. Some stylized facts and a literature review

Table 1 shows the evolution of FDI inflows as a share of GDP into several regions of the world.[2] The transition to market economies in Central and Eastern European countries has been accompanied by a surge of FDI inflows. CEECs attracted more FDI than the low-income countries from 1993 onward and outperformed lower-middle-income countries in 1999, which may have been affected by the Asian crisis. According to Brenton and Gros (1997), the commercial integration of some CEECs into the European Union is completed.

[1] Buch et al. (2003) estimate a dynamic cointegration model to investigate the long-run determinants of FDI for a larger set of European countries. However, this approach requires a large time dimension that precludes the use of transition-specific variables. Since their estimation results are rather unstable, we decide not to apply panel cointegration techniques.

[2] The classification of countries into regions follows the World Development Indicators (World Bank, 2001).

Table 1
FDI inflows to CEECs, as a share of GDP

Regions	1993	1994	1995	1996	1997	1998	1999
CEEC	1.87	1.68	3.23	2.24	3.17	3.78	4.37
Low income countries	1.32	1.23	2.05	2.48	3.06	3.39	2.98
Lower middle income countries	3.02	3.32	4.65	6.05	3.13	3.81	3.50
Upper middle income countries	2.29	3.28	3.70	3.90	4.94	5.22	6.10
High income OECD countries	1.47	1.62	1.88	1.75	2.16	3.98	5.63

Note: CEEC consists of Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic, and Slovenia.
Source: World Development Indicators (World Bank, 2002).

Table 2
Macroeconomic overview in 1999

Countries	FDI stock	FDI stock per capita	Gross domestic product	Monthly gross wage	Private market share	Country risk	Transition index
Czech Republic	21.10	2052.41	133.80	297.78	80	61.96	3.49
Hungary	19.86	1972.88	115.08	320.90	80	65.75	3.69
Poland	36.48	943.63	326.63	418.67	65	62.06	3.48
Slovak Republic	4.89	906.60	57.15	264.48	75	48.33	3.33
Slovenia	2.90	1460.59	31.72	792.82	55	70.06	3.20
Bulgaria	3.40	414.72	41.62	111.69	70	37.87	2.86
Romania	6.44	286.71	135.68	111.70	60	36.28	2.80
Portugal	23.52	2354.59	113.72	718.00	94	82.84	–

Sources: FDI Stock (in billions of dollars) and Stock per capita (in dollars) from UNCTAD (2001), GDP (in billions of dollars) from World Development Indicators (World Bank, 2001), Monthly Gross Wage (in dollars) from WIIW Handbook of Statistics (WIIW, 2001) and ILO (2001), Private market share (in % of GDP) from EBRD (2001). The country risk index is taken from Euromoney (1999) and is inversely related to observed risk. The transition index is a simple average of the progress in transition indicators from EBRD (2001).

Hence, FDI flows to these countries may reflect a deeper phase of integration. However, the CEEC group is not homogeneous and, as noted by Bevan and Estrin (2000), countries with favorable initial conditions have attracted more FDI than their more risky and poorer performing neighboring countries.

Table 2 presents a brief overview of the state of the transition in some Eastern Economies using Portugal, which joined the EU only in 1986, as a comparator. Most of the foreign investment goes to Poland, the Czech Republic and Hungary, which are the three largest CEECs and also the earliest members of the Central European Free Trade Area (CEFTA).[3] Consequently, investment in one of these countries guarantees access to all of their markets and to the nearby European Union. Moreover, these countries are characterized by a low country risk and a high level of reform measured by the EBRD's transition index. For Hungary and the Czech Republic, the private market is 80% of GDP.

[3] The CEFTA was created in 1992 by the former Czechoslovakia, Hungary and Poland. On March 1993, duties on approximately 40% of industrial goods were eliminated. On January 1997, duties on industrial products were removed completely, except for a few sensitive sectors.

Table 3
Share of FDI stock by country of origin, as of December 1999

Countries	Czech Republic	Hungary	Poland	Slovak Republic	Slovenia	Bulgaria	Romania
EU	82.7	76.9	63.8	74.5	81.2	60.2	56.8
Austria	11.5	11.7	2.3	16.9	37.5	4.5	5.1
France	4.7	6.1	11.0	4.2	12.8	3.0	7.1
Germany	29.6	28.0	17.3	22.0	12.3	15.3	10.2
Italy	0.9	3.2	9.1	1.6	6.6	1.2	7.6
Netherlands	27.1	15.5	9.2	15.0	3.8	6.0	11.6
UK	4.7	6.4	5.9	9.1	4.8	5.7	5.1
Others	4.2	6.0	9	5.7	3.4	24.5	10.1
USA	8.2	12.2	14.7	13.0	4.4	7.1	7.7

Source: UNCTAD (2001).

Hence, the countries having a large market, i.e., high GDP, and a stable, advanced market economy perform well in terms of attracting FDI.

On a per capita basis, although relatively small, Slovenia and to a lesser extent the Slovak Republic attract significant FDI. Slovenia has a relatively stable environment, with a country risk index of 70, and the Slovak Republic has a relatively high share of private businesses at 75% of GDP. Moreover, both countries are well advanced in their transition to a market economy. In Bulgaria and Romania, the slow progress toward a market economy has impeded FDI inflows, even though these economies have the lowest labor costs of all CEEC countries. Based on these data, we make a distinction between the Central European Countries, namely, Czech Republic, Hungary, Poland, Slovak Republic and Slovenia, and the South Eastern European Countries, namely, Bulgaria and Romania, in our analysis.

The origins of FDI flows to CEECs as of December 1999 are reported in Table 3. Foreign investment comes mainly from the EU, with Germany, the Netherlands and Austria as the main investors. Proximity to the EU stimulates market-seeking investment of EU-based multinationals but also, to a smaller extent, greenfield investments (Alessandrini, 2000). The latter benefit from few large privatization projects mostly in the late 1990s. The position of the US is non-negligible, particularly in the Visegrad countries, i.e., Poland, Czech Republic, Slovak Republic and Hungary. These four countries account for about 90% of US investment in the region.

