Tax differences and foreign direct investment in the EU27[♣]

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March 2010

Abstract

We empirically analyze the impact of corporate tax rates and agglomeration economies on FDI using panel data on bilateral FDI flows and stocks in the enlarged European Union. The novelty of the paper is that it explicitly deals with agglomeration forces and how these may explain differences in tax policies between new and old member countries. The empirical analysis closely follows the implicit underlying model where the foreign direct investment decision is seen a two-step procedure: first, whether to invest or not, and second, the amount of FDI to invest. The paper makes use of recent data on corporate tax rates for all 27 EU member countries and covers the period 1995-2006. We find that there are large differences in determinants of FDI going to EU15 and to the new member countries. First, tax differentials mainly seem to influence FDI flows to new members. Second, when it comes to agglomeration economies, these appear to play a somewhat more important role for the amount of investment made within the EU15. In addition, significant differences are found between the determinants of the extensive and intensive margins of the FDI decision.

JEL classification: F12; F15; F21; H71

[♣] We thank Peter Neary and participants at the Merton seminar at the University of Oxford. We also thank seminar participants at Örebro University and conference participants at SNEE Conference in Mölle, 2009, ETSG in Rome, 2009, and ACE International Conference in Hong Kong, 2009, for valuable comments. Generous financial support from SIEPS (Swedish Institute for European Policy Studies) is gratefully acknowledged.

I. Introduction

As part of international investment flows, foreign direct investment (FDI) has gained much attention by researchers on globalization and tax competition. The use of tax incentives as a mean to attract FDI has been analyzed within a framework where the elimination of barriers to international investments induces countries to compete for mobile capital. There is by now also quite strong empirical support that FDI flows do respond to tax rates (see, e.g., De Mooij & Ederveen, 2006, Feld & Heckemeyer, 2009). In the European Union (EU), the issue of tax competition has regained interest along with both increased economic integration worldwide and, in particular, the EU enlargement that has made the union more heterogeneous in terms of the economic and financial structures of member countries. Considerably lower corporate tax rates in the new member countries have also resulted in some of the old member countries raising demand for tax harmonization.

How the new member countries' lower tax rates have affected FDI flows within the EU is, however, unclear. In fact, empirical studies provide mixed results of the effects of lower corporate taxes in the new member countries, questioning the expressed concern by old members of increased tax competition. Also, the theoretical development of the traditional tax literature has pointed out other factors as being equally important when it comes to attracting FDI. In particular, as suggested by for example Baldwin & Krugman (2004), the presence of agglomeration economies may tend to "lock in" firms and capital in certain regions which, in turn, enables countries that benefit from these agglomeration economies to retain high taxes.

In this paper, we empirically analyze how FDI in the European Union are affected by corporate tax rates and agglomeration economies with a particular focus on differences between tax policies in old and new member countries. The analysis takes as a point of departure the opposing forces of tax rates, on the one hand, and agglomeration economies, on the other, on FDI, and that these forces are likely to differ between old and new members. We use panel data on bilateral FDI flows and stocks between both old (EU15) and new

member countries (NMCs) of the European Union. The paper makes use of recent data on effective marginal and average corporate tax rates for all EU member countries and covers the period 1995-2006.

We contribute to the existing empirical literature in several ways. First, by using more recent data, the analysis is one of the first to also comprise the development after the actual accession to the EU of most of the new members. Second, the paper explicitly deals with agglomeration forces and how these may explain differences in tax policies between new and old members. Especially, we expect agglomeration forces to be stronger in old member countries which would allow these countries to maintain higher taxes. This also offers one possible explanation as to why new member countries with less pronounced agglomeration economies are likely to pursue more aggressive tax policies in order to attract new investments. Third, the empirical analysis closely follows an underlying model where the foreign direct investment decision is seen as a two-step procedure: first, whether to invest or not, and second, the amount of FDI to invest. This set-up of the investment decision is essential in order to distinguish between the impact of different tax rates on the extensive and intensive margin of FDI.

The findings in this paper suggest that there are large differences in the determinants of FDI going to the EU15 and to the new member countries. We find support for the notion of increased tax competition from the new member countries; while tax differentials seem to influence FDI flows to new members, no such effect is found for flows between old member countries. At the same time, agglomeration economies appear to play a somewhat more important role for the amount of investment made within the EU15.

The paper is organized as follow. Section II discusses related studies on the sensitivity of FDI to corporate tax rates in the EU and the impact of agglomeration economies. Section III presents the data and econometric method. The results are reported in section IV and a discussion of the results is provided in section V. Section VI concludes the paper.

II. Background and Related Studies

The question if the ongoing EU enlargement with the accession of the new member countries will increase tax competition in Europe is closely related to how FDI respond to taxation in the new members countries. Overall, there has been a downward trend in corporate statutory as well as effective tax rates over the last decade in both the old and new member countries. As showed in Figure 1 and Figure 2, however, the decline in corporate tax rates seems to have been more pronounced in the new member countries. The tax gap for statutory tax rates between old and new members has increased from 4 percent in 1995 to 10 percent in 2007. Similarly, the tax gaps for both effective average and effective marginal tax rates have doubled since 1998. Figure 3 and Figure 4 display total FDI flows within the EU27 and FDI flows from old (EU15) to the new members, respectively.[1] Noteworthy is the sharp increase of FDI flows from the EU15 to the NMCs from 2003 which coincide in time with the enlargement 2004. On the other hand, the share of FDI flows going to NMCs of total FDI flows within the EU27 has only increased from 11.6 percent in 1995 to 13.3 percent in 2006.

Although corporate tax rates are considerably lower in the new EU members the impact of these lower taxes on FDI is uncertain. There is a vast amount of empirical studies showing that corporate tax rates matter for FDI. However, most of these studies have focused on some sub-sample of OECD countries, and it is not until recently that the NMCs have been included in empirical analyses. There are some studies of the determinants of FDI to the Central and East European countries (CEECs) during the transition period[2] but only a few papers have explicitly considered tax competition in the enlarged EU. The empirical evidence from these studies is also mixed. A study by Lahrèche-Révil (2006) uses a gravity framework and analyzes bilateral FDI flows between 1990 and 2002 from the EU15 to other EU countries including some new member states. She finds that although high tax rates seem to have a negative effect on FDI inflows to EU15 countries, taxation does not seem to

[1] The EU15 consists of the EU member countries prior to the enlargement in 2004, while the NMCs are countries that gained accession in the 2004 and 2007 enlargements.
[2] E.g., Carstensen & Toubal (2004) and Demekas *et al* (2007).

influence FDI inflows to the new member countries. Therefore, it is concluded, tax competition from the new members may not be of great concern. Also, Wolff (2007) considers how different sub-components of bilateral FDI flows react to corporate tax rates using data on the EU25 from 1994 to 2003. Although there appear to be some differences across different components of FDI, he does not find any significant effect of corporate taxes on total FDI flows. On the other hand, Bellak & Leibrecht (2009) investigate FDI inflows to eight new member countries during the period 1995-2003. They find quite strong negative effects of bilateral tax differences and estimate the semi-elasticity, i.e. the percentage change in FDI in response to a one percentage point increase in the tax rate, to be about -4.3.[3] The reason, they argue, is that they use average effective as opposed to statutory corporate tax rates where the effective tax rate is considered to be a more appropriate measure of the overall tax burden.[4]

A possible reason for the mixed results could be that the studies differ in sample, method, and measures of corporate tax rates. Notably, none of the studies incorporate the development after the accession of the NMCs. More importantly, significant effects are only found when NMCs are dealt with separately. As there are no reasons to assume the determinants of FDI nor the responsiveness of FDI flows to taxes to be the same in new and old member countries, this suggest that resulting empirical estimates should differentiate between these two groups.

