Foreign Direct Investment in Central- and East European Countries: A Panel Study [i]

by Markus Leibrecht and Christian Bellak *)

Vienna 2005

DRAFT

Abstract

In recent years many Central- and East European Countries have lowered their corporate tax rates in order to attract Foreign Direct Investment (FDI). We estimate a panel of 56 bilateral country-relationships of 7 home and 8 host countries over a period of 1995-2003 and use a gravity-model setting to check for market-related, efficiency-related and transition-specific determinants of FDI. Contrary to earlier studies using statutory tax rates, bilateral effective average tax rates are used as a measure of the corporate tax burden. The results indicate that taxes are an important location advantage determining the location decisions of foreign MNEs and that taxation is almost equally important to other cost factors like real unit labor costs. In particular, results suggest a semi-elasticity of FDI with respect to taxation of -4.5. This semi-elasticity is in absolute well above those of existing studies. This can partly be attributed to the usage of the BEATR instead of the Statutory tax rate as measure of tax burden.

Keywords: Taxation; Foreign Direct Investment; Multinational Enterprises; Transformation Economies;

JEL classification: F21, H25

*) Both authors: Department of Economics, Vienna University of Economics, Vienna, Austria. Contact author: christian.bellak@wu-wien.ac.at

1 Introduction

Governments in Central and East European Countries (CEEC-8) intervene to influence the location choice of Multinational Enterprises (MNEs) by various measures. They provide incentive packages, fiscal and non-fiscal, and they try to shape various location factors in order to lower production costs for foreign firms. One location factor that figures prominently in actual policy making as well as in the public debate is the corporate income tax rate. What is at issue therefore is, whether tax-rate cuts are an appropriate policy tool for attracting Foreign Direct Investment (FDI) and whether FDI responds significantly to changes of the corporate income tax burden in the CEEC-8.

A first look at the data reveals that a close relationship between FDI and corporate income taxation is indeed plausible. First, the data show a remarkable surge of European and US direct investment into the CEEC-8 during the last years. A considerable variation over time and between host and home countries in the distribution of FDI is discernible (see tables 1 and 2).

Table 1 Aggregate FDI flow into the CEEC-8 (Euro mn) 1995-2003

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	average 1995-99	average 1999-03
CZ	1962.95	1130.14	1134.26	3300.36	5920.25	5396.71	6296.23	8970.70	2283.06	2689.59	5736.67
HU	3901.72	2598.60	3674.75	3414.40	3107.46	2992.70	4394.87	3008.19	2183.48	3339.39	3144.81
PL	2797.38	3542.43	4327.89	5677.51	6821.17	10113.69	6378.96	4368.65	3734.97	4633.28	6149.07
SK	197.55	291.24	203.34	630.37	401.48	2084.66	1768.76	4360.62	504.95	344.80	2179.75
SI	116.11	137.31	292.67	194.36	99.16	148.73	412.05	1698.84	160.03	167.92	604.91
RO	320.33	207.13	1071.39	1811.63	976.73	1122.78	1291.87	1209.81	1384.37	877.44	1252.21
CR	87.31	402.28	469.91	831.69	1376.62	1178.76	1743.30	1188.65	1514.28	633.56	1406.25
BU	69.11	85.84	445.13	479.27	768.25	1084.34	907.66	956.75	1254.77	369.52	1050.88

Source: UNCTAD database.

As expected, larger countries receive the highest FDI inflows. Table 1 reveals that there was a surge in FDI inflows to all of the CEEC-8 since 1995. This was accentuated during the second sub-period, where the average of inflows is everywhere higher than for the first sub-period, with the exception of Hungary.

Table 2 Origin of FDI in the CEEC-8 (bilateral stock and 7 home countries' stock in per cent of total stock) 2003

	AUT	GER	FR	IT	NL	UK	US	Together
Bulgaria	10.95	8.29	2.23	6.33	9.89	5.70	8.52	51.92
Croatia	25.80	17.91	0.93	8.62	8.37	2.49	10.79	74.91
Czech	11.82	20.57	7.92	1.07	30.92	4.25	5.16	81.70
Hungary	11.22	29.20	4.34	1.85	19.54	0.86	5.21	72.21
Poland	4.02	17.25	14.47	3.90	23.34	3.66	9.47	76.10
Slovakia	14.01	18.97	2.39	8.13	26.24	7.48	4.05	81.28
Slovenia	23.19	7.80	7.45	6.44	5.41	2.76	1.63	54.69
Romania	6.23	7.16	10.43	7.77	18.59	1.95	3.36	55.49

Source: WIIW Database

Table 2 shows the origin of FDI stock. The three most important home countries are Germany, The Netherlands and Austria. The large share of Austria in Slovenia and Croatia as well as the large shares of Germany and the Netherlands in all countries but Slovenia are striking. The data also reveal that most of the FDI stock is owned by European Investors. There is a striking difference between EU-member and non-member host countries, with Slovenia being under- and Croatia being over-estimated, as the seven home countries own above 70 percent of the total stock in member host-countries, but only somewhat more than 50 percent in Bulgaria and Romania.

The observed surge in FDI inflows to the CEEC-8 was accompanied by a more or less pronounced drop in the overall statutory corporate income tax rates[ii] in most of the CEEC-8.[iii] (cf. Table 3a)

Tables 3a and 3b Overall Statutory Corporate Tax Rates 1995 – 2005 (in per cent)

Year	*CZ*	*HU*	*PL*	*SK*	*SI*	*BUL*	*CRO*	*RO*
1995	41.00	18.60	40.00	40.00	30.00	40	25	38
1996	39.00	19.00	40.00	40.00	25.00	40	25	38
1997	35.00	19.00	36.00	40.00	25.00	36	35	38
1998	35.00	19.14	36.00	40.00	25.00	30	35	38
1999	35.00	19.40	34.00	40.00	25.00	27	35	38
2000	31.00	19.64	30.00	29.00	25.00	25	35	25
2001	31.00	19.64	28.00	29.00	25.00	20	20	25
2002	31.00	19.64	28.00	25.00	25.00	15	20	25
2003	31.00	19.64	27.00	25.00	25.00	23.5	20	25
2004	28.00	17.80	19.00	19.00	25.00	19.5	20	25
2005	26.0	17.70	19.00	19.0	25.0	15	20	16

Year	*AUT*	*FR*	*GER*[iv]	*NL*	*UK*	*US*	*IT*
1995	34.00	36.70	57.40	35.00	33.00	38.60	52.20
1996	34.00	36.70	57.40	35.00	33.00	40.00	52.20
1997	34.00	36.70	57.40	35.00	31.00	40.00	53.20
1998	34.00	41.70	56.70	35.00	31.00	40.00	41.30
1999	34.00	40.00	52.30	35.00	31.00	40.00	41.30
2000	34.00	36.60	51.85	35.00	31.00	40.00	41.25
2001	34.00	35.30	38.67	35.00	30.00	40.00	40.25
2002	34.00	34.30	38.67	34.50	30.00	40.00	40.25
2003	34.00	34.30	39.58	34.50	30.00	40.00	38.25
2004	34.00	34.30	38.67	34.50	30.00	40.00	37.25
2005	25.00	34.30	38.67	30.50	30.00	40.00	37.25

Source: Update based on Bellak et al. (2004)

Table 3 shows that all CEEC-8 reduced their rates, notably Slovakia and Poland. The average decrease of the rates is 14.4 percentage points. Note, that Slovakia started to reduce its rate in 2000 whereas Poland experienced a more gradual fall. The slight increase in Hungary between 1998 and 2000 is due to an increase in the local business tax. The non-members Bulgaria and Romania have the lowest tax rates among the CEEC-8 in 2005.

In comparison, the drop in the rates in the seven main home countries was modest (cf. Table 3b). The largest reductions occurred in Germany and Italy, the countries with the highest rates in 1996. The average fall is about 5.9 percentage points.

The descriptive evidence therefore suggests the possibility of competition for FDI *inter alia* via tax-rate cuts. But is this relationship statistically and economically meaningful? The main purpose of this paper is to investigate if there is indeed a significant causal relationship between the effective corporate tax burden and FDI-flows to the CEEC-8.

A widely used approach to estimating the effect of potential determinants of inward FDI is to regress the chosen dependent variable, such as the log of FDI, on a set of independent variables, which on theoretical grounds would likely affect the location choice of an MNE between alternative locations. These variables typically reflect location factors influencing vertical vs. horizontal FDI. We have chosen a gravity-setting, which has been widely used to explain trade flows but also increasingly FDI flows.

