The University of Nottingham

research paper series

Globalisation, Productivity and Technology

Research Paper 2005/43

Do low corporate income tax rates attract FDI? Evidence from Eight Central- and East European Countries

by

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The Centre acknowledges financial support from The Leverhulme Trust under Programme Grant F114/BF

GEP Leverhulme Centre for Research on Globalisation and Economic Policy

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Acknowledgements

An earlier version has been presented at the GEP Workshop on FDI and taxation, 3rd October 2005. We would like to thank the participants and the discussant for useful comments. The usual disclaimer applies. Financial support from the Austrian FWF (grant no. SFB F 020 "International Tax Coordination", F-2008) is gratefully acknowledged.

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Abstract

We estimate a panel of 56 bilateral country-relationships of 7 home and 8 host countries of foreign direct investment (FDI) from 1995-2003 using a panel gravity-model setting to analyze the role of taxation as a determinant of FDI. While gravity variables explain most of the variation of FDI inflows, the bilateral effective average tax rate is also an important determinant of the location decisions and roughly equally important to other cost factors. The semi-elasticity of FDI with respect to taxation is between -3.3 and -4.6, which in absolute terms is above those of earlier studies. This can partly be attributed to using a superior measure of corporate income tax burden.

JEL classification: F21, H25

Keywords: Taxation; Foreign Direct Investment; Multinational Enterprises; Central- and Eastern Europe

Outline

Non-Technical Summary

Governments in Central and East European Countries (CEECs) intervene to influence the location choice of Multinational Enterprises (MNEs) by various measures. We focus on the corporate income tax rate which is commonly believed to exert a large impact on the profitability of Foreign Direct Investment (FDI) and hence on the location choices of MNEs. However, most of the earlier studies, mainly using statutory tax rates, suggest an inelastic response of FDI to the corporate income tax burden. As statutory tax rates are an inferior measure of the corporate income tax burden the aim of our paper is to provide the first empirical application of effective average tax rates (beatrs) on the bilateral level to explaining FDI flows to the CEEC-8. Our analysis is based on the OLI-paradigm, which explains the choice for FDI versus other routes of foreign market servicing, and a Panel-gravity setting. We find that FDI is positively related to both source and host-market size as well as to progress in privatisation and that FDI is inversely related to the distance between home and host countries as well as to the effective corporate income tax burden and to unit labour costs. The derived tax-elasticity is very robust and higher than those derived in earlier studies on CEECs, pointing to a larger importance of tax policy for company location decisions. The coefficient on the beatr is always statistically significant and negative in the range of –3.3 and -4.6. Results also suggest that the relative importance of the beatr as a determinant of FDI must not be over-emphasised as our results reveal that at least during the period 1995-2003 the beatr had no exceptional influence on FDI flows in the CEEC-8 as compared to other determinants. The differences in the absolute value of the semi-elasticities when compared to earlier studies are clearly partly due to the use of beatrs. In order to check the measurement error of earlier studies, we also derive a semi-elasticity after replacing the beatr by the statutory tax rate, which is indeed substantially lower. Moreover, long-run estimates lead us to believe that vertical FDI will gain in importance compared to horizontal FDI. This is due to the relatively large increase in our estimates for unit labour costs and the beatr in our long-run specification. This reasoning is consistent with surveys of the motives stated by foreign investors, even if they usually tend to overstate market-related motives ex post. These results bear important information for the ongoing discussion on tax competition and tax coordination in an Enlarged Europe. While this study is a step towards further explanations of FDI flows to the CEECs, there are several limitations to our analysis, which mainly concern the exclusion of location factors like size and quality of public infrastructure. This omission is due to the lack of meaningful data.

I. Introduction

Governments in Central and East European Countries (CEECs) 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 attract foreign firms. Here we focus on the corporate income tax rate which is commonly believed to exert a large impact on the profitability of Foreign Direct Investment (FDI) and hence on the location choices of MNEs.

Data reveal 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 CEECs 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 here]

Table 1 reveals that there was a surge in FDI inflows to selected CEECs since 1995. This was accentuated during the 2000-2003 sub-period, where the average of inflows is everywhere higher than for the first sub-period, with the exception of Hungary. Also note that larger countries receive the highest FDI inflows.

[Table 2 here]

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-represented, 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 CEECs was accompanied by a more or less pronounced drop in the overall statutory corporate income tax rates[1] in most of the CEECs, notably in Slovakia and Poland.[2] (cf. Table 3a)

[Tables 3a and 3b here]

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 these CEECs 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 relationship between the (effective) corporate tax burden and FDI flows to the CEEC. More specifically, the aim of the paper is threefold:

- Examine the role of corporate tax burden as a location factor for FDI in CEECs and compare it to earlier results, via estimating tax-rate elasticities
- Assess the impact of different measures of tax burden on the tax-rate elasticity.
- Analyse the role of taxes compared to other location factors.

A widely used approach to analysing 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 (e.g. OLI-paradigm) would likely affect the location choice of an MNE between alternative locations. These variables typically reflect location factors influencing vertical vs. horizontal FDI. The location factor of our main interest is the tax burden which a potential foreign investor faces when choosing a location

[1] "Overall" means that local business taxes are included.
[2] An overview is given by e.g., Cnossen (2005).

in one of the CEECs. We have chosen a gravity-setting for deriving tax-rate elasticities, which has been widely used to explain trade flows but also FDI flows.

We include 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 host countries, termed CEEC-8 (i.e., Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovak Republic, Slovenia and Romania). The latter are in the centre of the ongoing public debate within the EU about an intensified tax competition. The time span considered here ranges from 1995 to 2003. This paper contributes to our understanding of the determinants of FDI in emerging economies by investigating the often neglected effects of changes in the corporate tax policies of the CEECs on the volume of inward FDI. Moreover the paper distinguishes itself from earlier studies by including a theoretically well founded measure of the tax burden, namely forward-looking tax rates, rather than the statutory tax rate, which has various shortcomings. Our 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 II includes a short literature review of results on the role of taxes as drivers of FDI to CEECs. Section III gives some conceptual background and section IV describes our dataset and discusses the variables and the methodology used in the estimation. Section V presents our empirical specification and methodology. Section VI shows our results and provides a discussion. Section VII summarises.

II. The Impact of Taxation on FDI

This subsection takes a brief look at earlier evidence and discusses a number of conceptual points in the remainder. In general very few studies dealing with taxes as drivers of FDI to the CEECs are available (e.g. Javorcik 2004; Carstensen and Toubal 2004; Clausing and Dorubantu 2005) and most studies exclude the taxation issue at all (e.g. Holland and Pain 1998; Frenkel et al. 2004; Buch et al. 2005). Almost all studies including taxes as location factors rely on the (host country) statutory corporate income tax rate. More sophisticated effective tax rates are used only recently by (Benassy-Quere and Lahreche-Revil 2005; Jakubiak and Markiewicz 2005). These authors use backward looking tax rates in the spirit

of Mendoza et al. (1994). From a conceptual point of view it is well known that for location decisions of MNEs neither of these rates is appropriate. (see below)

We surveyed eight papers[3] which deal explicitly with FDI to the CEECs for their tax-rate elasticities and find a median tax-rate elasticity of around -1.45 (semi-elasticity) – a lower value than DeMooij's and Ederveen's (2003 and 2005, respectively) overall median tax-rate elasticities of about -3.3 and -4.28, respectively, for FDI to mainly developed countries. Our result implies that a 1 percentage point increase in the tax rate will reduce FDI by 1.45 percent.

