The Role of Corporate Income Tax in Foreign Direct Investment Inflows into the "Old" and "New" EU Member States

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Abstract
Theoretical literature states that there are various potential determinants of foreign direct investment inflows, income tax being one of them. However, empirical investigations into the role of corporate income tax in foreign direct investment inflows have delivered heterogeneous outcomes. My empirical research not only focuses on the role corporate income tax plays in foreign direct investment inflows into the European Union as a whole, but mainly examines, whether there are statistically significant differences in their impact when looking separately at the old Member States and those which entered the European Union in 2004 or later. To fulfil the research objective I employed econometric analysis of panel data. This paper is 1,0 the result of the research project VEGA 1/0238/13.

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1. Introduction

In general, investments are an important factor of economic growth in any country. However, foreign direct investment (hereinafter "FDI") plays an even more important role in developing countries (Markusen, a iní, 1999) and in countries in transition from communist, centrally planned economies to market-based economies. FDI also brings other important benefits, including, among others, spillover effects, the import of new technology, know-how, training of the host country workforce, networking with home country producers who supply products to them, and job creation. Due to the great importance of FDI for economies, politicians and researchers have sought to identify which factors determine FDI inflows to countries.

To date a plethora of theoretical and empirical literature has been written, devoted to determinants of FDI. The conventional, classical approach to clarifying the causes and determinants of FDI, and which preceded modern theories, was based on the theory of international trade and the concept of comparative advantage. The motives for FDI were explained by the marginal productivity of capital, i.e. foreign investments are made if the marginal productivity of capital abroad is higher than that in the host country, and the factor deemed the most important determinant of FDI was the interest rate differential.

A breakthrough in insights among economists into factors motivating foreign investment came in the 1960s and 1970s with the publication of works by Stephen Hymer (1970), Yair Ahroni (1966) and Richard Caves (1974). The most important new theories concerning FDI determinants include industrial organisation theory, product life cycle theory, macroeconomic theories, eclectic paradigm, diversified risk hypothesis, macrofinancial theories.

One of the most influential and vivid theories is the eclectic theory developed by Dunning (Dunning, 1995) and (Dunning, 1993). Dunning's theory of the OLI paradigm includes among the determinants of expansion and allocation of capital abroad the desire of investors to retain benefits deriving to them from ownership of a specific advantage that they have or own, hence ownership (O). Investors also seek advantages of location (L), where these are not reduced simply to raw material sources and low costs, but include also the economy's competitiveness resulting from technological advancement, market size, purchasing power, sophisticated consumers and a segmented market. A

motivation is also the desire, by means of exporting capital and expanding to host country markets, to internalise (I) research results that have been created and are the property of firms in the host countries.

According to UNCTAD, host country determinants of FDI are divided into three groups: (1) policy framework for FDI; (2) economic determinants; and (3) business facilitation. According to which economic factors motivate FDI inflows, UNCTAD states these types of FDI: (a) market-seeking FDI, (b) resource-seeking FDI, (c) efficiency-seeking FDI (UNCTAD, 1998).

In an overview of potential FDI determinants and the results of empirical research, Chakrabarti (2001) states that the most frequently studied potential FDI determinants are market size, labour costs, trade barriers, the rate of economic growth, openness of the economy, the trade deficit, exchange-rate and tax, though the results of empirical research into their effect are often contradictory. Asiedu (2002) gives an overview of the results of empirical research into the effect of factors such as real GDP per capita, infrastructure quality, labour costs, openness, taxes and tariffs, and, similarly as Chakrabarti, states studies with positive, negative and insignificant effects of those variables on FDI. An overview of the results of empirical research into FDI determinants was published by Bloningen (2005). Bloningen and Piger (2011) specifically emphasise that a large number of factors that are stated as being statistically significant in empirical studies were not shown to be significant according to their research[1].