The main objective of the present paper is to investigate possible differences in the effects of corporate taxes on investment flows going to new and old member countries. A closely related question is if other forces may affect the impact of taxes. As argued, the inclusion of agglomeration economies to the traditional tax competition literature could add

[3] This finding can be compared with De Mooij & Ederveen (2006) who construct a meta-sample of 31 previous studies focusing on OECD countries and find that a majority of the semi-elasticities lies between -5 and 0, with a median of -2.9. Also, in the recent meta-study by Feld & Heckemeyer (2009) that include studies of the new member states, the semi-elasticity is estimated to be -1.68.

[4] Statutory tax rates are used in the study by Wolff (2007) while Lahrèche-Révil (2006) uses both statutory and average effective tax rates.

to our understanding of differences in tax policies across countries. Bénassy-Quéré et al (2005) considering 11 OECD countries and Hansson & Olofsdotter (2008) investigating the EU15 find evidence of bilateral FDI flows being sensitive to agglomeration economies. Also, the results from studies on firm location, show that agglomeration economies tend to mitigate negative effects of taxes on the location decision of firms (e.g., Devereux et al, 2007, and Brülhart et al, 2008). The influence of agglomeration economies when it comes to tax competition in the enlarged EU, however, has not been thoroughly taken into account in previous studies. Hence, in so far the impact of corporate taxes on FDI between new and old member countries remains unsolved, the inclusion of agglomeration effects could substantially add to previous research. In this paper, we focus on agglomeration forces that may dampen the responsiveness of FDI to corporate tax rates and whether these forces differ between new and old members. Konrad & Kovenock (2009) offer a theoretical framework of competition for FDI and agglomeration economies.[5] In the static version of their model, agglomeration forces are expected to be larger in countries that previously have received large amount of FDI. Since agglomeration economies give an opportunity to have higher taxes, deviations in tax rates across countries is then determined by differences in the stock of FDI. At the same time, the two-fold nature of FDI suggests that higher taxes deter new flows of FDI. Thus, this could be seen as a trade-off between competing for new FDI with low taxes or take advantage of agglomeration forces and tax old FDI.[6] For our purpose, this setting provides a theoretical foundation as to why new member countries without large stocks of FDI are likely to pursue a more aggressive tax policy in order to attract new investments.

[5] Razin & Sadka (2007) also develop a model focusing on the EU enlargement and the asymmetries in tax policies between EU15 and EU10.
[6] In the dynamic version of their model, this implies that agglomeration advantages between countries may change over time.

III. Methodology and Data

As emphasized by Razin et al (2004) and Razin & Sadka (2006) the foreign investment decisions can be characterized by a two-step procedure; first, a location decision on whether to invest or not in a particular country, and second, a flow decision on how much to invest. Razin et al (2004) model this by assuming fixed setup costs of new investment, making bilateral FDI flows between an investing and a host country "lumpy". [7] The fixed costs will play no role for the decision on the amount of investment but will affect the location decision whether to engage in FDI at all. This two-fold nature of the investment decision suggests that the empirical estimation should make use of a sample selection procedure – an issue not addressed in previous studies of FDI and the enlargement of the EU, with Wolff (2007) as an exception. We, hence, use the joint Heckman estimation technique which we believe to be a more appropriate estimation procedure and more in line with the underlying model. In the Heckman's selection correction procedure selection from the sample is first predicted and then used to adjust the OLS estimates to account for the selection bias. In other words, the Heckman method assumes that there exists an underlying selection equation determining whether the dependent variable is observed or not. Moreover, by using Heckman we are able to analyze whether our independent variables have different effects on the decision to invest and the amount invested, respectively.[8] This method is also more appropriate as FDI flow data in general are characterized by many zero observations where no FDI flows appear, either since no FDI takes place or is too small to be reported, or due to negative values.[9] Specifically, the following model is estimated:

[7] The assumption of fixed set-up costs distinguishes FDI flows from purely financial flows.

[8] An alternative to the Heckman procedure is a Tobit estimation where the zero observations are also treated as a result from a censored process. The Tobit estimator, however, assumes that the effects of the independent variables are the same for both the probability of being selected and the observed amount.

[9] Negative signs are due to disinvestment, e.g. when the investor sells shares or pays back loans.

$$FDI_{ijt}^{*} = X_{1ijt}\beta_1 + \varepsilon_{1ijt} \quad (1)$$

$$s_{ijt}^{*} = X_{2ijt}\beta_2 + \varepsilon_{2ijt} \quad (2)$$

$$FDI_{ijt} = FDI_{ijt}^{*}, s_{ijt} = 1 \quad \text{if } s_{ijt}^{*} > 0 \quad (3)$$

$$FDI_{ijt} = 0, s_{ijt} = 0 \quad \text{if } s_{ijt}^{*} \leq 0\,. \quad (4)$$

Equation (1) is the flow equation determining the FDI flows while equation (2) is the underlying selection equation where s_{ijt} is one if the FDI flow from country *i* to country *j* is positive and zero if no FDI is observed. The error terms are assumed to be normally distributed with a covariance σ_{12} and with a correlation coefficient ρ. If ρ is positive OLS estimation of equation (1) will yield biased results while Heckman provides consistent and asymptotically efficient estimates.

We estimate the effect of tax rates and agglomeration economies on FDI by using unbalanced panel data on bilateral FDI flows between all 27 member countries of the European Union for the period 1995-2006. We follow previous studies on FDI and use a gravity model where FDI is determined by standard gravity variables, as well as taxes, agglomeration economies, and additional control variables.[10] We follow Blonigen and Davies (2004) and use a log-linear specification to deal with the skewness common in FDI data. In more details, the flow equation (1) is estimated according to:

$$lnFDIflow_{ijt} = \beta_1 lnGDP_{it} + \beta_2 lnGDP_{jt} + \beta_3 lnDIST_{ij} + \beta_4 TAXDIFF_{ijt} + \beta_5 AGGLOM_{jt-1} + X_{1i,j,t}\gamma + \lambda_t + \varepsilon_{ijt} \quad (1')$$

[10] For other studies of FDI that employ a gravity framework, see, for example, Wei (2000), Stein & Daude (2003), Blonigen and Davies (2004), Bénassy-Quéré et al (2005), Lahrèche-Révil (2006), Wolff (2007), Bellak & Leibrecht (2009), and Egger et al (2009).

where $lnFDIflow_{ijt}$, is the natural logarithm of the flow of FDI from investing country *i* to host country *j* in year *t*. $lnGDP_{it}$ and $lnGDP_{jt}$ are the logarithms of the investing and host country's GDP, respectively, $lnDIST_{ij}$ is the logarithm of the bilateral distance between country *i* and *j*, $TAXDIFF_{ijt}$ is the difference in corporate tax rates between the host and investing countries, $AGGLOM_{,jt-1}$ is our agglomeration variable based on last years' stock of FDI in the host country, $X_{1i,j,t}$ is a vector of additional bilateral and host country control variables assumed to affect the inflow of FDI, and λ_t is a time dummy.

Since the gravity framework typically deals with flows, we use bilateral net FDI outflows from investing to host country provided by Eurostat as our dependent variable. The data set records about 2000 observations of FDI flows going to the NMCs and a little more than 2600 observations of FDI flows to the old member countries. For these observations, a EU15 country stands as the investing country in approximately 60 percent of the cases. Regarding different components of FDI, equity capital constitute the largest part of FDI for both new and old member countries. Between 1995 and 2006, the share of FDI in the form of equity capital has been 80 percent of EU15's outgoing investments to the new member countries and around 70 percent to other EU15 countries. During the same period, reinvested earnings–the component expected to be the most sensitive to taxes–were about 18 percent of total FDI from EU15 countries to NMCs and 12 percent within the EU15.

