# Labor Taxation and FDI decisions in the European Union[♣]

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*Abstract*

This paper uses panel data on bilateral FDI flows in the European Union to empirically analyze the impact of labor and corporate taxations on FDI decisions. While the effect of corporate taxes on FDI is well documented, the impact of labor taxes on FDI has been neglected. This is surprising since labor taxation may influence FDI as well. The reason for this is that taxation of labor affects the production cost and the ability to attract and retain productive labor and ultimately the investment return. By employing a Heckman two-step estimation model, which controls for possible sample selection bias due to many zero bilateral observations, it is found that labor taxes do influence FDI decisions. The effect is significant both statistically and economically, although the magnitude is smaller than for corporate tax.

**Keywords**: labor taxation; foreign direct investment

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## 1. Introduction

Researchers have paid much attention to the role corporate taxation plays in attracting foreign direct investment (FDI). As a result, there is a vast literature estimating the effect corporate taxes have on FDI, and it is now fair to say there is consensus that corporate taxation has a statistically significant impact on FDI decisions. The exact magnitude is uncertain, however. Common estimates of the semi-elasticity typically fall between -5 and 0, with a median of -2.9 (see e.g., De Mooij & Ederveen, 2006 and Feld & Heckemeyer, 2009), implying that a one percentage point increase in the corporate tax rate lowers FDI by 2.9 percent.

Other taxes, apart from the corporate tax rate, may impact a firm's net return and, hence, are likely to matter for FDI decisions as well. Knowledge of the impact of other taxes on FDI decisions is limited, however. One important tax whose effect has been neglected so far is labor taxation. Taxation of labor, and that of high-skilled labor in particular, may affect multinationals' activities and FDI decisions as taxation of labor likely directly influences the net return to investments by increasing firms' costs. In addition, labor taxation may reduce work effort and firms' ability to attract and retain productive workers and thus indirectly lowers the investment return.

This paper studies how taxation of labor influences FDI decisions. It closely follows Hansson & Olofsdotter (2010) and makes use of a two-step Heckman estimation model that controls for possible sample selection problems, and, we believe, better reflects the nature of FDI decisions; that is, whether to invest or not and, given that investment takes place, the amount of FDI to invest.

Using recent data on marginal and average labor and corporate tax rates for all the 27 EU member countries covering the period 1997-2007, we find that labor taxes have a negative impact on FDI. More specifically, within the EU27 we find a semi-elasticity of around -2, implying that a one percentage point increase in the difference in labor tax rates lowers FDI flows by about 2 percent.

The rest of the paper is organized as follow. Section 2 provides some background for why labor taxation may matter for FDI decisions, and discusses some previous studies. Section 3 reviews trends in FDI flows within the EU and in corporate and labor tax rates, while section 4 presents the method and data used. Section 5 reports the results and section 6 provides some further analysis and discussion. Section 7 concludes the paper.

## 2. Why labor taxes may matter for FDI decisions

Why is there extensive research on corporate taxation and FDI decisions, but little or no research on labor taxation and FDI decisions? Obviously, it is natural to assume that taxation of capital, rather than labor, affects capital flows such as FDI. Moreover, the extensive focus on corporate taxation as a determinant of FDI typically rests on the assumption that capital is mobile and responds to cross-country differences in corporate tax rates. Countries can thus attract FDI by lowering their corporate tax rate. The downward trend in corporate tax rates in the last decades has been attributed, at least partially, to this so-called tax competition.

On the other hand, the link to FDI is less obvious for labor taxation, which has not traditionally been regarded as influencing FDI decisions. The reasons for this can be

questioned, however. One reason is that labor is immobile (or at least more immobile than capital). Another reason is that labor taxation is not typically thought of as influencing firms' costs and investments. Still, even if labor were less mobile than capital, or even totally immobile, labor taxation could matter for FDI decisions as it is expected to affect multinational firms' net returns and, consequently, their location and investment decisions. Whether labor taxation impact firms' net return depends on how labor taxes affect firms' costs; that is, the incidence of labor taxation. Traditionally, the burden of labor taxation has been thought to fall entirely on the employees and therefore not impacting employers' cost. This result may not hold, however, especially not for high-skilled workers who face increasing alternatives and are unlikely to supply their labor perfectly inelastically.

Several recent studies suggest that the traditional view of a tax on labor being fully borne by the employee can be questioned (see e.g., Forslund et al, 2006, Daveri & Tabellinni, 2000, and Bingley & Lanot, 1999). There are many reasons for this and several of them result from globalization and increasing competition. Wage formation, for example, is more decentralized today than it has been previously (Kiander et al, 2004) due to, among other things, increased competition and an increasing share of workers in foreign-owned companies. Today, firms have a wider set of options than previously when it comes to production location and, thanks to technological progress, means of production. This has altered the power positions in wage negotiation away from the employee. Consequently, it is unrealistic to assume that the long-run labor supply is perfectly inelastic and, therefore, totally insensitive to firms' increasing alternatives and the increased risk of losing one's job.

Moreover, even if the burden of the labor tax were to fall entirely on the employees, labor taxation would likely affect the ability of firms to attract and retain productive labor and key personnel and, in addition, workers' effort. An extensive literature has found that incentives and compensation policies matter for individuals' effort (see e.g., Ehrenberg, 1990, and Prendergast, 1996, for reviews). This literature indicates that there is a positive relationship between wages and work effort. One reason for this, stemming from the efficiency wage theory, suggests that workers compare their current pay with opportunities outside the firm, and that a higher net wage reduces the attractiveness of outside opportunities and increases higher work effort at current jobs (Akerlof & Yellen, 1986). Another reason, stemming from the equity theory, suggests that workers compare compensation within the firm (Lawler et al, 1968). Empirical work has confirmed a positive correlation between wage and work effort (see e.g., Lazear, 2000, Asch, 1990, Bognanno & Ehrenberg, 1990, Kahn & Sherer, 1990). Hence, even if we assume that the burden of labor taxation falls entirely on workers, labor taxation would still affect production costs as lower net compensation for workers reduces their effort, which in turn increases production costs and lowers efficiency. Similar results have been found in the tax response literature, with several studies revealing that especially high-income earners respond to lower net-return by reducing effort rather than reducing hours worked (see e.g., Gruber & Saez, 2002).

The importance of a well functioning labor market and a strong link between workers' incentives and effort has also been pointed out as one of the twelve important pillars for competiveness according to the World Competitiveness Report. To ensure competitiveness it is important to allocate workers to their most efficient use and to

provide incentives that motivate effort (World Economic Forum, 2009). Large labor tax wedges and a progressive tax structure can, thus, reduce the link between incentives and effort and reduce competitiveness and ultimately the return to investments.

Few empirical studies have estimated the effect of labor taxes on FDI, despite survey results suggesting that labor taxes do influence firms' localization and investment decisions. For example, a survey by Braunerhjelm & Lindquist (1999), based on interviews with the 50 largest corporations in Sweden, shows that individual income taxation is one of the driving factors for Swedish firms' decisions on location of their headquarters. Specifically, their survey discloses that favorable individual income taxation, followed by well developed transportation, closeness to customers, and attractive region are the most important determinants of where headquarters locate. Although corporate taxation is found to be important, it ranks lower than individual income taxation.

A few studies have investigated the effect that labor taxes have on FDI. Egger & Radulescu (2008) model how corporate taxes and labor taxes influence FDI decisions. They distinguish between labor taxes levied on employers and employees, and argue that both affect firms' profits but for different reasons. Labor taxes levied on employers increase firms' costs and, thereby, reduce profits, while taxes levied on employees reduce managers' effort and, thereby, firms' profits. Egger & Radulescu hence assume that the statutory incidence equals the economic incidence. In the empirical part of their paper the hypothesis is tested on FDI stocks from 49 countries for 2002. The result suggests that labor taxes matter for FDI decisions, and, interestingly, that the employee-borne part of the labor tax influences FDI stocks negatively. The progressivity in the personal income

tax also has a negative and significant impact on FDI stocks. However, they do not find that the employer-borne part of the tax affects FDI stocks significantly, which may seem surprising, but could indicate that the statutory tax incidence is a poor proxy for the economic incidence. Corporate tax rates are found to be more important, though, when it comes to level of significance and magnitude.