The main objective of this paper is to examine whether corporate tax play a significant role in attracting FDI into the European Union Member States, and if yes, whether the role played by corporate tax in attracting FDI is equally significant in the case of the old Member States (hereinafter simply the "EU17") and the new Member States (hereinafter simply the "EU10"). Research results may help answer the question of whether harmonisation of corporate tax in the European Union is feasible, particularly with regard to the sustainability of FDI inflows to the EU10 Member States.

Analysing the impact of corporate taxation on FDI inflows to the European Union Member States and the differences therein between the old EU17 and new EU10 Member States is important for at least two reasons. Firstly the EU10 Member States, which acceded to the EU in 2004 or later, are not as economically advanced, as reflected in the per capita GDP gap between them and the old EU17 Member States. Sustainable FDI inflows to the new Member States is of particular importance for them, because these inflows is believed to support economic growth, which contributes to convergence between the new EU10 and old EU17 Member States. Secondly, proposals to harmonise rules for determining the tax base for corporate tax are being presented in the European Union, and which, in the case of an unchanged nominal tax rate in individual states, would significantly affect the level of the effective tax rate. This in turn may create pressure also on the level of the nominal tax rate. A consequence could be a change in the current differences in the level of corporate tax between the old EU17 and new EU10 Member States. If, however, corporate tax in the new EU10 Member States were confirmed as having a larger and significant impact on FDI inflows, this could be an argument against the introduction of common rules for determining the tax base for corporate taxation in the EU.

In my research strategy I first evaluate the significance of several selected FDI determinants for all EU Member States, taking into account also the statutory and effective tax rates. The objective is to determine whether corporate tax play a statistically significant role in determining FDI inflow to the EU as a whole, and whether they *equally* motivate FDI inflows to all EU Member States, i.e. old EU17 Member States and newly acceded EU10 states. To make the empirical research more efficient, I use panel data built from time series for the period 2003 – 2011 and 27 cross-section units, i.e. the EU Member States. The remainder of the paper proceeds as follows. The second section describes the objective and strategy of the empirical research. Section 3 then sets out the model and data, while Section 4 gives an description of the method employed, and Section 5 gives the estimation procedure and reports the results. Section 6 concludes the paper.

2. Empirical Research – Objective and Strategy

[1] Of particular note, their results suggest that many covariates found significant by previous studies are not robust.

The objective of the econometric analysis is to determine whether selected factors, including corporate tax, have a statistically significant effect on FDI inflows to the EU Member States. A further objective is to ascertain whether the effect of selected factors, particularly of corporate tax, *differs* between the old EU17 Member States and the newly-acceded EU10 Member States, with emphasis on the fact that the latter were, following accession, transformation economies with a significantly lower real per capita GDP. I consider Member States as at 2011.

In order for me to be able to identify separately the significance of the selected determinants of FDI inflows to the old EU17 and new EU10 Member States, I examined their effect in all the 27 EU Member States (hereinafter simply the "EU 27") and in the group of 17 states that were EU members prior to 2004 (hereinafter simply the "EU 17"). They are: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden, United Kingdom and I include here also Cyprus and Malta, since they were not transformation economies. I also examine separately the significance of the selected potential FDI determinants in the EU10 group of Member States, which at the time of accession were transformation economies and I denote them here as the "new" EU Member States (hereinafter simply the "EU10"). They are: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

I subordinated the strategy of the empirical analysis to the objective and, therefore, I estimate the model's parameters in three scenarios. In *scenario 1* I check the effect of selected explanatory variables on the inflow of FDI into the EU 27, i.e. regardless of whether this concerns the old, more advanced EU17 Member States, or the new, less developed EU10 Member States. At the same time I expect that, variables controlling the significance of cost factors, including corporate tax, will have a negative sign, but it is not proven that their effect on FDI inflows is statistically significant. In *scenarios 2 and 3*, I divide the EU 27 set into the two subgroups, for which I independently estimate the effect of the same factors as in scenario 1. In scenario 2 I check the effect of these factors on FDI inflows to the EU 17. In *scenario 3* I estimate the effect of the same factors on FDI inflows for the EU 10 group. At the time of their accession to the EU, these states had a technological gap with the advanced EU states, which could have had a negative consequence on their economic performance. An overview of countries included in the individual scenarios is given in Table 1. Research strategy, namely splitting group of countries into subgroup when examining whether determinants of FDI inflow are equal for Africa and the rest of the world, applied Asiedu (2002).