The growing theoretical literature on FDI identifies two main areas in which multinational companies compensate for the cost of operating abroad. The horizontal approach considers the endogenous emergence of multinational enterprises (MNEs) in models of imperfect competition, e.g., Horstmann and Markusen (1992), Brainard (1993) and Markusen and Venables (1998, 2000). Horizontal multinationals produce the same product in multiple plants so that they serve local markets from local production. Horizontal multinationals arise if proximity advantages outweigh concentration advantages.[4] In this proximity-concentration approach to FDI, the presence of multinational firms depends on a set of in-

[4] The proximity advantage reflects the benefits of locating production close to consumers while the concentration advantage reflects the benefits from economies of scale. Companies choose to export their goods and services if concentration advantages prevail.

dustry characteristics, e.g., factor intensities, increasing returns to scale, and product differentiation, and country characteristics, e.g., relative endowment differences and trade costs. Other indirect factors, e.g., public and private infrastructure and legal systems, also affect both trade costs and plant setup costs (Markusen and Zhang, 1999). Breuss et al. (2001) provide an interesting extension of the models of Markusen and Venables (1998, 2000). In a three-factor model, they introduce structural subsidies that may decrease either the transport cost or the plant setup cost of MNEs.[5] In their model, multinational activities increase in countries where the structural expenditures are allocated directly to subsidize investments.

Given the dominance of developed countries as source and as host countries, horizontal models have received somewhat more attention than vertical models of FDI, e.g., Helpman (1984). These models explain the existence of MNEs by large differences in factor endowment across countries because different parts of the production process have different input requirements. Since input prices vary across countries, it becomes profitable to split the production process according to the factor intensities of its different stages. Hence, the vertical model allows the separation of the knowledge-generating activities from production. Markusen et al. (1996) and Markusen (1997) integrate these two approaches by developing a knowledge-capital model that allows multinationals to be vertical as well as horizontal. Vertical MNEs arise when countries have different factor endowments and trade costs are low.[6]

Two main conclusions for the choice of explanatory variables to be used in the empirical analysis emerge from the preceding discussion. First, both horizontal and vertical MNEs are expected to invest in CEECs. The former are attracted not only by local markets but also by the opportunity to service the neighboring countries and the EU market through FDI in accession countries; the latter are attracted by factor endowment differences and low labor costs. All of these variables are closely related to theoretical models of FDI. Second, the transition path of the individual CEECs matters. A foreign investment decision is affected by the progress of a potential host country toward a market economy. Hence, Hungary and the Czech Republic, which pursued a policy of fast privatization and exhibited a sound political and legal system, perform exceptionally well in terms of FDI while others lag far behind. Consequently, a second set of explanatory variables must be considered to measure the transitional characteristics of the CEECs.

3. Empirical specification

Based on the theoretical literature, we identify a set of traditional determinants of FDI, namely, market size, trade costs, plant and firm specific costs, and relative factor endowments. A second set of explanatory variables introduces transition-specific

[5] Structural subsidies can be used to improve infrastructure facilities and thereby reduce trade costs. They can be also used to subsidize investments directly and thereby reduce the MNEs' plant setup costs.

[6] Tariffs and transport costs encourage vertical multinational activity by magnifying differences in factor prices, on the one hand, and discourage this activity by making trade between the parent company and its affiliate more expensive, on the other hand.

determinants, namely, the share of private businesses, the method of privatization, and the risk associated with each host country, that may influence the decision to invest in CEECs. The motivation for our choice of variables follows; the details of the computations and the data sources are given in Appendix A.

The impact of market size on FDI inflows in CEECs must be treated carefully. Initially, FDI inflows coincided with a period of recession up to 1995, which has been associated with the transition to a market economy (Kornai 1994, 1995; Lavigne, 1999; Roland, 2000). Hence, a perverse but spurious relationship between FDI and market size would result from using the actual output of the host country. Practical suggestions to overcome this statistical problem include proxying market size by population size (Meyer, 1996), starting the analysis at the point of recovery (Barell and Holland, 2000), and taking FDI inflows relative to GDP (Holland and Pain, 1998). All these approaches find FDI to be significantly and positively influenced by market size ceteris paribus. As an alternative approach, we propose taking the market potential associated with a specific location because this is the information that a MNE considers when making a locational decision. The decision of whether to serve remote customers by export or by FDI is not related simply to the size of the domestic market but it also depends on the market size of all neighboring countries (Head and Mayer, 2002). Even within a country, the domestic market is limited by transportation costs between the subsidiary and the various regional markets. Therefore, we measure the market potential of a country as the average of the output of all countries in the sample weighted by an inverse distance measure derived from transportation costs on a region-to-region basis.

In the empirical literature, distance is often used to model trade costs. However, since this variable is constant over time, it cannot be distinguished from any other time-invariant variables in our panel. In her analysis of US FDI at a sectoral level, Brainard (1997) uses freight cost and tariffs as proxies for trade costs. Unfortunately, freight costs are not available for Eastern European countries. Consequently, we take the host country's tariff revenue as a percentage of imports to be the sole proxy for trade costs. Since the impact of tariffs on FDI depends on the size of the host country, we multiply it by average GDP of the host country.[7] This variable conveys more information than a simple distance measure because it changes over time. Due to the aggregate nature of our data, we cannot differentiate between horizontal and vertical FDI; thus, we expect tariffs to have an ambiguous impact on FDI.

Given the relatively low labor costs in CEECs, firms should have a strong incentive to locate their labor-intensive activities in the area. Holland and Pain (1998) find that wage differences between CEECs have a significant impact on FDI inflows from the EU. However, they do not control for the bilateral wage relation between host and home countries. Moreover, low wages do not necessarily reflect low production costs because labor productivity may be low. Taking this into account, the location decision of a multinational depends on the relative productivity-adjusted labor cost in the host county.

[7] We do not use yearly GDP data because we want to control for relative size effects between individual host countries and not for business cycles or other fluctuations.

Thus, we expect that high unit labor costs of the host country relative to the reporting country will depress FDI.

The potential access to skilled labor in the host country is also important.[8] While actual unit labor costs measure the relevant costs for a given production technology, investment by western MNEs leads to innovations in the host country's production technology even though this technology remains less advanced than in the home countries. Bartel and Lichtenberg (1987) suggest that the transition from the old to the new technology generates job tasks and operating procedures that are not only different but less defined in the short run. Nelson and Phelps (1966) argue that education increases the capability to process and understand information; they confirm empirically that educated people are better able to cope with the implementation of a new technology. Consequently, a MNE's demand for educated labor should be high at least for a transition period until the production technology is fully implemented in the CEECs.[9] Therefore, we expect a skilled labor force to have a positive impact on FDI inflows. In this paper, we measure skill as the fraction of medium and higher-educated workers in the relevant labor force.