The location factor of our main interest is the tax burden which a potential foreign investor faces when choosing a location in one of the CEECs. We thereby focus upon FDI from the main home countries (i.e., Austria, Germany, France, Italy, The Netherlands, United Kingdom and the United States of America) to the CEEC-8 (i.e., Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovak Republic, Slovenia and

Romania), because the latter are in the center of the ongoing public debate within the EU about an intensified tax competition. The time span considered here ranges from 1995 to 2003.

The present paper distinguishes itself from the existing studies by including a theoretically well founded measure of the tax burden rather than the statutory tax rate, which has various shortcomings.

This paper contributes to our understanding of the determinants of FDI in emerging ecoomies by investigating the effects of changes in the corporate tax policies of the CEECs on the volume of inward FDI. The empirical results indicate that the tax-lowering strategies of the CEECs had statistically significant and quantitatively important effects on FDI in CEECs.

The remainder of the paper is structured as follows. Section 2 includes a short review of existing empirical literature on corporate income taxes as a location factor as well as methodological problems of empirical studies. Section 3 explains the theoretical background. Section 4 discusses the variables and the methodology used in the estimation. In section 5 the estimation results are presented and discussed, and section 6 summarizes.

2 The impact of taxation on FDI

It is difficult to come up with strong predictions about the consequences of tax-rate cuts on FDI inflows in CEEC-8. This is due to a conceptual and an empirical argument. This subsection therefore takes a brief look at earlier evidence and discusses a number of conceptual points in the remainder.

There exist only a few empirical studies, which suggest a mixed picture. These studies suggest that taxes have only a relatively low impact on FDI to CEEC-8. In Bellak et al. (2004) we survey seven papers (Alfano 2004; Beyer 2002; Carstensen

and Toubal 2004; Clausing and Dorobantu 2005; Edmiston et al. 2003; Javorcik 2004; Mintz and Tsiopoulos 1994) which include taxes as a determinant of FDI[v] and find a median tax rate elasticity of -1.51. This implies that a 1 percentage point change in the tax rate will reduce FDI by 1.5 percent. The absolute value is well below the value of -9.1 found by DeMooij and Ederveen (2003 and 2001) for FDI to mainly developed countries and below the value of -0.6 which Desai et al. (2004) suggest as a rule of thumb.

The low semi-elasticity may be explained by the following facts, which are partly transition-specific:

- Tax-cutting strategies of governments may have little impact on FDI, since FDI may reflect strategic decisions by the management and are thus only partly cost-driven in the short run (compared to portfolio investment which reacts more directly to changes in profitability).
- As far as FDI-flows contribute to expansionary investment, it may react less than in the case of new investment, Greenfield investment in particular.
- Given the large number of location factors stated to be relevant for location decisions by firms themselves, taxes may well have a lower relative weight than other location factors.
- Also, the possibility for transfer pricing and other methods of profit shifting may turn the tax burden for MNEs *ceteris paribus* in a non-issue.
- Should the influence of taxes in the CEECs differ from that of OECD countries? At first sight one may argue that if one controls for transition-specific factors, there should be no difference. Yet, even after controlling for these factors, a difference should be left, since the bilateral FDI relationship between an OECD country and a CEEC is primarily market-oriented, while the FDI relationship among OECD countries is primarily restructuring and

efficiency-oriented (M&A). Therefore, we expect a lower semi-elasticity wrt taxes for an OECD-CEEC FDI-flow.

Yet, there are also methodological problems of earlier studies, which help to explain this result:

(a) Statutory vs. effective tax rates

The validity of the relatively low value of the semi-elasticity is also questionable from a conceptual point of view as most of the papers surveyed use the *statutory* corporate income tax rates as a measure of the tax burden in the host countries instead of the forward looking bilateral effective average tax rates better suited for FDI. Using the statutory tax rate of the host country may therefore result in a sort of measurement error bias in the estimated tax rate elasticities as the BEATRs differ in level and variability from the statutory corporate income tax rates.[vi]

Practically all earlier studies have used statutory tax rates or backward-looking tax rates as the measure of tax burden in the host country. This is not appropriate, since only effective tax rates are able to capture the specific features of the tax burden of FDI. (Devereux and Griffiths 1999)

(b) Lack of sensitivity analysis

Sensitivity analysis is important here in three respects: First, the sensitivity of FDI towards tax-rates at different levels of tax-rates (point elasticity); second, the sensitivity of the effective tax rate on the underlying assumptions of the average investment project. Sensitivity of the coefficients wrt the exclusion of a time period or country is carried out via the jackknife analysis.

(c) Home – host relationship

With few exceptions, emphasis has been put only on home-host relationships (e.g. Benassy-Quere et al. 2003 and 2005) use the relative corporate tax rate of home over host countries. Yet, the location decision of the MNE is not between home – host, but between different hosts.

(d) Measure of FDI

Most authors in the taxation and FDI field would argue that instead of FDI flows FDI stocks or PPEs should be used as dependent variables. The argument rests on the fact that the FDI variable should depict the productive investment / capital that has been located in a particular country / location. Yet, there is also an argument for using FDI flows, especially in panel analysis when annual data are used. In this case, the annual location decision of the MNE refers to the FDI flow, which is not location-bound, rather than to the location-bound capital stock invested abroad during earlier periods.

(e) Log specification

Analyses which use log specifications have dealt with the problem of negative FDI values in various ways: Using net inflows of FDI involves the possibility of negative values by definition, if divestments are larger than new investments.[vii] Negative values create the problem that FDI values cannot be expressed in logarithmic form, which is convenient if one wants to derive elasticities. In the literature, four strategies were used to tackle the problem: (a) no mentioning of the problem, hence our suspicion that negative values are simply dropped or set to zero; (b) using linear transformation, yet which alters the value of the coefficient derived (e.g., Frenkel et al. 2004); (c) using gross inflows of FDI, yet which overestimates the real FDI

invested and thus leads to biased estimates (e.g. Alsan et al. 2004); and (d) taking the log of the absolute value of FDI flows and multiplying by minus one (e.g. Buch et al. 2005), which is probably the least disturbing transformation. In our study we drop 46 negative values, which account for 10 percent of total observations.

It therefore remains mainly an empirical question to determine the role of the tax burden for FDI for particular countries and particular time periods and thus raises interesting methodological issues. This study tackles several of these problems and adds to the literature in particular by using BEATRs instead of the statutory corporate income tax rates as measure of tax burden.

3 Theoretical background: Determinants of inward FDI

The question why a particular country succeeds in the competition for inward FDI can be answered by reference to the OLI-paradigm (Dunning 1988; Markusen 1995). Based upon various theories (e.g. Trade Theory, Theory of the Firm and Theory of Industrial Organization) the OLI-paradigm avers that FDI emerges if a firm has an Ownership (O) advantage (e.g. a patent) combined with a Location (L) advantage (e.g. low production costs; large market size) and an Internalization (I) advantage (e.g. economies of interdependent activities). If only an O advantage is given, licensing results. If an O- and an I-advantage are given exports instead of FDI are used for servicing the foreign market. The predictions of the OLI-paradigm about the choice of the route of foreign market servicing are listed in Table 4.

Table 4 The choice for Foreign Direct Investment

Ownership – advantage	Internalization-advantage	Foreign Location-advantage	Lead to the following type of foreign market servicing…	… resulting in the following location choice of production
Yes	**Yes**	**Yes**	**Foreign Direct Investment**	**Abroad**
Yes	**Yes**	**No**	**Exports**	**Domestic**
Yes	**No**	**No**	**Contractual resource transfers**	**Domestic**
Why?	How?	Where?		

Source: based on Dunning (1988).

Yet the OLI-paradigm provides only examples of the most important host country determinants or L-factors which attract FDI *conditional* upon a firm's decision to undertake FDI. In particular, it does not suggest how to operationalize L-advantages. The OLI paradigm neither attributes weights to single location factors like taxation, nor does it assess their relative weights (e.g. taxes vs. relative unit labor costs). Therefore, we describe the rational for the choice of the variables in the next subsection in detail.

4 Variables, Data and Empirical Specification and Methodology

Dependent Variable

The net-bilateral-FDI-outflow from home country (i) to host country (j) for the years 1995 to 2003 (t) is used as the dependent variable. FDI data are taken mainly from the OECD International Direct Investment Statistics Yearbook 1991–2002.[viii]

Independent Variables

As we are entirely concerned with the second question raised above (where to locate?) our independent variables have to be valid proxies for host country-related L advantages. We base our choice of independent variables upon the findings of some recent and/or widely cited studies, sometimes using different operationalisations. We group the location advantages as follows:

- market-related variables (home market size, host market size, distance)
- cost-oriented location factors (unit labour costs, tax rate)
- transition-specific location factors (inflation, privatization, political risk)

(a) **Home market size** (*gdphome*)

The larger a home country, the larger the potential for FDI outflows *ceteris paribus*, which suggests a positive coefficient.