Table 1: Overview of countries included in the econometric analysis scenarios

Scenario 1	Scenario 2	Scenario 3
EU27	EU17	EU10
Austria, Belgium, Bulgaria, Czech Republic, Cyprus, Estonia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom	Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden, United Kingdom	Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

Note: Even if Cyprus and Malta entered the European Union in 2004, I put them to the group of EU17. This is because before they entered the EU, they had been already market-oriented economy. To the contrast, I put to the EU10 only transition economies entering the EU from 2004 to 2011.

3. Model and data

Literature suggests that there is more than one determinant of FDI inflow to a country. When paying particular attention to the role of corporate tax, FDI determinants can be split into two groups: tax and non-tax determinants. Based on previous literature and results from empirical research, to

ascertain the determinants of FDI inflows to EU Member States, with particular attention to the role of corporate tax, I estimate the following model:

(1)

$$\ln FDI = \beta_1 + \beta_2 RR_{it} + \beta_3 RR_{it} + \beta_4 INFL_{it} + \beta_5 LBRCST_{it} + \\ + \beta_6 MBL100_{it} + \beta_7 OPNS_{it} + \beta_8 CITRT_{it} + \beta_9 TXEF_{it} + u_{it}$$

where the dependent variable is the inflow of foreign direct investment in each EU27 country (*FDI*). The explanatory variables are gross domestic product per capita (*RR*), inflation (*INFL*), labour costs (*LBRCST*), infrastructure (*MBL100*), the marginal nominal corporate tax rate (*CITRT*), the degree of the economy's openness (OPNS) and the effective tax rate on profit and capital assets (TXEF), and finally $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ are the estimated parameters of the model. I conduct the analysis on historical data for the period 2003 – 2011.

In model (1) the dependent variable is logarithm of *foreign direct investments*, which I denote as *FDI*. For their representation in the model I chose the data inward FDI flows in US dollars at current prices and current exchange rates in millions. The data source is UnctadStats.

Market size, RR is a determinant that, according to the Dunning eclectic paradigm, can be categorised into the group of location specific factors. Empirical literature studies widely market size as a potential determinant of FDI. For example, Tsai (1994) found positive significant effect of market size, while Wei (2000) reports insignificant effect. For representing it in the econometric analysis I selected data on gross domestic product at market prices at purchasing power parity per inhabitant. The data source is Eurostat. I expect a positive sign for the estimated parameters for the groups EU27, EU17 and EU10.

Inflation, INFL is an economic factor that can negatively affect FDI inflow. Walsh and Yu (2010) found average inflation non-significant for total FDI, however negative weak impact was found on primary, secondary and tertiary FDI. To represent the variable I used data on HICP inflation, the annual average rate of change (%). The data source is Eurostat. I expect a negative sign for the estimator.

Labour costs, LBRCST are among the potential factors that motivate in particular the resource-seeking type of FDI (UNCTAD, 1998). Wheeler and Moody (1992) found positive effect, while Schneider and Frey (1985) negative effect, and Lipsey (1991) found them insignificant. The variable is represented by data on labour costs for LCI (compensation of employees plus taxes minus subsidies), this being the labour cost index, nominal value, where the base year is 2008 (2008 = 100). The data source is Eurostat. With regard to the negative effect of high labour costs on FDI inflows, I expect a negative sign for the estimator.

Infrastructure, MBL100 is a determinant that, according to the Dunning eclectic paradigm, can be categorised into the group of location specific factors. Bellak (2009) reports positive significant impact of infrastructure on FDI inflow into Central European Countries. For representing it I used data on the level of telecommunications in the EU Member States. A reason for this choice was that the UNCTAD also categorises telecommunications among factors motivating the inflow of resource-seeking FDI. The variable is represented by data on mobile telecom subscriptions (per 100 people). The data source is the World Bank database. In all scenarios I expect a positive sign for the estimators.