Yet, these studies use statutory tax rates of the host countries as a measure of corporate tax burden. Therefore, our survey result is more in line with the lower values of -1.2 and -2.05, respectively, derived by DeMooij and Ederveen on studies relying upon statutory tax rates. However, we question this low tax-rate elasticity. The statutory tax rate is not an appropriate indicator for the tax burden especially in the case of FDI, because it does not include all relevant tax codes. From a conceptual and empirical point of view bilateral forward-looking effective average tax rates (beatrs) should be used (Devereux and Griffith 1999 and 2002; Bellak et al. 2006). Hence the estimated tax-rate elasticities from statutory tax-rates are probably flawed and suffer from some sort of measurement error bias. In our study, we follow Devereux and Griffith 1999 and use beatrs. Consequently we should expect a higher tax-rate elasticity than the one based on statutory tax rates as the survey of DeMooij and Ederveen reveals (tax-rate elasticities of -9.3 and -5.9 respectively, when effective average tax-rates are used).

Besides the argument based on the tax measure, low semi-elasticities may also 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 efficiency-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 of existing capital stock, it may react less than in the case of new investment, Greenfield investment in particular.

[3] The papers are: Alfano (2004), Benassy-Quere and Lahreche-Revil (2005), Beyer (2002), Carstensen and Toubal (2004), Edmiston, Mudd and Valev (2003), Clausing and Dorobantu (2005), Javorcik (2004) and Mintz and Tsiopoulos (1997; on European periphery countries). The often cited study of Woodward et al. (2000) was not included, since they examine tax *holidays*, yet not the tax-rate.

- 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.

III. Some Conceptual Considerations

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 on various theories (e.g. Trade Theory, Theory of the Firm and Theory of Industrial Organisation) 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 Internalisation (I) advantage (e.g. economies of interdependent activities). (see Table 4)

[Table 4 here]

According to the OLI-paradigm the decision where to locate is a decision between different *foreign* markets. The location factors considered have to be valid proxies for host country-related L advantages. Home-host relationships, often used in empirical models (e.g. Benassy-Quere et al. 2003 and 2005 use the relative corporate tax rate of home over host countries), do not follow from the OLI-setting. Yet, the OLI-paradigm provides only examples of the most important host country determinants or L-factors which attract FDI *conditional* on a firm's decision to undertake FDI. In particular, it does not suggest how to operationalise L-advantages. The OLI paradigm neither attributes weights to single location factors like taxation, nor does it assess their relative weights. Hence it is impossible to deduce an exact empirical model of FDI from the OLI-paradigm alone. Empirical applications have to rely on more or less ad hoc specifications, but at least some grouping of the location factors considered should be given. For example it is possible to separate

those factors in efficiency or market-related or as supply and demand factors (e.g. Mold 2003).

IV. Data and Variables

Dependent Variable

The bilateral-net-FDI-outflow from home country (i) to host country (j) for the years 1995 to 2003 (t) is used as the dependent variable (*fdimn*).[4] The average mean value of the annual FDI flow during 1995-03 is € 4 mn, with a pronounced increase since the year 2000. Measured in terms of FDI stock, our 56 bilateral FDI flow relationships cover the larger part of total stocks in the host countries in 2003. (cf. Tables 7 and 2)

The fact that we use FDI flows in our study requires some explanation, as frequently critique has been raised with respect to this measure. First, according to some authors a distinction between mergers and acquisitions versus new investment (expansion or Greenfield) is called for, since the former reflects only an ownership change but does not result in new capital. While this distinction may be relevant for studies analysing the effects and the impact of FDI in the host economy or the effects of relocation vs. expansion for the home countries, the distinction is irrelevant for the research question of this paper. Since we use aggregate FDI data, we capture both, M&As as well as new and expansionary investment. Yet, one would probably expect a lower tax elasticity of M&As as well as expansionary investment compared to new capital stock (Greenfield investment), since with the former two types of FDI, the location of the existing capital stock (i.e. a firm to be privatized in the case of M&A in the CEECs) will have a heavy weight in determining the location choice of subsequent FDI flows.[5]

Secondly, some authors argue that FDI flows reflect only *financial* flows, not necessarily reflecting new *real* capital formation in the host country. (see e.g., Devereux and Griffith 2002, p. 84f.) These authors conclude that there is a superior measure, namely plant, property and equipment (PPE), which reflects real capital (fixed assets). As Hines (1996, p. 11) puts it: "PPE probably more closely corresponds to capital that enters production functions." For example, Gorter and Parikh (2003, p. 197) argue that

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

> "at least part of EUROSTAT FDI should end up as PPE because of the lasting interest of the direct investor, conditioned by the ten percent ownership requirement. FDI, therefore, proxies the international allocation of real capital. Nevertheless, one should be aware of the ability of multinational corporations to shift profits from one EU member state to another without actually relocating productive activity. For this purpose they may adjust intra-firm prices of intermediate goods, debt contracts, royalty transfers, and the allocation of the headquarter's expenses. Some of these shifted paper profits are likely to enter the FDI data through reinvested earnings."

Conceptually, FDI flows include (i) equity of the parent company in the subsidiary, (ii) net-loans between parent and affiliate as well as (iii) reinvested earnings and (iv) local financing (like raising new capital, loans).

Empirically, using FDI flows as the dependent variable may overestimate or underestimate "real investment" and have therefore been criticised as being only a second-best measure of "real capital": *Overestimation* may result from the fact that financial flows, which are unrelated to the activities of the affiliate may enter the components (i), (ii) or (iii), for example due to transfer pricing (i.e. overvaluing services or goods by the parent) which inflates debt or overvaluing services or goods by the affiliate , which inflates reinvested earnings. *Underestimation* may result from the fact that the local financing (component iv) is excluded. For example, if the affiliate raises a loan in the host country.

In the case of the CEECs, over- and under-estimation effects of real capital by FDI flows tend to exist but may be rather small. Profit shifting might play a certain role, as the CEECs are low-tax countries in general, but underestimation due to local new equity financing probably is of minor importance. Rather, it is the other way round, i.e. a listed acquired firm is de-listed from the stock exchange after the acquisition by the foreign parent, in order to gain 100% ownership.[6]

Thus, the most serious source of under-estimating real capital remaining is local loans. Our major concern when using FDI flows therefore would be the exclusion of the type of financing on the basis of raising capital locally. Unfortunately, there is no information (hard data) available on the actual size of the underestimation by excluding local loans.

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[5] Empirical evidence as, e.g. discussed by DeMooij and Ederveen (2005, pp. 23-24) reveals indeed a lower tax elasticity for M&As than for FDI or PPE.