(b) **Host market size** (*gdphost*)

In theory market size increases FDI as with a larger host market the likelihood that MNEs will be able to recoup the costs of their foreign investment increases (Navaretti and Venables 2004). We therefore expect a positive sign of the estimated coefficient.

(c) **Distance** (*dist*)

Distance is an important determinant of FDI (Brainard 1997). It is especially relevant for production FDI where economies of scale on the plant level at the affiliate have to be weighed against the costs of exporting. This measure has been frequently used in gravity-type models as well as in specifications in empirical studies explaining FDI. The expected sign of the estimated coefficient is ambiguous a priori. While large distance may encourage FDI due to an I-advantage it also may discourage FDI due

to the lack of market know-how, higher communication and information costs and differences in culture and institutions (Buch et al. 2004 and 2005; Buch and Lipponer 2004). Moreover besides capturing the effects described above, distance may also be interpreted also as a proxy for dependence among cross-sectional units (Lusinyan 2005). Hence distance may help to reduce possible problems related to correlation between cross-sectional units.

(d) **Taxation** (*beatr*)

In Bellak et al. (2004) we argue that from a conceptual and empirical point of view forward looking effective tax rates should be used for assessing the role of corporate income taxation on FDI. Table 5 summarizes this view. From the OLI paradigm we conclude that the L-advantages determine the location choice (where?) in the case of FDI. Combining this FDI-related argument with the argument of the taxation literature, which states that for *discrete* choices the average tax rate is relevant, reveals that BEATRs are the relevant L-factor to reflect the tax component of the location decision of MNEs. The rates are calculated using the methodology developed by Devereux and Griffith (1999). For further details concerning assumptions and the calculation, see the appendix and Bellak et al. (2004). We expect a negative sign of the estimated coefficient.

Table 5 Parent Company's Location Decision: OLI and taxation

MNC decision	Determinants according to the OLI paradigm	Result	Relevant Effective rax rate
1. Why and how?	**O, I**	**FDI**	**--**
2. Abroad: Where?	**L** (e.g. tax burden)	**Choice of particular country**	**Average**
3. How much?	**--**	**Scale of investment abroad**	**Marginal**

Source: Based on Devereux and Griffith (2002)

(e) **Privatization** (*prevneu*)

Privatization revenues on an annual basis have been used to reflect progress in privatization. This seems a better measure than the sometimes used indices of the private-sector share (used e.g. by Holland and Pain 1998) or indices of the progress in privatization (used e.g. by Carstensen and Toubal 2004) as published by the EBRD. We expect a positive sign of the coefficient.

(f) **Unit labour costs** (*ulc*)

According to the public debate low labor costs are among the most important determinants of inward FDI in the CEEC-8. This reasoning is in line with evidence reported e.g., in Hunya (2004) who suggests that after the first wave of vertical FDI in the CEEC-8, FDI have shifted "further East" due to increasing labor costs in some of the CEEC-8. Bedi and Cieslik (2002) find that industries which receive more FDI also reveal higher wages and a higher wage growth. Yet, for Poland, they find a strong negative correlation between FDI and wage levels (-0.32). One explanation is again the distinction between market-oriented and efficiency-oriented FDI, which varies by industry (ibidem, p. 13). Thus, in general low labour costs of the host country should

exert a positive impact upon efficiency FDI; for market-oriented FDI the relationship should be positive, indicating purchasing power of consumers and / or a high skill-level in case of horizontal FDI.

In order to check for the empirical relationship, we include a variable which measures labour costs, i.e. unit labour costs (*ulc*). In the literature, various definitions of *ulc* are used, but there is hardly a satisfactory reasoning for the particular type of *ulc* chosen. Therefore, we discuss this issue here in greater detail.

Ulc are defined as the costs of input (labour) that is required to produce one unit of output. They are measured either in *nominal* terms or in *real* terms and are expressed either in *local* currency or in *common* currency. They can be used in *absolute* terms or in *relative* terms across locations (countries, respectively). (See e.g., Someshwar et al. 2004.)

Given these various definitions, one has to carefully choose the appropriate type of unit labour costs. For our purpose, which is explaining the location choice of a foreign MNE between various host countries, we argue that the following criteria are important in the choice of the appropriate *ulc* definition:

- First, since the location choice is international rather than on a national level (e.g. between regions of the same country) *ulc* should be expressed in *common currency*. Here we choose the Euro as the common currency.
- Second, since the host countries of FDI experienced divergent price-level developments over the examination period, with some countries showing rather large inflation and hence, exchange-rate movements, we consider *real ulc* as appropriate. Note, that this consideration is also based on the practical fact that *nominal ulc* are calculated from the compensation of employees in current prices over GDP in constant prices, high inflation would eventually leave the compensation of employees larger than GDP.

- Hauf (1997, p. 525) argues that for comparisons across countries, real *ulc* calculated from nominal compensation and nominal GDP should be used, while comparisons across time require real units in order to exclude the effect of an increasing price level on the *ulc*.

The previous arguments, which suggest expressing *ulc* in common currency in real terms, relate to the actual location choice of a foreign investor: in order to compare, e.g. the labour costs of two foreign locations, given real value added, the comparison needs to be made in a common currency, since the investor compares the absolute amount of wage costs of employees. Therefore, assuming 2 locations, even if location 1 has lower *ulc* than location 2 when expressed in national currencies, this may look different when transferred to a common currency. Currency appreciations (and vice versa for depreciations) may thus increase (decrease) *ulc*. It is important to note that the decision of the foreign investor on the basis of *ulc* relates to both, the vertical or efficiency-related FDI and the horizontal or market-related FDI. *Ceteris paribus*, if *ulc* are lowest in the country where the market is given (e.g. location 1), the market will be supplied by local production. Yet, if there is another host country (e.g. location 2) with lower *ulc* in common currency, location 1 will be supplied by exports from location 2.

(g) **Political Risk** (*risk*)

In countries in transition, property rights may be insecure, given expropriations, and political stability may be low. Hence, political *risk* may play a role as a determinant of FDI, too. As Navaretti and Venables (2004, p. 6) argue "political risk and instability seems to be an important deterrent to inward FDI". We expect a negative relationship (a *positive* coefficient due to the measurement) between political risk and FDI.

(h) **Inflation** (*infl*)

The sign of the coefficient of this variable is a priori ambiguous *a priori*. It may have a negative impact upon FDI due to the macroeconomic instabilities, which high inflation rates imply (Buch and Lipponer 2004). For our sample it is important to note that inflation has been brought down substantially compared to the early transition period. Hence it may no longer impact (negatively) upon FDI.

(i) **Common border** (combord)

Common border reflects the possibility of intensified trade and capital flows between adjacent home and host countries compared to distant countries.

Table 6 provides a summary of the discussion on individual L-factors above.

Table 6 Country-level location factors related to market- and efficiency-oriented FDI

	Variable	Prediction by type of investment (Expected sign)	
		Market-oriented	Efficiency-oriented
$gdphome_{it}$	GDP home country	+	+
$gdphost_{jt}$	GDP host country	+	+
$dist_{ijt}$	Distance	–	–
beatr	Bilateral effective average tax rate	–	–
ulc_{jt}	Real unit labour costs	+	–
$prev_{jt}$	Annual privatization revenues	+	+
risk	Political Risk	–	–
pp	Inflation	–	–

A number of variables, which have been used in other studies are excluded here:

First, openness and tariff are excluded, since the latter are highly multi-collinear (as also Frenkel et al. 2004 mention) with political risk, which is included. Moreover, these three indicators provide roughly the same information.

Second, the private sector share is excluded, but privatization revenues are included.

Third, we prefer *gdp* instead of *population* as a measure of market size.

Fourth, as there are no common languages between home and host countries, this variable is not necessary.

Fifth, the Euromoney overall risk indicator is not used, since it includes a structural break, which is often neglected in empirical studies, but which renders it meaningless as to its time dimension.

Sixth, infrastructure is excluded as there are tremendous operationalisation problems. Indicators like telephone lines are an inappropriate proxy in our view.

