

## Ensaio

# Corporate Taxes and the Location of FDI in Europe<sup>1</sup>

Tomás Oliveira da Silva<sup>2</sup> e Sérgio Lagoa<sup>3</sup>

## 1. Introduction

Since the second half of the 20th century and particularly after 1980, international trade has rapidly evolved, becoming a key feature of a globalized economy. The dispute for international investments began between the developed countries, followed by the developing world, later in the century. In turn, foreign direct investment (FDI) became an increasingly important component of investments around the world.

FDI is a type of international factor movements, which is a branch of the study of international trade. Particularly, a FDI is not a simple short-run financial investment. In accordance to OECD (2008), “foreign direct investment (FDI) is a category of investment that reflects the objective of establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor”.

Therefore, FDI is one way of serving a foreign market and the decision to undertake FDI is part of a wider set of decisions. Firstly, a multinational company decides if it wants to serve the foreign market at all. Then, if it finds the foreign market interesting, the company has to choose between exporting, licensing or undertaking FDI. Finally, if it chooses to make an investment abroad, the company is left with the decision of where to locate its investment (i.e. the location decision).

A large share of literature addresses this process, studying the behaviour of multinational companies<sup>4</sup>. One widely used conceptual approach is known as the OLI-framework (or eclectic paradigm) - Dunning (1980, 1981). Dunning’s approach draws on the theory of internationalization, summarizing the process of decision making of a company choosing whether and how to enter a foreign market.

According to Dunning, a company should only undertake FDI when it has three categories of advantages: ownership advantages, internalization advantages and locational advantages. In the absence of locational advantages the company should export, while if it only possesses ownership advantages it should serve the foreign market through licensing. In this research we particularly address the locational advantages, which include, for example, access to protected market, more favourable tax rates, lower production cost, lower risk, or lower competition. These advantages vary across alternative locations and should be determinant for the companies’ ultimate location decision.

There is a vast literature devoted to study the location determinants of FDI, for a review see for example Blonigen (2005). Dunning (1980) classifies the motivations for FDI in four types: natural resource seeking, market seeking, efficiency seeking and strategic asset or capability seeking. Among the wide range of FDI determinants arising from those motivations, the most consensual ones are market size, labour costs, economic growth, level of international trade, agglomeration effects and taxes. Particularly, larger market size and higher economic growth as well as higher levels of trade and agglomeration effects have a positive effect on FDI. Conversely, higher labour costs and higher taxes have a negative effect on FDI. In this research the role of taxes in the FDI location decision is addressed and our findings provide evidence that higher corporate taxes do in fact repel foreign direct investments.

<sup>1</sup> The opinions expressed in this article represent the views of the authors and do not necessarily correspond to those of the Portuguese Ministry of Economy and Employment.

<sup>2</sup> *Gabinete de Estratégia e Estudos*, Portuguese Ministry of Economy and Employment.

<sup>3</sup> ISCTE Lisbon University Institute.

<sup>4</sup> For a review of literature see for example Markusen (1995).

The empirical literature regarding the effect of taxes on FDI is rather diverse and sometimes presents contradictory results. Differences arise essentially from different measures of tax rates, FDI data and econometric methods. This research contributes to the literature in three points. Firstly, it uses an extensive firm-level dataset consisting of worldwide projects of real investment hosted in Europe for 9 years. Secondly, it evaluates whether the presence of a country in favoured economic areas, like the European Monetary Union (EMU), affects the impact of corporate taxes on the location of FDI. Finally, it analyses how the response of FDI to taxes depends on the specific characteristics of the projects, such as the sector and capital intensity. The empirical analysis uses three tax rates, but focuses on the effective average tax rate which is deemed in the literature as the most appropriated to explain location decisions (Devereux and Griffith, 1998). This article also investigates if the tax rates' volatility has an impact on FDI.