The first main independent variable of interest in this study is corporate taxes and the measure of this variable requires some discussion. Several studies of tax competition show that there are large variations between different tax measures, especially on capital. It is therefore crucial to identify the appropriate tax variables when conducting empirical analysis. Since our concern is how differences in tax rates affect investment and location, forward looking tax measures should be the more appropriate measure as investment decisions primarily depend on current and expected future tax rules. Statutory tax rates have the advantage of being straightforward and are easily accessible. However, these tax rates are problematic since they disregard the size of the tax base and neglect depreciation rules,

government tax compensations etc. Effective tax rates take this into account and are calculated as the net present value of tax payments as a share of the net present value of pre-tax income using tax rules. When it comes to firm localization and the discrete investment decisions dealing with whether to invest abroad or not, the average effective tax rate is probably the most relevant tax as suggested by e.g., Devereux & Griffith (2003). On the other hand, for marginal decisions when investment is already in place, effective marginal rates are more appropriate. It should be noted, however, that these tax rates are based on a hypothetical investment project that requires a number of assumptions and simplifications. Also, according to Razin & Sadka (2006) effective tax rates are associated with an endogeneity problem as they are affected by the amount of investment. Instead they argue in favor of using statutory tax rates as they are the best available instrument to effective taxes. Although effective taxes are our preferred tax measures, we hence also consider statutory tax rates. The statutory tax rates are available for all EU member countries (EU27) from 1995. Data on effective marginal and average taxes are provided by Devereux et al (2008) from 1998. We use the differences in tax rates between host and investing country and expect this difference to be negatively related to the outflow of FDI.[11]

The second key independent variable is agglomeration. Agglomeration economies may appear at many different levels and it is far from clear-cut how this variable should be measured. In this study, we follow the basic setting in Konrad & Kovenock (2009) and let the stock of FDI reflect agglomeration effects in the host country. Thus, we expect that countries with a larger stock of FDI will also, ceteris paribus, have an advantage in attracting new investment compared to countries with a smaller stock. The use of the FDI stock as a determinant of FDI flows underline a self-reinforcing effect of agglomeration economies that

[11] Unlike some previous papers who employ bilateral tax rates we use effective marginal and average tax rates differences as our tax measures. Bilateral tax rates have the advantage of reflecting various bilateral tax treaties that affect taxation and hence FDI. We abstain from using bilateral tax rates as they are hard to accurately measure. There are over 2000 tax treaties worldwide (Radaelli, 1997) and they are hard to quantify and in addition a treaty can have different consequences for different country pairs depending on unilateral tax practices (Blonigen & Davis, 2002).

is empirically supported in, e.g., Cheng and Kwan (2000). We use lagged total stock of FDI from all countries in the sample in the host country as our main agglomeration variable.[12] The chosen two-stage framework of the FDI decision seems appropriate when agglomeration economies are defined in terms of previous amount of FDI received. Also, the setup may allow us to analyze if the impact of the FDI stock differs between the decision on whether to invest and the decision on how much to invest.

As for the gravity variables, GDP for the host and investing countries represents the size of the economies and are in the standard setting expected to have a positive effect on bilateral FDI flows. The effect of geographical distance is from a theoretical point of view ambiguous as it may reflect trade costs.[13] The results from most empirical studies, though, find distance to have a negative impact on FDI.

It should be emphasized that despite its goodness of fit, the gravity framework for FDI is theoretically unfounded.[14] The obvious reason is the multifaceted nature of FDI that makes the impact of markets and geography complex. While the simple bilateral gravity framework should work well for horizontal FDI, vertical FDI and export-platform FDI decisions have a definite multilateral character where the decision to invest in a specific country is not isolated from alternative investment locations.[15] We include a market potential variable for the host country that is measured as the market size (in terms of GDP) of all other countries in the sample weighted by distance. Thus if FDI is mainly in the form of export-platform FDI where the host-country serves as a platform for exports to third markets, this variable is expected to be positive. For vertical FDI, on the other hand, market potential is less clear.[16]

[12] The bilateral measure of the stock of FDI in host country *j* stemming from investing country *i* has also been considered.
[13] For a theoretical discussion of trade costs and FDI, see Neary (2009).
[14] A more theoretical founded framework for FDI is provided by Carr, Markusen & Maskus (2001) that include distance and trade costs.
[15] The multilateral character of FDI in combination with the impact of market access is also related to the difficulty in defining the scope for agglomeration economies.
[16] As discussed in, e.g., Blonigen et al (2004) market potential will have no effect on vertical FDI where the multinational enterprise (MNE) seeks the single lowest cost producer by evaluating all

However, we add the differences in unit labor costs between host and investing country in order to account for investments primarily based on differences in factor prices. This should be of particular importance in our case as we consider countries with different economic and financial structures. In addition, the vector X_1 also incorporates several host country characteristics such as the inflation rate, the share of government investment, the amount of trade and GDP per capita are included as well as dummies for whether the host and investor are actually members of the EU in a particular year. These variables as well as further data description are presented in the appendix. In the selection equation, equation (2), X_2 includes all variables in X_1 and, in addition, trade openness and GDP per capita for identification. For the estimations employing statutory corporate tax rates, the statutory tax differentials are used in both the selection and flow equation. For effective taxes, we use, in line with theory, the average tax differentials in the selection equation and the marginal tax differentials in the flow equation.

IV. Results

As a benchmark, we start by estimating our model on all FDI flows within the EU. Hence, columns (1) and (2) in Table 1 presents the results from the Heckman joint estimations of the flow and selection equation for FDI flows between all country pairs.

The results provide quite strong support for the gravity variables as GDP in host and investing country enter positively (and highly significantly in most estimations) and distance negatively in both the flow and selection equation. In the selection equation, we find as expected that higher unit labor costs in the host compared to the investing country have a negative effect on the decision whether to invest or not whereas EU membership of the host and investing country have clear positive impacts. On the other hand, neither the tax differentials variables nor the agglomeration variable are significant in the selection process.

possible locations. On the other hand, in cases where several activities are to be outsourced by a MNE, the market potential of a specific location is likely to have a positive impact on the FDI decision.

In the flow equation – that estimates the amount of FDI conditional on FDI taking place – labor costs differences also appear to have a negative impact on the amount of investment. Similarly to the selection equation, we do not find any significant effects for the statutory or the effective marginal corporate tax differentials on FDI flows. However, the coefficient for the stock of FDI is now positive and statistically significant suggesting that these agglomeration variables have a positive influence on FDI flows once investment is decided upon. Also, the result for the market potential variable is positive and significant in both estimations. In addition, inflation is not significantly correlated with FDI flows while government investment in the host country has a negative and statistically significant impact on FDI flows. Again, actual membership in the EU of the host and investor seems to increase FDI flows.

The results in columns (1) and (2) do not reveal any empirical evidence of tax differentials having an impact on overall investment flows between EU countries.[17] However, in this paper we investigate possible differences in the effects of tax differentials on investment flows between old and new member countries. Therefore, we continue by considering divergences in the determinants of FDI flows to the NMCs and to the old member countries (EU15). In the following, we focus on FDI flows from the EU15 and study how investment decisions' differ between investments within the EU15 and to the NMCs, respectively.