As labor taxation is strongly correlated with labor cost, the literature on labor and wage cost as determinants of FDI is of relevance and worth briefly mentioning. Several papers discuss the impact labor or wage costs have on FDI decisions. As labor cost is an important factor cost, it is thought to mainly influence vertical FDI; that is, FDI motivated by lower production costs. There is mounting evidence that labor and wage costs influence localization decisions. Braconier et al (2005), for instance, reveal that wage costs have a strong negative effect on FDI flows from the US and Sweden; countries with relatively cheap low-skilled labor attract more FDI than countries where low-skilled labor is more expensive, which supports the case for vertical FDI. Moreover, Becker et al (2005) find that higher labor costs deter FDI flows to Germany and Sweden. This is also in line with what Braunerhjelm & Thulin (2009) reveal for FDI flows from Sweden. Specifically, they maintain that FDI flows have become increasingly sensitive to wage costs, but that the presence of agglomeration economies allows for higher wages. Cheng & Kwan (2000) also find wage costs to have a negative effect on FDI in 29 Chinese regions for the period 1985 to 1995, which is in contrast to Chen (1996) and Head & Ries (1996) for whom labor cost differences are not important for location of FDI in China, but agglomeration economies are. Further support for a link between labor costs and FDI is provided in Bellak et al (2008) who, after studying and surveying pre-

existing literature on labor costs and FDI to the Central and Eastern European Countries (CEEC), conclude that labor cost is an important negative determinant of FDI flows into CEEC.

### 3. FDI and taxes in the EU15 and the New Member Countries

We choose to study how labor taxation affects investment decisions within the EU27. As we believe that FDI decisions differ between investments in the old EU (EU15) and in the new member countries (NMCs), we analyze the determinants of the two member groups separately.[1] Figures 1 and 2 display total FDI flows within the EU27 and FDI flows from the EU15 to the new member countries, respectively. Within the EU27, FDI flows steadily increased from 1995 to 2000. In 2000 FDI dropped noticeably but has since fluctuated with an increasing trend. For investment flows from the EU15 to the NMCs, it is noteworthy that FDI flows sharply increased from 2003. This is likely explained by the enlargement in 2004. Despite the sharp increase, the share of FDI flows to the NMCs, as a total of FDI flows within the EU27, only increased from 11.6 percent in 1995 to 13.3 percent by 2006, which implies that increased FDI flows to the NMCs did not crowd out investments within the EU15.

Figures 3 and 4 present the development of the corporate tax rates in the EU15 and the NMCs. Figure 3 shows the development of the statutory corporate tax rate since 1995, while Figure 4 shows the development of the effective marginal and average corporate tax rate since 1998. Both figures display negative trends, and the decline is

[1] Austria, Belgium, Denmark, Germany, Greece, Finland, France, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK are counted as the old EU members or the EU15. Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Romania are counted as the new member countries (NMCs).

more distinct for the statutory rates than for the effective rates.[2] The decline in corporate tax rates is more pronounced in the NMCs, and the gap between the statutory corporate tax rates in the old and new member states has widened from 4 percent in 1995 to 10 percent in 2007. For the effective average and marginal tax rates the gap has doubled since 1998, which has led some to fear intensified tax competition from the enlargement. Hansson & Olofsdotter (2010) provide support for the notion that the NMCs' lower corporate tax rates have indeed led to increased FDI flows from the EU15 to the NMCs.

Figures 5 and 6 show the development of the labor tax rates in the EU15 and the NMCs since 1995. Figure 5 displays the top marginal statutory tax rates and Figure 6 the implicit average tax rates (calculated as the ratio of total tax revenues to a proxy for potential labor tax based (Eurostat, 2010)) on personal income. Labor tax rates, and especially top marginal rates, have declined as well. As labor is assumed to be less mobile than capital, these declining trends are typically not perceived to be a result of tax competition, but rather due to the increased awareness of the distortionary effect of high marginal tax rates. The NMCs employ substantially lower top marginal tax rates (many of them apply fairly low and flat rates) and the gap between the two member groups has widened from almost 10 percentage points in the mid 1990s to over 19 percentage points in 2008. The gap between the implicit average tax rates for labor income has also increased; from 1 percentage point in 1995 to 4 percentage points in 2007.

Increasing FDI flows have hence coincided with decreases in both corporate as well as labor tax rates. Whether the increase in FDI can be attributed to lower tax rates, and in that case which ones, needs to be further investigated.

[2] Tax reforms across countries have lowered statutory rates and broadened the base, resulting in substantially lower statutory rates but less so for effective rates.

## 4. Method and Data

In order to estimate how labor taxation affects FDI decisions, we employ the two-step Heckman estimation technique, which is appropriate when FDI flow data are characterized by many zero observations, in order to mitigate problems of sample selection bias (Davis & Kristjánsdóttir, 2010).[3] In addition, we believe that this estimation method fits nicely with the underlying FDI decision process. According to Razin et al (2004) and Razin & Sadka (2006), 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 investments, making bilateral FDI flows between an investing and a host country "lumpy".[4] The fixed costs play no role in the decision on the amount of investment, but affect the location decision and 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. The Heckman' selection estimation model is, hence, a natural candidate. Also, using this model allows the independent variables to have different effects on the decision to invest and the amount to invest, respectively.

In the Heckman's selection model, 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 model assumes an underlying selection equation determining whether the dependent

[3] Zero values can be due to no FDI flows appearing, either since no FDI takes place or is too small to be reported, or due to negative values. Negative signs are due to disinvestment, e.g., when the investor sells shares or pays back loans.
[4] The assumption of fixed set-up costs distinguishes FDI flows from purely financial flows.

variable is observed or not (whether FDI takes place or not). More specifically, we estimate the following model:

$$FDI^{*}_{ijt} = X_{1ijt}\beta_1 + \varepsilon_{1ijt} \qquad (1)$$

$$s^{*}_{ijt} = X_{2ijt}\beta_2 + \varepsilon_{2ijt} \qquad (2)$$

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

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

Equation (1) estimates the determinants of the amount of FDI flows, while equation (2) estimates the underlying selection equation where $s_{ijt}$ is one if the FDI flow from country *i* to country *j* is positive, and zero otherwise. The error terms are assumed to be normally distributed with a covariance $\sigma_{12}$ and with a correlation coefficient $\rho$. If $\rho$ 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 on FDI by using unbalanced panel data on the bilateral FDI flows between all 27 member countries of the European Union for the period 1997-2007. 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.[5] We follow Blonigen and Davies (2004) and use a log-linear specification to deal with the skewness common in FDI data. In more detail, the flow equation (1) is estimated according to:

[5] 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).

$$\ln FDIflow_{ijt} = \beta_{11} \ln GDP_{it} + \beta_{12} \ln GDP_{jt} + \beta_{13} \ln DIST_{ij} + \beta_{14} TAXDIFFLAB_{ijt} + \beta_{15} TAXDIFFCORP_{ijt} + \beta_{16} AGGLOM_{ij-t} + X_{1ijt}\beta_1 + \lambda_t + \varepsilon_{ijt} \quad (5)$$

where ln$FDIflow_{ijt}$, is the natural logarithm of the flow of FDI from investing country *i* to host country *j* in year *t*. ln$GDP_{it}$ and ln$GDP_{jt}$ are the logarithms of the investing and host country's GDP, respectively, ln$DIST_{ij}$ is the logarithm of the bilateral distance between country *i* and *j*, $TAXDIFFLAB_{ijt}$ is the difference in labor tax rates between the host and investing countries, $TAXDIFFCORP_{ijt}$ is the same difference for the corporate tax rates, $AGGLOM_{jt-1}$ is an agglomeration variable based on the previous year's 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 $\lambda_t$ 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 to the NMCs and a little more than 2600 observations of FDI flows to the old member countries. For these observations, a EU15 country is the investing country in approximately 60 percent of the cases. Regarding different components of FDI, equity capital constitutes the largest part of FDI for both new and old member countries.

The main independent variable of interest in this paper is the labor tax rate. According to theory, we should expect average taxes to influence discrete decisions, such as whether to invest or not, and marginal tax rates to influence decisions such as how much to invest. Consequently, we want to use average tax rates in the selection equation and marginal tax rates in the flow equation. As we are interested in how tax differences

affect investment and location, we wish to use forward-looking tax measures, as investment decisions primarily depend on current and expected future tax rules. Defining these tax rates is not straightforward. We use two different sets of average and marginal labor tax rates. First, we use the implicit average tax rate on labor income from Eurostat (Eurostat, 2010), and the top marginal income tax rate (IBFD). The implicit average tax rate is calculated as the ratio of total tax revenues to a proxy for the potential labor tax base.[6] The top marginal income tax rate is the statutory marginal tax rate applying to personal income in the top bracket. Second, we use the average and marginal tax rates derived by OECD for a single person with an income that is 167 percent of the average production worker's (APW) (OECD, 2010).