The firm-level dataset provided by the European Investment Monitor of Ernst & Young is studied with the use of a conditional logit model controlling for country fixed-effects which appears in the literature as an accurate reflection of multinationals' behaviour. The base result suggests that if the host country's corporate taxes decrease by one percentage point (pp.), the odds ratio<sup>5</sup> of this country receiving an FDI project increases by about 3.1%.

Assuming that FDI has immeasurable positive effects on the host economy<sup>6</sup> not only in a direct way - inducing economic growth - but also through numerous positive spillover effects, our results should be of major interest in particular for policy makers. On the other hand, our results should be useful for multinationals investing in Europe as they represent a kind of benchmark of multinationals behaviour.

The remainder of this article is structured as follows. The next Chapter presents a review of the literature. Chapter 3 describes the data used in the empirical work. Chapter 4 develops the econometric approach. Chapter 5 presents and discusses the empirical results. Finally, Chapter 6 concludes.

## 2. Literature on corporate taxes and FDI

The study of taxes and FDI arose with Hartman (1984, 1985) and since then a significant body of literature has been devoted to study how FDI is affected by corporate taxation<sup>7</sup>. Hartman's study consists of an empirical analysis of inward FDI in the US between 1965 and 1979. The author concludes that taxes negatively affect FDI based on retained earnings, while they do not affect FDI based on new transfers. Hartman's research had some limitations and a series of studies soon followed, trying to test his findings.

Hartman was part of a first body of literature that was devoted to the study of inward FDI in the US using aggregate data on FDI, which has certain limitations. In particular, a large share of the aggregate data on FDI consists of financial flows such as mergers and acquisitions (M&A). This type of investment embodies mainly an ownership decision and does not necessarily involve a real investment (de Mooij and Ederveen, 2003). Auerbach and Hassett (1993) believed that, because of the use of aggregate data, researchers had been studying financial flows of FDI instead of real investments. The authors argue that different types of investment might be unequally affected by taxes and later research validated this argument.

Building on this notion, Swenson (2001) studies inward FDI in the US, from 46 countries, distinguishing between 6 types of FDI. She argues that the statutory tax rates negatively affect new plants and plant expansions for most of the investing countries while the effect on mergers and acquisitions is significantly positive for all countries. Swenson points to another interesting result which is the fact that investments in new plants are more sensitive to taxes than plant expansions. She suggests that this is justified mainly by the fact that the company's current choices may be constrained by its prior decisions.

<sup>5</sup> The odds ratio is equal to the probability of locating in the country divided by the probability of not locating in the country, i.e.  $odds\ ratio = p/(1-p)$ .

<sup>6</sup> Some authors address the effects of FDI in the host economies; see for example Borensztein et al. (1998).

<sup>7</sup> For an extensive survey see for example de Mooij and Ederveen (2003).

Another segment of the literature uses firm-level data for FDI. For instance, Devereux and Griffith (1998) analyse the decision making of US multinationals investing in Europe with a nested multinomial logit model. The authors use data on the production that US multinationals undertake in Europe. The location decision, which is the last branch of the authors' nested logit, is modelled with a conditional logit model, similar to the one used in this research, but with a set of alternatives reduced to only three countries (UK, Germany and France). The authors find that an increase in the effective average tax rate of a country significantly reduces the probability of that country receiving foreign investment; while the average tax rate computed from the data (using firm accounting data) has no significant effect<sup>8</sup>. They also do not find a significant role for the statutory tax rate.

More recently, Buettner and Ruf (2007) use a firm-level panel of the location of subsidiaries by non-financial German multinationals, between 1996 and 2003. Their approach also uses a discrete choice analysis with a fixed-effects logit model and the relevance of alternative tax measures is tested. Like in Devereux and Griffith (1998) the marginal effective tax rate has no effect on location decisions. In addition, the statutory tax rate has a considerable stronger effect than the effective average tax rate.