The regression results for investment flows from the EU15 to the NMCs are reported in columns (3) and (4). The most notable difference from the previous results is the lack of positive and significant results for the agglomeration and market potential variables in the flow equation; and market potential has even a negative and significant effect in the selection equation. On the other hand, openness to trade and GDP per capita are now positive and

[17] In addition to aggregate FDI flows, Eurostat also provides data on FDI into different industries and sectors that could add additional information on the interaction of taxes and agglomeration on FDI flows. Preliminary estimations for the manufacturing sector and different service sectors suggest that FDI in the manufacturing sector is deterred by higher taxes but no such effect is found for the service sectors.

significant in the selection equation. More importantly, however, the results for the tax differentials remain insignificant in both estimations. In order to investigate this further, we re-estimate our model for different sub-samples of the NMCs. It could be argued that, as a group, the NMCs are more heterogeneous than the old EU15 countries and that, therefore, the impact of taxes even within this group is likely to differ. We differentiate between 1) all transition economies, 2) the Baltic countries, and 3) Cyprus and Malta, and find that investment flows from the EU15 to the two latter countries appear to follow a different pattern compared to investments to the other countries in the sample. These findings could possibly be attributed to the reputation of Cyprus and Malta as tax havens; that they, as opposed to the other NMCs, are not formerly socialistic countries; and that geographically they differ by being islands unattached from continental Europe. Therefore we choose to exclude Cyprus and Malta in the subsequent analysis and focus on investments to the CEECs.[18] Columns (5) and (6) report the findings for the EU15's investment to the NMCs excluding Cyprus and Malta while columns (7) and (8) show the results for FDI flows between EU15 countries.

The regression results reveal interesting differences between FDI determinants in NMCs and the EU15. The most striking result relates to the effects of tax differentials. Thus, while no significant results for taxes are found for the EU15, taxes seem to influence FDI to the NMCs. Particularly, the results in the flow equation suggest that both statutory and effective marginal tax differentials negatively and statistically significantly influence the amount the EU15 invest in the new member countries. In the selection equation for NMCs, the two tax differentials have negative signs as expected but the coefficient is only significant for the effective tax rate.

In addition, the agglomeration variable appears to play a more important role for the EU15. The only positive and significant effect for the stock of FDI is found in the flow equation in the within EU15 estimations. Market potential also has the expected sign and is

[18] Doing this also make comparisons with previous studies of FDI to transition economies easier.

significant in the EU15 estimations, but is negative, and significantly so in the selection equation, for investments to the NMCs. Interestingly, the impact of government investment has a significantly positive impact only on FDI flows to the NMCs.

To determine whether agglomeration economies have a dampening effect on tax competition, as predicted in many theoretical models, we include an interaction term between tax differentials and the agglomeration variable, expected to have a positive sign. The results for our main variables of interest are presented in Table 2. We find some evidence of agglomeration leading to less tax competition for investments to the NMCs; the interaction terms are positive in columns (1) and (2) although only significant for marginal effective taxes. On the other hand, no similar result is obtained for investments between EU15 countries and the interaction term actually turns out negative and significant in one of the estimations. Important to note, though, is that the results for the impact of tax differentials on FDI flows prevail in Table 2 as well as the findings for the direct impact of the stock of FDI and market potential. Thus, as agglomeration economies appear to have a direct effect on FDI flows for the old EU countries, the effect is indirect on NMCs.

As mentioned previously, there is no precise way of measuring and defining agglomeration economies since these forces may operate at different levels. Although we would argue that the total FDI stock in a country is a better measure of agglomeration economies in a country, we have also considered the bilateral stock of FDI stemming from a particular investor as a potential agglomeration measure. The coefficient for the bilateral FDI stock turns out positive and significant in some cases no clear results are found for the interaction between tax differentials and bilateral FDI. In addition to measures based on the stock of FDI we also test for the interaction between GDP of the host country and the tax measures. This, however, also gives indeterminate and insignificant results in most of the estimations.[19] Thus, in so far we believe that the total stock of FDI is a proxy for agglomeration economies, the results to this point suggest that agglomeration forces have a

[19] These results are available upon request.

direct positive impact on FDI to the EU15 but less so to NMCs. The evidence of whether agglomeration economies may also dampen negative effects of tax competition remains, however, indecisive.

Further estimations

The question of asymmetries between the importance of host and investing countries' tax rates has gained attention in the literature. Razin & Sadka (2006) suggest that only host country tax rates matter for investment flows once FDI exist, while the tax rate in the investing country is more important for location decisions. The question of asymmetries also relates to double taxation agreements. In principle, different agreements in order to avoid double taxation will only affect *outward* FDI. Here, countries could either employ an exemption system, where foreign-source profits are exempted from paying corporate income taxes in the home country, or a credit system, where foreign paid taxes are credited against home country's taxes. This implies that the investment decision will be indifferent to taxes in the host country under a credit system while under the exemption system both host and parent tax rates matter. Thus, we test whether host countries taxes matter more for investment flows than taxes in the investing country. In addition to the inclusion of host and investing countries' taxes, we also include a dummy for countries employing an exemption system.[20] Again, we concentrate on differences in EU15's investments going to NMCs (still excluding Cyprus and Malta) and to other EU15 countries, respectively, and the results are reported in Table 3. For investments to the NMCs, the tax levels seem only to be important for the amount of FDI flows once an investment is made as the coefficients for tax rates are only significant in the flow equations. As expected, the tax rates of the host country have a negative impact on investment flows while FDI outflows increase with the tax rate of the investing country.[21] On the other hand, there is no clear pattern of tax rates of the host and

[20] Specifications with interactions between the tax rate and tax system provide similar results.
[21] The results are not sensitive to the inclusion of the tax exemption dummy.

investing country playing different roles in different stages for the NMCs. For the EU15, the results are difficult to interpret as the estimated tax rate coefficients in some cases are significant with the wrong signs. We find, however, that a higher effective marginal tax rate in the investing country now has a large positive impact on FDI outflows to another EU15 country. Finally, the significant and positive effect of the tax exemption dummy in the selection equation suggests that EU15 countries that employ an exemption system invest more in both NMCs and EU15 countries.[22]

The results so far thus indicate that there are significant differences between new and old member countries. Previous studies of CEECs have also suggested non-traditional variables as important determinants of FDI to these countries. In particular, the privatization process and the decrease in trade costs during the transition period of these countries have in several studies been showed to influence FDI inflows (Carstensen & Toubal, 2004, Demekas et al, 2007, and Bellak et al, 2009). We have tested if the inclusion of private market share and the share of tax revenue in the NMCs alter our results.[23] Our findings, however, suggest that these variables have no major impact on FDI flows to the NMCs (possible since we focus on a later time period) and their inclusion do not change the results for the tax differentials.

The impact of our explanatory variables could also be sensitive to the inclusion of dummy variables. A result from Wolff (2007) is that tax measures lose explanatory power when year and country dummies are included. We test the robustness of our results for FDI flows from the EU15 to NMCs by, in addition to year dummies, including country dummies in the estimations. The results (not reported) show that the inclusion of these dummy variables indeed reduces the significance of other explanatory variables. As for tax

[22] The result that taking into account different tax schemes across countries does not alter the effects of taxes on FDI are in line with previous studies showing that bilateral tax treaties do not have a major impact on FDI activity (see, e.g., Blonigen & Davies, 2004).
[23] These variables are from the European Bank for Reconstruction and Development (EBRD).

differentials, while the statutory tax differential turns insignificant, the results for the effective tax rates remain significant.

By only focusing on bilateral FDI flows between EU countries, we disregard how these flows interact with each other as well as with the rest of the world. By considering the investing country's total outward FDI flows, some of the interaction between investments to a particular host country and with other countries might be captured. Also, the appropriate measure of agglomeration might not be limited to the stock of FDI stemming from other EU countries but from the whole world. Including total FDI outflows and total FDI stock in the regressions, however, do not alter the results for tax differentials and the variables turn out insignificant in most estimations.[24]

In addition, we perform a number of sensitivity analyses. The results are in most cases insensitive to these, and, hence, we do not report the results from these sensitivity analyses. For instance, the results are insensitive to alterations in the data – for instance dropping all negative FDI flows, all missing observations, or replacing all zero FDI flows with ones.[25] Moreover, the different results found between statutory and effective tax rates are not driven by using different years in the estimations. We constrain the estimations for the statutory tax rates to include the same observations as for the effective tax rates; without changing the results. The results are also insensitive to dropping some explanatory variables, such as trade and government investment, and to using the same explanatory variables in the flow and selection equation as done by, e.g., Wolff (2007).