Our preferred tax set is the top marginal tax rate as it is forward looking, and we also believe the top marginal tax rate to be more relevant for firms trying to attract productive high-skilled labor than the rate of a person with an income 167 percent of the APW. Moreover, the OECD tax data lack information on many of the new EU members. In addition, the definition of how they are measured was changed in 2000.[7] We calculate the difference in the average and marginal taxes between host and investing country and expect this difference to negatively influence FDI outflows.

How to measure the other tax rate variable, the corporate tax rate, is not straightforward either. By the same logic as above, we use average in the selection and marginal in the flow equation. We choose to use effective tax rates as these take into account the tax base, depreciation rules, government tax compensations etc. More

[6] Note that the implicit average tax rate is not the rate that applies to the top-bracket income earners but rather the overall average.
[7] The definition of the average and marginal tax rate was slightly changed in 2000, implying that the years 1997-1999 and 2000-2007 use different definitions of these tax rates.

specifically, they are calculated as the net present value of tax payments as a share of the net present value of pre-tax income. It should be noted, however, that these tax rates are based on a hypothetical investment project that requires a number of assumptions and simplifications. Data on effective marginal and average taxes are provided by Devereux et al (2008) starting in 1998. Again, 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.

Another independent variable thought to affect FDI flows is agglomeration (Hansson & Olofsdotter, 2010). Agglomeration economies may appear at many different levels and it is far from clear-cut how this variable should be measured. In this paper, we follow the basic setting in Konrad & Kovenock (2009) and let the stock of FDI reflect agglomeration economies in the host country. Thus, we expect that countries with a larger pre-existing stock of FDI will also have, ceteris paribus, 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 emphasizes a self-reinforcing effect of agglomeration economies that is empirically supported in, e.g., Cheng and Kwan (2000). We use the previous year's total stock of FDI, from all countries in the sample except from the investing country in question, in the host country as our main agglomeration variable.[8]

As for the gravity variables, GDPs for the host and investing countries represent the sizes of the economies and, in the standard setting, are expected to have a positive effect on bilateral FDI flows. From a theoretical point of view, the effect of geographical

[8] The bilateral measure of the stock of FDI in host country *j* stemming from investing country *i* has been considered, as has the total stock of FDI from all other countries in the sample including the country in question. We choose to deduct FDI stock from investing country *i* in order to avoid endogeneity problems.

distance is ambiguous, as it may reflect trade costs.[9] The results from most empirical studies, though, suggest that distance tends 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.[10] 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.[11] 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.[12] In addition, the vector $X_1$ also incorporates several host country characteristics such as the inflation rate, the share of government investment, labor productivity per hour worked 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.

[9] For a theoretical discussion of trade costs and FDI, see Neary (2009).
[10] A more theoretically founded framework for FDI, provided by Carr, Markusen & Maskus (2001), includes distance and trade costs.
[11] 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.
[12] 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 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 selection equation, equation (2), $X_2$ includes all variables in $X_1$ and, in addition, trade openness and GDP per capita for identification. The average tax rate differentials are employed for the tax variables.

An alternative estimation technique to deal with problems arising due to a large number of zero observations is to use a Tobit estimation. The zero observations are then treated as a result from a censored process. Alternatively, we use a Tobit estimation technique to estimate the impact of labor taxes on FDI decisions. 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.

## 5. Results

Table 1 reports the results from two Heckman two-step estimations of FDI within the EU27. The first columns in each specification report the estimates from the flow equations while the second reports the estimates from the selection equations. In the first specification we use our preferred labor tax measures; the top marginal and implicit average labor tax rate differentials. In the second specification we use the effective marginal and effective average labor tax differentials for a single person with an income 167 percent of the average production worker.

Starting with the traditional gravity variables, the results provide support for the importance of the role they play in FDI flows and whether FDI takes place or not. In addition, the GDPs of the investing and host countries have a positive and statistically significant impact on FDI flows as well as whether FDI takes place or not. As expected, distance has a negative and statistically significant impact on FDI flows. However, the

effect of distance is either insignificant (in the first specification), or even positive and significant (in the second specification) in the selection equations. This contradicts results from Davis & Kristjánsdóttir (2010) who found that, for investment flows to Iceland, distance played a more important role in investment decisions (selection) than in flow decisions.[13]

Turning to our main variables of interest, labor tax differentials, they seem to influence the decisions on whether to invest or not and the amount to invest. In the first specification, both the top marginal and the implicit average labor tax rate differentials have a negative and statistically significant impact. The resulting semi-elasticity is -3.3, remarkably high, implying that a one percentage point increase in the marginal tax rate differential reduces FDI flows by 3.3 percent. The other tax rate differentials, based on the tax difference of a single person with an income 167 percent of the APW, also have negative impacts. The effective average labor tax rate differential has a negative and statistically significant impact in the selection equation, while the effective marginal tax rate difference has a negative but insignificant effect in the flow equation.

The agglomeration variables also seem to be important determinants of FDI. Previous stock of FDI influences the amount invested positively, and market potential has an impact on whether investment takes place or not. Agglomeration, hence, seems to positively affect both whether investment takes place and the amount invested.

Of the other variables, it is noteworthy that government investment has a negative impact, and that labor productivity influences the amount positively but the selection

[13] This contradiction could possibly be explained by the multifaceted nature of FDI and differences between FDI to Iceland and within the EU. To Iceland a majority of FDI is greenfield, and hence characterized by large fixed set-up costs. FDI within the EU is characterized by large amounts of equity capital where the fixed set-up costs are substantially lower.

negatively. When the investing country is an EU-member both the probability that investment takes place and the amount invested increase. However, whether the host country is an EU-member seems to be of less importance for the investment decision and the amount invested. Table 2 includes corporate tax rate differentials as well. As expected, corporate tax rate differentials are important determinants of FDI. In both specifications, the corporate tax rate differentials have a negative and statistically significant impact on the amount of FDI invested as well as the discrete FDI decision. Even though the inclusion of the corporate tax rate differential does not lessen the significance of the labor tax variable, the magnitude is reduced to around -2 (for our preferred marginal tax rate differential). The economic impact of the corporate tax rate differential on FDI is larger than for the labor tax rate differential variable; with a semi-elasticity of -3 to -5. Previous FDI stock still has a positive impact on the amount invested; although the market potential variable plays a positive and significant role in the selection process, it now has a negative impact on the amount invested.

As pointed out by Hansson & Olofsdotter (2010), corporate tax rate differentials impact decisions on FDI flows from the EU15 to new members and within the EU15 differently. There is no reason not to expect the same to hold for labor taxation. Hence, we now distinguish between the impacts of the different determinants of FDI flows from the EU15 to the new member states (NMCs) and within the EU15. The regression results for investment decisions on flows from the EU15 to the NMCs are reported in Table 3, and the results for investment decisions within the EU15 are reported in Table 4. The results reveal some interesting differences. Starting with Table 3, labor tax rate differentials do not seem to be important determinants of investment flows to the NMCs.

The coefficients for the various labor tax variables are now insignificant, and in one case (the effective marginal tax differential) positive and significant. The corporate tax rate differential variables, however, are negative and statistically significant in both the flow and the selection equation for the two specifications. The magnitude is large; with a semi-elasticity for the effective marginal corporate tax rate differential between -6.9 and -8.7. Another interesting difference regards the agglomeration variables. Both previous FDI stock and market potential are now insignificant (except for a negative and statistically significant impact in the flow equation in the second specification), suggesting that agglomeration economies do not explain FDI flows from the EU15 to the NMCs. Worth noting is that the gravity variable distance now has a negative impact on the decision to invest and the amount invested. In addition, the amount of FDI invested in the NMCs is positively influenced by government investment in the NMCs.

Turning to Table 4 and investment within the EU15, taxation of labor seems to be an important determinant of the amount investment within the EU15. In the first specification, the top marginal labor tax differential variable is negative and statistically significant; with a semi-elasticity of -5.2. In the second specification, the effective marginal labor tax differential variable is also negative and statistically significant with a semi-elasticity of -3. Corporate tax rate differentials also influence the amount invested negatively and statistically significantly, but to a lesser extent than for investment flows to the NMCs. The semi-elasticities for the corporate tax rate differentials are between -5.5 and -4.8. Interestingly, distance now has a positive and significant impact on the decision to invest, which suggests that the further away the host country is, the more likely it is that investment takes place.