Openness of economies, OPNS is another potential determinant of FDI inflows. Positive significant impact of openness on FDI inflow found Asiedu (2002), while Hausmann and Fernández-Arias (2000) report negative impact. The openness of economies can be inferred from the level of import duties in the host country; this data was used in empirical research by Tekin-Koru (2006). In my analysis, the openness of economies is represented by data on the degree of openness of economies expressed as a percentage. I calculated the data as the share of the sum of exports and imports in the numerator and the gross domestic product in the denominator. This concerns the components: gross domestic product at market prices in millions of euro (at prices from the previous year). The data source is the Eurostat database.

Corporate tax. In view of the fact that I am examining the effect of corporate tax on FDI inflows, another variable in the model is corporate tax. While for example Hartman (1984) reports negative significant impact of corporate tax, Wheeler and Moody (1992), among others, found no significant effect corporate tax on FDI, and Swenson (1994) reports positive impact. The literature

discusses which indicator should be used to represent corporate tax in the model and calculations. Three approaches to measuring corporate tax can be identified. The first approach uses the average effective tax rate, the second uses the marginal effective tax rate. Some authors suggest the average and marginal effective tax rate on industrial buildings (Janickova, a iní, 2013). The third approach uses the nominal tax rate, as favoured by, for example, the European Commission (Company Taxation in the Internal Market, 2001). According to findings of the European Commission, *"the results of the quantitative analysis suggests that that the overall national tax rate is an important factor in determining the effective tax rate, and it is clear that a single or common base without further adaptations in practice would almost 'mechanically' accentuate this"* (European Commission, 2001 s. 17). De Mooij and Enderween (2003) published a synthesis of empirical research on impact of corporate tax on FDI, which draw on 25 studies. According to their meta regression, they found following typical elasticities: statutory tax rate -1,2, marginal effective tax rate -4,2, average effective tax rate -9,3. Bellak (2009) found significant negative impact of corporate tax on FDI inflow to eight Central European Countries. I draw also on the conclusions of empirical research by Devereux and Lammersen (2002), who calculated the effective tax rate, and by concurrently using the sensitivity analysis method, examined which rule of corporate taxation most affects the diversity of the effective tax rate among the EU countries. They concluded that it is the nominal corporate tax rate. In the panel regression analysis conducted I check the effect of corporate tax by means of two variables, firstly the levels of the nominal tax rate (CITRT), for which KPMG reports are used as the data source. During 2003-2011 nominal corporate tax rates in the EU Member States were not homogeneous due to continuous changes caused by the intra-EU tax competition between old and new Member States. The second variable, representing corporate tax is the effective tax rate, which I measure as the share of tax on income, profits and capital gains as a percentage of total taxes, where the data source is the World Bank database. I expect a negative sign for the estimator.

A summary of variables and data is in the Table 2.

Table 2: Variables and Data

Label	Variable	Data	Source	Exp. sign
FDI	Foreign direct investment	FDI flows inward in US Dollars at current prices and current exchange rates in millions	UnctadStats	
RR	market size	gross domestic product at market prices in Purchasing Power Standard per inhabitant	Eurostat	+
INFL	inflation	HICP inflation, annual average rate of change (%)	Eurostat	-
LBRCST	labor costs	labour cost for LCI (compensation of employees plus taxes minus subsidies) pričom ide o labour cost index, nominal value kde bázickým rokom je rok 2008 (2008=100)	Eurostat	-
MBL100	infrastructure	mobile cellular subscriptions (per 100 people)	World Bank	+
OPNS	openess	((Export+Import)/GDP) Author´s own computation from components of gross domestic product at market prices in Millions of euro (at prices of the previous year)	Eurostat	+
CITRT	Corporate tax	Marginal statutory tax rate (Taxation Trends in the EU 2012 edition , table 1.5., page 36	Eurostat	-