The absolute difference in GDP per capita is often taken as a proxy for the difference in relative factor endowments, although the relative capital–labor ratio would be a better measure. Unfortunately, capital stock data are not available for CEECs. Moreover, constructing capital stock data from investment data by means of the perpetual inventory method as outlined by the OECD (2001b) is not easily adaptable to CEECs for several reasons. First, the average service lives or depreciation rates for different types of productive assets are uncertain. Second, long consistent series of investment data are missing.[10] Finally, an unknown fraction of the capital stock that was used in the centrally planned economies turned out to be inappropriate for the market system introduced after the abolishment of communism. Consequently, we use the investment–labor ratio, with investment measured as gross fixed capital formation and labor measured as the working population, as a rough proxy for the unobservable capital–labor ratio.[11] Although we have no unambiguous prior expectation of the sign of this variable, the sign of the estimated coefficient provides some information about whether FDI in CEECs is horizontal or vertical.

The 1996 UNCTAD report on FDI incentives concludes that, even if the traditional determinants are still important in the location decision, firms also look for places to invest that offer specific financial and fiscal advantages, e.g., the existence of favorable investment and tax regimes. In particular, Breuss et al. (2001) argue that structural subsidies play an important role in the location decision. Moreover, the lack of information on incentives

[8] At this point, we depart from the theoretical literature by considering skill in the host country rather than in the home country.

[9] This hypothesis is not inconsistent with Egger and Stehrer (2003), who find that the wage bill of manual workers increased in comparison to non-manual workers, because we measure education directly and assume that education is advantageous even for manual workers when a new technology is introduced.

[10] Data before 1990 are calculated according to the material product system (MPS), which is different from the system of national accounts (SNA) used thereafter. Constructing capital stock data from investment data since 1990 only is clearly inadequate because no initial capital stock is available.

[11] In the steady state, a close correspondence between investment and capital is predicted by standard growth theories. However, in transition periods, this correspondence may be weaker.

given to MNEs does not allow us to control for discriminatory policies towards FDI by CEEC governments. Moreover, non-discriminatory practices, e.g., low corporate tax rates, should encourage FDI as Bénassy-Quéré et al. (2000) assert. We consider the impact of nominal corporate tax rates, corrected for the fiscal regime, and expect this variable to have a negative impact on FDI inflows into CEECs.

Other variables may have important impacts on FDI in transition economies. Intangible assets, such as the business culture, may affect the location decision of MNEs. The method and the level of privatization may reflect this effect because they are closely related to the effectiveness of corporate governance. Holland and Pain (1998) and Bevan and Estrin (2000) suggest taking the private sector share of GDP as a proxy for the level of privatization. We use this variable and expect it to influence FDI positively. However, we go beyond the methodology of Holland and Pain, who measure the method of privatization by a general index taking values from 1 to 5 to indicate the different methods ordered from most impeding to most attractive for FDI. The most impeding method involves using vouchers or management and employees buy-outs (MEBO) while the most attractive policy uses sales to outside owners (SOO) only. The other methods use a combination of these techniques as primary and secondary tools with the order indicating proximity to one of the extremes. Since this index is an ordinal variable, we use five dummy variables to capture the impact on FDI of each method of privatization. Moreover, since the quality of the business environment and the overall political climate is likely to influence FDI, we introduce a country risk variable. For this index, higher values indicate less risk associated with a specific country. Therefore, we expect the country-risk variable to have a positive impact on FDI inflows.

Our explanatory variables fall into two categories, namely traditional and transitional. Contained in the first group are the market potential of the host country j at time t, denoted MK_{jt}, tariffs as a proxy for trade costs, denoted $TARIFF_{jt}$, relative unit labor costs between the host country j and the home country i, denoted $RULC_{ijt}$, the fraction of skilled labor to total labor, denoted $SKILL_{jt}$, the relative labor–capital endowment between host and home country, denoted RLK_{ijt}, and the corporate tax rate, denoted TAX_{ijt}, which also controls for the different fiscal regimes in the home country. The second group consists of the private market share of host country j, denoted $PRIV_{jt}$, a political risk index, denoted $RISK_{jt}$, and a measure of the method of privatization. For the last variable, we use the index proposed by Holland and Pain (1998), denoted $METH_{jt}$, but split it into five dummy variables, denoted M^1_{jt} to M^5_{jt}.[12] The panel comprises ten OECD reporting countries, namely, Austria, Belgium (including Luxembourg), Denmark, France, Italy, Germany, Portugal, Spain, UK and US, and seven CEEC destination countries, namely, Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic and Slovenia. We consider the period from 1993 to 1999 because yearly data are available.

Our data imply a specific panel model with two cross-section dimensions, i.e., the ten reporting home countries i with $i = 1, \ldots, N_i$, and the seven CEEC host countries j with

[12] Since the influence of the dummy variables should be increasing from M^1_{jt} to M^5_{jt}, their signs depend on the dummy that we drop to avoid perfect collinearity. For example, if M^3_{jt} is dropped, M^1_{jt} and M^2_{jt} should be negative and M^4_{jt} and M^5_{jt} should be positive.

$j = 1, \ldots, N_j$, and one time dimension t with $t = 1, \ldots, T$. The model is specified as:

$$y_{ijt} = y_{ij,t-1}\alpha + x'_{ijt}\beta + \varepsilon_{ijt}, \quad |\alpha| < 1, \quad \text{and} \tag{1}$$

$$\varepsilon_{ijt} = \mu_{ij} + \nu_{ijt}, \tag{2}$$

where y_{ijt} is the net annual outward bilateral FDI of reporting country i into host country j at time t, and x_{ijt} denotes a $1 \times k$ vector of exogenous variables that vary in the cross section, either with the reporting country i, the partner country j, or with both, and in the time dimension t. Depending on the model, x_{ijt} consists of some of the following variables: $MK_{ijt}, TARIFF_{jt}, RULC_{ijt}, SKILL_{jt}, RLK_{ijt}, TAX_{ijt}, PRIV_{jt}, RISK_{jt}, METH_{jt}$ and M^k_{jt}, $k = 1, \ldots, 5$. Since FDI can take negative values due to disinvestment, we choose a semi-log model so that only the exogenous variables are given in logs, except for $TARIFF_{jt}, RULC_{ijt}, PRIV_{jt}, TAX_{ijt}$, which are expressed in percent, the privatization index, $METH_{jt}$, and the dummy variables, M^k_{jt}. The typical error component structure is given in (2) where μ_{ij} models the time-invariant country pair-specific effects and ν_{ijt} is a stochastic error term, which is assumed to be uncorrelated over all i, j and t.[13] The parameter α reflects persistence in the process of adjustment towards an equilibrium. In addition, β measures the short-run effect of x_{ijt} on y_{ijt} given $y_{ij,t-1}$. The long-run effect is calculated as $\beta/(1-\boldsymbol{\alpha})$.