So far, we have looked at how the differences in labor taxation between host and investing country impact FDI decisions. The host and investing countries' tax rates may be of different importance, however. As Razin & Sadka (2006) suggest, only host country tax rates matter for investment flows once FDI is present, while the tax rate in the investing country is more important for location decisions. We investigate whether this is the case in our sample, for both labor and corporate taxation, by using the level of the marginal and average labor and corporate tax rates in the host and investing countries. Table 5 presents the results from the regressions. For the investment decision the average labor tax rate in the investing country matters positively, as expected, while the average labor tax rate in the host country has no statistically significant impact. Contrary to Razin & Sadka, we find that the amount invested is positively affected by the marginal tax rate in the investing country and insensitive to the labor tax rate in the host country. The results for the corporate tax rate are similar; the tax rate in the investing country seems to matter more than the tax rate in the host country.

In addition, we investigate whether the impact of labor taxation on FDI decisions differs over time by dividing the sample into two subsamples, one including the years up and until 2002 and one including the years after 2002. The results from these regressions, using our preferred tax measures, shown in Table 6, suggest that labor taxation has become a more important determinant of FDI flows since 2002. Specifically, for the investment decision, the average corporate tax rate differential is negative and statistically significant in the earlier period, while the average labor tax rate differential is insignificant in the same period. In the later period, the average labor tax rate differential has a negative and statistically significant impact on the investment decision, while the

effect of the average corporate tax rate differential declines when it comes to both magnitude and significance levels. For the flow decisions the same pattern arises. The impact the marginal labor tax rate differential has on the amount invested has increased over time, while the effect of the marginal corporate tax rate differential has declined. This suggests that the role labor taxes play in investment decisions has increased over time.

Finally, we re-run some of the regressions using a Tobit estimation technique. Table 7 reports results from three Tobit estimations for investment flows within the EU27, from the EU15 to the NMCs, and within the EU15. The results from the Tobit estimation are similar to those from Heckman's two-step estimation. The top marginal labor tax differential is negatively correlated with FDI flows in the whole sample and for investment flows within the EU15. As before, the labor tax differential does not seem to be an important determinant of FDI flows from the EU15 to the NMCs. Again, the corporate tax rate differential is negatively correlated with FDI flows, and more so for FDI flows to the NMCs.

## 6. Further analysis and discussion

The regression results suggest that labor taxation is an important determinant of FDI. This is not surprising as labor taxation, especially of high-skilled labor, affects firms' production costs, the ability to retain and attract productive labor, as well as workers' effort and ultimately the return to investments. It is also consistent with the literature on FDI and labor (or wage) costs that tends to document a negative relationship between

labor costs and FDI, especially since labor cost and labor taxation are highly correlated.[14] Despite high correlation, incorporating the wage cost in the host country does not change the results noticeably. The semi-elasticity for the top marginal labor tax differential is reduced from -2.2 to -1.99. The labor cost variable has a negative and statistically significant impact in the selection equation but no significant impact on the amount invested.

The negative impact of labor taxation on FDI seems to have intensified over time. While corporate taxation has played an important role in FDI decisions before, labor taxation seems to have become more important for FDI decisions in recent decades, probably because corporate tax rates have converged within the EU and have thereby become of less importance for FDI decisions within the EU15. This is consistent with Braunerhjelm & Thulin (2009) who find that FDI has become increasingly sensitive to wage costs.

The results also reveal some interesting differences between decisions on FDI flows within the EU15 and to the NMCs, which indicates that the nature of FDI differs between the two member groups. For instance, the negative impact of distance on FDI flows to the NMCs suggests that these flows are of vertical character, while the positive impact of distance on investment within the EU15 suggests export-platform natured FDI within the EU15. That labor taxation on higher incomes has a negative impact on investments within the EU15 also supports this.

To further determine whether there are significant differences between the effect labor taxation has on investment flows within the EU15 and to the NMCs, we re-run the regression using the whole sample, but include an interaction term between the labor tax

[14] The correlation between top marginal tax rate and labor cost is 0.66.

difference and a dummy that equals one if the host country is a NMC. We expect this interaction term to be positive if labor taxation is of less importance for decisions on FDI flows to the NMCs. While the effect of the tax rate differential variable is negative and statistically significant, the interaction term is positive and statistically significant and eliminates the negative impact, or even turns it positive, of the labor tax rate differential on investment flows to the NMCS. This further supports the notion that labor taxation influences decisions on FDI flows within the EU15 differently from those to the NMCs.

Finally, the level of labor and corporate tax rates in the investing country seems to be more important for FDI decisions than the tax rate in the host country.[15] This suggests that high taxes at home are more important for investment decisions than low taxes in the host country. Countries with high levels of taxation should then expect a larger outflow of investment than countries with lower levels of taxation.

## 7. Conclusions

We find that labor taxation is important for FDI decisions, and deters FDI within the EU statistically and economically significantly. A one percentage point increase in the top marginal tax rate differential reduces FDI flows by 2 to 3 percent. Similarly, a one percentage point increase in the corporate tax rate differential reduces FDI flows by 3 to 5 percent. Hence, labor taxation deters FDI almost as much as corporate taxation. FDI flows within the EU15 are especially sensitive to labor taxation, while those to the NMCs are more sensitive to corporate taxation.

[15] For the corporate tax rate the question also relates to double taxation agreements. 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 the home country's taxes. This implies that, under a credit system, the investment decision will be indifferent to taxes in the host country, while under the exemption system both host and parent tax rates matter.

**References**


Akerlof, G., & J. Yellen, 1986, eds., *Efficiency wage models of labor market*, New York, Cambridge University Press.

Asch, B., 1990, Do incentives matter? The case of navy recruiters, *Industrial and labor Relations Review*, 43, 89-107.

Becker, S., Ekholm, K., Jäckle, R. and M-A Muendler, 2005, Location choice and employment decisions: A comparison of German and Swedish multinationals, *Review of World Economy*, 141(4), 693-730.

Bellak, C. and M. Leibrecht, 2009, Do low corporate income tax rates attract FDI? – Evidence from Central - and East European countries, *Applied Economics*, 41: 2691-2703.

Bellak, C., Leibrecht, M. & A. Riedl, 2008, Labour costs and FDI flows into Central and Eastern European Countries: A survey of the literature and empirical evidence, *Structural Change and Economic Dynamics*, 19, 17-37.

Bénassy-Quéré A., Fontagné, L., and A. Lahreche-Revil, 2005, How does FDI react to corporate taxation? *International Tax and Public Finance*, 12(5): 583-603.

Bingley, P. & G. Lanot, 1999, The incidence of income tax on wages and labor supply, mimeo.

Blonigen, B.A., and R.B. Davies, 2004, The effects of bilateral tax treaties on U.S. FDI activity, *International Tax and Public Finance*, 11(5): 601-622.

Bognanno, M. & R. Ehrenberg, 1990, Do tournaments have incentive effects, *Journal of Political Economy*, 98, 1307-1324.

Brackfield, D. & R. McKenzie, 2008, The OECD system of unit labour cost and related indicators, OECD Statistics Working paper, 2008(4), OECD.

Braconier, H., Norbäck, P-J., & D. Urban, 2005, Multinational enterprises and wage costs: Vertical FDI revisited, *Journal of International Economics*, 67, 446-470.

Braunerhjelm, P. & T. Lindquist, 1999, Utvandrarna - effekter och drivkrafter bakom huvudkontorsflytten, *Ekonomisk Debatt*, nr 8, 27, 483-497.

Braunerhjelm, P. & P. Thulin, 2009, Agglomeration relative wage costs and foreign direct investment – Evidence from Swedish NMCs 1974-1998, *Journal of Industry, Competition and Trade*, 9, 197-217.

Carr, D.L., Markusen, J.R. and K.E. Maskus, 2001, Estimating the knowledge-capital model of the multinational enterprise, *American Economic Review*, 91(3): 693-708.

Chen, C-H,. 1996, Regional determinants of foreign direct investment in mainland China, *Journal of Economic Studies*, 23(2), 18-30.

Cheng, L. K., and Y. K. Kwan, 2000, What are the determinants of the location of foreign direct investment? The Chinese experience, *Journal of International Economics*, 51: 379-400.

Daveri, F. & G. Tabellini, 2000, Unemployment, growth and taxation in industrial countries, *Economic Policy*, 30, 49-104.

Davies, R. & H. Kristjánsdóttir, 2010, Fixed costs, foreign direct investment, and gravity with zeros, Review of International Economics, 18(1), 47-62.