[6] Stock market listings of foreign firms in the CEECs show that the number of foreign firms listed is very low. Bratislava, Budapest, Ljubljana show no foreign listed firms, Prague shows 4 and Warsaw 7 foreign listed firms (web download http://www.fese.org/statistics/index.php, 24.11.05). Yet, this does not provide information that equity financing is not important, since on the one hand a foreign listed firm need not have

In summary, due to the low importance of local components FDI flows to the CEECs are a reasonable measure of the *annual real capital formation* of affiliates abroad. FDI-flows are thus a reasonable proxy of the annual change in PPE. Moreover, acquiring a firm in the CEECs means that *not only the fixed capital* is acquired, *but the whole firm*, including equity - and, of course, debt. No firm is able to acquire only real capital without the financial claims and liabilities. Therefore, we believe that we capture these components of FDI besides the "real capital" when using FDI flows. Also, the mobility of capital in the form of the location decision of the MNE is reflected in the annual FDI flow, which is not location-bound, rather than to the largely location-bound capital stock invested abroad during earlier periods.

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 on the findings of some recent and/or widely cited studies, which however use different operationalisations. We group the location advantages as follows[7]:

- market-related variables (host market size, distance, common border),
- efficiency-oriented location factors (unit labour costs, tax rate) and
- transition-specific location factors (inflation, privatisation, political risk).

Moreover, as we base our empirical specification on a gravity setting (see below) we additionally include home country size as an independent variable.

(a) **Home country size** (*gdphome*)

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

activities in the host country and on the other hand, an affiliate of a foreign firm might be listed under domestic firms, if it is a registered company in the host country.

[7] An alternative classification would be one between supply and demand (Mold, 2003), our demand variable being the host market size whereas all other explanatory variables are supply related.

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

In theory market size is positively related to 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 affiliate plant level have to be weighed against the costs of exporting. This measure is standard in gravity-type models and has been used in other specifications explaining FDI. Distance is important for FDI especially as it is a proxy for different types of costs, like transportation costs, communication costs, synchronisation costs and costs accruing due to cultural distance (Head 2003). While large distance may encourage FDI due to an internalisation-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). Hence from a theoretical point of view the sign of the distance coefficient is ambiguous *a priori* (see Markusen and Maskus 2002). Yet, in our case we expect a negative sign, as intra-firm trade flows between parent and affiliate tend to be high in the case of vertical FDI (VFDI) where the costs of re-exporting is an important determinant of overall cost. Secondly, even with horizontal FDI (HFDI), distance matters and we expect a negative sign, if affiliates are relatively new, as is often the case in the CEECs. New affiliates typically depend on headquarter services and intermediate inputs supplied by the parent. Thirdly, the negative impact of distance on FDI has been shown by many studies, notably by Markusen and Maskus (2002), who discriminate between various theories of FDI.

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

For *discrete* choices like the location decision of MNEs the average tax rate is the relevant measure of tax burden (e.g. Devereux and Griffith 1999). Moreover, for international investment decisions *beatrs* are the relevant L-factor to reflect the tax component of the location decision of MNEs (Bellak et al. 2006). We also use the statutory tax rate (*statrate*) alternatively to the *beatr* in one of the specifications below. We expect a negative sign of

the estimated coefficients. Yet, the coefficient of the *beatr* should be substantially larger in absolute value than the coefficient on *statrate*. For further details concerning assumptions made in the calculation of *beatrs* see the appendix.

(e) **Privatisation** (*privrev*)

Privatisation revenues on an annual basis are used to reflect progress in privatisation. We expect a positive sign of the coefficient as a higher degree of privatisation implies more investment opportunities for foreign investors due to first-mover advantages, competition effects etc. In our view *privrev* is a better measure than the sometimes used index of the private-sector share in total economy as published by the EBRD. This index has little variation over time as it varies, if at all, only in steps of 5 percentage points. It hence may underestimate the speed in the privatisation progress in several years.

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

According to the public debate low labour 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 CEECs, FDI have shifted "further East" due to increasing labour 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 on efficiency FDI. Labour costs should also have a negative impact in case of horizontal FDI, just like other input factors like energy costs, the tax burden or costs of raw materials. In cases where labour costs carry a positive sign, this is a hint towards an omitted variable bias, indicating purchasing power of consumers, a high skill-level in case of horizontal FDI etc.

Our variable which measures labour costs is a measure of *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 in the Appendix in greater detail.

(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, see Appendix) between political *risk* and FDI.

(h) **Inflation** (*pp*)

Inflation is included as a proxy for macroeconomic instabilities, which transition countries may be confronted with (Buch and Lipponer 2004). We expect a negative sign of the coefficients estimated. But, 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 have a large impact on FDI.

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

This variable is considered additionally to distance between home- and host country as center-to-center distance may overstate the effective distance between home and host countries (Head 2003). We expect a positive sign of the estimated coefficient.

(j) **Tariffs** (*tar*)

tar is defined as the ratio of tariffs on imports over imports of goods and services. From a theoretical point of view the sign of the coefficient of this variable is a priori ambiguous depending on the underlying motive for FDI. If the observed FDI is mainly HFDI, the market imperfection theory of FDI suggests a positive sign. In this case HFDI is observed due to an internalisation advantage ("tariff-jumping" FDI). If on the other hand FDI is mainly VFDI, theory suggests a negative sign (e.g. Frenkel et al. 2004; Navaretti and Venables 2004). In the case of VFDI high trade costs can be seen as a location-disadvantage, which deters FDI. For our sample it is again important to note that tariffs have been brought down substantially. *tar*, hence, may no longer have a large impact on FDI.

Table 5 summarises the discussion of individual L-factors. Market-related factors are positively, efficiency-related factors are negatively related and the sign of transition-specific factors depends on the measure used.

[Table5 here]

Descriptive data analysis

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 as dependent variable, which can be negative, we drop 45 observations (about 9 percent of our data set). Moreover, the search for unsystematic outliers[8] in the dependent and independent variables via box-plots and added variable plots pinpoints four data points as potential outliers, which are dropped from the analysis.

Table 6 shows the descriptive statistics for our dataset and reveals that the *between* variability is higher than the *within* variability.

[Table6 here]

Table 7 shows the variance inflation factors for our independent variables. As no individual factor is larger than 10, multi-collinearity should not cause a problem in our analysis (Hamilton 2005).

[Table7 here]

V. Empirical Specification and Methodology

[8] An unsystematic outlier is one which does not represent heterogeneity between the host countries. For example, using box plots the *ulc* for Slovenia are shown to be extreme values throughout the sample period. Hence, these data represent heterogeneity between the host countries which we exploit in our analysis.