Arellano and Bond (1991) propose applying a general method of moments (GMM) estimator to (1) in first differences, so that we have

$$\Delta y_{ijt} = \Delta y_{ij,t-1}\alpha + \Delta x'_{ijt}\beta + \Delta \nu_{ijt}, \tag{3}$$

where the individual specific effects are eliminated. These authors take all possible lags of the variables $y_{ij,t-1}$ and x_{ijt} to generate orthogonality restrictions and use a nonparametric estimator of the covariance matrix proposed by Hansen (1982). For predetermined variables x_{ijt}, this procedure results in the moment conditions $E[x_{ij,t-1}\Delta\nu_{ijs}] = 0$ for $t \leqslant s$ and $E[y_{ij,t-2}\Delta\nu_{ijs}] = 0$ for $t \leqslant s$. Although the GMM estimator has been used widely in the empirical literature, Blundell and Bond (1998) show that additionally using lagged differenced variables as instruments for Eq. (1) in levels offers dramatic efficiency gains when the time period is short. Hence, we use their system GMM estimator by exploiting the additional conditions $E[\Delta y_{ij,t-1}\varepsilon_{ijt}] = 0$ and $E[\Delta x_{ij,t-1}\varepsilon_{ijt}] = 0$.[14]

[13] In a static FDI model, the Lagrange Multiplier test for autocorrelation from Baltagi (2001) rejects the null hypothesis of serially uncorrelated disturbances with a test statistic equal to 23.67 and a p-value at 0.000. Therefore, we use the dynamic FDI model given by (1).

[14] With respect to the explanatory variables, x_{ijt}, we have more moment restrictions than country pairs available. Since estimation in panel data models normally means averaging only over the cross-section dimension, this implies linear dependencies within the moment restrictions and, thus, non-invertibility of the associated moment matrices. Therefore, we follow Arellano and Bond (1991) and average the moment conditions of the explanatory variables over N and T. The calculation of the two-step GMM estimator then follows Blundell and Bond (1998).

4. Estimation results

To examine the impact of adding more explanatory variables and also to assess the robustness of our model, we use five empirical specifications in Table 4 to estimate short-term effects and in Table 5 to estimate long-term effects. The baseline specifications, namely (S1) and (S2), are designed to include the effects of the traditional determinants

Table 4
Short-term parameters of the dynamic panel model

Independent variables	Label	(S1)	(S2)	(S3)	(S4)	(S5)
Lagged FDI	FDI_{t-1}	0.326***	0.348***	0.189***	0.237***	0.198***
		(0.000)	(0.000)	(0.000)	(0.001)	(0.009)
Market potential	MK_{jt}	166.192***	92.186***	60.568**	185.106***	101.830**
		(0.000)	(0.000)	(0.024)	(0.000)	(0.022)
Trade costs	$TARIFF_{jt}$	−1.767***	−2.019***	−0.310**	−0.818**	−0.487*
		(0.000)	(0.000)	(0.049)	(0.015)	(0.087)
Relative unit labor costs	$RULC_{ijt}$	−24.815***	−14.568***	−18.620***	−25.295***	−21.672**
		(0.000)	(0.000)	(0.0001)	(0.000)	(0.012)
Skill ratio	$SKILL_{jt}$	121.741**		205.636***	249.759***	347.293***
		(0.010)		(0.000)	(0.001)	(0.000)
Corporate tax rate	TAX_{ijt}	−1.667*	−5.332***	−1.870**	−3.845*	−5.821***
		(0.079)	(0.003)	(0.032)	(0.055)	(0.009)
Relative endowments	RLK_{ijt}		19.290*			
			(0.055)			
Private market share	$PRIV_{jt}$			240.089***	69.838	252.824**
				(0.002)	(0.313)	(0.038)
Methods of privatization	$METH_{jt}$			71.329***		
				(0.000)		
Vouchers	M_{jt}^1				−76.394**	−66.732*
					(0.045)	(0.081)
MEBO	M_{jt}^2				−32.428***	−56.212***
					(0.007)	(0.000)
SOO and MEBO	M_{jt}^4				109.301***	82.860***
					(0.000)	(0.000)
SOO	M_{jt}^5				275.255***	354.310***
					(0.000)	(0.001)
Country risk	$RISK_{jt}$					13.070***
						(0.000)
Number of obs.		420	420	420	420	420
Sargan test		23.761	20.962	30.893	43.233**	42.232*
		(0.475)	(0.641)	(0.232)	(0.043)	(0.068)
Second order autocorrelation		0.261	0.222	0.309	−0.275	−0.349
		(0.797)	(0.824)	(0.758)	(0.784)	(0.727)
Long-run multiplier		1.483	1.534	1.234	1.311	1.241

Note. The p-values are in parentheses.
* Significant at the 10% level.
** Idem., 5%.
*** Idem., 1%.

Table 5
Long-term parameters of the dynamic panel model

Independent variables	Label	(S1)	(S2)	(S3)	(S4)	(S5)
Market potential	MK_{jt}	246.537***	141.373***	74.719**	242.590***	126.980**
		(0.000)	(0.000)	(0.017)	(0.000)	(0.011)
Trade costs	$TARIFF_{jt}$	−2.621***	−3.097***	−0.382**	−1.073**	−0.608*
		(0.000)	(0.000)	(0.049)	(0.014)	(0.091)
Relative unit labor costs	$RULC_{ijt}$	−36.812***	−22.341***	−22.971***	−33.150***	−27.024**
		(0.000)	(0.000)	(0.0002)	(0.000)	(0.017)
Skill ratio	$SKILL_{jt}$	180.596***		253.679***	327.322***	433.065***
		(0.005)		(0.000)	(0.000)	(0.000)
Corporate tax rate	TAX_{ijt}	−2.473*	−8.177***	−2.307**	−5.039*	−7.259***
		(0.091)	(0.005)	(0.036)	(0.057)	(0.009)
Relative endowments	RLK_{ijt}		29.583**			
			(0.055)			
Private market share	$PRIV_{jt}$			296.181***	91.527	315.265**
				(0.004)	(0.316)	(0.045)
Methods of privatization	$METH_{jt}$			87.994***		
				(0.000)		
Vouchers	M^1_{jt}				−100.119**	−83.214*
					(0.044)	(0.084)
MEBO	M^2_{jt}				−42.499***	−70.095***
					(0.006)	(0.000)
SOO and MEBO	M^4_{jt}				143.245***	103.324***
					(0.000)	(0.000)
SOO	M^5_{jt}				491.791***	441.816***
					(0.001)	(0.002)
Country risk	$RISK_{jt}$					16.298***
						(0.000)

Note. The p-values are in parentheses.
* Significant at the 10% level.
** Idem., 5%.
*** Idem., 1%.

for FDI inflows but exclude the determinants specific to the CEE host countries. The only difference between (S1) and (S2) is that we use the skill ratio as the endowment variable in the first specification and replace it with the investment–labor ratio in the second.