Devereux, M.P., Elschner, C., Endres, D., Overesch, M., Schreiber, U. and C. Spengel, 2008, Corporate effective tax rates in an enlarged European Union, Report prepared for the European Commission.

Egger, P, Loretz, S., Pfaffermayr, M., and H. Winner, 2009, Bilateral effective tax rates and foreign direct investment, *International Tax and Public Finance*, 16: 822-849.

Egger, P. & D..M., 2008, Radulescu, Labour taxation and foreign direct investment, *CESifo Working paper*, no 2309.

Ehrenberg, R., 1990, Introduction: Do compensation policies matter?, *Industrial and Labor Relations Review*, 43(3), 3S-12S.

Eurostat, 2010, Eurostat Databases New Cronos.

Forslund, A., Gottfries, N. & A. Westermark, 2006, Real and nominal wage adjustment in open economies, *CESifo Working Paper*, no 1649.

Gruber, J. & E. Saez, 2002, The elasticity of taxable income: Evidence and implications, *Journal of Public Economics*, 84, 1-32.

Hansson, Å. & K. Olofsdotter, 2010, Tax differences and foreign direct investment in the EU27, manuscript, Lund University.

Head, K. & J. Ries, 1996, Inter-city competition for foreign investment: Static and dynamic effects of China's incentive areas, *Journal of Urban Economics*, 40, 38-60.

International Bureau of Fiscal Documnetation, (IBFD), various years, *European Tax Handbook*, IBFD, Amsterdam.

Kanh L. & P. Sherer, 1990, Contingent pay and managerial performance, *Industrial and Labor Relations Review*, 43, 107-121.

Kiander, J., Kilponen, J. & J. Vilmunen, 2004, Labor taxation, public finance, and wage determination: Evidence from OECD countries, *European Journal of Political Economy*, 20, 983-999.

Konrad, K. and D. Kovenock, 2009, Competition for FDI with vintage investment and agglomeration advantages, *Journal of International Economics*, 79: 230-237.

Lahrèche-Révil, A., 2006, Who's afraid of tax competition? – Harmless tax competition from the new European member states, CEPII No 2006-11.

Lawler, E., Koplin, C., Young, T. & J. Fadem, 1968, Inequity reduction over time in an induced overpayment situation, *Organizational Behavior and Human Performance*, 3, 253-268.

Lazear, E. 2000, Performance pay and productivity, *American Economic Review*, 90(5), 1346-1361.

OECD, 2010, Taxing Wages, OECD, Paris.

Mooij, R. de, and S. Ederveen, 2006, What a difference does it make? Understanding the empirical literature on taxation and international capital flows, Brussels, September 2006.

Neary, P., 2009, Trade costs and foreign direct investment, *International Review of Economics and Finance*, 18: 207-218.

Prendergast, C., 1996, What happens within firms? Survey of empirical evidence on compensation policies, NBER Working paper 5802.

Razin, A., Rubinstein, Y. and E. Sadka, 2004, Fixed costs and FDI: the conflicting effects of productivity shocks, NBER Working Paper 10864.

Razin, A. and E. Sadka, 2006, Vying for foreign direct investment: A EU-type model of tax-competion, NBER Working Paper 11991.

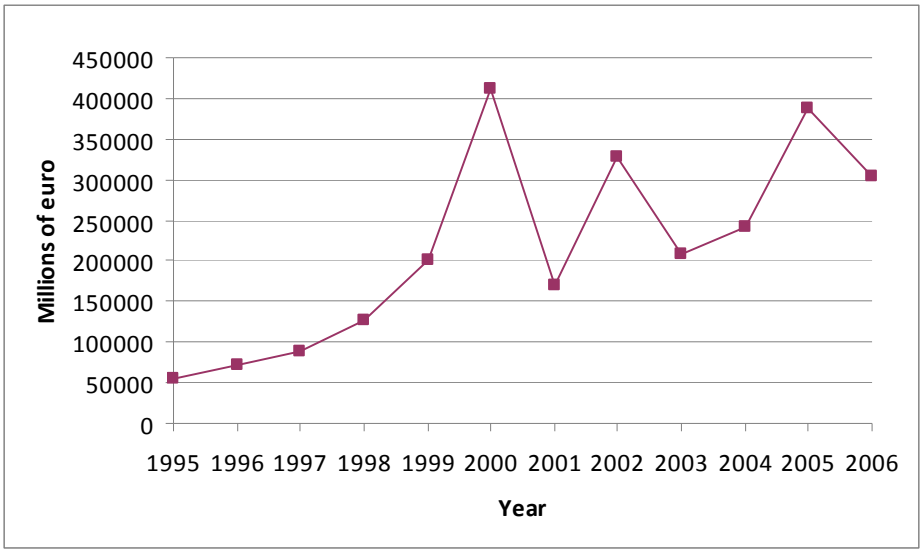
Stein, E. and C. Daude, 2003, Longitude matters: time zones and the location of FDI, Mimeo, Inter-American Development Bank

Wei, S.-J., 2000, How taxing is corruption on international investors? *The Reviews of Economics and Statistics*, 82(1):1-11.

Wolff, G., 2007, Foreign direct investment in the enlarged EU: do taxes matter and to what extent? *Open Economies Review*, 18, 327-346.

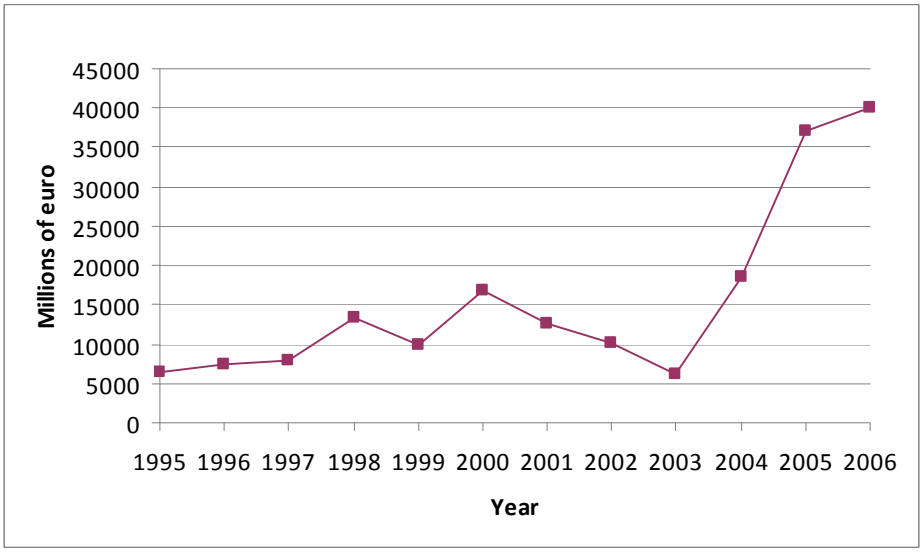
World Economic Forum, 2009, The Global Competitiveness Report 2009-2010.

**Figure 1. FDI flows within the EU27**



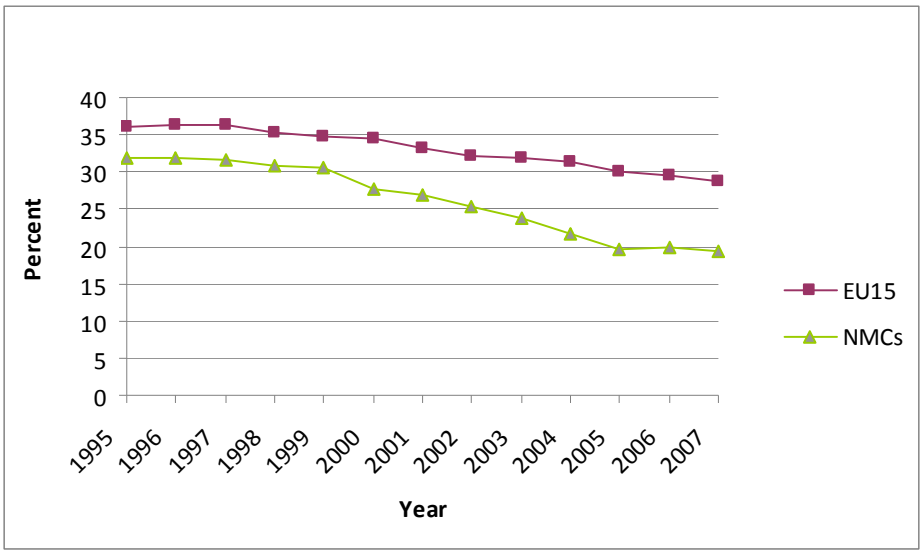

Source: Eurostat (2010)