Stowhase (2002) also uses data on German multinationals that choose to locate in the European Union between 1991 and 1998, but his focus is on the distinction between investments for profit-shifting and investments in real activity. The author concludes that investment in real activities is affected by effective tax rates, but not by statutory rates, whereas investment related to profit shifting (services, finance and R&D activities) is affected by statutory tax rates but not by effective tax rates. Regarding the first finding, Stowhase argues that, in general, production activities respond to a broader range of tax incentives which are more accurately measured by the effective tax rate. As for the latter, Devereux (1992) suggests that multinationals may undertake a strategy through which they locate production in a country where pre-tax profits are maximized and then the company shifts profits to a country with a lower statutory tax rate.

The survey of de Mooij and Ederveen (2003), already mentioned, provides an extended synthesis of the literature on taxation and FDI. After transforming the results of 25 empirical studies they find a mean elasticity of -3.3, suggesting that a 1 pp. decrease in the host country's tax rate raises FDI by 3.3%. However, they also find that there is substantial variation of the results among studies which can be explained for example by the characteristics of each study such as the type of data (both on taxes and FDI) or the econometric specification.

From what we have described, some points of debate seem to emerge in the literature. First, the impact of taxes on FDI depends on the exact measure of tax rate being used (statutory, effective or marginal). Second, the effect of taxes on FDI seems to be different across sectors; with different measures of tax rate having different effects across sectors. Third, project characteristics, such as whether it is a new project or an expansion, also seem to be important in determining the effect of taxes. Summarizing, there is still little, if any, consensus in the literature regarding the size of the impact of taxes on FDI and our research aims to contribute to the debates.

### 3. Data

#### 3.1. FDI

Regarding FDI, the type of data most used in the literature are aggregate values of FDI, either flows or stocks, which are easily available statistics for several countries and for long periods of time. However, as already mentioned, this type of data has its limitations. On the other hand, micro data, although more complex and rare, is generally believed to be more accurate in representing investment choices.

<sup>8</sup> As described in Chapter 3, the effective average tax rates are a forward-looking measure of taxation. An alternative are the average tax rates computed using firm accounting data i.e. a backward-looking measure of taxation, which is criticised mainly due to endogeneity problems (de Mooij and Ederveen, 2003).

The European Investment Monitor (EIM) from Ernst & Young (EY) provides the dataset used in this research. This database is researched and powered by Oxford Intelligence and focuses on the announcement of FDI projects which reflect real investment in manufacturing or services operations carried out in Europe. M&A and other financial flows not resulting in any real investments are excluded<sup>9</sup>.

The dataset used for our estimations dates from 1998 to 2006; it includes 20,886 FDI projects originating in 95 countries, which are carried out in 29 European countries<sup>10</sup>. The projects were undertaken by a total of 15,547 multinationals; 13,056 of them only account for one project, 1,532 account for two projects, and 959 account for three or more projects. The dataset contains information about the country of origin, the company, the type of investment (new/expansion), the sector and activity, etc.

### 3.2. Corporate taxes

Data on taxes is a topic of discussion within the literature. The most common types of tax measures, which are the ones used in this research, are the statutory tax rate (STR), effective average tax rate (EATR) and effective marginal tax rate (EMTR). The first have shown to be relevant for the FDI decisions and they are viewed as particularly relevant for the profit shifting decisions of multinational companies (Huizinga and Laeven, 2008). A clear advantage of the STR is that it does not require laborious computations and so it is of easier use. Moreover, it should be the correct rate to use whenever we study firms which are not very sophisticated in their decisions. However, the STR omits important aspects regarding the tax burden on a real investment, such as fiscal benefits, credits, deductions and depreciation allowances as well as non-income taxes.

The EATR, in turn, estimates the level of taxes that companies effectively face, taking into consideration several features of the tax codes. The study of FDI location decisions tends to support the view that the EATR is the most appropriate measure of corporate taxation. Contrary to the STR, it is a more complex measure of taxation, which reflects all relevant income and non-income taxes and comprises several important aspects of the tax codes.