Some of the sensitivity analyses change the results, however. These results are reported in Table 4 together with results from our base regressions for comparison. For instance, excluding the difference in labor unit cost generally increases the magnitude and significance level of the tax differential variable. For FDI flows within EU15 both the

[24] Except in the within EU15 regressions where total outward investment flows are negative and significant in both the selection and flow equations.

[25] The results are also insensitive to the use of other estimation techniques. We have alternatively used Tobit, fixed effect, and two-step Heckman estimations without changing the results for the tax differentials.

statutory and the effective marginal tax rate are now significant in both the flow and the selection specification. For FDI flows from EU15 to NMCs both the statutory and the effective tax differentials are significant in the selection estimation, and the coefficient of the effective marginal tax differential is larger in magnitude in both the selection and flow estimation. These results suggest that failing to incorporate unit labor cost overstates the tax differentials' impact on FDI decisions. Table 4 also report results from regressions dividing the sample into two sub-samples: one up and until 2000 and one after 2000 in order to test whether tax competition has become fiercer in the latter period. The results do not support that tax competition has become fiercer, however. On the contrary, the results suggest the opposite. If the sample is subdivided into two samples, one before and one after the accession of the new member states, tax rates differentials seem to influence FDI decisions but not the amount in the latter period for both the FDI decisions to NMCs and within EU15. In the earlier period tax rate differentials only influence the amount of FDI to NMCs. As the number of observations in the latter period is small no strong conclusions should be drawn from these results, however.

V. Discussion

Our empirical results provide new evidence on the impact of corporate taxes on FDI in the enlarged EU. Like Bellak & Leibrecht (2009), we find that tax rate differentials do influence FDI to the new member countries. Moreover, however, our estimation procedure suggests that the tax impact is more important on the intensive margin, i.e., on the amount of FDI once investment is decided upon. Here the responsiveness of FDI flows to tax differentials also seems to be quite large. The coefficients for the tax differentials can be interpreted as semi-elasticities and our estimations imply that a one percentage point increase in the tax differential leads to a reduction of FDI of, on average, about four percent.

Since investment flows to new and old member countries are considered separately, we can also conclude that no such effect is found for investments flows between old EU

countries. Thus, while some previous studies have found significant effects of corporate taxes on FDI flows between EU15 countries in the 1990s (e.g., Lahrèche-Révil, 2006, and Hansson & Olofsdotter, 2009), our findings suggest that the previous competition for FDI across old member countries has been replaced by competition from the new members. The different results for the two groups of member countries are also in line with the results in Mutti & Grubert (2004) who find the responsiveness to taxation to be lower in high-income OECD countries than in lower income countries.

Also in line with Bellak & Leibrecht (2009) we find that the effective tax measures have a larger impact on FDI than statutory taxes. However, we find the difference between statutory tax differences and effective tax differences to be smaller than they do. Our results are hard to compare though as we use a two-step investment decision model that we think better reflect the nature of FDI decisions.

In addition, the analysis shows that previous amount of FDI only has a positive impact on FDI flows to EU15 countries indicating agglomeration economies to play a larger role in the old member countries. Other factors may of course be important for FDI going to the NMCs. Although we have not paid it much attention, we get, for example, a positive and significant effect of government investment on FDI flows to the NMCs. This result is in accordance to recent empirical work on the importance of infrastructure and government investment in especially CEECs for attracting FDI. At the same time, our result suggests that controlling for these factors does not remove the impact of lower corporate taxes on FDI flows.

Finally, our results shed some light on the different types of FDI going to the new and the old EU countries. It should be noted that regional integration is expected to increase FDI between members mainly through an increase in cross-border merger activity (Neary, 2009) but it is far from clear how integration affects the type of FDI taking place. As argued, the gravity framework can be interpreted as dealing with horizontal FDI (captured by market size of the host country). In our estimations, GDP in the host country is positive and

significant for the within EU15 sample but not for the NMCs. Perhaps even more interesting, the results for market potential of the host country indicate export-platform FDI to be important for investments within the EU15. Neary (2002) models how the creation of a single market with falling trade costs is expected to increase export-platform FDI from foreign multinationals. Our empirical findings suggest export-platform FDI to be important for intra-FDI flows as well. On the other hand, there is no evidence of export-platform FDI taking place for EU15's investment in the NMCs which, in combination with the lack of significant results for horizontal FDI, implies vertical FDI to be more important in the NMCs.

VI. Conclusions

In this paper we have empirically investigated the impact of corporate tax rate differentials and agglomeration economies on FDI within the European Union using panel data on bilateral FDI flows and stocks. The paper departs from most previous work on FDI determinants in that it analyzes whether FDI determinants–particularly tax differentials and agglomeration economies–differ in importance between investment decisions to old EU members (EU15) and to new EU members (after 2003).

We find that there are important differences between FDI going to the EU15 and to the new member countries. Tax differentials seem to play a role for whether FDI takes place as well as the amount invested in the new members. For the EU15, however, tax differentials seem to be less important both for whether investment takes place and the amount invested. When it comes to agglomeration economies, we find support for agglomeration economies as reflected by the total stock of FDI being more important for the decision to invest in the EU15.

The results, thus, suggest that the new member countries are able to attract FDI due to lower tax rates. Despite higher taxes, the old member countries are successful in attracting

FDI, possibly due to agglomeration economies. Over time, however, as the new member countries gain FDI, this agglomeration advantage may diminish.

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Figure 1. Statutory corporate tax rates
Percent
40
35
30
25
20
15
10
5
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
EU15
NMCs

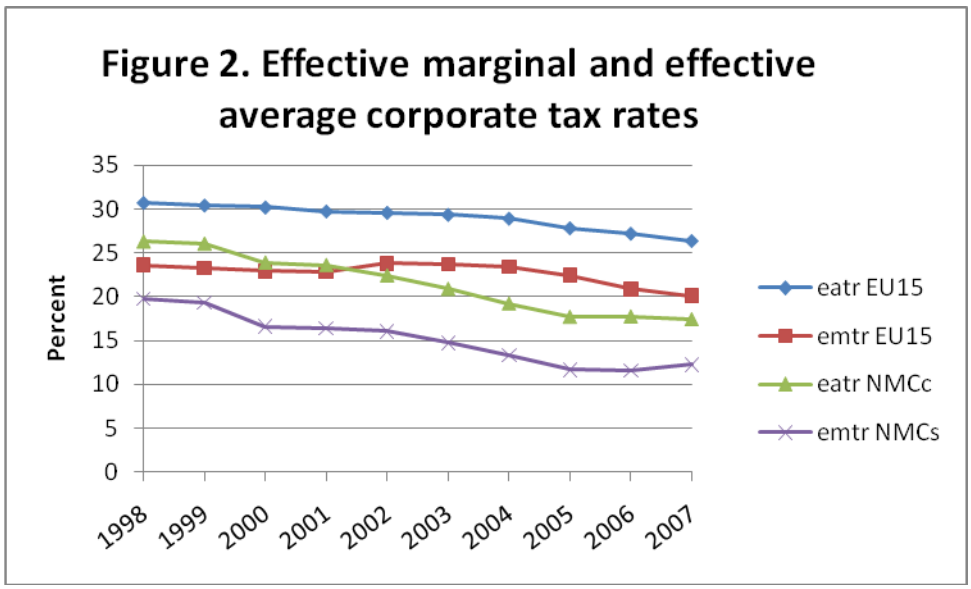
Figure 2. Effective marginal and effective average corporate tax rates
Percent
35
30
25
20
15
10
5
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
eatr EU15
emtr EU15
eatr NMCc
emtr NMCs