**Figure 2. FDI flows from the EU15 to the NMCs**



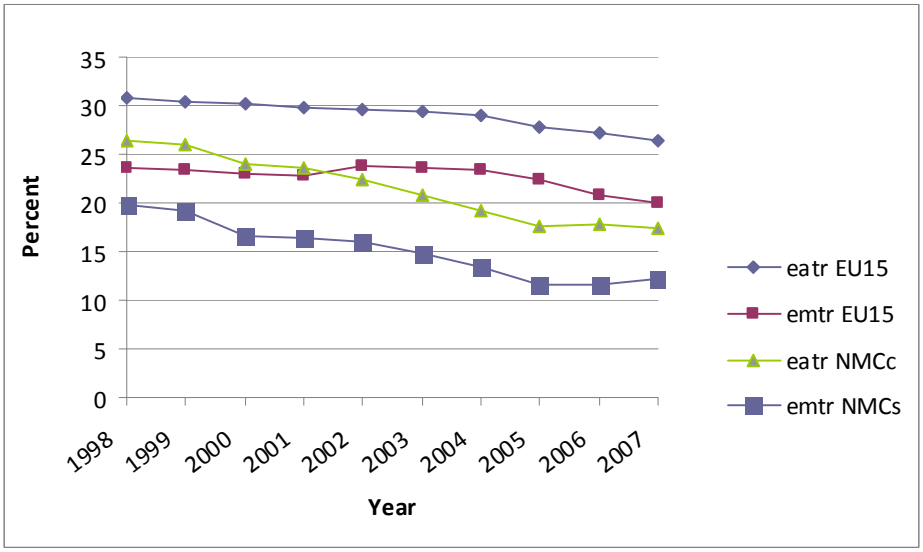

Source: Eurostat (2010)

**Figure 3. Statutory corporate tax rates**



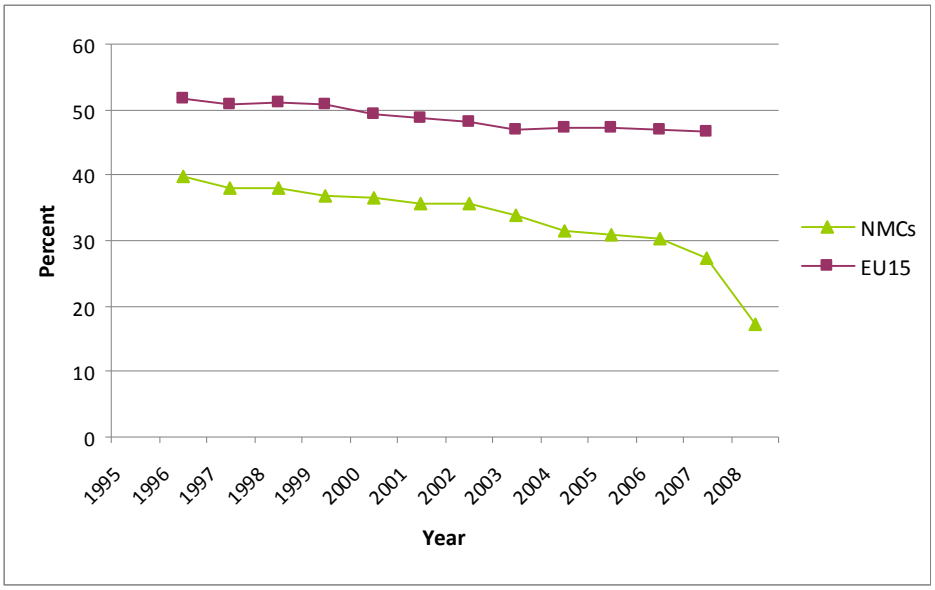

Source: European Commission

**Figure 4. Effective marginal and effective average corporate tax rates**



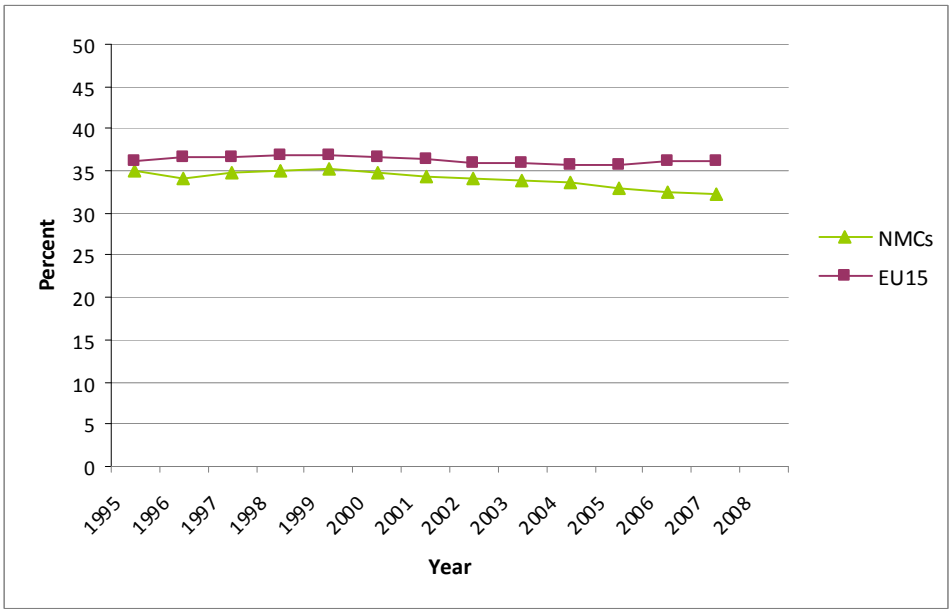

Source: Devereux et al (2008)

**Figure 5. Top statutory personal income tax rates**




Source: IBFD (2010)

**Figure 6. Implicit average personal income tax rates**




Source: Eurostat (2010)

Table 1. Heckman estimations: Determinants of FDI flows to all EU27

| | EU27 | | EU27 | |
|---|---|---|---|---|
| | flow | selection | Flow | selection |
| lnGDP(investor) | 0.728 | 0.159 | 0.452 | 0.162 |
| | (7.29)** | (5.23)** | (5.03)** | (3.45)** |
| lnGDP(host) | 0.909 | 0.230 | 0.624 | 0.386 |
| | (6.04)** | (11.14)** | (2.97)** | (10.56)** |
| lndistance | -1.368 | -0.058 | -1.276 | 0.137 |
| | (13.51)** | (1.85) | (9.60)** | (3.14)** |
| Top marginal labor | -3.313 | | | |
| tax rate differential | (7.09)** | | | |
| Effective marginal | | | -0.716 | |
| labor tax differential | | | (1.57) | |
| FDI stock (host) | 0.178 | 0.020 | 0.188 | -0.024 |
| | (5.05)** | (1.40) | (5.70)** | (1.30) |
| Market potential | 0.000 | 0.195 | -0.077 | 0.329 |
| (host) | (0.00) | (2.71)** | (0.41) | (3.27)** |
| Inflation (host) | 0.031 | 0.005 | 0.055 | 0.022 |
| | (2.32)* | (1.08) | (1.88) | (1.39) |
| Government | -0.059 | -0.008 | -0.064 | -0.024 |
| investment (host) | (3.43)** | (1.32) | (2.74)** | (2.12)* |
| Labor productivity | 0.016 | -0.009 | 0.013 | -0.009 |
| | (3.95)** | (4.03)** | (3.79)** | (3.06)** |
| EU membership | -0.175 | -0.063 | -0.414 | -0.047 |
| (host) | (0.88) | (0.87) | (1.82) | (0.37) |
| EU membership | 2.686 | 0.583 | 2.701 | 0.656 |
| (investor) | (6.29)** | (10.09)** | (5.69)** | (6.91)** |
| Implicit average | | | | |
| labor | | -0.641 | | |
| tax differential | | (2.49)* | | |
| Effective average | | | | -0.742 |
| labor tax differential | | | | (2.60)** |
| Trade (host) | | -0.001 | | -0.001 |
| | | (1.01) | | (0.86) |
| GDP per capita (host) | | 20.898 | | 20.569 |
| | | (3.12)** | | (2.28)* |
| Constant | -11.230 | -4.578 | -2.302 | -7.891 |
| | (2.95)** | (9.00)** | (0.45) | (9.00)** |
| Observations | 3,980 | 3,980 | 2,173 | 2,173 |
| $\chi^2$ | 371.25 | | 459.17 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
Also includes year dummies

Table 2.