Finally, the EMTR is calculated upon the tax incentive on a firm's marginal investment decisions. In the literature, the EMTR turns out as rather insignificant in relation to FDI location decisions but this is comprehensible because, generally speaking, investment location decisions are not marginal (Devereux and Griffith, 2003).

As suggested by Devereux and Griffith (1998), investors choose between a set of locations comparing the post-tax level of profits in each of them, and the relevant measure of taxes is the EATR. As for the EMTR, it is a determinant of the optimal level of production in each alternative which indirectly affects the location decision. Therefore, Devereux and Griffith argue that, despite the fact that both these two tax measures may affect the location decision, the direct effect of the EATR should outweigh the indirect effect of the EMTR.

In the empirical work, we use data for the three above described measures of corporate taxation which were calculated by Overesch and Rincke (2008). The STR was calculated as the headline tax rate on corporate income adjusted to surcharges and local income taxes. As for the EATR and EMTR, Overesch and Rincke followed a methodology proposed by Devereux and Griffith (2003) with some specifications similar to the assumptions followed by the European Commission (2001).

In essence, this method consists in determining the effective tax levels of a hypothetical standardized investment project. This standardized investment project contains investment in industrial buildings, machinery, intangible assets, inventories and financial assets. The pre-tax rate of return is assumed to be

<sup>9</sup> For a more extensive description of the methodology of Ernst & Young's database please check one of the European attractiveness surveys published annually (for example Ernst & Young, 2011).

<sup>10</sup> See Appendix D for a list of both origin and host countries.

of 20%, in accordance with the European Commission (2001). Overesch and Rincke base their computations on tax information collected from several databases<sup>11</sup>. Table 1 shows the relevant descriptive statistics for the tax data.

**Table 1. Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
<u>Country characteristics</u>					
EATR	261	0.254	0.068	0.091	0.393
STR	261	0.286	0.079	0.100	0.565
EMTR	261	0.180	0.083	-0.195	0.356
log GDP	261	11.800	1.542	8.517	14.660
log Labour cost	261	2.849	0.914	0.558	4.051
GDP growth rate	261	0.039	0.026	-0.057	0.122
Agglom. effects	259	0.188	0.048	0.082	0.343
EA	261	0.363	0.481	0.000	1.000
EU	261	0.636	0.481	0.000	1.000
Core	261	0.276	0.447	0.000	1.000
Taxes' volatility	203	0.009	0.013	0.000	0.055
<u>Project characteristics</u>					
New investment	20,885	0.661	0.473	0.000	1.000
Services	20,886	0.520	0.500	0.000	1.000
High tech	12,587	0.168	0.374	0.000	1.000
Capital intensity	4,965	0.404	2.182	0.000	125.000

*Total of 261 observations of 29 countries over 9 years. Data for agglomeration effects (GVA manufacturing as percentage of total GVA) are not available for Greece in 1998 and 1999. Taxes' volatility is measured by the standard deviation of the EATR over  $n$ ,  $n-1$  and  $n-2$ ; implying the loss of the observations for 1998 and 1999. Total of 20,886 projects. Information concerning the type of project (new investment or expansion) is not available for one project. Total of 12,587 projects in manufacturing. Total of 4,965 projects with available information for capital investment (in US\$) and jobs creation.*

### 3.3. Other variables

The estimations include four control variables which are commonly referred to in the literature as relevant FDI determinants: gross domestic product (GDP) in nominal terms as a measure of market size, yearly nominal compensation per employee as an indicator of labour costs, real GDP growth rate as an indicator of economic expansion, and gross value added (GVA) in manufacturing as a percentage of total GVA, measuring agglomeration effects. The first two variables were used in logarithmic form. GDP, GDP growth rate and GVA were collected from Eurostat and the yearly nominal compensation per employee from AMECO.