Empirical Specification and Methodology

We base our analysis upon a gravity setting as models of that type seem to be successful in explaining bilateral trade flows and more recently bilateral FDI-flows as well (e.g. Frenkel et al 2004, Brainard 1997). More specifically, we use the triple-indexed-Gravity-model proposed by Mátyás (Mátyás 1997, Mátyás et al 1998).[ix] The triple-indexed-Gravity-model is specified as follows:

$$\ln FDI_{ijt} = b_1 \ln Y_{it} + b_2 \ln Y_{jt} + \ln DIST_{ijt} + g_t + a_i + b_j + e_{ijt} \qquad (1)$$

where:

FDI_{ijt} is the net-FDI-outflow from home country i to host country j at time t;

Y_{it} is the GDP in country i at time t and the same for Y_{jt} for country j;

$Dist_{ijt}$ is the distance between countries i and j;

a_i, $ß_j$ and $?_t$ are home, host and time specific effects;

e_{ijt} is the remainder error term;

In this specification lnY_{jt} captures market size usually, which is usually included in specifications explaining FDI-flows. As we are using bilateral-net-FDI-outflows lnY_{it} is intended to capture size differences in home countries. From an econometric point of view a_i, $ß_j$ and $?_t$ can be treated either as random or fixed effects. For our study a fixed effects approach is the proper choice for our sample consists of an ex-ante determined selection of countries and because we are interested in the specific effects per se: home country fixed effects can be interpreted as the propensity of the home countries to undertake FDI in the CEEC-8 (Mátyás et al. 2001, Egger 2000) and the host country specific effects will be substituted by various location factors in our analysis. Moreover it does not make sense to assume that we have a random sample of time periods. Hence time effects are treated as fixed as well. These effects account *inter alia* for the business cycle and for common shocks (Verbeek 2004, Egger and Pfaffermayr 2003).

Our data set constitutes a balanced panel of bilateral net-FDI-flows for seven home countries (i), eight host countries (j) and nine years (t), resulting in 504 observations. Since log FDI-flows are used, which can be negative, we drop 46 observations (about 9 percent of our data set). Moreover the search for outliers via Box-plots and added variable plots pinpoints one data point as a potential outlier[x] leaving us with 457 observations in total.

In the first step of analysis we estimate the triple-indexed-Gravity-model given in (1) and test for the significance of the various fixed effects to avoid misspecification in further steps (see Mátyás 1997 on this topic*).* Moreover we use this model to test for

endogeneity of lnY_{it} and lnY_{jt} via a regression-based Hausman-Wu-test (Wooldridge 2002), using home- and host-country population as instruments.[xi] In a next step we substitute the host country fixed effects by the various location factors (in levels[xii]) described above and test for their statistical significance. We thereby start from the most general model (including all considered location factors) and test down until the preferred specification is reached. This procedure may reduce the probability of an omitted variable bias and it provides information about the robustness of our regression results. An additional robustness and stability analysis is done via a jackknife analysis with respect to countries included and via interacting the coefficient on BEATR, ulc and prevneu with a dummy for the period 2000-2003. Lastly, long-run estimates of our gravity and location variables are derived via a traditional cross-section regression (Kennedy 2003; Egger and Pfaffermayr 2003). Estimation is done via Pooled OLS with cluster-robust standard-errors.[xiii]

5 Results

Table 7 shows the descriptive statistics. In particular, the average bilateral net-FDI flow across countries and time was 205 mn Euros annually. It becomes clear that the between variability is higher than the within variability.

*****Table 7 about here

We distinguish the results by describing the same groups of variables as above:

- market-related variables (home market size, host market size, distance, common border)
- cost-oriented location factors (unit labour costs, effective tax rate)

- transition-specific location factors (inflation, privatization revenues, political risk)

The following tables describe our findings in greater detail, following the argument provided in the methodology section of the paper.

*****Table 8 about here

Table 8 shows the basic gravity model. The coefficients on GDP of home and host country as well as distance carry the expected sign (model 1). Model 2, the proper specification, includes the home and host country dummy variables as well as time dummy variables besides the core gravity variables.[xiv] The various groups of dummy variables are tested for their joint significance using Wald-Tests. Home country and time dummies are mostly significant individually and jointly significant, host country dummies are jointly significant. To avoid possible misspecification we include home and time dummies in our analysis. Host country dummies are substituted by location factors. A Hausman-Wu-test for endogeneity of gdphome and gdphost using pophome and pophost as instruments does not reject the null of exogeneity (1st stage regression F-value: 75.25; 2nd stage regression p-value of test on 1st stage residuals: 44.28).

Next, our analysis proceeds by a brief description of models 3-9. In these models, the host country dummy variables have been substituted by substantive host country variables, measuring cost- and transition-specific host country location advantages as described above.

*****Table 9 about here

Table 9 includes these steps, testing for the significance of the home country and time dummy variables. The comparison between models 3-7 and models 8-9 reveals that the home country dummy variables are jointly significant in every specification, the time dummy variables have been excluded in the latter two models, since they are not significant individually and only marginally significant jointly. Furthermore they impact heavily upon the coefficient of $\ln Y_{it}$.

the market-related factors

Turning to models 3-7, they reveal the significance of the gravity variables (GDP of host country and distance) with the correct sign, while the GDP of the home country is significant only in models 8-9, depending on the exclusion of the time dummy variables. Note that the combord variable is never significant. The coefficients of the host country GDP and home country GDP in models 8 and 9 are close to 1, which is the theoretically predicted value. The coefficient for distance ranges from 0.72 to 0.90, which is in line with the values reported on the average distance effect of 0.94 (see, e.g. Head 2003).

the efficiency-related factors

It is worth noting that the two cost-related factors, the BEATR and the ulc, show remarkably stable coefficients with the correct sign across models 3-9 and they are highly significant.

Countries with higher levels of effective tax rates attract fewer FDI. Thus, in the past, tax lowering strategies of governments in the CEECs had an important effect on the distribution of FDI among the CEEC-8.

The semi-elasticity derived in our study ranges from -4.02 – -4.5. Countries with higher levels of effective tax rates attract fewer FDI. In particular, a one percentage

point reduction of the effective tax rate would increase FDI inflows by 4.5 percent at maximum, which evaluated at the mean FDI inflow of Euro 205.6 mn amounts to Euro 9.3 mn on average. Thus, in the past, tax lowering strategies of governments in the CEECs had an important effect on the distribution of FDI among the CEEC-8.

How does this measure compare to results of earlier studies? First of all, the derived semi-elasticity is considerably lower than the one reported above on the meta-analysis by DeMooij and Ederveen. In our view this result indicates that FDI in the CEECs is primarily of a market-seeking nature, where the tax burden of course matters, but is not the primary determinant.

Yet, this interpretation must be contrasted with the negative sign of the coefficient on unit labor costs, which following our reasoning above points to efficiency considerations of foreign investors. A one percent increase in unit labor costs reduces FDI inflows by 3.4 percent. A positive sign would also not have been implausible. After all, unit labor costs increased in all of the CEEC-8 during the period considered here. Obviously, the clearcut conceptual separation of market- and efficiency-related motives is blurred in praxi, where FDI often include some element of both motives. Moreover, the beta coefficients on the tax and the labor cost variables, not shown here, reveal that the influence of unit labor costs and tax burden on inward FDI is very similar.

Secondly, since the study carried out by Carstensen and Toubal covers partly the same countries as well as a similar time period, it is convenient to compare our results to their results. The comparison is based on the fact that their study is the only study out of the surveyed 7 studies on CEECs above that has carried out the analysis on a bilateral level, just like ours. The median value of the semi-elasticity derived by us on the ten semi-elasticities reported in Carstensen and Toubal is -1.6, thus, much lower in absolute value than ours. It must be kept in mind, however, that

they use the statutory tax rate rather than effective tax rates. (more on this issue in the discussion of table 10 below)

To conclude the cost-specific variables, a closer look at the unit labor cost variable is taken, although it is notoriously difficult to compare, since almost every study uses another definition. Lansbury et al. (1994) use unit labor costs in a host country relative to other potential hosts in Central Europe and find that is has a significant negative impact on FDI when controlling for unit labor costs of other potential host countries (e.g. EU periphery). Inclusion of relative wage and relative productivity measures as in Holland and Pain (1998) appears to leave only the relative wage variable significant, while productivity differentials across host countries do not appear significant, which implies "that considerations of comparative factor costs across countries influence some investment decisions." (p. 16). Clausing and Dorobantu measure labor costs by the average compensation rate in the host country and also find a negative effect throughout. The elasticity of FDI with respect to compensation is -0.5. Thus, while these studies consistently reveal negative significant effects of labor costs on FDI, the negative effect should be interpreted with caution, as a positive sign for unit labor costs is possible, if they actually capture a higher skill level and higher per capita income.