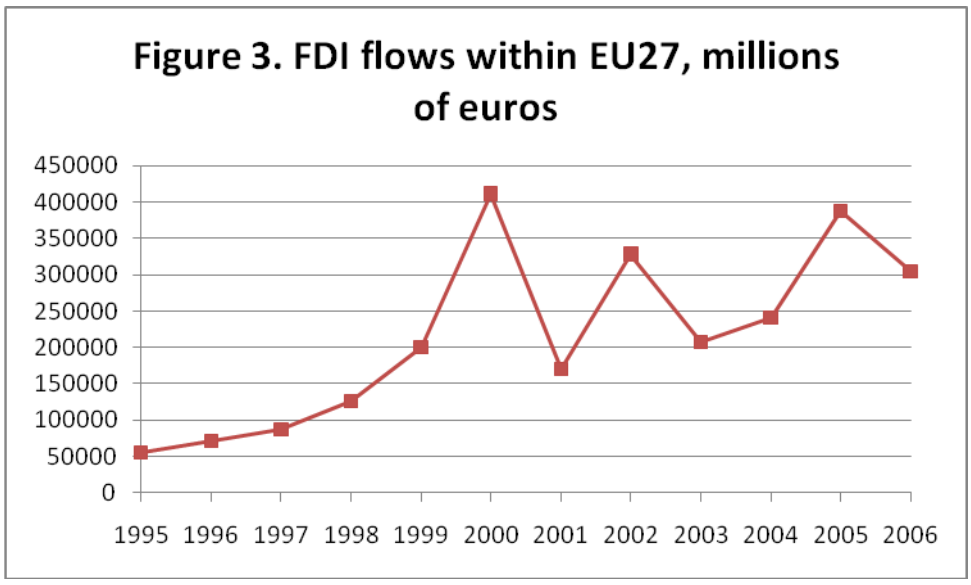
Figure 3. FDI flows within EU27, millions of euros
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006

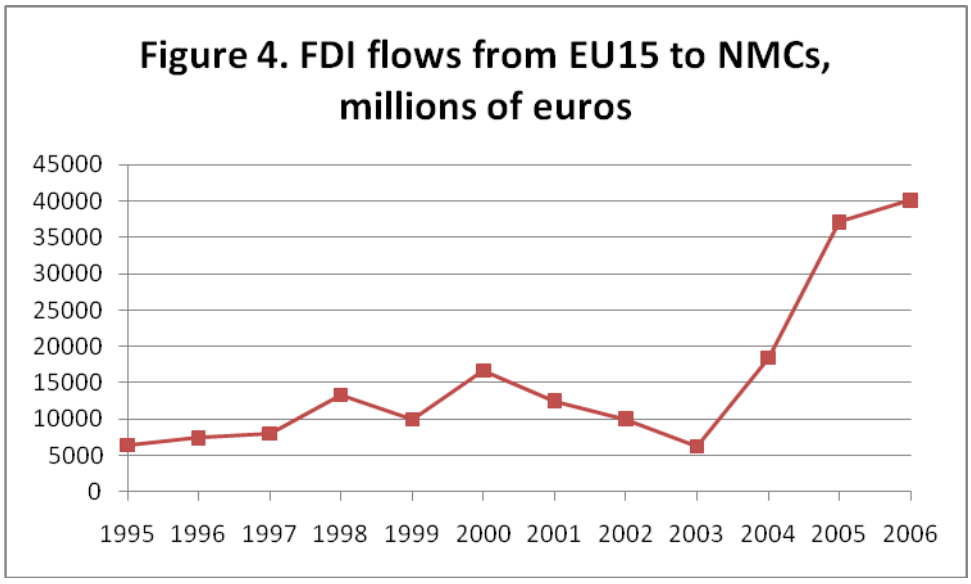
Figure 4. FDI flows from EU15 to NMCs, millions of euros
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006

Table 1. Heckman estimations: determinants of FDI flows

	All		EU15 to NMCs	
	(1)	(2)	(3)	(4)
lnGDP (host)	0.476	0.491	0.121	0.152
	(0.163)***	(0.119)***	(0.133)	(0.138)
lnGDP (investor)	0.690	0.677	0.704	0.693
	(0.124)***	(0.097)***	(0.125)***	(0.125)***
lnDistance	-1.303	-1.242	-1.017	-0.874
	(0.161)***	(0.158)***	(0.212)***	(0.239)***
Statutory tax differential	-0.812		-1.751	
	(1.056)		(1.518)	
Effective marginal		-0.016		0.794
tax differential		(0.936)		(1.354)
FDI stock (host)	$9.69\cdot10^{-8}$	$9.85\cdot10^{-8}$	$6.22\cdot10^{-8}$	$5.85\cdot10^{-8}$
	$(4.04\cdot10^{-8})$**	$(4.26\cdot10^{-8})$**	$(5.79\cdot10^{-8})$	$(6.03\cdot10^{-8})$
Marketpotential (host)	$5.42\cdot10^{-7}$	$5.45\cdot10^{-7}$	$-3.65\cdot10^{-7}$	$-4.38\cdot10^{-7}$
	$(2.33\cdot10^{-7})$**	$(2.18\cdot10^{-7})$**	$(3.50\cdot10^{-7})$	$(3.67\cdot10^{-7})$
Unit labor cost	-0.071	-0.079	0.028	0.011
difference	(0.026)***	(0.019)***	(0.025)	(0.026)
Inflation (host)	-0.008	0.035	0.011	0.141
	(0.011)	(0.030)	(0.015)	(0.035)
Government investment	-0.101	-0.128	-0.045	-0.069
(host)	(0.023)***	(0.024)***	(0.024)*	(0.026)***
EU membership (host)	1.144	1.159	0.279	0.332
	(0.223)***	(0.203)***	(0.209)	(0.209)
EU membership	2.089	2.063		
(investor)	(0.382)***	(0.262)***		
Selection equation				
lnGDP (host)	0.203	0.199	0.214	0.144
	(0.033)***	(0.033)***	(0.053)***	(0.059)**
lnGDP (investor)	0.101	0.105	0.445	0.428
	(0.058)*	(0.054)*	(0.091)***	(0.093)***
lnDistance	-0.119	-0.103	-0.824	-0.929
	(0.066)*	(0.067)	(0.157)***	(0.172)***
Statutory tax differential	0.208		-0.232	
	(0.428)		(0.774)	
Effective marginal		0.151		-1.104
tax differential		(0.536)		(1.095)
FDI stock (host)	$1.73\cdot10^{-10}$	$2.35\cdot10^{-9}$	$2.49\cdot10^{-8}$	$4.45\cdot10^{-8}$
	$(2.21\cdot10^{-8})$	$(2.24\cdot10^{-8})$	$(3.27\cdot10^{-8})$	$(3.57\cdot10^{-8})$
Marketpotential (host)	$2.76\cdot10^{-7}$	$2.59\cdot10^{-7}$	$-8.83\cdot10^{-7}$	$-9.15\cdot10^{-7}$
	$(1.79\cdot10^{-7})$	$(1.48\cdot10^{-7})$*	$(2.50\cdot10^{-7})$***	$(2.62\cdot10^{-7})$***
Unit labor cost	-0.026	-0.023	-0.041	-0.032
difference	(0.008)***	(0.007)***	(0.017)**	(0.017)*
Inflation (host)	-0.004	-0.008	0.005	-0.021
	(0.007)	(0.014)	(0.009)	(0.020)
Government investment	-0.016	-0.024	-0.008	-0.007
(host)	(0.011)	(0.011)**	(0.015)	(0.017)
Trade (host)	-0.002	-0.001	0.006	0.006
	(0.002)	(0.002)	(0.003)**	(0.003)**
GDP per capita (host)	-3.560	-9.798	93.778	86.587
	(18.663)	(13.014)	(24.404)***	(27.48)***
EU membership (host)	0.227	0.252	0.357	0.350
	(0.156)	(0.115)**	(0.136)***	(0.142)**
EU membership	0.451	0.391		
(investor)	(0.098)***	(0.086)***		
Dummies	year	year	year	year
observations	5,034	4,054	1,262	998
χ^2	291.60	292.41	85.54	105.66
P-value	0.000	0.000	0.000	0.000

Numbers in parenthesis report standard errors clustered around country pairs. *** significant at 1 percent significance level. ** significant at 5 percent significance level. * significant at 10 percent significance level.