Additionally, this research intends to evaluate whether the presence of a country in favoured economic areas, like the EMU, affects the impact of corporate taxes on the location of FDI. Regarding the theory of Optimum Currency Areas (OCA) which arose with Mundell (1961), the creation of the EMU is probably its most remarkable case study<sup>12</sup>. The theory posits, among other things, that the creation of a monetary union entails a process of market integration which leads to an increase in international trade.

<sup>11</sup> International Bureau of Fiscal Documentation (IBFD), Amsterdam; and surveys published annually by Ernst & Young, PwC and KPMG.

<sup>12</sup> Despite the fact that many have argued that the EMU did not (and does not) meet the criteria to be an optimum currency area.

Similarly, following Baldwin and Krugman (2004) we analyse a distinction between core and peripheral countries supported on the existence of agglomeration forces, such that, ignoring tax differences, a firm knows its profit will be higher in the core. The separation between core and peripheral European countries varies widely across the literature. In this research, taking into consideration the recent developments in Europe's economy, we restricted the core to Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland and the UK<sup>13</sup>.

In the same way, it is arguable that the countries within the EU receive higher levels of FDI. In particular, some authors have addressed this issue investigating the impact that the recent enlargements of the EU had on trade and FDI. Their findings, in general, suggest that the new members witness gains in terms of trade and FDI, which may however be counterbalanced by losses in some older member states (Breuss, 2001).

In this research these issues related with groups of countries are addressed in a different way. The introduction of the euro, for example, is not tested as a determinant of FDI; instead we will investigate whether countries within the euro area are able to set higher taxes than other countries, without unbalancing FDI. We follow the same approach for the core/periphery separation and for the EU. For this purpose, there are three dummy variables for groups of countries - euro area (EA), European Union (EU) and core. These variables equal one if the country belongs to the group in question and zero otherwise.

Another topic of investigation within this research concerns the types of projects for which two dummy variables are used. The first variable equals one, if the project is a new investment, and zero, otherwise. A second dummy variable regarding the type of project is created in order to investigate if services and industrial functions are affected by taxes in a different way. The variable equals one, if the investment consists of services functions, and zero, if it consists of industrial functions<sup>14</sup>. Finally, the last specification concerning project characteristics investigates if the capital intensity of the investment projects affects their sensitivity to taxes. The measure of capital intensity used is calculated as the capital invested per job created.

The last section of the empirical results investigates a final tax related aspect which may affect FDI location decisions – the taxes' volatility. The objective is to investigate if it is a determinant of the location of FDI across Europe. We measure the taxes' volatility with the standard deviation of the EATR over the three periods prior to the investment. Table 1 shows the relevant descriptive statistics for all the control and dummy variables.

#### 4. Econometric approach

As discussed in Chapter 1, a multinational company must thoroughly evaluate a set of possible advantages when headed to a decision of whether and how to serve a foreign market. First, the company decides whether or not to serve a foreign market. If the decision is affirmative, the second choice is whether to serve it through exports, licensing or investing abroad. Finally, if it decides to invest abroad, the company has to decide where to locate its investment.

In this research the proposed model addresses the choice between the several possible locations when headed to serve a foreign market through FDI. Therefore, we adopt a version of the multinomial logit model developed by McFadden (1974) – the alternative-specific conditional logit model or “McFadden's choice” model.

First, let us consider a multinational deciding in which country to locate an investment project. The company will choose the location where it maximizes profits. This choice can be defined as

<sup>13</sup> The peripheral countries are: Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Turkey.