<u>the transition-specific factors:</u>

The variable reflecting the transition to market economies is kept throughout models 3 – 9. The other two transition-specific variables, namely inflation and political risk, which were included in model 3 have been excluded stepwise as well as together with combord. They are not significant, pointing to the fact that inflation has been brought down considerably in the CEEC-8 compared to earlier periods of transition. Studies including earlier years (e.g. Edmiston et al. 2003) reveal significant negative

effects of inflation on annual inward FDI flows as a percentage of GDP, where macroeconomic instability in the transition countries was a much more important issue than in the latter half of the 1990s or in recent years. Also, political stability seems to be not a distinguishing location factor within the CEEC-8. This is in marked contrast to other studies, especially those using data from the beginning of the transformation process till the end of the 1990ies (e.g. Carstensen and Toubal 2004; Frenkel et al. 2004).

Privatisation has been an important driver of inward FDI in the CEECs in general. We used privatization revenues, while other studies have used the private sector share (see e.g. Lansbury et al. 1996, Holland and Pain 1998; Carstensen and Toubal 2004) or the overall transition index (Edmiston et al. 2003, who found no significant results on this variable) as an indicator of progress towards a market economy in the CEECs. As Clausing and Dorobantu (p. 86, FN9) argue, the private sector share in GDP is problematic, as in the case of e.g. Russia, it turns out that progress in privatization is not necessarily correlated with progress in transition (e.g. black market vs. market economy; see also Lansbury et al. 1994). Moreover, this variable which is an estimate made by the EBRD varies, if at all, only in steps of 5 percentage points, and thus has little variation over time.

This explains why we chose annual privatization revenues to reflect progress in privatization. At first sight, the coefficient on privatization revenues, although significant with the correct sign, seems very low, as FDI flows increase by about 0.02% if privatization revenues increase by one million Euro. Privatization revenues should be correlated with gross FDI inflows, if foreign investors primarily benefit from the privatization. Yet, given the fact that we explain net FDI flows, a low correlation would indicate that gross inflows may be compensated by high outflows in case of divestment or sale of a subsidiary. In some cases, as described above, net outflows

are actually negative, implying a potentially large difference between net and gross outflows.

We believe, that our indicator of privatization is more meaningful than using the estimates provided by the EBRD, not least since they turn out to be insignificant in a number of studies, which may be partly due to the fact how they operationalise the privatization process. Two notable exceptions are Carstensen and Toubal (2004), where the "method of privatization" (i.e. vouchers vs. other methods) turns out to have a significant effect on FDI inflows; and Holland and Pain (1998), who conclude that "countries with a programme of direct privatization through cash sales have attracted relatively higher inward investment than those countries using voucher privatization." (p. 16)

The home country dummies remaining in model 9, our preferred specification, clearly indicate the differences between the overrepresented small European countries like Austria and the Netherlands as well as Germany and the comparatively low importance of the US and the UK as investors in the CEEC-8, their coefficients being individually not significant.

*****Table 10 about here

In order to check our argument that it makes indeed a difference when using the statutory tax rate instead of the appropriate effective tax rate, we replace our measure of the BEATR by the statutory tax rate. Results in models 10 and 11 of table 10 suggest that the coefficient on BEATR is almost the same with and without the time dummies. A semi-elasticity of -3.5 is derived, which means that a one percentage point reduction in the statutory tax rate will increase inward FDI by 3.5 percent. Thus, the derived semi-elasticity is clearly lower in absolute terms than

when the BEATR is used. This confirms our expectation and implies that indeed, the relatively low value of the semi-elasticity derived in our meta-analysis of 7 studies reported above (-1.51) is partly due to the use of statutory tax rates in the empirical estimation. This result is also of importance with regard to evaluating the effectiveness of governments' tax cuts, which might have had a larger effect on inward FDI than these studies reveal.

Robustness and Stability Analysis

We check the robustness of our preferred specification against the impact of possible cross-section outliers by stepwise dropping particular home and host country, respectively (Kittel and Winner 2002). Table 11 reports the resulting minimum and maximum values of the coefficient estimates and the coefficient derived from our preferred specification as well as the country excluded.

Table 11 implies that the results are robust with respect to dropping countries as no coefficient changes sign and none becomes insignificant with the exception of the coefficients on unit labor costs when Slovenia is excluded. This last result shows that the relatively low FDI-flows to Slovenia may be partly due to the high unit labor costs compared to the other host countries in our sample.

*****Table 11 about here

The stability of our coefficient on BEATR, ulc and prevneu are checked by interacting these variables with a dummy-variable for the years 2000-2003. The year 2000 is chosen as some host countries (notably Romania and the Slovak Republic) started to reduce their BEATR beginning in 2000. Table 12 shows that the semi-elasticity for BEATR and ulc for the period 2000-2003 are not significantly different

from that of the previous years. The sensitivity of FDI with respect to taxation and unit labor costs has thus not increased during the later years. With respect to privatization revenues model 14 shows that the importance of privatization as a driver of FDI is significantly lower in the period from 2000.

*****Table 12 about here

Long run estimates are derived via OLS regression on the time-averaged cross-sectional data (Egger and Pfaffermayr 2003), excluding transition-specific variables. The results reported in table 13 (model 15) show that cost-factors gain in importance in the long-run, implying that the share of efficiency-oriented FDI in total FDI-flows increases. The tax-rate elasticity increases substantially to about -8.7. Moreover including transition-specific variables these are not statistically significant (model 16).

******Table 13 about here

It is important to note that the coefficient for BEATR has increased in both specifications. The higher semi-elasticity suggests that FDI reacts stronger to changes in the levels of tax rates in the long run. This is indicative of a scenario, where the CEECs have caught up with the industrialized countries and similarly to highly developed countries, which "exchange" a good deal of FDI in the form of mergers and acquisitions as well as restructuring investment, the then post-transition countries might compete more on the cost-related location factors. This reasoning also applies to the coefficient on unit labor costs (0.046-0.047 instead of 0.034 in model 9) and hence supports our argument.

Thus, in general our findings on privatization, taxation and labor-costs indicate the importance of government policies in the CEECs in influencing inward FDI, with no outstanding role of taxation. Lastly, the relationship between the short- and the long-term estimates is plausible as the more similar the CEECs become, the lesser should be the influence of transition-specific factors as well as market-specific factors as markets will be increasingly divided between the main MNEs in the various industries, e.g. the banking sector. This implies that – just as in the OECD countries as argued above – efficiency-related location factors will gain importance.

6 Summary

Recently published empirical models link the level of inward FDI to the level of corporate income taxation in CEECs. These papers argue that the corporate tax burden acts as a deterrent to inward FDI, since it is a cost-related location factor. Yet, these papers do not make use of the recently developed model of effective tax rates by Devereux and Griffith, thus probably using a flawed indicator of the tax burden.

The aim of this paper was to provide the first empirical application of effective tax rates on the bilateral home country – host country level to explaining FDI-flows to the CEEC-8.

Partly contrary to earlier evidence on the CEECs, our results suggest four conclusions:

First, as expected, the derived tax-elasticity differs from earlier results, pointing to a higher importance of tax policy for company location decisions in CEECs.

Second, the relative importance of the corporate tax rate as a determinant of FDI has often been exaggerated, as our results reveal that at least during the period 1995-2003 the tax burden had no exceptional influence on inward FDI flows as compared to the other determinants.

Third, the findings of our investigation also reveal that the differences in the semi-elasticities when compared to earlier studies are clearly partly due to the use of BEATRs. The semi-elasticity derived after replacing the BEATR by the statutory tax rate is indeed lower.

Fourth, these results also lead us to believe that FDI in the CEECs are primarily of a market-seeking nature rather than an efficiency-seeking nature. This is also consistent with our estimates of the importance of corporate income taxes as determinants of the long-run development of FDI.

While this study is a step further in explaining FDI flows, there are also several limitations to our analysis, mainly regarding the exclusion of determinants like infrastructure which is due to the lack of meaningful data. Other potentially important omitted variables are economies of agglomeration and the effective marginal tax rate, the latter being especially important as our dependent variable is aggregate FDI-flows (Devereux and Griffith 2002).

7 References

Alfano M.R. (2004) *Government policy and inward FDI flows within transition countries: a TSCS analysis*, Paper presented at IIPF, Milano, pp. 1-22.

Alsan, M., D.E. Bloom, D. Canning (2004) *The Effect of Population Health on Foreign Direct Investment*, NBER Working Paper No. 10596 June.

Baltagi B. H. (2005) *Econometric Analysis of Panel Data*, 3rd edition, (Chichester: John Wiley & Sons.

Bedi A.S., Cieslik A. (2002) Wages and wage growth in Poland. *Economics of Transition*, Vol. 10, No. 1, pp. 1-27.