In specifications (S3) and (S4), we add the transitional variables for private market share and the privatization method. Specification (S3) uses the privatization index $METH_{jt}$, which takes values between 1 and 5; in specification (S4), this index is replaced by the four dummy variables M^1_{jt} (vouchers or MEBO only), M^2_{jt} (vouchers and MEBO), M^4_{jt} (SOO and vouchers or MEBO) and M^5_{jt} (SOO only).[15] In the last specification (S5), we add the host country specific risk, which is obviously related closely to the transition process in each country.

[15] M^3_{jt} (vouchers or MEBO and SOO) is the residual to avoid perfect collinearity.

To assess the validity of the five specifications, we compute the Sargan test for overidentifying restrictions and the Arellano and Bond (1991) m_2 test for autocorrelation.[16] As Table 4 indicates, except for specification (S4), the overidentifying restrictions cannot be rejected at the 5% level. However, Arellano and Bond (1991) report a strong tendency of the Sargan test to generate overrejection so that the p-value of 0.043 in model (S4) is not troublesome. The m_2 test for the absence of second order autocorrelation of the differenced disturbances is important because the consistency of the GMM estimator hinges on this property. For each of the five specifications, we cannot reject the null of no autocorrelation at any conventional significance level. Therefore, we conclude that the GMM method is appropriate for our empirical work.

In all specifications, the significant and positive short-term impact of the lagged FDI indicates that the adjustment process plays a non-negligible, but small, role. The maximum estimate of this parameter in specification (S2) can be interpreted in the following way. A permanent change in an exogenous variable has 65.2% of its long-run impact in the first period, 87.9% after two periods, 95.8% after three periods and so on.[17] For a single measure of persistence, we follow Hendry (1995) and use the mean lag, which can be interpreted as the average adjustment time and equals 0.534 years.[18] Hence, the low coefficient of lagged FDI reflects a relatively fast adjustment to a new equilibrium.

Regarding the exogenous variables, all the signs of their estimated parameters are as expected. The first specification, (S1), considers the traditional determinants of FDI; because only the exogenous variables are in logs, the parameters must be interpreted as semi-elasticities. Market potential has a substantial positive effect on FDI; a 1% increase in market potential induces average FDI flows from one home to one host country to increase by about 166 million dollars in the first year and 246 million dollars in the long run. The size of the positive effect of a reduction of the tariffs of 1% depends on the size of the host country; it ranges from 20 million dollars for Poland to 17 million dollars for Slovenia in the first year and 30 million dollars for Poland to 25 million dollars for Slovenia in the long run.[19] Because FDI inflows rise with decreasing tariffs, the complementarity relationship between trade and FDI may be due to vertical multinational activities.

According to the trade theory, vertical multinationals reduce the overall costs of production by locating their labor-intensive activities in countries with relatively low unit labor costs. Table 4 indicates that a decrease in the unit labor costs of one CEE country with respect to the reporting country increases the flow of FDI into the host country by roughly 25 million dollars in the first year and 37 million dollars in the long run. In addition, the education of the labor force in the host country, as measured by our skill ratio, has a strong positive impact on FDI inflows. Obviously, a skilled labor force is crucial to the implementation of innovative production technologies and to the adaptation to a Western business culture. At the same time, education may influence the size and composition of

[16] Actually, we use a variant of the m_2 test adjusted for our extended number of moment conditions.

[17] These numbers are calculated as follows: $1 - 0.348 = 0.652$, $(1 + 0.348)(1 - 0.348) = 0.879$ and $(1 + 0.348 + 0.348^2)(1 - 0.348) = 0.958$.

[18] The mean lag is calculated as $\hat{\alpha}/(1 - \hat{\alpha})$.

[19] The calculation of these figures is as follows. The total effect is equal to the estimated parameter times the log average of GDP, e.g., the total effect for Slovenia $= -1.767 \times 9.63 = 17.02$.

demand as Egger (2001) asserts. Hence, MNEs are not only motivated by relatively cheap labor but also discriminate between more or less skilled labor in the CEEC host countries. Finally, relatively high corporate tax rates exert pressure on profits and have an adverse effect on FDI flows. However, our estimated parameter value for corporate tax rates is small and not significant at the 5% level. A decrease of one percentage point in the nominal corporate tax rate in the host countries increases bilateral FDI flows by less than 2 million dollars in the first year and by only about 2.5 million in the long run. This small estimated impact may arise because we do not take into account the special tax regimes designed to attract FDI.

In the second specification (S2), a relative endowment variable replaces the skill ratio and the sizes of the coefficients on market potential, relative unit labor costs, and corporate tax rate change substantially but all are highly significant. Our empirical results show that FDI increases as countries become increasingly different in their relative endowments, indicating that FDI flows are positively related to specialization. The sign of the relative endowment variable was ambiguous a priori. The estimated positive impact suggests the existence of vertical MNEs but this conjecture cannot be confirmed due to the aggregated nature of the data. Moreover, our use of the investment–labor ratio as a proxy for the capital–labor ratio in the specification of relative endowments is clearly not ideal and may lead to a non-negligible error. Therefore, we do not include this variable in the other specifications, in which we include the transition-specific variables.

In specification (S3), we introduce the market share of private businesses and the privatization index; both are positive and highly significant. Adding these variables does not change the sign of the traditional variables but it does lower considerably their impacts compared with specification (S1), although the skill ratio is the notable exception. Hence, the transition specific variables are important determinants of FDI because MNE's decision to invest in CEECs depends both on the level and the method of privatization. Despite their large markets and their relatively low labor costs, Bulgaria and Romania attracted little FDI before 1996. Only with the recent introduction of new privatization laws, which enable sales to outside owners, did these countries have more success with foreign investors.