<sup>14</sup> The industrial functions include the activities of logistic, manufacturing and testing and servicing; while services include contact centre, education & training, headquarters, internet data centre, research & development, sales & marketing and shared services centre.

$$\begin{aligned}
 y_{ij} &= 1 && \text{if } \pi_{ij}^e = \max(\pi_{i1}^e, \pi_{i2}^e, \dots, \pi_{ij}^e) \\
 y_{ij} &= 0 && \text{otherwise}
 \end{aligned} \tag{1}$$

where  $\pi_{ij}^e$  denotes the expected profit of project  $i = 1, \dots, n$  in country  $j = 1, \dots, m$ . The profit level is a function of country characteristics  $x_{ij}$  and of project characteristics  $z_i$ , and an unobserved random element  $\varepsilon_{ij}$ .

$$\pi_{ij}^e = x'_{ij}\beta + z'_i\gamma_j + \varepsilon_{ij} \quad , j = 1, \dots, m \tag{2}$$

The model allows country-specific variables for all alternatives, not just the chosen alternative. For each country-specific variable there is only one coefficient to be estimated, while for each project-specific variable there are  $j$  coefficients to be estimated. This model is a conditional logit model or mixed logit.

Applying McFadden's model to our research implies the estimation of the location probability  $p_{ij}$  under which the project  $i$  chooses the  $j$ th country as

$$p_{ij} = e^{x'_{ij}\beta + z'_i\gamma_j} / \sum_{l=1}^m e^{x'_{il}\beta + z'_i\gamma_l} \quad , j = 1, \dots, m \tag{3}$$

The model includes country fixed-effects i.e. the "unique" characteristics of each alternative, as dubbed by McFadden. These characteristics include, for instance, geographical location with respect to the rest of Europe, language, culture, and publicly provided infrastructures. The introduction of country fixed-effects allows to overcome the possibility of correlation between taxes and unobserved country characteristics. Several authors have emphasized the importance of performing such control (Bartik, 1985; Buettner and Ruf, 2007; Hines, 1996; Phillips and Goss, 1995). In addition, only  $m - 1$  of the coefficients  $\gamma_j$  are free to vary. There is the need to normalize the constant terms associated with each of the alternatives. This means that one of these constant terms is set as  $\gamma_j = 0$ . The country chosen for this normalization was France.

## 5. Empirical results

### 5.1. Base model

As described in Chapter 5, our econometric approach employs the conditional logit model which provides estimates of the location probabilities of investment projects for 29 European countries. Table 2 shows the results for the main model where column (1) includes only control variables and columns (2), (3) and (4) include the three measures of corporate taxation – EATR, STR and EMTR, respectively.

The coefficients for the control variables show the expected sign and are significant across the four specifications. They suggest, in line with the literature, that larger market size, stronger economic growth, higher agglomeration effects and lower labour costs increase the probability of a country receiving foreign investment.

As was already mentioned, the coefficients measuring the country fixed-effects are normalized using France as base alternative. France was chosen because within the basic model with EATR, which will be the principal model throughout this thesis, France is the country with the highest fixed-effects. These constants measure the impact of the unobserved time-invariant country characteristics on their probability to attract FDI projects. The more negative (positive) the constant the less (more) attractive these unobserved characteristics are for investors, when compared to France.

In all the four specifications of the model, these terms turn out to be significant for almost every country. The exceptions are Belgium and the UK. There is also another set of countries with only slightly less attractive fixed characteristics than France (with a constant larger than -1.5), which are: Austria, Denmark, Germany, Hungary, Netherlands, Spain and Sweden.

All three tax measures show negative and significant coefficients. Contrary to the results of Devereux and Griffith (1998), we find a significant negative impact even for the EMTR.