We base our analysis on a gravity setting. Firstly, models of this type can easily be combined with the OLI-paradigm. Secondly, they 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). A basic Panel-gravity-model includes (the log of) home and host country size as well as distance and country-pair specific effects as well as time dummies.[9] The model we estimate is a generalized Panel-gravity-model with various location factors added. It is shown in equation (1)[10]:

$$\ln FDI_{ijt} = b_1 \ln Y_{it} + b_2 \ln Y_{jt} + b_3 \ln DIST_{ij} + b_4 X_{ijt} + b_5 Z_{ij} + b_6 W_{jt} + \gamma_t + \alpha_{ij} + e_{ijt} \qquad (1)$$

where:

$lnFDI_{ijt}$ is the log of net-FDI-outflow from home country i to host country j at time t (*lnfdimn*);

lnY_{it} is the log of GDP in country i at time t and the same for $\ln Y_{jt}$ for country *j* (*lngdphome* and *lngdphost*);

$lnDIST_{ij}$ is the log of the distance between countries i and j (*lndist*);

X_{ijt} are location factors which vary between country-pairs and over time (e.g. *beatr*)

Z_{ij} are location factors which vary over country-pairs only (i.e. *combord*)

W_{jt} are location factors which vary over time and over host countries (e.g. *pp*)

γ_t are time dummies (*TD*)

α_{ij} are country-pair-specific effects;

e_{ijt} is the remainder error term.

Most of the right hand side variables in (1) represent different location factors in the spirit of the OLI-paradigm. The only variable which does not constitute a location factor, is $\ln Y_{it}$ which captures home country size. It is important to note, that we consider the country-pair specific effects as random. This is for two reasons. First, Hausman-tests[11] on fixed versus random effects show that the random effects assumptions cannot be rejected. Hence using the random effects estimator results in more efficient estimates than the fixed effects

[9] These variables may be called "gravity-specific".

[10] Note, that this specification includes that introduced by Mátyás 1997 as a special case (Cheng and Wall 2004; Egger and Pfaffermayr 2003).

[11] We perform two types of Hausman-tests. First, if no serial correlation and heteroskedasticity seems to be present and if the other requirements of the original Hausman-test are fulfilled (e.g. the difference between fixed effects and random effects variance matrices is invertible) we use the original Hausman-test. Second, in case of non-spherical errors or a non-positive definite difference in the fixed effects and random effects variance matrices we follow Wooldridge (2002, p. 290ff.) and perform a regression based Hausman-test (with cluster robust standard errors).

estimator does. Furthermore, it allows estimating the impact of time fixed variables (i.e. *dist* and *combord*) on FDI flows. Second, from a more substantive point of view, the random effects approach is relevant here as we are concerned with the decision of MNEs between various host countries. In this decision differences *between* host countries matter, which are captured by the random effects estimator. Concerning time effects we consider these to be fixed as it does not make sense to assume that we have a random sample of time periods. Time effects account *inter alia* for the business cycle, for common shocks and common trends (Verbeek 2004, Egger and Pfaffermayr 2003).

Our estimation strategy is based on two pillars. We first estimate equ. (1) with the gravity specific variables only and the *beatr* included. Then we introduce additional location factors stepwise to this basic specification ("pillar 1 strategy"). Second, we apply a general to specific strategy, starting with the most general model (1) and testing down until a specification is reached with all significant[12] variables included (pillar 2 strategy). This procedure should reduce the probability of an omitted variable bias and it provides information about the robustness of the tax-rate elasticity. An additional robustness and stability analysis is done via a jackknife analysis with respect to host countries included and via inter-acting the coefficient on *beatr*, *ulc* and *privrev* with a dummy for the period 2000-2003. Lastly, long-run estimates are derived via a traditional cross-section regression on time averaged variables (Egger and Pfaffermayr 2003). Note that we always test for the presence of serial correlation (Wooldridge-test, Wooldridge 2002) and heteroskedasticity (LM-test, Verbeek 2004). Furthermore, we inspect standard errors from different types of robust covariance estimates (non-robust, White-robust; cluster-robust). If the significance of our estimates changes by using more robust standard errors we additionally present results from the more robust estimates even in case statistical tests do not show the presence of heteroskedasticity and/or serial correlation (i.e. models 2b and 4b below).

VI. Results

Table 8 shows the results of our pillar 1 strategy. The coefficients on the *gravity-specific variables* are always significant with the expected sign with the exception of home country size. The magnitude of the coefficients on distance and host market size is reasonable as

[12] Significant at least at the 5% level.

they are in line with the theoretical prediction of the gravity model and with empirical evidence for gravity models explaining international trade flows (Head 2003; Leamer and Levinsohn 1995). In some models, the relatively low and statistically insignificant coefficient on home country size is not unexpected as relatively small countries (Austria and The Netherlands) are the main source countries of FDI in our sample.

The coefficient on *beatr* is always statistically significant and negative in the range of –3.3 and -4.6 (or –5.7 excluding time dummies). Concerning other location factors considered, only *privrev* and the *ulc* of the host country impact statistically significant and economically plausible on FDI flows. All other location factors carry the expected sign and the magnitude of their coefficients seems to be economically plausible,[13] but they are statistically insignificant. Concerning the impact of *tar* the positive sign is in favour of the tariff jumping hypothesis. The insignificance of *tar* is plausible as tariffs were brought down considerably during the first part of the 1990ies and hence are of minor importance throughout our sample period. Concerning *pp* our results point to the fact that inflation has decreased considerably in the CEEC-8 compared to earlier periods of transition. Studies including earlier years and countries in macroeconomic turbulence (e.g. Edmiston et al. 2003) reveal significant negative effects of inflation on annual inward FDI- flows. Also, political stability (*risk*) does not seem to be 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). Furthermore, statistical tests show that time dummies are mostly jointly significant and that the random effects assumption is valid for each specification.

[Table 8 here]

Next, our analysis proceeds with our pillar-2 strategy. The results are shown in table 9. Model 8 is our most general model including all location factors as well as time dummies. The results are not very different from those of our pillar-1 strategy: *beatr*, *privrev* and *ulc* are statistically significant with the expected sign and all other variables have the expected

[13] For example, the coefficient on *combord* implies that sharing a common border increases FDI flows by about 67% - an extent which is common in gravity models explaining international trade flows (Head 2003).

signs but are statistically insignificant. Moreover the magnitude of the estimates is in line with those of our pillar-1 strategy.

Dropping insignificant variables step-by-step beginning with the most insignificant variable and controlling for possible multi-collinearity effects we finally end up with model 9. This includes the gravity-specific variables as well as *beatr*, *ulc* (both efficiency-related) and *privrev* (transition specific). Again, statistical tests show that the random effects specification is valid. Further tests, using inefficient but consistent pooled OLS estimates, suggest that model 9 has satisfactory properties from a statistical point of view. Particularly, the Reset-test suggests that our linear specification is sufficient. Moreover, studentized residuals do not show the presence of outliers using a cut off-level of +/- 3.5 (Egger and Pfaffermayr 2003). The highest variance inflation factor of 2.41 implies that multi-collinearity should not be a problem in model 9.

[Table 9 here]

The tax-rate elasticity in model 9 is –4.4[14] implying that a 1 percentage-point decrease in the effective tax rate on FDI increases FDI flows ceteris paribus by about 4.4%, which evaluated at the mean FDI inflow of Euro 193.5 mn amounts to Euro 8.5 mn on average. This value is substantially higher than that surveyed by Bellak et al. (2006) and much more in line with the findings of DeMooij and Ederveen (2003 and 2005). 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.