Bellak C., M. Leibrecht and R. Römisch (2004) 'New evidence on the tax burden of MNC activities in Central- and East-European New Member States', SFB International Tax Coordination Working Paper No. 2 (Vienna: Vienna University of Economics).

Benassy-Quere A., Fontagne L., Lahreche-Revil A. (2003) Tax competition and foreign direct investment. *CEPII Working Paper*, No. 2003-17.

Benassy-Quere A., Lahreche-Revil A. (2005) Corporate taxation and FDI within the EU25. Paper prepared for the 2nd Euroframe Conference on Economic Policy Issues in the European Union, June 3rd, Vienna,

Beyer, J. (2002) Wie erfolgreich sind Maßnahmen zur Förderung von ausländischen Direktinvestitionen? Empirische Befunde aus den Transformationsländern, *Zeitschrift für Wirtschaftspolitik*, 51 / 1, pp. 63-83.

Blonigen, B.A. (2005) A review of the empirical literature on FDI determinants. *NBER Working Paper Series*, No. 11299, pp. 1-37.

Brada J.C., Kutan A.M., Yigit T.M. (2003) *The effects of transition and political instability on foreign direct investment: central Europe and the Balkans*. *ZEI Working Paper* No. B28.

Brainard, S. L. (1997) An empirical assessment of the proximity-concentration trade-off between multinational sales and trade, *The American Economic Review*, 87 (4), pp. 520-44.

Brück, T., A. Uhlendorff and M. Woweries (2004) Lohnkosten im internationalen Vergleich, DIW Wochenbericht Nr. 14.

Buch, C., and A. Lipponer (2004) 'Clustering or competition? The foreign investment behaviour of German banks', Deutsche Bundesbank Discussion Paper Series 1: Studies of the Economic Research Centre No. 06.

Buch, C., J. Kleinert and F. Toubal (2004) 'The Distance Puzzle: On the Interpretation of the Distance Coefficient in Gravity Equations', *Economics Letters*, 83 (3), pp. 293-98.

Buch, C., J. Kleinert, A. Lipponer and F. Toubal (2005) 'Determinants and effects of foreign direct investment: evidence from German firm-level data', *Economic Policy*, January, pp. 51-110.

Büttner, T. (2002) The impact of taxes and public spending on the location of FDI: evidence from FDI-flows within Europe. *ZEW Discussion Paper* No. 02-17.

Carstensen, K. and F. Toubal (2004) 'Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis', *Journal of Comparative Economics* 3, pp. 3-22.

Caves, R. (1996) *Multinational Firms and Economic Analysis*, (Cambridge: Cambridge University Press).

Clausing, K.A. and C.L. Dorobantu (2005) Re-entering Europe: Does European Union candidacy boost foreign direct investment?, *Economics of Transition*, Vol. 13 (1), pp. 77-103.

Cnossen S. (2005) Corporation taxes in the new EU member states: a survey and evaluation. *De Economist*, Vol. 153, No. 2, pp. 199-226.

DeMooij, R. A. and S. Ederveen (2003) 'Taxation and foreign direct investment: a synthesis of empirical research', *International Tax and Public Finance* 10, pp. 673-693.

DeMooij, R.A. and S. Ederveen (2001) 'Taxation and foreign direct investment: a synthesis of empirical research', *Paper presented at the OCFEB Conference*, October, The Hague.

Desai, M.A., F.C. Foley and J.R. Hines (2004) 'Foreign direct investment in a world of multiple taxes', *Journal of Public Economics* 88, pp. 2727-2744.

Devereux, M.P. and R. Griffith (1999) 'The taxation of discrete investment choices', *IFS Working Paper Series* No. W98/16.

Devereux, M.P. and R. Griffith (2002) 'The impact of corporate taxation on the location of capital: a review', *Swedish Economic Policy Review,* 9 (1), pp. 79-102.

Dunning, J.H. (1988) *Explaining International Production* (London: Unwin Hyman).

Edmiston K., Mudd, S. and Valev, N. (2003) Tax Structure and FDI: The deterrent effects of Complexity and Uncertainty, *Fiscal Studies*, 24, pp. 341-359.

Egger, P. (2000) 'A note on the proper specification of the gravity equation', *Economics Letters* 66, pp. 25 – 31.

Egger, P. and M. Pfaffermayr (2003) 'The proper panel econometric specification of the gravity equation: A three-way model with bilateral interaction effects', *Empirical Economics* 28, pp. 571 – 580.

European Bank for Reconstruction and Development (various years), *Transition Report*, London.

Eurostat (2002) *European Union Foreign Direct Investment Yearbook 2001*, Luxembourg.

Frenkel M., K. Funke and G. Stadtmann (2004) 'A panel analysis of bilateral FDI flows to emerging economies', *Economic Systems* 28, pp. 281–300.

Harris M.N., Matyas L. (1998) The econometrics of gravity models. *Melbourne Institute Working Paper*, No. 5/98.

Hauf, S. (1997) Volkswirtschaftliche Lohnstückkosten und ihre Komponenten, Wirtschaft und Statistik, Nr. 8, pp. 523-535.

Head, K. (2003) Gravity for beginners, Web Download.

Hinze, J. (1998) Problems of International Labour Cost Comparisons, Intereconomics 03.

Holland, D. and N. Pain (1998) 'The Diffusion of Innovations in Central and Eastern Europe: A Study of the Determinants and Impact of Foreign Direct Investment', *National Institute of Economic and Social Research discussion paper* No. 137, London: NIESR.

Jakubiak M. and Markiewicz M. (2005) Capital mobility and tax competition in the EU after enlargement. Paper prepared for the 2nd Euroframe Conference on Economic Policy Issues in the European Union, June 3rd, Vienna

Kennedy, P. (2003) Guide to Econometrics, fifth edition (Cambridge: MIT Press).

Kittel, B. and H. Winner (2002) *How Reliable is Pooled Analysis in Political Economy? The Globalization – Welfare State Nexus Revisited*, MPIfG Discussion Paper 02/3, Cologne.

Lansbury, M., Pain, N. and K. Smidkova (1996) Foreign Direct Investment in Central Europe Since 1990: An Econometric Study, National Institute Economic Review, May, pp. 104-114.

Leibrecht, M. and R. Römisch (2002) 'Comparison of tax burden', *WIIW Research Report* No. 292, Vienna.

Lipsey, R.E. (2000) 'Interpreting Developed Countries' Foreign Direct Investment', NBER Working Paper 7810.

Lusinyan L. (2005) 'On Macroeconomic Applications of Dynamic Panel Data Models: The Role of Cross-Sectional Dependence', European University Institute (EUI), Department of Economics.

Markusen, J.R. (1995) 'The boundaries of multinational enterprises and the theory of international trade', *Journal of Economic Perspectives*, 9 (2), pp. 169-289.

Mátyás, L. (1997) 'Proper Specification of the Gravity Model', *The World Economy*, 20(3), pp. 363-368.

Mátyás, L., Kónya, N. and Harris M.N. (2001) Modelling Export Activity of Eleven APEC Countries. *Melbourne Institute Working Paper*, No. 5/00.

Merlevede B., Schoors K. (2004) Determinants of foreign direct investment in transition economies, draft version.

Mintz, J.M., Tsiopoulos, T. (1997) Taxation of foreign capital in the mediterranean region. *Transnational Corporations*, Vol. 6, No. 2, pp. 51-94.

Navaretti B.G. and A.J. Venables (2004) *Multinational firms in the world economy,* (Princeton, N.J.: Princeton University Press).

OECD (1991) *Taxing Profits in a Global Economy: Domestic and International Issues*, Paris.

OECD (2002) 'Recent Privatization Trends in OECD Countries', *Financial Market Trends*, Paris, pp. 43-55.

OECD (2004) *International Direct Investment Statistics Yearbook 199 –2002*, Paris.

Someshwar, Rao and Jianmin Tang (2004) Competitiveness Challenges Facing Canadian Industries, *Canadian Public Policy*, Vol. 30, Issue 4, pp. 365-380.

Woodward , D.P., R.J. Rolfe, P. Guimaraes and T. Doupnik (2000) Taxation and the location of Foreign Direct Investment in Central Europe, in: K. Fatemi (ed.) *The New World Order*, Pergamon Press, pp. 192-203.