TXEF	Corporate tax	Taxes on income, profits and capital gains (% of total taxes)	World Bank	-

4. Method

Three types of data can be used in the econometric analysis: time series, cross-section and panel data. In the case of time series data, the data are monitored for one or more variables for one entity over a certain time period, for example over several years; the data have the dimension of time. Such analysis could, for example, be an analysis of FDI inflows to SR over the period 2003 – 2011. In *cross-section* data the data are monitored for one or more variables at a single moment in time, for example one year, though for multiple entities; the data have the dimension of space, but not time. In *panel* data both the preceding types of data structure are combined, and data for one or more variables are concurrently monitored at several time periods concurrently for multiple entities. The panel data in my analysis is created from time series of variables included in the model (1) over the period of the 9 years (2003 – 2011) for multiple entities concurrently, in this case for the 27 EU Member States. A panel of time series thus concurrently has the dimensions of *space and time*. On the basis of pooling time series I get, providing no data for any year are missing, in total 243 observations for each variable in the model.

Compared with econometric analyses based only on time series without a spatial dimension, or only on cross-section data without a time dimension, it may be said that there are several advantages to the estimation of parameters of a time-series panel model. Firstly, a combination of time series and cross-section data make it possible to obtain more observations. This is advantageous particularly in cases where there are available only a small number of observations per entity, in our case per country. In this case, where for each of the 27 countries, the number of observations in the time series of each variable is 9 (2003 – 2011) the pooling of time series for several countries is also advantageous, because a greater number of observations is obtained, namely up to 243 (= 9 * 27). Secondly, the advantage of a larger number of observations in using panel regression is particularly appropriate in the case of econometric analysis of the EU10 transformation economies. With regard to the fact that some of them arose as independent sovereign states only after 1989, there are only a relatively small number of observations available for them. Consequently there is here the risk of micronumerosity. A consequence of this is that with an increase in the number of explanatory variables included in the model there is a decrease in the number of degrees of freedom (df). On the other hand, if we want to avoid reducing the degrees of freedom through the fact that I do not include all necessary variables in the model, the analysis is exposed to the risk of incorrect specification of the model. In both cases, the result is inconsistent and the estimation of the model's parameters is distorted, leading to incorrect conclusions. The panel regression method for multiple countries can solve problems that arise in applying other methods of empirical research for individual countries. Thirdly, an advantage of panel regression analysis is that together with the significant increase in the number of observations, there is also an increase in the number of degrees of freedom, an increase in the efficiency of estimates and the problem of colinearity between variables is mitigated. Fourthly, an advantage of regression analysis of panel data models is the greater degree of heterogeneity and possible generalisation of conclusions for economic theory. Specifically, the estimated parameters correspond not only to a greater number of observations, but also to a greater number of countries. This makes it possible to avoid the problem of insufficient generalisability of analysis results, as arises in interpreting the results of analyses performed only for individual countries, particularly small contracts. Fifthly, an advantage of the estimation of models by the panel regression method is that together with the increase in the number of observations and in the generalisability of results there are not neglected, indeed it becomes possible to take into consideration and to take account of, the specifics for each country, because it makes it possible to estimate the parameters of a model taking into account specific factors operating in individual countries. On the one hand, an advantage of panel data is the accompanying expansion in heterogeneity, and on the other there is not ignored and not lost the effect of specific factors operating in individual countries. In the case of the panel regression method it makes it possible to capture specific effects operating on the examined phenomenon in individual countries. It ensures the ability to check the effect of differences between countries on the variability of the dependent variable. The inclusion of the time dimension in the analysis helps to check the impact of changes over time on the

development of the explained variable. The effect of specific factors is estimated either by means of the fixed effects model or a random effects model. For deep insights into the panel data analysis see Baltagi (2005).