How does this measure compare to results of earlier studies? The derived semi-elasticity is lower than the one reported by DeMooij and Ederveen (2003 and 2005). In our view this result indicates that FDI in the CEECs is primarily of a market-seeking nature, where the tax burden matters, but is not the primary determinant. Moreover, it is convenient to compare our results to the results of the study carried out by Carstensen and Toubal, since it covers partly the same countries as well as a similar time period. Also, their study is the only study out of the 7 studies on CEECs surveyed above that has carried out the analysis on a bilateral level like ours. The median value of the semi-elasticity derived by us on the

[14] The mean value of all estimates is about -4.0.

ten semi-elasticities reported in Carstensen and Toubal is -1.6, thus, much lower than ours in absolute value. It must be kept in mind, however, that they base their analysis on statutory tax rates rather than effective tax rates.

To conclude the discussion of the efficiency-related variables we take a closer look on the impact of the unit labour costs. Model 9 shows that a one percentage-point increase in *ulc* reduces FDI flows by about 3.1 percent. Comparing this estimate with those of other studies is notoriously difficult, since almost every study uses another definition of labour costs. Lansbury et al. (1994) use unit labour costs in a host country relative to other potential hosts in Central Europe and find that is has a significant negative impact on FDI. 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 according to the authors implies "that considerations of comparative factor costs across countries influence some investment decisions" (p. 16). Clausing and Dorobantu (2005) measure labour costs by the average compensation rate in the host country and also find a negative effect throughout. Some studies (e.g., Benassy-Quere et al., 2005, p. 590) even find a positive relationship between FDI and labour costs, which is unexpected. As mentioned in the conceptual part above this is most likely due to an omitted variable bias, where labour costs reflect other determinants entering labour costs. The authors state themselves, that "unit labour costs are positively related to the quality of labour." (ibidem, p. 589)

Concerning the privatisation process our analysis shows a significant and positive impact of *privrev* throughout. At first sight, the coefficient on *privrev*, although significant with the correct sign, seems very low, as FDI flows increase by about 0.03% if privatisation revenues increase by one million Euro. Privatisation revenues should be correlated with gross FDI inflows, if foreign investors primarily benefit from the privatisation. Yet, given the fact that we explain *net* FDI flows, a low correlation would indicate that gross inflows may be compensated by high capital outflows resulting from a divestment or sale of a subsidiary or profit transfers. In some cases, as described above, net outflows are actually negative, implying a potentially large difference between net and gross outflows.

Other studies use the EBRD's private sector share (see e.g. Lansbury et al. 1996, Holland and Pain 1998; Carstensen and Toubal 2004), the overall transition index (e.g. Edmiston et al. 2003) or the method of privatisation (e.g. Holland and Pain 1998; Carstensen and Toubal 2004) to capture the effect the privatisation process has on FDI flows. In many

cases the impact turns out to be insignificant, because the share variable does not vary much over time. Two notable exceptions are Carstensen and Toubal (2004), where the "method of privatisation" (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 program of direct privatisation through cash sales have attracted relatively higher inward investment than those countries using voucher privatisation." (p. 16)

Beta-Coefficients

Table 10 shows the Beta coefficients corresponding to model 9.[15] The gravity-specific variables are the most important determinants of FDI flows and effective taxes as important as the privatisation process as location factor. Moreover, unit labour costs are the least important variable in our specification. These results imply that the role of taxes as a location factor must not be underscored or over-emphasized, relative to that of other location determinants.

An alternative measure of corporate tax burden

In order to check our argument that using the statutory (overall) corporate income tax rate instead of the appropriate effective tax rate makes indeed a difference, we replace our measure of the *beatr* by the statutory tax rate in model 9. Results for model 10 reported in table 10 show a substantial drop of the semi-elasticity to about -2.4, which is (marginally) not significant at the 5% level. This confirms our expectation and implies that indeed, the relatively low value of the semi-elasticity derived in our meta-analysis is partly due to the use of statutory tax rates in empirical estimations. 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 earlier studies reveal.

[Table 10 here]

Robustness and Stability Analysis

[15] These are calculated by applying the usual formula for standardized coefficients on the random effects estimates using the overall standard deviations for the random effects transformed variables of model 9.

We check the robustness of our preferred specification in model 9 against the impact of possible cross-section outliers by stepwise dropping host countries (e.g. Winner 2005). Table 11 reports the resulting minimum and maximum values of the coefficient estimates and the coefficient derived from our preferred specification (model 9) as well as the country excluded. The results are robust with respect to dropping countries as no coefficient changes sign and none becomes insignificant with the exception of the coefficient on *ulc* when the Czech Republic and especially when Slovenia are excluded. The relatively low FDI flows to Slovenia may be partly due to the high unit labour costs when compared to other host countries in our sample.

[Table 11 here]

The stability of the coefficients on *beatr*, *ulc* and *privrev* is checked by inter-acting 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 (models 11 to 13) shows that the semi-elasticity for *beatr* and *ulc* for the period 2000-2003 are not significantly different from that of previous years. The sensitivity of FDI with respect to taxation and unit labour costs has thus not changed during the later years. Model 12 shows that the importance of privatisation as a driver of FDI is significantly lower in the period from 2000. This last result seems to be plausible as the privatisation process levelled off in many CEECs around 2000 (EBRD transition report, various issues).

[Table 12 here]

Long-run estimates

Finally, we present long-run estimates derived via OLS regression on the time-averaged cross-sectional data (Egger and Pfaffermayr 2003). In the long run transition-specific variables should not play any role as drivers of FDI and efficiency-related FDI should gain in importance. Hence, we expect the coefficient on *privrev* to become insignificant and those of *ulc* and *beatr* to increase in magnitude.

The results reported in table 13 (model 14 and 15) indeed confirm these expectations. The cost-factors gain in importance in the long-run, implying that the share of efficiency-oriented FDI in total FDI flows increases and that efficiency-related location factors will gain importance. The tax-rate elasticity increases substantially to about -9.3. Its relative increase – the semi-elasticity more than doubles – is higher than that of the other variables considered. Moreover, as expected the transition-specific variable is no longer statistically significant. Also note that this substantial increase in the tax-rate elasticity is again in line with the recent survey of DeMooij and Ederveen (2005). They report a typical tax-rate elasticity for cross-section models of -11.65.

[Table 13 here]

VII. Summary

Recent empirical evidence for the CEECs has shown that a high corporate tax burden acts as a deterrent to FDI flows, since it affects the profitability of investments negatively. Yet, these studies do not make use of the recent model of effective tax rates developed by Devereux and Griffith (1999) thus probably using a flawed indicator of the corporate tax burden.

The aim of this paper was to provide the first empirical application of effective average tax rates on the bilateral level to explaining FDI flows to the CEEC-8. Based on the OLI-paradigm and a Panel-gravity setting we find that FDI is positively related to both source and host-market size as well as to progress in privatisation and that FDI is inversely related to the distance between home and host countries as well as to the corporate tax burden and to unit labour costs.