Regarding the size of transition-specific effects, the estimated coefficient on $PRIV_{jt}$ indicates that a rise of 1% in the market share of private businesses leads, on average, to an additional 240 million dollars bilateral FDI in the short run and 296 million in the long run. At the same time, the method of privatization is statistically significant; however, the estimated coefficient must be interpreted with caution because the privatization index is constructed as a metric variable although it is only an ordinal measure. Hence, we replace this index with dummy variables in specification (S4). To avoid perfect collinearity, we arbitrarily omit one of these, namely M^3_{jt}. Consequently, the impacts of the other dummy variables are interpreted as departures from privatization method 3, which uses a combination of MEBO and SOO. For example, privatizing by vouchers, i.e., M^1_{jt}, leads to roughly 76 million dollars less bilateral FDI inflows than privatizing by MEBO and SOO. From the four dummy coefficients, we estimate that a change from vouchers to MEBO, i.e., M^2_{jt}, generates additional 44 million dollars of bilateral FDI inflows in the short run

and a change from SOO and MEBO, i.e., M_{jt}^4, to SOO, i.e., M_{jt}^5, yields an FDI increase of 266 million dollars in the first year.[20]

Using dummy variables for the method of privatization affects the private market share variable considerably. The estimated coefficient is much smaller than in specification (S3) and it becomes insignificant. Admittedly, the method and level of privatization are correlated, which leads to collinearity between the dummy variables and the private market share. Furthermore, the Sargan test is significant at the 5% level which indicates misspecification although this test tends to reject the null hypothesis too often. When we introduce an additional explanatory variable $RISK_{jt}$ to control for the overall risk of the host countries in specification (S5), the private market share variables returns to its previous size and becomes significant at the 5% level. The risk variable takes values between 10, which indicates no risk of non-payment of foreign debt, and 0, which indicates no chance of payment. This variable is correlated somewhat with the level of privatization because the faster-privatizing countries are also the least risky. To separate the two effects, we include both variables in specification (S5). The parameters for the dummy variables are slightly smaller than in specification (S4) but they retain their significance.

As expected, the coefficient of the $RISK_{jt}$ variable is positive and highly significant indicating that the higher is the country risk index, i.e. the less risky is the investment climate, the more attractive is a country for foreign investors. However, the introduction of country risk lowers considerably the coefficient and the significance level of the trade cost variable. Country risk is defined as the risk of non-payment or non-servicing the payments for goods or services, loans, trade-related finance and dividends and the non-repatriation of capital. Hence, it is a type of trade cost so that the reduction in the size and significance of the $TARIFF_{jt}$ variable is explainable. Finally, the coefficient of the skill ratio increases significantly. This emphasizes the importance of a highly educated workforce in addition to relatively low unit labor costs.

The estimation results suggest that the theory-founded traditional variables alone, analyzed in specifications (S1) and (S2), give a plausible but incomplete description of the determinants for FDI in CEECs. This is not surprising because, by their very nature, theoretical models provide only preliminary guidance for the set-up of empirical models. Incorporating the specific situation of the CEECs by adding transitional variables in specifications (S3) to (S5) makes our empirical FDI model more realistic. The finding that the transitional variables exhibit plausible and significant effects on FDI indicates that the transitional state of the CEECs is important to foreign investors. Specification (S5) is the most complete one because it contains the effects of the level of privatization, the different methods of privatization, and the country risk, so that it is preferred to the other specifications for purposes of interpretation.

5. Concluding remarks

In a dynamic panel model, we identify the factors that encourage and impede FDI flows from OECD countries to seven transition countries in Central and Eastern Europe.

[20] The first number is calculated as $-32 + 76$ while the second number equals $375 - 109$.

Both traditional variables suggested by theory and transition-specific variables have significant and plausible effects on FDI. Among the traditional variables, we find a robust and positive impact of market potential on FDI. However, market access explains only partly the motivation of multinationals that invest in CEECs. Comparative advantages, e.g., low relative unit labor costs, corporate tax rates and relative endowments, also exert a significant influence. Moreover, a skilled labor force helps to attract foreign investors, presumably because it is crucial to the implementation of innovative production technologies and to the adaptation to a Western business culture. From the negative impact of trade costs on FDI, we conclude that FDI and trade are complementary. However, traditional variables are not sufficient to explain FDI in the CEECs. We find that both the level of privatization, measured by private market share, and the actual method of privatization, as a proxy for the quality of corporate governance, have considerable positive impacts on the decision to invest in CEECs. Moreover, we find a significant effect for country risk indicating that uncertainty linked to the legal, political, and economic environment is an important deterrent to FDI.

These empirical results suggest that transition economies can be divided into two broad groups. The Central European economies have been the most successful in attracting FDI because of their relatively high market potential and their sound legal and economic environment, even though they have relatively high unit labor costs. The two Southern and Eastern European countries certainly benefit from low unit labor cost; however, their slow transition process combined with a risky economic environment was a major obstacle for foreign investors. These countries were unsuccessful in attracting FDI during the first half of the nineties. They began to attract investors only after they changed to foreign-oriented privatization policies in the late nineties.

Two interesting extensions come to mind. First, EU enlargement should have considerable effects on FDI flows to CEECs, because the market potential of the entrants will increase considerably due both to the likely increase in their GDP and to the reduction in the economically relevant distance to the EU, i.e., transportation costs. Decreasing trade costs should also be reflected in a reduction of CEECs tariffs. However, the process of integration should reduce the unit labor cost differences between the CEECs and the present member countries of the EU, which would reduce FDI in the CEECs. As a result, the catching-up process will have a tendency to increase investments by horizontal multinationals and depress investments by vertical multinationals. This distinction indicates the importance of firm-level data that would allow researchers to determine more precisely the impact of EU enlargement on the location of multinationals. Second, our finding of a complementary relationship between FDI and trade should be explored further. In our framework, no trade variable is included in the estimated equation. A multiple equation model that takes trade and FDI into account simultaneously would provide a more complete treatment of this issue and determine the robustness of our result.

Acknowledgments

This paper has benefited substantially from the comments of Johannes Bröcker, Claudia Buch, Gerd Hansen, Jörn Kleinert, Horst Raff, two unknown referees and, in particular, the

Editor. We also wish to thank the seminar participants at Kiel and the ETSG meeting 2002 for their helpful comments. We are of course responsible for any remaining errors.

Appendix A. Construction of variables

This section describes the construction of the variables used in our empirical analysis. The subscript i refers to the home country and j refers to the host country; t is the time period. All data are converted in US dollars. The data sources are reported in Table A.1.