5. Estimation Procedure and Results

I stated that three types of model are used for panel data econometric analysis. In this part I describe the procedure by which I selected the most suitable of the three possible models, and at the end I give a table of the results. In the first step, using the OLS method, I estimated the parameters of the pooled model; the results are given in table 5 in column 1. The coefficient of determination means that 39.49% of the observed values are explained by the linear regression model. At a significance level of $\alpha = 0.05$ sign, the coefficient of determination is significant, and, therefore, also the model as a whole is statistically significant.

The decision on whether I are to use the pooled model, or the fixed effects model or the random effects model depends on the results of diagnostic tests that I apply to the results of the OLS analysis. If the intercepts for each cross-sectional unit, in this case for each EU Member State, are equal, the pooled OLS analysis method is suitable for estimating the model's parameters. In the event that the intercepts for the cross-sectional units for individual Member States are not equal, it is appropriate to use a fixed effects model instead of a pooled OLS model. By means of a suitable diagnostic test I therefore test the null hypothesis wherever the intercepts for the individual cross-sectional units, in this case the Member States, are equal, or whether the alternative hypothesis applies, that intercepts for the Member States are not equal. The null and alternative hypotheses are:

(3)

$$H_0 : \beta_1 = \beta_2 = ... = \beta_N$$
$$H_1 : \beta_1 \neq \beta_2 \neq ... \neq \beta_N$$

where β is an intercept, *i* a country, *N* is the number of countries included in the model. If the null hypothesis is true, and the intercepts for individual states are equal, then it is appropriate to use the pooled regression analysis (pooled OLS) method for estimating the model's parameters hypothesis. If the intercepts for individual states are not equal, I then accept the alternative hypothesis, and it is necessary to use a separate intercept for each state. Therefore, in such a case the fixed effects model is more suitable. Table 3 presents the results of the diagnostic test for the pooled OLS for the EU 27.

Table 3: Diagnostic assuming a balanced panel with 27 cross-sectional units over 9 periods

The fixed effects estimator allows for differing intercepts by cross-sectional unit slope; standard errors in parentheses; p-values in brackets			
const:	11.587	(1.5356)	[0.00000]
rr_1:	2.2276e-005	(5.2019e-005)	[0.66904]
infl_1:	-0.050417	(0.035426)	[0.15653]
lbrcst_1:	-0.040409	(0.0092074)	[0.00002]
mbl100_1:	0.010072	(0.0074592)	[0.17874]
citrt_1:	-0.025741	(0.031837)	[0.41994]
opns_1:	0.72159	(0.5217)	[0.16844]
txef_1:	-0.017989	(0.019691)	[0.36225]
27 group means were subtracted from the data			
Residual variance: 128.777/(203 - 34) = 0.761992			
Joint significance of differing group means: F(26, 169) = 10.004 with p-value 1.15182e-022			

Based on a low p-value of the F-statistic at the significance level $\alpha = 0.05$, I reject the null hypothesis that the model's intercept is homogeneous, and I accept the alternative hypothesis. Therefore, I decided that in the analysis the fixed effects model is more suitable than the pooled model.

In the next step I decide whether the pooled model or the random effects model is more suitable for the analysis. O make the decision on the basis of testing the presence of a variance between the units included in the model, in this case the Member States. I test the null hypothesis that the variance between units is equal to 0, and its alternative hypothesis:

(4)

$$H_0 : \sigma_\nu^2 = 0$$
$$H_1 : \sigma_\nu^2 \neq 0$$

where σ is the variance and ν is the cross-section specific error. If the null hypothesis is confirmed, there is no variance between individual Member States in the model; in such case there is no point in using the random effects model. I test for the presence of a variance between units (i.e. Member States) by means of the Breusch-Pagan LM test statistic. If the calculated LM value exceeds the critical value χ^2 or if the p-value is less than 0.05, then at the α=0.05 significance level I reject the null hypothesis and use the random effects model for estimating the model's parameters. If I accept the alternative hypothesis, a variance exists between Member States, therefore there it makes sense to use the random effects model for estimating the model's parameters. The result of the Result of Breusch – Pagan test statistic is given in Table 4.