In summary four points are worth noting:

First, the derived tax-elasticity is very robust and differs from earlier results on CEECs, pointing to a larger importance of tax policy for company location decisions. Considering the relative importance of supply (*dist, ulc, beatr*) and demand factors (*gdphost*) in the CEECs (cf. Table 10) our analysis confirms e.g., Mold's result that "the extent to which

demand-related variables are usually more reliable determinants of FDI inflows than supply-side factors in econometric analysis." (2003, p. 44)

Second, the relative importance of the corporate tax rate as a determinant of FDI must not be over-emphasised as our results reveal that at least during the period 1995-2003 the tax burden had no exceptional influence on FDI flows in the CEEC-8 as compared to other determinants.

Third, the differences in the absolute value of 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 *statrate* is indeed substantially lower.

Fourth, long-run estimates lead us to believe that VFDI will gain in importance compared to HFDI. This is due to the relatively large increase in our estimates for *ulc* and *beatr* in our long-run specification. This reasoning is consistent with surveys of the motives stated by foreign investors, even if they usually tend to overstate market-related motives *ex post*.

While this study is a step towards further explanations of FDI flows to the CEECs, there are several limitations to our analysis, which mainly concern the exclusion of location factors like size and quality of public infrastructure. This omission is due to the lack of meaningful data.

Also, special investment incentives (e.g. regional, R&D) are not included. As there are many different incentives granted by CEEC governments throughout the sample period of nine years including only selected incentives in the *beatr* would be arbitrary. Moreover, many CEECs have reduced their special investment incentives during our survey period according to the aquis communautaire of the EU. For example, Boudier-Bensebaa (2005) reports that in Hungary special tax incentives for MNEs have increasingly been abolished or domestic and foreign firms are treated equally.

VIII. **Appendix: Detailed description of data and data sources**

Databases

- 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
- European Bank for Reconstruction and Development (various years), *Transition Report*, London.
- Eurostat (2002) *European Union Foreign Direct Investment Yearbook 2001*, Luxembourg.
- OECD (2004) *International Direct Investment Statistics Yearbook 1991 –2002*, Paris.
- European Tax Handbook

- *fdimn*

fdimn reflects bilateral net-outflows from home countries (i) to host countries (j) for the years (t) 1995 to 2003. Data are converted into a common currency (EUR mn) using the average bilateral exchange rate in year 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 of sources is available from the authors on request.

- *gdphome*

gdphome is the home country's GDP measured in million Euro. It is taken from Eurostat's New Cronos database.

- *gdphost*

gdphost is the host country's nominal GDP measured in million Euro. It is taken from Eurostat's New Cronos database.

- *dist*

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

- *beatr*

The bilateral average effective tax rate is calculated according to the model developed by Devereux and Griffith (1999). The calculation is based on the following assumptions and parameters:

- 3 different assets (machinery, building and inventory in the manufacturing sector)
- a cross border investment of 1 with a pre-tax financial return of 20%
- 7 ways of financing: (i) retained earnings of subsidiary; (ii) new equity of subsidiary and retained earnings of parent; (iii) debt of subsidiary and retained earnings of parent; (iv) new equity of subsidiary and new equity of parent; (v) debt of subsidiary and debt of parent; (vi) new equity of subsidiary and debt of parent; (vii) debt of subsidiary and new equity of parent.
- economic depreciation rates: 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 33.3% / 33.3% / 33.3% 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 CEESs 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. *beatr* is measured in percent.

- *statrate*

Is the overall statutory corporate income tax-rate of a host country. Values are taken from the European Tax Handbook. It includes local business taxes and is defined in percent.

- *privrev*

Annual privatisation revenues are on the basis of the stock figures on privatisation revenues in percent of GDP published in the annual EBRD Transition Report. Annual privatisation revenues are expressed in million Euro.

- *ulc*

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 and Tang 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:

- First, since we base our analyyis on the OLI-paradigm we do not use relative unit labour costs, but *ulc* in *absolute* terms.

- Second, since the location choice is international rather than on the national level (e.g. between regions of the same country) we use *ulc* expressed in a *common currency*.[16]
- Third, since the host countries of FDI experienced divergent price-level developments over the examination period, with some countries showing relatively 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.

We apply the following formula to calculate real unit labour costs in common currency, which is used in a similar form e.g. by van Ark and Monnikhof (2000).

ulc = [((annual nominal compensation of employees in national currency / nominal EURO exchange rate) / employees) / ((nominal GDP in national currency / PPP EURO exchange rate) / employment)]

PPP exchange rates vs. Euro has been taken from the WIIW database and the other indicators have been taken from the AMECO database.

- *tar*

tar is defined as the ratio of "tariffs on imports" (from Eurostat, Main National Accounts, Position D212: "taxes and duties on imports excluding VAT", position S13: General Government) over "imports of goods and services", taken from the European Commission's AMECO database.

- *risk*

risk captures political risk. Data are taken from various issues of "Euromoney". 25 is the maximum value (lowest possible risk level) and zero the minimum value. 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.

[16] Also, Bevan and Estrin (2004, p. 780) "use the unit labour cost in the host country denominated in Euros because multinational enterprises evaluate alternative locations based on real costs to ensure that a lower wage is not compensated for by reduced labour productivity."

- *pp*

pp is a proxy for inflation measured as the increase in producer prices. Data are taken from various editions of EBRD's Transition Report.

- *combord*

The common border variable is 1 if home and host countries share a common border and zero otherwise.

IX. Tables

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 2000-03
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

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
BG	10.95	8.29	2.23	6.33	9.89	5.70	8.52	51.92
CR	25.80	17.91	0.93	8.62	8.37	2.49	10.79	74.91
CZ	11.82	20.57	7.92	1.07	30.92	4.25	5.16	81.70
HU	11.22	29.20	4.34	1.85	19.54	0.86	5.21	72.21
PL	4.02	17.25	14.47	3.90	23.34	3.66	9.47	76.10
SL	14.01	18.97	2.39	8.13	26.24	7.48	4.05	81.28
SI	23.19	7.80	7.45	6.44	5.41	2.76	1.63	54.69
RO	6.23	7.16	10.43	7.77	18.59	1.95	3.36	55.49

Source: WIIW Database

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

Year	*CZ*	*HU*	*PL*	*SK*	*Sl*	*BUL*	*CRO*	*RO*
1995	41.00	18.60	40.00	40.00	30.00	40.00	25.00	38.00
1996	39.00	19.00	40.00	40.00	25.00	40.00	25.00	38.00
1997	35.00	19.00	36.00	40.00	25.00	36.00	35.00	38.00
1998	35.00	19.14	36.00	40.00	25.00	30.00	35.00	38.00
1999	35.00	19.40	34.00	40.00	25.00	27.00	35.00	38.00
2000	31.00	19.64	30.00	29.00	25.00	25.00	35.00	25.00
2001	31.00	19.64	28.00	29.00	25.00	20.00	20.00	25.00
2002	31.00	19.64	28.00	25.00	25.00	15.00	20.00	25.00
2003	31.00	19.64	27.00	25.00	25.00	23.50	20.00	25.00
2004	28.00	17.80	19.00	19.00	25.00	19.50	20.00	25.00
2005	26.00	17.70	19.00	19.00	25.00	15.00	20.00	16.00

Year	*AUT*	*FR*	*GER*[17]	*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. (2005)

Table 4:

The Choice for Foreign Direct Investment

Ownership-advantage	Internalisation-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**

Source: based on Dunning (1988)

[17] The overall tax-rate for undistributed profits is shown.