Table 1. *continued*

	EU15 to NMCs(10)♣		Within EU15	
	(5)	(6)	(7)	(8)
lnGDP (host)	0.224	0.180	0.413	0.292
	(0.119)*	(0.121)	(0.137)***	(0.124)**
lnGDP (investor)	1.152	1.297	0.670	0.690
	(0.110)***	(0.121)***	(0.117)***	(0.122)***
lnDistance	-1.368	-1.492	-1.440	-1.465
	(0.293)***	(0.245)***	(0.217)***	(0.215)***
Statutory tax differential	-3.736		-0.820	
	(1.294)***		(1.562)	
Effective marginal tax differential		-4.716		-1.633
		(1.377)***		(1.178)
FDI stock (host)	$4.54\cdot10^{-8}$	$2.60\cdot10^{-8}$	$8.93\cdot10^{-8}$	$1.03\cdot10^{-7}$
	$(5.40\cdot10^{-8})$	$(5.91\cdot10^{-8})$	$(4.43\cdot10^{-8})$**	$(3.99\cdot10^{-8})$***
Marketpotential (host)	$2.78\cdot10^{-8}$	$-5.24\cdot10^{-8}$	$6.86\cdot10^{-7}$	$6.39\cdot10^{-7}$
	$(3.50\cdot10^{-7})$	$(3.36\cdot10^{-7})$	$(2.91\cdot10^{-7})$**	$(2.81\cdot10^{-7})$**
Unit labor cost difference	0.005	0.007	-0.050	-0.046
	(0.024)	(0.024)	(0.022)**	(0.021)**
Inflation (host)	0.022	0.114	0.124	0.130
	(0.011)*	(0.028)***	(0.094)	(0.094)
Government investment (host)	0.050	0.050	-0.035	-0.026
	(0.021)**	(0.023)**	(0.037)	(0.037)
EU membership (host)	-0.167	-0.047		
	(0.198)	(0.184)		
EU membership (investor)				
Selection equation				
lnGDP (host)	0.286	0.209	0.314	0.255
	(0.054)***	(0.059)***	(0.050)***	(0.052)***
lnGDP (investor)	0.441	0.399	0.049	0.123
	(0.114)***	(0.117)***	(0.100)	(0.112)
lnDistance	-0.895	-1.097	-0.362	0.370
	(0.172)***	(0.187)***	(0.110)***	(0.108)***
Statutory tax differential	-0.564		0.745	
	(0.936)		(0.910)	
Effective marginal tax differential		-2.115		-1.045
		(1.392)		(1.250)
FDI stock (host)	$1.73\cdot10^{-8}$	$3.69\cdot10^{-8}$	$-2.95\cdot10^{-8}$	$-1.66\cdot10^{-8}$
	$(3.77\cdot10^{-8})$	$(4.16\cdot10^{-8})$	$(2.68\cdot10^{-8})$	$(2.76\cdot10^{-8})$
Marketpotential (host)	$-1.32\cdot10^{-6}$	$-1.04\cdot10^{-6}$	$7.43\cdot10^{-7}$	$6.55\cdot10^{-7}$
	$(5.43\cdot10^{-7})$**	$(5.86\cdot10^{-7})$*	$(2.47\cdot10^{-7})$***	$(2.46\cdot10^{-7})$***
Unit labor cost difference	-0.025	0.010	-0.039	-0.037
	(0.018)	(0.018)	(0.012)***	(0.011)***
Inflation (host)	0.0003	-0.026	-0.021	-0.035
	(0.009)	(0.020)	(0.061)	(0.061)
Government investment (host)	-0.021	-0.006	-0.028	-0.020
	(0.020)	(0.024)	(0.024)	(0.026)
Trade (host)	0.005	0.004	-0.010	-0.008
	(0.004)	(0.004)	(0.004)***	(0.004)*
GDP per capita (host)	113.449	67.057	36.885	34.056
	(57.127)**	(61.652)	(13.851)***	(14.051)**
EU membership (host)	0.368	0.413		
	(0.157)**	(0.166)**		
EU membership (investor)				
Dummies	year	year	year	year
observations	1,095	843	1,415	1,283
χ^2	247.78	258.71	292.69	251.23
P-value	0.000	0.000	0.000	0.000

♣Excluding Cyprus and Malta.

Numbers in parenthesis report standard errors clustered around country pairs. *** significant at 1 percent significance level. ** significant at 5 percent significance level. * significant at 10 percent significance level.

Table 2. Heckman estimations: determinants of FDI flows with interaction terms

	EU15 to NMCs[♣]		Within EU15	
	(1)	(2)	(3)	(4)
Taxdiff×agglom	$1.50 \cdot 10^{-7}$	$7.15 \cdot 10^{-6}$	$-6.79 \cdot 10^{-8}$	$4.48 \cdot 10^{-7}$
	$(4.48 \cdot 10^{-7})$	$(5.04 \cdot 10^{-7})^{**}$	$(4.20 \cdot 10^{-7})$	$(3.41 \cdot 10^{-7})$
Statutory tax differential	-4.081		-0.776	
	$(1.661)^{**}$		(1.806)	
Effective marginal		-7.055		-2.372
tax differential		$(1.478)^{***}$		$(1.366)^{*}$
FDI stock (host)	$6.35 \cdot 10^{-8}$	$2.28 \cdot 10^{-7}$	$8.96 \cdot 10^{-8}$	$1.25 \cdot 10^{-7}$
	$(7.89 \cdot 10^{-8})$	$(1.27 \cdot 10^{-7})^{*}$	$(4.47 \cdot 10^{-8})^{**}$	$(4.09 \cdot 10^{-8})^{***}$
Marketpotential (host)	$1.92 \cdot 10^{-8}$	$-1.18 \cdot 10^{-7}$	$6.74 \cdot 10^{-7}$	$6.44 \cdot 10^{-7}$
	$(3.48 \cdot 10^{-7})$	$(3.33 \cdot 10^{-7})$	$(2.88 \cdot 10^{-7})^{**}$	$(2.81 \cdot 10^{-7})^{**}$
Selection equation				
Taxdiff×agglom	$3.90 \cdot 10^{-7}$	$5.61 \cdot 10^{-7}$	$-7.15 \cdot 10^{-7}$	$-2.06 \cdot 10^{-8}$
	$(4.18 \cdot 10^{-7})$	$(5.24 \cdot 10^{-7})$	$(3.34 \cdot 10^{-7})^{**}$	$(2.78 \cdot 10^{-8})$
Statutory tax differential	-1.165		1.600	
	(1.245)		(1.008)	
Effective marginal		-3.216		-0.521
tax differential		$(1.710)^{*}$		(1.425)
FDI stock (host)	$6.28 \cdot 10^{-8}$	$1.16 \cdot 10^{-7}$	$-2.81 \cdot 10^{-8}$	$-2.06 \cdot 10^{-8}$
	$(6.43 \cdot 10^{-8})$	$(8.41 \cdot 10^{-8})$	$(2.66 \cdot 10^{-8})$	$(2.78 \cdot 10^{-8})$
Marketpotential (host)	$-1.31 \cdot 10^{-6}$	$-1.04 \cdot 10^{-6}$	$7.20 \cdot 10^{-7}$	$6.43 \cdot 10^{-7}$
	$(5.37 \cdot 10^{-7})^{***}$	$(5.71 \cdot 10^{-7})^{**}$	$(2.47 \cdot 10^{-7})^{***}$	$(2.47 \cdot 10^{-7})^{**}$
observations	1,095	843	1,415	1,283
χ^2	252.96	315.89	293.69	289.97
P-value	0.000	0.000	0.000	0.000

[♣]Excluding Cyprus and Malta.