Table 4: Breusch-Pagan test statistic

LM = 157.624 with p-value = prob(chi-square(1) > 157.624) = 3.73996e-036
Variance estimators: between = 1.21097 within = 0.761992 Panel is unbalanced: theta varies across units

A low *p*-value counts against the null hypothesis that the pooled OLS model is adequate, and in favour of the random effects alternative. In the last step in selecting an appropriate model for working with panel data, I decide whether I am to use a fixed effects model or random effects model for estimating the parameters of the panel data model. The decision depends on whether the cross-section specific errors ν_i and explanatory variables are mutually correlated. I decide on the basis of the Hausman test statistic. If on the basis of it I reject the null hypothesis, I will use the random effects model; else I accept the alternative hypothesis that such a correlation exists and, therefore, I will use the fixed effects model. The level of the Hausman test statistic for my model is H = 17.223 with p-value = prob(chi-square(7) > 17.223) = 0.0160133. A low *p*-value counts against the null hypothesis that the random effects model is consistent and in favour of the fixed effects model. Summary of diagnostic test that led us to choose fixed effects model is in Table 5.

Table 5: Diagnostic test to choose most appropriate model for panel data analysis

Choice	Null and alternative hypotheses	Test statistic	Decision
pooled vs fixed effects	H_0: $\beta_1=\beta_2=\ldots=\beta_N$ H_A: $\beta_1\neq\beta_2\neq\ldots\neq\beta_N$	F-statistic	fixed effects
pooled vs random effects	H_0: $\sigma_\nu^2 = 0$ H_A: $\sigma_\nu^2 > 0$	Breusch-Pagan test statistic	random effects
fixed effects vs random effects model	$H_0 : \mathrm{cov}(\nu_i, X_{it}) = 0$ $H_0 : \mathrm{cov}(\nu_i, X_{it}) \neq 0$	Hausman test statistic	fixed effects

Based on the results of the diagnostic tests, I decided that the fixed effects model is most appropriate for my analysis. Estimation of the parameters of the *fixed effect model* is based on the technique where the slope coefficients of independent variables are constant and identical for all entities (Member States), though the intercept differs between individual entities and it is this that absorbs the effects of the specifics of each Member State in the set. The specifics of individual countries are taken into account in the estimates of the model's parameters by means of a constant particular to each Member State, while estimates of the coefficients of independent variables remain common for the model as a whole. I used lagged variables, with length of lag one year. The fixed effects model is written as:

(5)

$$\ln FDI = \beta_{1i} + \beta_2 RR_{i(t-1)} + \beta_3 RR_{i(t-1)} + \beta_4 INFL_{i(t-1)} + \beta_5 LBRCST_{i(t-1)} +$$
$$+ \beta_6 MBL100_{i(t-1)} + \beta_7 OPNS_{i(t-1)} + \beta_8 CITRT_{i(t-1)} + \beta_9 TXEF_{i(t-1)} + u$$
$$i = 1,2,..,27$$
$$t = 2003,2004,2005,...,2011$$

A distinguishing feature in fixed effect model is in the intercept, where in the first case the intercept β_1 was common and constant for all countries, whereas in the second case it is individual for each country, i.e., $\beta_{1i,}$ where i denotes one of the 27 Member States and means that the constant for each of them may be different. Differences may be caused by specific distinguishing features of individual countries. The term "fixed effects" means that although a constant may differ between individual units, each individual intercept is time-invariant – it is constant over time. The fixed effects model assumes that the slope coefficients of regressors do not change over time or for individual entities. I estimated the parameters of the fixed effects model for all EU countries together (scenario 1), for the group of the old EU 17 states (scenario 2) and for the new EU 10 transformation economies (scenario 3). The results are given in Table 6.