Table 5:
Country-level Location Factors related to Market- and Efficiency-oriented FDI

	Source	Variable	Expected Sign
Market-specific			
(a) $gdphome_{it}$*	New Cronos	GDP home country	+
(b) $gdphost_{jt}$*	New Cronos	GDP host country	+
Efficiency-specific			
(c) $dist_{ij}$*	Internet sources	Distance	–
(i) $combord_{ij}$	Maps	Common border	+
(d) $beatr_{ijt}$	Own calculation	Bilateral effective average tax rate	–
(e) ulc_{jt}	AMECO and WIIW	Real unit labour costs	–
Transition-specific			
(f) $privrev_{jt}$	EBRD Transition Report	Annual privatisation revenues	+
(g) $risk_{jt}$	Euromoney	Political Risk	–[18]
(h) pp_{jt}	EBRD Transition Report	Inflation	–
(i) tar_{jt}	EUROSTAT	Tariffs	?

* these variables are the "core gravity variables"

[18] The derived coefficient is, however, positive. Yet, this is due to the measurement (see Appendix) as the highest value denotes the lowest level of political risk.

Table 6:

Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
lnfdimn	overall	4.018	1.755	-0.430	7.811609	N = 449
	between		1.391	1.669	7.190298	n = 56
	within		1.116418	0.6097709	7.941213	T = 8.02
lngdphome	overall	13.89785	1.109758	12.11845	16.24108	N = 449
	between		1.127279	12.20799	16.09599	n = 56
	within		0.1447758	13.43736	14.24014	T = 8.02
lngdphost	overall	10.3925	0.7679184	8.964734	12.24109	N = 449
	between		0.7575605	9.386973	11.94145	n = 56
	within		0.2140549	9.933505	10.8839	T = 8.02
lndist	overall	6.996246	0.9822578	4.036892	9.15006	N = 449
	between		0.9984176	4.036892	9.15006	n = 56
	within		0	6.996246	6.996246	T = 8.02
beatr	overall	34.79265	7.435217	16.1142	55.92223	N = 449
	between		5.379209	24.07576	48.07636	n = 56
	within		5.083323	17.52962	47.069	T = 8.02
Ulc	overall	24.61693	9.230205	11	50	N = 449
	between		8.770968	15.42857	46.14286	n = 56
	within		2.899841	15.61693	32.41693	T = 8.02
privrev	overall	1223.837	1157.485	58.16944	4570.032	N = 449
	between		908.2537	93.03492	2712.472	n = 56
	within		739.7431	-19.38042	4375.463	T = 8.02
Pp	overall	28.08931	112.819	-1.2	901.8	N = 449
	between		43.94309	1.922222	154.0429	n = 56
	within		104.109	-122.5535	803.6671	T = 8.02
risk	overall	13.88744	3.329582	5.32	19.82	N = 449
	between		2.900568	9.597143	17.48333	n = 56
	within		1.648892	7.737439	17.39244	T = 8.02
Tar	overall	4.342851	3.832391	0.5	18.45	N = 449
	between		3.076358	0.95	11.71222	n = 56
	within		2.280815	-0.171435	13.43174	T = 8.02
combord	overall	.1314031	0.3382175	0	1	N = 449
	between		0.3337119	0	1	n = 56
	within		0	0.1314031	0.1314031	T = 8.02

Table 7:

Variance Inflation Factors

Variable	VIF	1/VIF
dist	3.74	0.267
gdphost	2.91	0.343
risk	2.64	0.379
gdphome	2.62	0.381
tar	2.27	0.440
privrev	2.19	0.456
combord	1.78	0.561
ulc	1.73	0.577
beatr	1.23	0.813
pp	1.16	0.858

Table 8:

Pillar-1 Results

Model_1	Model_2a	Model_2b
lngdphome 0.29026	0.34597**	0.46472***
(1.78)	(2.48)	(3.21)
lngdphost 1.27140***	1.34399***	1.44075***
(8.02)	(8.99)	(10.70)
lndist -0.60524***	-0.67522***	-0.76821***
(-3.28)	(-4.35)	(-4.55)
beatr* -0.03476	**-0.04636***	**-0.05685***
(-2.85)	(-3.42)	(-5.80)
	ulc -0.03316***	***ulc*** -0.03439***
	(-2.88)	(-2.99)
cons -7.74253***	-7.59421***	-9.21078***
(-3.34)	(-3.94)	(-4.70)
N 449	449	449
R^2: within: 0.2960	= 0.2957	= 0.2516
between: 0.5913	= 0.6485	= 0.6493
overall: 0.4638	= 0.4981	= 0.4818
AR(1): $\chi^2_1 = 1.232$	= 1.207	= 2.005
Het.: $\chi^2_{12} = 18.39$	$\chi^2_{13} = 19.07$	$\chi^2_5 = 8.966$
TD: $\chi^2_8 = 24.01$***	= 13.45	*not included*[a]
Hausman: $\chi^2_3 = 5.88$	$\chi^2_4 = 8.32$	= 7.69
BP: χ_1 = 226.88***	= 162.35***	= 153.38***

Model_3	Model_4a	Model_4b
lngdphome 0.28124	0.27291	0.40092**
(1.81)	(1.65)	(2.52)
lngdphost 0.98886***	1.23147***	1.32896***
(5.98)	(6.96)	(8.14)
lndist -0.59529***	-0.57739***	-0.67614***
(-2.84)	(-3.03)	(-3.61)
beatr* -0.03379	**-0.03512***	**-0.04482***
(-2.84)	(-2.44)	(-4.68)
privrev 0.00029***	***risk*** 0.02111	***risk*** 0.02252
(4.29)	(0.58)	(0.73)
cons -5.03765**	-7.59143***	-9.38413***
(-2.19)	(-3.61)	(-4.36)
N 449	449	449
R^2 within = 0.3205	= 0.2984	= 0.2549
between = 0.6248	= 0.5834	= 0.5813
overall = 0.4927	= 0.4601	= 0.4416
AR(1) = 1.304	= 0.935	= 1.737
Het.: $\chi^2_{13} = 20.78$	= 19.99	$\chi 2_5 = 7.480$
TD: $\chi^2_8 = 29.21$***	= 15.43	*not included*[a]
Hausman: $\chi^2_4 = 5.4$	= 8.88	= 7.38
BP: $\chi_1 = 213.27$***	= 210.83***	= 196.99***

[a] Models_2a and _4a: cluster robust standard errors change significance of time dummies but not that of other variables. Models_2b and _4b hence exclude time dummies