(1) MK_{jt} denotes the market potential of the host country and is related not only to the domestic market but also to the market of all the neighboring countries. We measure MK_{jt} by taking into account the host's internal transportation costs proxied by the distance in minutes and the transportation cost between the host and the home country. In a first step, we compute the weighted arithmetic distance d_{ijt} over all region-to-region distances $\delta_{kk'}$ between country j and i:

$$d_{ijt} = \sum_{k \in R_j} \sum_{k' \in R_i} \frac{\overline{GDP}_{kt}}{GDP_{jt}} \frac{\overline{GDP}_{k't}}{GDP_{it}} \delta_{kk'}.$$

R_i is defined as the set of all regions in country i and $\overline{GDP}_{kt}$ measures the GDP of region k at time t. In a second step, we introduce transportation costs in the calculation of market potentials for each year as:

$$MK_{jt} = \sum_{i} \frac{GDP_{it}}{d_{ijt}}.$$

(2) $TARIFF_{jt}$ is tariff revenues as a percentage of imports to proxy for the trade cost of country j. To account for the possibility that the effect on FDI depends on the size of the host country, we multiply this measure by the log average of GDP of the host country.

(3) $RULC_{ijt}$ is the relative unit labor cost between the host county j and the home country i given by

$$RULC_{ijt} = \frac{ULC_{jt}}{ULC_{it}},$$

where ULC_{jt}, the unit labor cost of CEECs, are computed as

$$ULC_{jt} = \frac{W_{jt} E_{jt}}{GDP_{jt}}.$$

Here, W_{jt} is the average monthly gross wage and E_{jt} is total employment, with GDP_{jt} measured in millions of dollars. The unit labor costs of the reporting countries ULC_{it} are calculated as

$$ULC_{it} = \frac{C_{it} E_{it}}{GDP_{it} e_{it}}.$$

Here, C_{it} is the compensation of employees, E_{it} is total employment, and e_{it} is the number of wage and salary earners, with GDP_{it} measured in millions of dollars.

(4) RKL_{ijt} measures the relative investment–labor ratio between country j and country i as

$$RKL_{ijt} = \ln \frac{K_i}{L_i} - \ln \frac{K_j}{L_j},$$

where K is gross fixed capital formation and L is employment.

(5) $SKILL_{jt}$ measures the relation of skilled to total labor in CEECs as

$$SKILL_{jt} = \frac{EDU^3_{jt} + EDU^2_{jt}}{EDU^3_{jt} + EDU^2_{jt} + EDU^1_{jt}},$$

where EDU^h_{jt} is gross education enrollment with $h = 3$ denoting tertiary education, 2 denoting secondary education, and 1 denoting primary education.

(6) TAX_{ijt} is the corporate tax rate, which also controls for the different fiscal regimes, given by

$$TAX_{ijt} = TAX_{jt} - TAX_{it},$$

if the investing country has adopted an exemption scheme or a partial credit scheme and $TAX_{it} < TAX_{jt}$. However, if the investing country has adopted a partial credit scheme and $TAX_{it} > TAX_{jt}$, $TAX_{ijt} = 0$.

(7) $PRIV_{jt}$ is the market share of private businesses in country j as percent of GDP.

(8) $METH_{jt}$ is an index for the method of privatization used in Eastern Europe from Holland and Pain (1998). The variable takes the following values:

- $METH_{jt} = 5$ if SOO is the only method,
- $METH_{jt} = 4$ if SOO is the primary and voucher or MEBO is a secondary method,
- $METH_{jt} = 3$ if voucher or MEBO is the primary and SOO is a secondary method,
- $METH_{jt} = 2$ if voucher or MEBO is the primary and MEBO or voucher is a secondary method, and
- $METH_{jt} = 1$ if voucher or MEBO is the only method.

The abbreviations SOO and MEBO refer to sales to outside owners and managerial and employee buy-outs, respectively. In our empirical work, we use five separate dummy variables, designated M^1_{jt} to M^5_{jt}. Each of these corresponds to using the method described above at time t.

(9) $RISK_{jt}$ is the political risk index taken from various issues of *Euromoney*. The index is defined as the risk of non-payment or non-servicing payments for goods or services, loans, trade-related finance and dividends and the non-repatriation of capital. This variable takes values from 10, which indicates no risk of nonpayment, to 0, which indicates no chance of payments. Countries were scored both in comparison with each other and with respect to their own measure in the previous year.

Table A.1
Data sources

Variable name	Label	Sources
Foreign direct investments	FDI	OECD International Direct Investment Statistic Yearbook (OECD, 2001a), European Union Foreign Direct Investment Yearbook (Eurostat, several editions).
Market potential	MK_{jt}	The GDP data are taken from the World Development Indicators (World Bank, several editions). Regional GDPs and distances were kindly provided by Prof. Johannes Bröcker (see Bröcker and Richter, 1999).
Trade costs	$TARIFF_{jt}$	EBRD (2001).
Relative unit labor costs	$RULC_{ijt}$	European Economy (European Commission, 2002), WIIW (2001), ILO (several editions).
Skill ratio	$SKILL_{jt}$	UNICEF (2001), World Development Indicators (World Bank, several editions).
Relative factor endowments	RKL_{ijt}	Gross fixed capital formation is taken from EBRD (2001). Employment is taken from the World Development Indicators (World Bank, 2001).
Corporate tax rate	TAX_{ijt}	PriceWaterhouseCoopers (several editions).
Private market share	$PRIV_{jt}$	EBRD (2001).
Methods of privatization	$METH_{jt}$	EBRD (several editions), Holland and Pain (1998), Böhm and Simoneti (1993), Böhm (1994–1996).
Country risk	$RISK_{jt}$	Euromoney (several editions).

References

Alessandrini, Sergio (Ed.), 2000. The EU Foreign Direct Investments in Central and Eastern Europe. A. Giuffré, Milano.

Arellano, Manuel, Bond, Stephen, 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58 (2), 277–297.

Baltagi, Badi, 2001. Econometric Analysis of Panel Data, 2nd Edition. Wiley, Chichester.

Barell, Ray, Holland, Dawn, 2000. Foreign direct investment in Central European manufacturing. In: Weresa, Marzenna A. (Ed.), Foreign Direct Investment in Transition Economies: The Polish Case. School of Slavonic and East European Studies. University College, London. SSEES occasional paper No. 50.

Bartel, Ann P., Lichtenberg, Frank R., 1987. The comparative advantage of educated workers in implementing new technology. Review of Economics and Statistics 69 (1), 1–11.