| | EU27 | | EU27 | |
|---|---|---|---|---|
| | flow | selection | flow | selection |
| lnGDP(investor) | 0.476 | 0.149 | 0.515 | 0.169 |
| | (6.56)** | (4.66)** | (5.09)** | (3.47)** |
| lnGDP(host) | 0.321 | 0.197 | 0.045 | 0.359 |
| | (2.93)** | (8.55)** | (0.21) | (8.90)** |
| lnDistance | -1.237 | -0.051 | -1.422 | 0.117 |
| | (15.16)** | (1.58) | (10.92)** | (2.60)** |
| Top marginal labor tax rate differential | -2.172 (4.65)** | | | |
| Effective marginal labor tax differential | | | -1.228 (2.57)* | |
| Effective marginal corp. tax differential | -3.082 (5.27)** | | -5.254 (6.68)** | |
| FDI stock (host) | 0.149 | 0.013 | 0.197 | -0.035 |
| | (5.73)** | (0.91) | (5.14)** | (1.79) |
| Market potential (host) | -0.438 | 0.216 | -0.488 | 0.402 |
| | (3.59)** | (2.90)** | (2.61)** | (3.70)** |
| Inflation (host) | 0.102 | 0.020 | 0.059 | 0.019 |
| | (3.73)** | (1.50) | (1.71) | (1.00) |
| Government investment (host) | -0.055 | -0.012 | -0.014 | -0.015 |
| | (3.42)** | (1.69) | (0.56) | (1.24) |
| Labor productivity | 0.025 | -0.006 | 0.025 | -0.007 |
| | (8.46)** | (2.37)* | (6.80)** | (2.23)* |
| EU membership (host) | -0.090 | -0.063 | -0.508 | -0.048 |
| | (0.57) | (0.82) | (2.10)* | (0.38) |
| EU membership (investor) | 1.145 | 0.547 | 1.703 | 0.611 |
| | (3.59)** | (8.82)** | (3.69)** | (6.27)** |
| Implicit average labor tax differential | | -1.277 (3.90)** | | |
| Effective average labor tax differential | | | | -1.417 (2.75)** |
| Effective average corp. tax differential | | -0.687 (2.53)* | | -0.695 (2.29)* |
| Trade (host) | | -0.002 | | -0.003 |
| | | (1.51) | | (1.60) |
| GDP per capita (host) | | 14.560 | | 19.445 |
| | | (2.11)* | | (2.06)* |
| Constant | 1.835 | -4.096 | 6.054 | -7.753 |
| | (0.68) | (7.72)** | (1.20) | (8.59)** |
| Observations | 3,564 | 3,564 | 2,056 | 2,056 |
| $\chi^2$ | 503.61 | | 437.57 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
Also includes year dummies

Table 3. Determinants of FDI flows from the EU15 to the NMCs

| | EU15 to NMCs | | EU15 to NMCs | |
|---|---|---|---|---|
| | flow | selection | flow | Selection |
| lnGDP(investor) | 1.462 | 0.278 | 1.239 | -0.520 |
| | (11.44)** | (2.66)** | (4.99)** | (1.03) |
| lnGDP(host) | 0.246 | 0.266 | 0.317 | 0.308 |
| | (1.75) | (3.50)** | (1.77) | (2.89)** |
| lndistance | -1.708 | -0.995 | -1.478 | -0.856 |
| | (5.56)** | (7.07)** | (4.72)** | (4.43)** |
| Top marginal | -0.046 | | | |
| labor tax differential | (0.05) | | | |
| Effective marginal | | | 2.105 | |
| labor tax differential | | | (3.22)** | |
| Effective marginal | -6.938 | | -8.693 | |
| corp tax differential | (6.01)** | | (5.22)** | |
| FDI stock (host) | -0.016 | -0.012 | 0.025 | -0.016 |
| | (0.39) | (0.35) | (0.44) | (0.30) |
| Market potential | -0.404 | -0.254 | -2.191 | 0.797 |
| (host) | (1.10) | (0.63) | (3.09)** | (0.74) |
| Inflation (host) | 0.098 | 0.030 | 0.013 | 0.028 |
| | (3.67)** | (1.22) | (0.28) | (0.72) |
| Government | 0.055 | 0.001 | 0.138 | 0.017 |
| investment (host) | (2.49)* | (0.03) | (3.00)** | (0.43) |
| Labor productivity | 0.029 | -0.002 | 0.009 | -0.004 |
| | (2.57)* | (0.22) | (0.58) | (0.29) |
| EU membership | -0.271 | 0.112 | 0.111 | 0.545 |
| (host) | (1.38) | (0.67) | (0.37) | (2.10)* |
| Implicit average | | -1.473 | | |
| labor tax differential | | (1.64) | | |
| Effective average | | | | 0.226 |
| labor tax differential | | | | (0.25) |
| Effective average | | -4.914 | | -7.185 |
| corp tax differential | | (4.25)** | | (3.98)** |
| Trade (host) | | -0.000 | | -0.024 |
| | | (0.16) | | (2.16)* |
| GDP per capita (host) | | 33.742 | | 15.750 |
| | | (0.60) | | (0.12) |
| Constant | -7.030 | 0.345 | -5.056 | 8.882 |
| | (3.23)** | (0.19) | (1.14) | (1.20) |
| Observations | 634 | 634 | 346 | 346 |
| $\chi^2$ | 279.21 | | 91.23 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
Also includes year dummies

Table 4. Determinants of FDI flows within the EU15

| | Within EU15 | | Within EU15 | |
|---|---|---|---|---|
| | flow | selection | flow | selection |
| lnGDP(investor) | 1.122 | 0.151 | 0.877 | 0.139 |
| | (2.57)* | (2.38)* | (3.48)** | (2.20)* |
| lnGDP(host) | 1.571 | 0.337 | 1.140 | 0.339 |
| | (1.56) | (6.49)** | (1.92) | (6.63)** |
| lndistance | -0.251 | 0.311 | -0.917 | 0.298 |
| | (0.23) | (5.32)** | (1.54) | (5.11)** |
| Top marginal | -5.219 | | | |
| labor tax differential | (2.05)* | | | |
| Effective marginal | | | -2.962 | |
| labor tax differential | | | (2.69)** | |
| Effective marginal | -5.545 | | -4.826 | |
| corp tax differential | (1.73) | | (2.79)** | |
| FDI stock (host) | 0.144 | -0.031 | 0.115 | -0.029 |
| | (1.03) | (1.28) | (1.31) | (1.19) |
| Market potential | 0.772 | 0.164 | 0.191 | 0.169 |
| (host) | (1.09) | (1.19) | (0.46) | (1.23) |
| Inflation (host) | -0.208 | -0.054 | 0.012 | -0.038 |
| | (0.59) | (1.09) | (0.06) | (0.77) |
| Government | -0.088 | -0.010 | -0.085 | -0.010 |
| investment (host) | (0.84) | (0.60) | (1.25) | (0.58) |
| Labor productivity | 0.003 | -0.004 | 0.009 | -0.003 |
| | (0.13) | (0.88) | (0.73) | (0.64) |
| Implicit average | | -0.028 | | |
| labor tax differential | | (0.06) | | |
| Effective average | | | | -0.096 |
| labor tax differential | | | | (0.19) |
| Effective average | | -0.989 | | -0.946 |
| corp tax differential | | (1.44) | | (1.32) |
| Trade (host) | | -0.002 | | -0.003 |
| | | (0.94) | | (1.15) |
| GDP per capita | | | | |
| (host) | | 22.885 | | 22.146 |
| | | (1.88) | | (1.73) |
| Constant | -31.000 | -7.938 | -16.215 | -7.842 |
| | (1.15) | (6.72)** | (1.04) | (6.68)** |
| Observations | 1,207 | 1,207 | 1,217 | 1,217 |
| $\chi^2$ | 48.20 | | 118.91 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
Also includes year dummies