Model_5		Model_6		Model_7	
lngdphome	0.28021		0.32341**		0.23844
	(1.70)		(2.04)		(1.40)
lngdphost	1.24630***		1.37563***		1.25056***
	(7.66)		(8.17)		(7.80)
lndist	-0.59275***		-0.65996***		-0.45979**
	(-3.16)		(-3.86)		(-2.01)
beatr	**-0.03254****		**-0.03440*****		**-0.03472*****
	(-2.61)		(-2.76)		(-2.84)
pp	-0.00044	***tar***	0.04499	***combord***	0.51741
	(-0.86)		(1.43)		(1.08)
cons	-7.48229***		-9.04955***		-7.87836***
	(-3.17)		(-3.78)		(-3.37)
N	449		449		449
R^2:	within: 0.2980		= 0.3004		0.2964
	between: 0.5894		= 0.5949		0.5990
	overall: 0.4633		= 0.4671		0.4677
AR(1):	$\chi^2_1 = 1.193$		= 1.209		= 1.232
Het.:	$\chi^2_{13} = 18.40$		= 26.109**		= 19.259
TD:	$\chi^2_8 = 24.52$***		= 28.33***		= 24.59***
Hausman:	$\chi^2_4 = 8.92$		= 7.36		= 5.55
BP:	$\chi_1 =$ 227.50***		= 228.82***		= 213.27***

*** p < 0.01; ** p < 0.05; Het: LM-Test for Heteroskedasticity in fixed effects model; TD: time dummies; BP: Breusch-Pagan-test for random individual effects; Hausman: Hausman-test or Hausman-Wooldridge-Test for fixed vs. random effects; AR(1): Wooldridge-test for serial correlation in linear panel data models

Table 9:

Pillar-2 Results

	Model_8	Model_9
lngdphome	0.24030	0.32967**
	(1.61)	(2.27)
lngdphost	0.99097***	1.05707***
	(5.58)	(6.63)
lndist	-0.42646**	-0.65757***
	(-2.18)	(-4.35)
beatr	**-0.04360*** **	**-0.04370*** **
	(-3.51)	(-3.50)
privrev	0.00028***	0.00029***
	(3.54)	(3.79)
ulc	-0.03739***	-0.03076***
	(-3.26)	(-2.67)
combord	0.73066	
	(1.81)	
pp	-0.00083	
	(-1.58)	
risk	0.03424	
	(1.10)	
tar	0.02148	
	(0.67)	
cons	-5.06197**	-4.898357**
	(-2.27)	(-2.20)
N	449	449
R^2:	within: 0.3311	= 0.3235
	between: 0.6776	= 0.6603
	overall: 0.5280	= 0.5155
AR(1): χ^2_1 =	0.960	= 1.276
Het.: χ^2_{18} =	35.593***	χ^2_{14} = 21.535
TD: χ^2_8 =	29.66***	= 28.32***
Hausman: χ^2_8 =	10.32	χ^2_{13}= 13.35
BP: χ_1 =	151.79***	= 175.14***
		Reset: χ^2_3 = 5.04
		st.res > 3.5: 0
		Highest VIF: 2.41

*** p < 0.01; ** p < 0.05; st.res: studentized residuals; VIF: variance inflation factor; Het: LM-Test for Heteroskedasticity in fixed effects model; TD: time dummies; BP: Breusch-Pagan-test for random individual effects; Hausman: Hausman-test or Hausman-Wooldridge-Test for fixed vs. random effects; AR(1): Wooldridge-test for serial correlation in linear panel data models; Reset: Ramsey-functional-form-test

Table 10:

Beta Coefficients and Statutory Tax Rate

Beta Coeff.		**Model_10**
lngdphome	0.173	0.26277
		(1.69)
lngdphost	0.396	1.04806***
		(6.15)
lndist	-0.261	-0.60497***
		(-3.67)
beatr	**-0.192**	**statrate** **-0.02360**
		(-1.78); **p = 5.1**
privrev	0.191	0.00027***
		(3.57)
ulc	-0.115	-0.02546**
		(-2.09)
cons	---	-5.057145**
		(-2.12)
N	449	449

Overall standard deviations from random effects transformed variables are used to calculate beta coefficients. The values used are: 1.264 (*lnfdimn*), 0.664 (*lngdphome*), 0.474 (*lngdphost*), 0.502 (*lndist*), 5.552 (*beatr*), 832.988 (*privrev*) and 4.716 (*ulc*).

Table 11:

Jackknife Analysis

Dependent variable: *lnfdi*					
	Minimum (in absolute value)	Host country excluded	Estimate	Maximum (in absolute value)	Host country excluded
beatr	-3.17** (-2.45)	Czech Rep.	-4.40***	-5.80*** (-4.38)	Croatia
ulc	-1.99 (-1.61)	Czech Rep.	-3.10***	-4.40*** (-3.08)	Romania
privrev	0.02** (2.64)	Hungary	0.03***	0.04*** (3.63)	Czech Rep.
*** p < 0.01; ** p < 0.05 ; t-value in parenthesis					

Table 12:

Stability Analysis

Model_11		**Model_12**		**Model_13**	
lngdphome	0.33443**		0.33157**		0.32780**
	(2.54)		(2.43)		(2.41)
lngdphost	1.06292***		1.01179***		1.05694***
	(5.97)		(5.82)		(5.95)
lndist	-0.66290***		-0.66850***		-0.65628***
	(-4.49)		(-4.34)		(-4.32)
beatr	**-0.04666*** **		-0.03725***		-0.04277***
	(-2.93)		(-2.89)		(-3.14)
dummybeatr	**0.00259**	***privrev***	**0.00044*** **		0.00029***
	(0.12)	(4.75)			(3.38)
privrev	0.00029***	***dummypriv***	**-0.00031*** **	***ulc***	**-0.03010** **
	(3.39)		(-2.79)	(-2.36)	
ulc	-0.03126***		-0.02565**	***dummyulc***	**-0.00219**
	(-2.71)		(-2.26)		(-0.16)
cons	-4.96785**		-4.50656**		-4.86455**
	(-2.28)		(-2.18)		(-2.32)
N	449		449		449

Table 13:

Long run estimates

Model_14	**Model_15**
lngdphome 0.41477***	0.44549***
(3.08)	(2.80)
lngdphost 1.15908***	1.44501***
(3.01)	(9.22)
lndist -0.72365***	-0.75861***
(-4.81)	(-4.24)
beatr **-0.08386*****	**-0.09311*****
(-3.05)	(-3.87)
privrev 0.00026	
(0.76)	
ulc -0.03892**	-0.04697***
(-2.21)	(-3.30)
cons -5.16485	-7.48713***
(-1.55)	(-3.48)
N = 449	449
Number of Groups = 56	56
F(6,49) = 16.81***	F(5,50) = 20.13
R^2 (between) = 0.6730	= 0.6681
R^2_adj = 0.632	= 0.63
Het. = χ_6 = 2.379	Het. = $\chi 5$ = 2.759

*** p < 0.01; ** p < 0.05

Het: LM-Test for Heteroskedasticity

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