Note: taxdiff×agglom denotes the interaction between the used tax differential measure and FDI stock in the flow and selection equation, respectively. Numbers in parenthesis report standard errors clustered around country pairs. *** significant at 1 percent significance level. ** significant at 5 percent significance level. * significant at 10 percent significance level.

Table 3. Heckman estimations: Tax system and tax levels

	EU15 to NMCs[♣]		Within EU15	
	(1)	(2)	(3)	(4)
Statutory tax rate (host)	-3.554		-1.689	
	(1.920)*		(2.231)	
Statutory tax rate (investor)	3.236		0.684	
	(1.820)*		(2.389)	
Effective marginal tax rate (host)		-3.244		4.362
		(2.204)***		(2.075)**
Effective marginal tax rate (investor)		6.234		6.025
		(1.523)***		(1.741)***
Tax exemption system (investor)	-0.328	-0.266	-0.100	-0.243
	(0.585)	(0.575)	(0.279)	(0.245)
Selection equation				
Statutory tax rate (host)	0.259		-0.557	
	(1.362)		(1.472)	
Statutory tax rate (investor)	-0.003		-2.691	
	(1.374)		(1.190)**	
Effective marginal tax rate (host)		-0.587		-0.840
		(1.788)		(2.413)
Effective marginal tax rate (investor)		1.763		-0.391
		(2.150)		(1.587)
Tax exemption system (investor)	1.122	0.867	1.170	1.130
	(0.222)***	(0.239)***	(0.176)***	(0.182)***
observations	999	843	1,283	1,283
χ^2	257.66	292.07	246.78	324.62
P-value	0.000	0.000	0.000	0.000

[♣]Excluding Cyprus and Malta.

Note: taxdiff×agglom denotes the interaction between the used tax differential measure and FDI stock in the flow and selection equation, respectively. Numbers in parenthesis report standard errors clustered around country pairs. *** significant at 1 percent significance level. ** significant at 5 percent significance level. * significant at 10 percent significance level.

Table 4. Sensitivity analyses:

	Base results				Excluding unit labor cost				Until 2000				After 2000			
	EU15 to NMC[♣]		Within EU15		EU15 to NMC[♣]		Within EU15		EU15 to NMC[♣]		Within EU15		EU15 to NMC[♣]		Within EU15	
Statutory tax differential	-3.736		-0.820		-2.818		-4.254		-4.417		1.150		-2.985		-2.126	
	(1.294)***		(1.562)		(1.267)***		(1.162)***		(1.785)***		(1.774)		(2.143)		(2.196)	
Effective marginal tax differential		-4.716		-1.633		-5.986		-2.654		-5.869		0.257		-4.742		-0.801
		(1.377)***		(1.178)		(1.184)***		(0.929)***		(2.485)**		(3.330)		(1.634)***		(1.293)
Selection equation																
Statutory tax differential	-0.564		0.745		-1.917		-1.397		-1.558		0.554		0.139		1.082	
	(0.936)		(0.910)		(0.677)***		(0.477)***		(1.370)		(1.053)		(1.309)		(1.390)	
Effective marginal tax differential		-2.115		-1.045		-3.968		-2.666		-4.909		-1.502		-2.461		-2.136
		(1.392)		(1.250)		(0.969)***		(0.614)***		(2.643)*		(1.607)		(1.818)		(1.357)
observations	1,095	843	1,415	1,283	1,470	1,140	2,205	1,995	442	296	565	433	653	547	850	850
χ^2	247.78	258.71	292.69	251.23	207.87	288.09	356.06	310.63	191.53	239.95	240.93	181.31	162.54	228.52	230.00	175.25
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

[♣]Excluding Cyprus and Malta.

Note: taxdiff×agglom denotes the interaction between the used tax differential measure and FDI stock in the flow and selection equation, respectively. Numbers in parenthesis report standard errors clustered around country pairs. *** significant at 1 percent significance level. ** significant at 5 percent significance level. * significant at 10 percent significance level.

Appendix

A1.Data description

Variable	Definition	Source	Mean	Standard deviation
FDIflow	Bilateral net FDI outflows, million euros	Eurostat	562.02	3981.84
Statutory corporate tax rates	Top statutory tax rate on corporate income in percent	European Commission	0.30	0.09
Effective marginal tax rate on corporate income	The proportional difference between the pre-tax and post-tax required rates of returns in percent	Devereux et al (2008)	0.20	0.08
Effective average tax rate on corporate income	Net present value (NPV) of tax payments as share of NPV of total pre-tax income in percent	Devereux et al (2008)	0.26	0.07
GDP	Gross domestic product at market prices, millions of PPS (Purchasing Power Standard)	Eurostat	345035.3	504235.8
Distance	Bilateral distance in kilometers between the largest cities in country *i* and country *j*	CEPII	1395.60	757.32
Marketpotential	For country j: $\sum_{k \neq j} GDP_k / Distance_{jk}$	Eurostat, CEPII (own calculations)	1400667	564914.5
Unit labor cost	Hourly labor costs, total industry in PPP	Eurostat	15.08	8.17
Inflation rate	Annual change in CPI	Eurostat	4.75	11.05
Government investment	Government investment expenditures in percent of GDP	Eurostat	22.25	5.10
FDI stock	Total stock of FDI, million euros	Eurostat (own calculations)	744575.7	1853892
Trade	Sum of exports and imports in percent of GDP	Eurostat (own calculations)	104.77	48.48
GDP per capita	GDP per capita, millions of PPS	Eurostat	0.018	0.009

A2. Correlation statistics

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
lnFDIflow	**(1)**														
lnGDP (host)	**(2)**	0.47													
ln GDP (investor)	**(3)**	0.37	-0.01												
lnDistance	**(4)**	-0.24	-0.03	-0.05											
Statutory tax differential	**(5)**	-0.12	-0.48	0.44	0.00										
Effective marginal tax differential	**(6)**	-0.11	-0.53	0.51	0.04	0.71									
Effective average tax differential	**(7)**	-0.13	-0.03	0.50	0.02	0.94	0.87								
FDI stock	**(8)**	-0.13	0.18	-0.03	0.06	-0.32	-0.46	-0.41							
Marketpotential	**(9)**	0.13	0.29	0.15	-0.33	0.27	0.11	0.22	0.02						
Unit labor cost difference	**(10)**	-0.15	-0.46	0.47	-0.00	0.70	0.69	0.75	-0.40	0.36					
Inflation	**(11)**	-0.06	0.03	-0.25	-0.07	-0.27	-0.19	-0.24	-0.03	-0.04	-0.36				
Government investment	**(12)**	-0.09	0.05	-0.41	-0.15	-0.23	-0.30	-0.27	0.04	-0.05	-0.45	0.46			
Trade	**(13)**	-0.13	-0.01	-0.60	-0.16	-0.08	-0.27	-0.16	0.04	0.56	-0.08	0.18	0.31		
GDP per capita	**(14)**	0.22	-0.00	0.26	0.00	0.39	0.33	0.40	0.02	0.53	0.60	-0.39	-0.43		