Wooldridge J.M. (2002) *Econometric Analysis of Cross Section and Panel Data* (Cambridge: MIT-Press)

8 Appendix: Detailed description of data and data sources

Databases

- Austrian Institute of Economic Research database
- European Commission AMECO database
- Eurostat New Cronos database
- OECD Foreign Direct Investment Statistics database
- UNCTAD Foreign Direct Investment database
- Vienna Institute of International Economic Studies database
- World Development Indicators

- *FDI*

FDI reflects the bilateral net-FDI outflows from the home countries (i) to the host countries (j) for the years (t) 1995 to 2003. FDI flow data were first converted into a common currency (EUR mn) using the average bilateral exchange rate in t. FDI data are taken mainly from the OECD International Direct Investment Statistics Yearbook 1991 – 2002 and the OECD Foreign Direct investment database. Missing values were substituted by information directly obtained from National Statistical Offices and National Sources. A detailed description is available from the authors upon request.

- *gdphome*

$gdphome_{it}$ is the home country's GDP measured in million Euro. It is taken from Eurostat's New Cronos database.

- *gdphost*

$gdphost_{jt}$ is the host country's nominal GDP measured in million Euro. It is taken from Eurostat's New Cronos database.

- *dist*

Distance is defined as the geographical distance between the capital cities of the home and the host country in kilometers. Data are taken from various internet sources.

- *beatr*

The average effective tax rate is calculated using the Devereux-Griffiths (1999) methodology, based on the following assumptions and parameters:

- 3 different assets (machinery, building and inventory in the manufacturing sector)
- 7 ways of financing a cross border investment of 1 with a pre-tax financial return of 20: (i) retained earnings subsidiary; (ii) new equity subsidiary and retained earnings parent; (iii) debt subsidiary and retained earnings parent; (iv) new equity subsidiary and new equity parent; (v) debt subsidiary and debt parent; (vi) new equity subsidiary and debt parent; (vii) debt subsidiary and new equity parent.
- economic depreciation rates of the various assets: 3.61% for buildings, 12.25% for machinery, 0 for inventory
- nominal interest rate of 7.625%
- common inflation rate of 2.5%
- constant nominal exchange rate

- a weighted average structure of assets (buildings / machinery / inventory) of 55 / 35 / 10
- a weighted average structure across the various types of financing (retained earnings / equity / debt): 55 / 10 / 35 for parent and 1/3 / 1/3 / 1/3 for subsidiary

Our assumptions about the asset structure differ from those of other studies, which mainly follow OECD (1991), because data on inventories in the CEE-NMS show that they are far less important than they have been within the OECD as reported in 1991. Instead we assign a higher weight to investment in buildings. Note also that we do not include any tax incentives in our measure since the choice of relevant incentives in each home and host country would be arbitrary. eatr is measured in percent.

- *prevneu*

Annual privatization revenues are calculated on the basis of the stock figures on privatization revenues in percent of GDP published in the annual EBRD Transition Report. Figures are in national currency, calculated as percent of GDP.

- *ulc*

ulc_{cc} = [((annual nominal compensation of employees in national currency / nominal exchange rate) / employees) / ((nominal GDP in national currency / PPP exchange rate) / employment)]

note: cc … common currency

PPP exchange rate vs. Euro was taken from the WIIW database. All other indicators were taken from AMECO database.

- *risk*

Political risk data are taken from various issues of “Euromoney”. 25 is the maximum value (lowest possible risk level) and zero the minimum value (highest possible risk value). To obtain the overall country risk score, Euromoney assigns a weighting to nine categories. These are political risk (25% weight), economic performance (25%), debt indicators (10%), Debt in default or rescheduled (10%), credit ratings (10%), access to bank finance (5%), access to short-term finance (5%), access to capital markets (5%), forfaiting (5%). However, we take only the political risk, as the overall index, although often used in various studies, shows a severe structural break.

- *infl*

As a proxy for inflation the GDP-deflator of each host country is used, taken from the AMECO database.

- *combord*

This variable reflects the fact that home and host countries share a common border. It is 1 if this is the case and zero otherwise.

Table 7. Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
fdimn	overall	205.548	400.1954	0.11	4625	N =	458
	between		279.8115	8.142857	1407.886	n =	56
	within		295.7485	-863.9766	3561.623	T-bar = 8.17857	
lnfdimn	overall	4.013039	1.825008	-2.207275	8.439232	N =	458
	between		1.438413	1.669474	7.110221	n =	56
	within		1.157665	-0.7054491	7.935481	T-bar = 8.17857	
lngdphome	overall	13.89907	1.109063	12.11845	16.24108	N =	458
	between		1.128986	12.20994	16.09599	n =	56
	within		0.1452193	13.43857	14.21708	T-bar = 8.17857	
lngdphost	overall	10.4141	0.7914674	8.964734	12.24109	N =	458
	between		0.7651663	9.386973	11.95952	n =	56
	within		0.2139981	9.955107	10.90551	T-bar = 8.17857	
lndist	overall	6.99938	0.9778837	4.036892	9.15006	N =	458
	between		0.9984176	4.036892	9.15006	n =	56
	within		0	6.99938	6.99938	T-bar = 8.17857	
beatr	overall	34.76657	7.393821	16.1142	55.92223	N =	458
	between		5.385446	24.07576	48.07636	n =	56
	within		5.049255	17.50354	47.04292	T-bar = 8.17857	
ulc	overall	24.62227	9.107629	11	50	N =	458
	between		8.782997	15.42857	46.14286	n =	56
	within		2.877031	15.62227	32.42227	T-bar = 8.17857	
prevneu	overall	1338.501	1488.062	61.2772	8939.764	N =	458
	between		1067.757	93.03492	3519.359	n =	56
	within		1050.132	-767.1591	7148.153	T-bar = 8.17857	
Pp	overall	27.65873	111.7449	-1.2	901.8	N =	458
	between		43.95611	1.922222	154.0429	n =	56
	within		103.0789	-122.9841	803.2365	T-bar = 8.17857	
risk	overall	13.86419	3.362643	5.32	19.82	N =	458
	between		2.934297	9.597143	17.48333	n =	56
	within		1.688418	7.990859	17.51794	T-bar = 8.17857	
combord	overall	0.1310044	0.3377741	0	1	N =	458
	between		0.3337119	0	1	n =	56
	within		0	0.1310044	0.1310044	T-bar = 8.17857	

Table 8. The basic and the proper gravity model

	Model 1	Model 2
lngdphome	0.35870**	-0.37813
	(2.47)	(-0.43)
lngdphost	1.34728***	-0.42997
	(8.44)	(-0.41)
lndist	-0.65544***	-0.87371***
	(-4.02)	(-3.67)
cz		2.42571
hu		2.89965*
pl		4.06643
sk		0.67480
sl		0.07781
ro		1.85464
cro		0.87369
aut		0.26558
fr		1.61960***
uk		1.07997***
nl		1.10291
ger		2.44428***
us		3.63567*
time1		-2.23582***
time2		-1.74534**
time3		-1.24963**
time4		-1.01258**
time5		-0.56379
time6		-0.22184
time7		-0.04360
time8		-0.12194
_cons	-10.40436***	17.68288
	(-5.31)	(1.19)
R2_adj	0.41	0.61
N	457	457
Test of dummies:		Home ($?^2_6$ = 128.58***)
		Host ($?^2_7$ = 23.94***)
		Time ($?^2_8$ = 26.16***)

t-values in parentheses; t-values for dummy variables not shown.
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 9. Specification search