Table 5. Determinants of FDI: levels of tax rates in host and investing country, theEU27

| | Top marginal tax rates | | Tax rates for 167×APW | |
|---|---|---|---|---|
| | flow | selection | flow | selection |
| lnGDP(investor) | 0.386 | 0.156 | 0.492 | 0.181 |
| | (5.29)** | (4.87)** | (5.51)** | (3.67)** |
| lnGDP(host) | 0.200 | 0.215 | 0.329 | 0.324 |
| | (1.85) | (8.60)** | (2.04)* | (7.61)** |
| lndistance | -1.246 | -0.045 | -1.266 | 0.130 |
| | (15.42)** | (1.35) | (11.12)** | (2.87)** |
| Marginal labor tax | -1.076 | | -1.070 | |
| rate (host) | (1.71) | | (1.89) | |
| Marginal labor tax | 2.436 | | 1.648 | |
| rate (investor) | (4.16)** | | (2.39)* | |
| Effective marginal | -0.048 | | -0.330 | |
| corp tax rate (host) | (0.06) | | (0.32) | |
| Effective marginal | 6.225 | | 10.183 | |
| corp tax rate (investor) | (7.36)** | | (10.51)** | |
| FDI stock (host) | 0.148 | 0.018 | 0.142 | -0.023 |
| | (5.58)** | (1.17) | (4.23)** | (1.16) |
| Market potential | -0.257 | 0.186 | 0.074 | 0.386 |
| (host) | (2.24)* | (2.46)* | (0.45) | (3.54)** |
| Inflation (host) | 0.110 | 0.020 | 0.071 | 0.021 |
| | (4.11)** | (1.50) | (2.25)* | (1.12) |
| Government | -0.056 | -0.011 | -0.063 | -0.014 |
| investment (host) | (3.59)** | (1.52) | (2.89)** | (1.12) |
| Labor productivity | 0.018 | -0.003 | 0.012 | -0.010 |
| | (5.85)** | (1.07) | (3.58)** | (3.08)** |
| EU membership | 0.104 | -0.120 | -0.147 | -0.012 |
| (host) | (0.66) | (1.50) | (0.65) | (0.09) |
| EU membership | 1.107 | 0.563 | 2.517 | 0.553 |
| (investor) | (3.70)** | (9.02)** | (6.83)** | (5.59)** |
| Average labor tax | | -0.496 | | 0.199 |
| rate (host) | | (1.30) | | (0.49) |
| Average labor tax | | 1.002 | | 1.840 |
| rate (investor) | | (2.54)* | | (3.91)** |
| Effective average | | -2.075 | | -0.904 |
| corp tax rate (host) | | (4.69)** | | (1.27) |
| Effective average | | 0.447 | | 1.854 |
| corp tax rate (investor) | | (1.03) | | (2.89)** |
| Trade (host) | | -0.002 | | -0.002 |
| | | (1.62) | | (1.24) |
| GDP per capita (host) | | 10.161 | | 28.236 |
| | | (1.40) | | (2.87)** |
| Constant | 2.739 | -4.262 | -2.007 | -8.721 |
| | (1.07) | (7.61)** | (0.49) | (9.09)** |
| Observations | 3,564 | 3,564 | 2,056 | 2,056 |
| $\chi^2$ | 621.19 | | 577.32 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%
Also includes year dummies

Table 6. Different time periods

| | <=2002 | | >2002 | |
|---|---|---|---|---|
| | Flow | selection | flow | selection |
| lnGDP(investor) | 0.678 | 0.165 | 0.284 | 0.152 |
| | (6.68)** | (3.01)** | (3.01)** | (3.58)** |
| lnGDP(host) | 0.377 | 0.184 | 0.019 | 0.168 |
| | (2.72)** | (4.34)** | (0.13) | (5.44)** |
| lndistance | -1.262 | -0.090 | -1.125 | -0.046 |
| | (9.56)** | (1.66) | (10.25)** | (1.12) |
| Top marginal | -1.610 | | -2.469 | |
| labor tax differential | (1.94) | | (4.12)** | |
| Effective marginal | -2.249 | | -3.139 | |
| corp tax differential | (2.74)** | | (3.48)** | |
| FDI stock (host) | 0.270 | 0.051 | 0.205 | 0.022 |
| | (3.45)** | (1.13) | (5.79)** | (1.29) |
| Market potential | -0.034 | 0.077 | -0.396 | 0.184 |
| (host) | (0.16) | (0.59) | (2.39)* | (1.83) |
| Inflation (host) | 0.164 | 0.011 | -0.031 | 0.034 |
| | (4.85)** | (0.61) | (0.63) | (1.65) |
| Government | -0.054 | 0.015 | -0.048 | -0.016 |
| investment (host) | (2.03)* | (0.99) | (2.09)* | (1.87) |
| Labor productivity | 0.020 | 0.002 | 0.023 | -0.002 |
| | (3.17)** | (0.43) | (6.11)** | (0.59) |
| EU membership | 0.208 | -0.583 | -0.047 | -0.102 |
| (host) | (0.55) | (2.90)** | (0.19) | (0.98) |
| EU membership | 2.383 | 0.676 | 0.712 | 0.236 |
| (investor) | (5.49)** | (6.82)** | (2.55)* | (2.63)** |
| Implicit average | | -0.481 | | -1.251 |
| labor tax differential | | (1.14) | | (3.28)** |
| Effective average | | -3.203 | | -0.918 |
| corp tax differential | | (5.07)** | | (2.14)* |
| Trade (host) | | -0.006 | | -0.000 |
| | | (2.71)** | | (0.28) |
| GDP per capita (host) | | 30.308 | | -1.268 |
| | | (1.83) | | (0.14) |
| Constant | -3.499 | -4.635 | 8.413 | -3.474 |
| | (1.01) | (4.97)** | (2.56)* | (4.99)** |
| Observations | 1,510 | 1,510 | 2,054 | 2,054 |
| $\chi^2$ | 342.72 | | 236.53 | |
| p-value | 0.000 | | 0.000 | |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
Also includes year dummies

Table 7. Tobit estimations of FDI flows

| | EU27 flow | EU15 to NMCs flow | Within EU15 Flow |
|---|---|---|---|
| lnGDP(investor) | 0.479 | 1.541 | 0.537 |
| | (8.41)** | (11.59)** | (5.32)** |
| lnGDP(host) | 0.560 | 0.478 | 0.469 |
| | (8.57)** | (3.98)** | (4.21)** |
| lndistance | -1.137 | -1.926 | -1.906 |
| | (8.59)** | (8.77)** | (8.92)** |
| Top marginal | -1.993 | -0.830 | -2.071 |
| labor tax differential | (3.59)** | (0.90) | (2.10)* |
| Effective marginal | -2.067 | -4.646 | -2.178 |
| corp tax differential | (3.22)** | (3.65)** | (2.40)* |
| FDI stock (host) | 0.055 | -0.056 | 0.065 |
| | (2.27)* | (1.34) | (2.07)* |
| Market potential | -0.314 | -0.828 | 0.105 |
| (host) | (2.04)* | (1.77) | (0.43) |
| Inflation (host) | 0.041 | 0.046 | -0.016 |
| | (1.90) | (1.83) | (0.23) |
| Government | -0.003 | 0.054 | 0.023 |
| investment (host) | (0.17) | (2.45)* | (0.75) |
| Labor productivity | 0.021 | 0.034 | 0.002 |
| | (6.12)** | (3.00)** | (0.25) |
| EU membership | -0.042 | -0.118 | |
| (host) | (0.34) | (0.71) | |
| EU membership | 0.748 | | |
| (investor) | (5.38)** | | |
| Constant | -2.675 | -8.665 | 5.241 |
| | (1.75) | (3.35)** | (1.84) |
| Observations | 1,631 | 370 | 738 |
| Number of groups | 491 | 108 | 179 |

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Appendix

A1.Data description

| Variable | Definition | Source | Mean | Standard deviation |
|---|---|---|---|---|
| FDIflow | Bilateral net FDI outflows, million euro | Eurostat | 562.02 | 3981.84 |
| Top marginal tax rate | Tax rate applying to the top income bracket | IBFD | 0.43 | 0.10 |
| Implicit average tax rate | Ratio of total tax revenues to a proxy for the potential labor tax base | Eurostat | 0.35 | 0.07 |
| Marginal tax rate for single person | Marginal effective tax rate for a single person with an income 167% of the APW | OECD, Taxing wages | 0.54 | 0.12 |
| Average tax rate for single person | Average affective tax rate for a single person with an income 167% of the APW | OECD, Taxing wages | 0.47 | 0.09 |
| 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 |
| Market potential | For country j: $\sum_{k \neq j} GDP_k / Distance_{jk}$ million euro | Eurostat, CEPII (own calculations) | 1.403 | 0.565 |
| Labor productivity | Labor productivity per hour worked, index EU15 100 | Eurostat | 72.67 | 31.57 |
| Labor cost | Hourly labor cost, all branches except agriculture, fishing and private households with employed persons, euro | Eurostat | 13.12 | 8.82 |
| 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 euro | Eurostat (own calculations) | 0.932 | 1.941 |
| 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 |