Bénassy-Quéré, Agnès, Fontagné, Lionel, Lahrèche-Révil Amina, 2000. Foreign direct investment and the prospects for tax co-ordination in Europe. Working paper No. 2000-06. CEPII, Paris.

Bevan, Alan, Estrin, Saul, 2000. The determinants of foreign direct investment in transition economies. Discussion paper No. 9. Center for New and Emerging Market, London Business School, London.

Blundell, Richard, Bond, Stephen, 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87 (1), 115–143.

Böhm, Andreja, 1994–1996. Privatization in Central and Eastern Europe. In: Annual Conference Series, Vols. 5–7. CEEPN, Ljubljana.

Böhm, Andreja, Simoneti, Marko, 1993. Privatization in Central and Eastern Europe. In: Annual Conference Series, vol. 4. CEEPN, Ljubljana.

Brainard, Lael S., 1993. A simple theory of multinational corporations and trade with a trade-off between proximity and concentration. NBER working paper No. 4269. NBER, Cambridge.

Brainard, Lael S., 1997. An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. American Economic Review 87 (4), 520–544.

Brenton, Paul A., Gros, Daniel, 1997. Trade reorientation and recovery in transition economies. Oxford Review of Economic Policy 13 (2), 65–76.

Breuss, Fritz, Egger, Peter, Pfaffermayr, Michael, 2001. The impact of agenda 2000's structural policy reform on FDI in the EU. Journal of Policy Modeling 23 (7), 807–820.

Bröcker, Johannes, Richter, Frank, 1999. Wie Wirken Sich Neue Verkehrstechnologien und die Entwicklung Transeuropäischer Netze auf die Europäische Standortverteilung aus? DFG project BR 1542/3-1, Forschungsbericht, vol. 1, Kiel.

Buch, Claudia M., Kokta, Robert M., Piazolo, Daniel, 2003. Foreign direct investment in Europe: Is there redirection from the south to the east? Journal of Comparative Economics 31 (1), 94–109.

Egger, Peter, 2001. European export and outward foreign direct investment: a dynamic panel approach. Weltwirtschaftliches Archiv 137 (3), 427–449.

Egger, Peter, Stehrer, Robert, 2003. International outsourcing and the skill-specific wage bill in Eastern Europe. World Economy 26 (1), 61–72.

EBRD, several editions. Transition report. European Bank for Reconstruction and Development, London.

Euromoney, several editions.

European Commission, Directorate General Economic and Financial Affairs, 2002. Statistical Annex of European Economy. European Commission, Luxembourg.

Eurostat, several editions. European Union Foreign Direct Investment Yearbook. Eurostat, Luxembourg.

Hansen, Lars P., 1982. Large sample properties of generalized method of moments estimators. Econometrica 50 (4), 1029–1054.

Head, Keith, Mayer, Thierry, 2002. Market potential and the location of Japanese firms in the European Union. CEPR discussion paper No. 3455. CEPR, London.

Helpman, Elhanan, 1984. A simple theory of trade with multinational corporations. Journal of Political Economy 93 (3), 451–471.

Hendry, David F., 1995. Dynamic Econometrics. Oxford Univ. Press, Oxford.

Holland, Dawn, Pain, Nigel, 1998. The diffusion of innovations in Central and Eastern Europe: A study of the determinants and impact of foreign direct investment. NIESR discussion paper No. 137. NIESR, London.

Horstmann, J. Ignatius, Markusen, James R., 1992. Endogenous market structures in international trade (natura facit saltum). Journal of International Economics 32 (1), 109–129.

International Labor Office (ILO), several editions. Laborstat Database, ILO, Geneva. Available at http://laborsta.ilo.org/.

Kornai, Janos, 1994. Transformational recession: the main causes. Journal of Comparative Economics 19 (1), 39–63.

Kornai, Janos, 1995. Transformational recession: General phenomenon examined through the example of Hungary's development. In: Kornai, J. (Ed.), Highway and Byways: Studies on Reform and Post-communist Transition. MIT Press, Cambridge, pp. 161–208.

Lansbury, Melanie, Pain, Nigel, Smidkova, Katerina, 1996. Foreign direct investment in Central Europe since 1990: an econometric study. National Institute Economic Review 156, 104–113.

Lavigne, Marie, 1999. The Economics of Transition: From Socialist Economy to Market Economy, 2nd Edition. Macmillan, Chatham, Kent.

Markusen, James R., 1997. Trade versus investment liberalization. NBER working paper No. 6231. NBER, Cambridge.

Markusen, James R., Venables, Anthony, 1998. Multinational firms and the new trade theory. Journal of International Economics 46 (2), 183–203.

Markusen, James R., Venables, Anthony, 2000. The theory of endowment, intra-industry, and multinational trade. Journal of International Economics 52 (2), 209–234.

Markusen, James R., Venables, Anthony, Konan, Denise, Zhang, Kevin H., 1996. A unified treatment of horizontal direct investment, vertical direct investment, and the pattern of trade in goods and services. NBER working paper No. 5696. NBER, Cambridge.

Markusen, James R., Zhang, Kevin H., 1999. Vertical multinationals and host-country characteristics. Journal of Development Economics 59 (2), 233–252.

Meyer, Klaus E., 1996. Business operation of British and German companies with the economies of transition. CIS Middle Europe Centre discussion paper No. 19, London Business School, London.

Nelson, Richard R., Phelps, Edmund S., 1966. Investment in humans, technological diffusion, and economic growth. American Economic Review 56 (2), 69–75.

OECD, 2001a. International Direct Investment Statistics Yearbook. Organisation for Economic Co-operation and Development, Paris.

OECD, 2001b. Measuring Capital. Organisation for Economic Co-operation and Development, Paris.

PriceWaterhouseCoopers, 1993–2000. Corporate Taxes: Worldwide Summaries. Wiley, New York.
Roland, Gérard, 2000. Transition and Economics: Politics, Markets and Firms. MIT Press, Cambridge.
UNCTAD, 2001. Promoting linkages. World Investment report. United Nations Conference on Trade and Development and OECD, New York and Geneva.
UNICEF 2001. A decade of transition—The MONEE project CEE/CIS/Baltic. Regional monitoring report No. 8. United Nations Children's Fund, Florence.
WIIW, 2001. WIIW Handbook of Statistics: Countries in Transition. Vienna Institute for International Economic Studies, Vienna.
World Bank, several editions. World Development Indicators. World Bank, Washington.