Table 6: Parameters of the fixed effects model for EU27, EU17 and EU10

	Scenario 1	Scenario 2	Scenario 3
	EU27	EU17	EU10
dependent variable	l_fdi	l_fdi	l_fdi
	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
const	11.73	12.0983	10.83
	(<0.00001)***	(0.00003)***	(<0.000001)***
rr_1	2.22755e-05	4.48555e-05	6.5342e-05
	(0.66904)	(0.56696)	(0.50724)
infl_1	-0.0504168	-0.0611428	-0.0612711
	(0.15653)	(0.50042)	0.05524*
lbrcst_1	-0.0404085	-0.0421708	-0.0513235
	(0.00002)***	(0.09028)*	(<0.00001)***
mbl100_1	0.0100718	0.00256043	0.018054
	(0.17874)	(0.84747)	(0.02364)**

citrt_1	-0.0257407	-0.0195454	-0.0493505
	(0.41994)	(0.68507)	(0.17885)
opns_1	0.721586	0.539755	0.689115
	(0.16844)	(0.58620)	0.15964
txef_1	-0.0179889	-0.0018742	-0.0292128
	(0.36225)	(0.95702)	(0.13456)
R-squared	0.761702	0.688598	0.776862
Number of observations	203	127	76
Number of cross-sectional units	27	17	10

6. Conclusion

Econometric analysis for EU27 reports just one common determinat of FDI inflow, which is labor costs. Labour costs have a common statistically significant adverse effect on FDI inflows to the EU as a whole. Results for EU10 show, that all signs are correct; the model as a whole is significant; it explains 77.68% of dependent variable variability. There are a greater number of significant determinants than in the case of the EU27 or EU17; I found 3 significant variables that have an adverse effect on FDI inflow to the EU10 – inflation, labor costs and infrastructure, i.e. in addition to labour costs, FDI inflow to the EU10 is determined by two further factors: inflation and infrastructure. I found that neither the effective tax rate nor statutory corporate income tax rate are statistically significant, even though they have an adverse effect on FDI inflows to the EU10. At the same time, this result does not differ when comparing the significance of tax rates as a determinant of FDI inflow into the old EU 17 states. Overall, within the period 2003 – 2011, tax rates show an adverse impact on FDI inflows into the EU as a whole, though they are not statistically significant. The estimated size of negative impact of nominal corporate tax rate on FDI is in line with previous results of empirical research, namely de Mooij and Enderveen (2003) found elasticity of nominal corporate tax rate around -1,2. According to our results, if nominal tax rate increases by 1 point the next year FDI will decreasy by 2,5% in EU27, 1,9% in EU17, and 4,9% in EU10. However, as already stated, the influence is weak. The second measure, average effective tax rate (txef) shows also result consistent with previous empirical studies. de Mooij and Enderveen (2003) report elasticity -9,3, our research found elasticities -1,7 for EU27, -0,18 for EU17 and -2,9 for EU10. Again, the significance is weak. In contrast, there is only one significant adverse effect common to all EU 27 Member States and that is labour costs.

This econometric analysis shows that tax rates, either nominal or statutory do have an adverse effect on FDI inflows, but this effect is not statistically significant. This result holds true for the European Union as a whole, both for the old EU17 and the new EU10 Member States. The implication of this finding is that the harmonisation of statutory and effective tax rates will most likely play an adverse role in FDI inflows into the EU as a whole, but this role will not be statistically significant. The EU Member States will suffer similar effects on FDI inflows. By contrast, the new EU10 Member States need to pay attention to inflation and infrastructure.

In terms of the impact of tax rate harmonisation on FDI inflows, the effect on FDI inflows into the EU10 is no more significant than that on FDI inflows into the EU17 countries. In light of this, the harmonisation of effective tax rates or statutory tax rates may have an adverse, but not statistically significant, effect in all EU Member States and this is not, therefore, a reason to treat the EU 10 differently in terms of effective or statutory tax rates. The impact of corporate on FDI inflows cannot be said to be a reason against harmonising effective or statutory tax rates within the EU.

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