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
lngdphost	1.08103***	1.11758***	1.12891***	1.08546***	1.16898***	1.09303***	1.18439***
	(8.86)	(8.99)	(10.45)	(9.05)	(10.79)	(9.17)	(11.63)
lngdphome	-0.27562	-0.26369	-0.26436	-0.26919	-0.24939	1.04832*	1.15347**
	(-0.31)	(-0.30)	(-0.29)	(-0.30)	(-0.28)	(1.97)	(2.14)
lndist	-0.72376***	-0.78396***	-0.80846***	-0.76266***	-0.88745***	-0.72712***	-0.88558***
	(-2.87)	(-3.02)	(-3.40)	(-4.01)	(-5.14)	(-2.99)	(-5.22)
beatr	-0.04018***	-0.04190***	-0.03985***	-0.04025***	-0.04160***	-0.04319***	-0.04505***
	(-3.07)	(-3.20)	(-3.07)	(-3.09)	(-3.21)	(-3.51)	(-3.68)
prevneu	0.00016***	0.00015**	0.00017***	0.00016***	0.00016***	0.00016***	0.00016***
	(2.74)	(2.57)	(2.87)	(2.75)	(2.70)	(2.95)	(2.91)
ulc	-0.03856***	-0.03748***	-0.03435***	-0.03810***	-0.03294***	-0.03921***	-0.03352***
	(-3.63)	(-3.50)	(-3.23)	(-3.34)	(-2.91)	(-3.84)	(-3.11)
pp	-0.00088		-0.00089	-0.00085		-0.00072	
	(-1.57)		(-1.60)	(-1.50)		(-1.34)	
risk	0.03043	0.03146		0.03016		0.03352	
	(0.82)	(0.85)		(0.81)		(0.94)	
combord	0.09206	0.04602	0.08392			0.07791	
	(0.26)	(0.13)	(0.24)			(0.22)	
aut	0.29966	0.26544	0.23972	0.30706	0.20642	2.53726**	2.57456**
fr	1.12484***	1.12394***	1.16189***	1.12737***	1.16314***	0.80062***	0.81559***
uk	0.57750	0.58589*	0.62758*	0.58516	0.64066*	0.31949	0.36478
nl	0.78006	0.79266	0.81938	0.78808	0.83652	2.15499***	2.28934***
ger	2.05048***	2.02532***	2.03378***	2.05009***	2.00776***	1.21597***	1.12067***
us	2.93560	3.02872	3.09355	2.99651	3.21686	0.23554	0.34193
time1	-0.77631	-0.74438	-0.86063*	-0.77020	-0.82855*		
time2	-0.46896	-0.44704	-0.51843	-0.46246	-0.49520		
time3	-0.14693	-0.22965	-0.17630	-0.14395	-0.25934		
time4	-0.21517	-0.19062	-0.23920	-0.21116	-0.21357		
time5	0.20499	0.23235	0.14664	0.20921	0.17415		
time6	0.18193	0.19619	0.13354	0.18395	0.14725		
time7	0.22911	0.23518	0.20040	0.23136	0.20655		
time8	-0.20809	-0.19810	-0.23581	-0.20701	-0.22615		
_cons	2.45270	2.32845	2.70312	2.58193	2.63791	-16.10114**	-17.05529**
	(0.19)	(0.18)	(0.21)	(0.20)	(0.20)	(-2.09)	(-2.19)
R2_adj.	0.61	0.61	0.61	0.61	0.61	0.60	0.60
N	457	457	457	457	457	457	457
Test of dummies:							
Home($?^2_6$)	75.48***	74.82***	80.70***	81.06***	85.56***	75.24***	87.36***
Time($?^2_8$)	18.16**	16.72**	18.24**	18.32**	16.64**	--	--

t-values in parentheses; t-values for dummy variables not shown. *** p < 0.01, ** p < 0.05, * p < 0.1

Table 10. Replacing the BEATR by the Statutory Tax Rate

	Model 10	Model 11
lngdphome	1.25887**	-0.40539
	(2.29)	(-0.45)
lngdphost	1.20738***	1.19737***
	(11.48)	(10.43)
lndist	-0.86364***	-0.87229***
	(-4.83)	(-4.82)
statrate	-0.03595***	-0.03534***
	(-2.97)	(-2.72)
prevneu	0.00014**	0.00013**
	(2.53)	(2.30)
ulc	-0.02960***	-0.02996**
	(-2.70)	(-2.63)
aut	3.06689***	0.22505
fr	1.24292***	1.61776***
uk	0.78231***	1.07114***
nl	2.81516***	1.05689
ger	1.41432***	2.43556***
us	0.27313	3.68278*
time1		-0.96920*
time2		-0.57818
time3		-0.31547
time4		-0.23872
time5		0.15907
time6		0.13243
time7		0.14474
time8		-0.21248
_cons	-19.78953**	3.72357
	(-2.58)	(0.29)
R2_adj.	0.60	0.61
N	457	457
Home dummies($?^2_6$)	134.04***	128.16***
Time dummies($?^2_8$)		19.28**

t-values in parentheses; t-values for dummy variables not shown.
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 11 Jackknife Analysis

Dependent variable: lnFDI					
	Minimum	Host Country excluded	Preferred estimate	Maximum	Host Country excluded
beatr	-4.00**	Poland	-4.50***	-5.50**	Croatia
ulc	-1.16	Slovenia	-3.30***	-3.70***	Hungary
prevneu	0.01*	Hungary	0.016***	0.02**	Poland
	Minimum	Home Country excluded	Preferred estimate	Maximum	Home Country excluded
beatr	-3.60***	US	-4.50***	-5.5***	France
ulc	-2.80**	US	-3.30***	-4.20***	Austria
prevneu	0.011**	France	0.016***	0.017***	Austria
*** p < 0.01; ** p < 0.05; * p < 0.1					

Table 12 Stability Analysis

	Model 12	Model 13	Model 14
lngdphome	1.06493*	1.23747*	2.01213***
	(1.75)	(1.96)	(3.31)
lngdphost	1.18307***	1.18679***	1.09289***
	(11.52)	(11.37)	(10.75)
lndist	-0.88488***	-0.88522***	-0.89762***
	(-5.19)	(-5.22)	(-5.46)
beatr	-0.04473***	-0.04548***	-0.04351***
	(-3.66)	(-3.65)	(-3.62)
dummy_beatr	0.00122		
	(0.27)		
prevneu	0.00016***	0.00016***	0.00036***
	(2.90)	(2.91)	(5.21)
ulc	-0.0334989***	-0.03308***	-0.03055***
	(-3.10)	(-3.25)	(-2.83)
aut	2.42960**	2.71450**	4.02656***
fr	0.84239***	0.79210***	0.64066**
uk	0.38632	0.34562	0.25435
nl	2.20292***	2.37320***	3.20679***
ger	1.18084***	1.06451**	0.59847
us	0.52371	0.16557	-1.41211
dummy_ulc		-0.00145	
		(-0.23)	
dummy_prevneu			-0.00025***
			(-3.88)
_cons	-15.84629*	-18.22686*	-28.19129***
	(-1.81)	(-2.00)	(-3.26)
R2_adj.	0.60	0.60	0.61
N	457	457	457
Home ($?^2_6$)	89.28***	86.10***	85.68***

t-values in parentheses; t-values for dummy variables not shown.
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 13. Long run estimates

	Model 15	Model 16
lngdphome	0.45750***	
	(3.60)	
lngdphost	1.48033***	0.87716*
	(10.58)	(1.74)
lndist	-0.76368***	-0.30379**
	(-5.48)	(-2.18)
beatr	-0.08721***	-0.06890**
	(-3.60)	(-2.12)
ulc	-0.04671***	-0.04952*
	(-3.31)	(-1.94)
prevneu		0.00030
		(0.74)
risk		0.04040
		(0.59)
pp		-0.00473
		(-0.96)
_cons	-8.22880***	-0.19623
	(-4.14)	(-0.05)
R2_adj.	0.63	0.59
N	56	56

*** p < 0.01, ** p < 0.05, * p < 0.1

9 Endnotes

[i] This study has been prepared under FWF contract Nr. 1008, Sonderforschungsbereich "International Tax Coordination", http://www.sfb-itc.at/

[ii] "Overall" means that local business taxes are included.

[iii] For an overview see e.g., C nossen (2005).

[iv] The overall tax rate for not distributed profits is shown.

[v] The often cited study of Woodward et al. (2000) was not included, since they examine tax *holidays*, yet not the tax *rate*.

[vi] See Bellak et al. (2004) for empirical details.

[vii] In our sample, the largest negative net values are the bilateral FDI flows US – HU (2000: -2017 mn EUR), UK – HU (1999: -1067 mn EUR), GER – HU (2002: -718 mn EUR) and NL – HU (2003: -637 mn EUR).

[viii] A detailed data description can be found in the Appendix.

[ix] Note, that we do not use the generalized triplex-model proposed by Egger and Pfaffermayr (2003) for two reasons. First, this specification is identical to a two-way fixed effects specification with country-pair-specific fixed effects. Hence in this specification the fixed effects absorb all the between variability in the data. As our data set includes more between variability than within variability (see table 7) we do not use this approach. Second, the interpretation of the coefficients in the triplex-model is different from that of the generalized triplex-model, with the latter being „within in a narrow sense" (Egger and Pfaffermayr 2003). As we are concerned with the location choice of firms this narrow interpretation seems not appropriate. Furthermore we include an additional time-invariant, country-pair specific variable, namely combord.

[x] FDI flow FR -CRO in 1995 which is relatively low (0.11 mn EUR).

[xi] Additionally a Difference in Sargan's test (C-statistic) is carried out using Stata's ivreg2.

[xii] The location factors are included in levels, because data inspection does not show the presence of severe outliers and as level variables imply that we are directly estimating semi-elasticities.

xiii According the Breusch-Pagan-test for heteroscedasticity and the Arellano-Bond-test for serial correlation our model is confronted with non-spherical errors.

[xiv] Italy, Bulgaria and 2003 are included in the base group.