Table 2. Base Model

	(1)		(2)		(3)		(4)	
	Coef.	Rob. SE	Coef.	Rob. SE	Coef.	Rob. SE	Coef.	Rob. SE
EATR			-3.119 ***	(0.407)				
STR					-0.774 **	(0.334)		
EMTR							-1.235 ***	(0.236)
log GDP	0.564 ***	(0.206)	0.507 **	(0.213)	0.577 ***	(0.215)	0.562 ***	(0.215)
log Labour cost	-0.475 **	(0.206)	-0.562 ***	(0.211)	-0.502 **	(0.213)	-0.544 **	(0.214)
GDP growth rate	8.165 ***	(0.725)	7.580 ***	(0.741)	7.968 ***	(0.740)	8.034 ***	(0.732)
Agglom. effects	4.824 ***	(0.650)	2.010 ***	(0.771)	3.860 ***	(0.775)	3.709 ***	(0.709)
Austria	-1.139 ***	(0.403)	-1.325 ***	(0.417)	-1.100 ***	(0.420)	-1.231 ***	(0.421)
Belgium	-0.309	(0.373)	-0.462	(0.386)	-0.244	(0.389)	-0.523	(0.392)
Bulgaria	-1.607 ***	(0.506)	-2.496 ***	(0.536)	-1.698 ***	(0.535)	-2.022 ***	(0.538)
Croatia	-2.293 ***	(0.624)	-2.990 ***	(0.655)	-2.325 ***	(0.656)	-2.707 ***	(0.667)
Czech Republic	-1.211 ***	(0.368)	-1.536 ***	(0.385)	-1.148 ***	(0.388)	-1.402 ***	(0.389)
Denmark	-1.027 **	(0.446)	-1.401 ***	(0.463)	-1.037 **	(0.464)	-1.218 ***	(0.466)
Estonia	-1.497 *	(0.785)	-2.233 ***	(0.822)	-1.517 *	(0.824)	-1.828 **	(0.827)
Finland	-2.564 ***	(0.480)	-2.710 ***	(0.495)	-2.498 ***	(0.499)	-2.612 ***	(0.500)
France			----- (Base alternative) -----					
Germany	-1.354 ***	(0.119)	-1.074 ***	(0.130)	-1.225 ***	(0.136)	-1.320 ***	(0.125)
Greece	-3.101 **	(0.392)	-3.566 ***	(0.410)	-3.140 ***	(0.410)	-3.357 ***	(0.412)
Hungary	-0.795 **	(0.400)	-1.423 ***	(0.424)	-0.849 **	(0.423)	-1.042 **	(0.424)
Ireland	-1.274 ***	(0.503)	-1.735 ***	(0.526)	-1.289 **	(0.526)	-1.416 ***	(0.528)
Italy	-2.330 ***	(0.067)	-2.324 ***	(0.072)	-2.262 ***	(0.077)	-2.511 ***	(0.078)
Latvia	-2.066 ***	(0.702)	-3.096 ***	(0.742)	-2.182 ***	(0.740)	-2.507 ***	(0.743)
Lithuania	-2.216 **	(0.626)	-3.055 ***	(0.658)	-2.274 ***	(0.657)	-2.604 ***	(0.660)
Luxembourg	-1.975 ***	(0.904)	-2.507 ***	(0.935)	-1.974 **	(0.941)	-2.204 **	(0.944)
Netherlands	-0.913 ***	(0.271)	-1.109 ***	(0.282)	-0.914 ***	(0.283)	-1.004 ***	(0.284)
Norway	-2.733 ***	(0.495)	-3.208 ***	(0.516)	-2.798 ***	(0.516)	-2.889 ***	(0.517)
Poland	-1.312 ***	(0.201)	-1.842 ***	(0.220)	-1.371 ***	(0.215)	-1.587 ***	(0.218)
Portugal	-1.686 ***	(0.358)	-2.052 ***	(0.375)	-1.690 ***	(0.375)	-1.881 ***	(0.377)
Romania	-1.886 ***	(0.342)	-2.435 ***	(0.362)	-1.904 ***	(0.362)	-2.168 ***	(0.365)
Slovakia	-1.689 ***	(0.517)	-2.194 ***	(0.539)	-1.672 ***	(0.543)	-1.931 ***	(0.544)
Slovenia	-3.069 ***	(0.723)	-3.514 ***	(0.749)	-3.018 ***	(0.754)	-3.297 ***	(0.757)
Spain	-1.047 ***	(0.096)	-1.006 ***	(0.102)	-1.029 ***	(0.103)	-1.023 ***	(0.103)
Sweden	-1.100 ***	(0.355)	-1.385 ***	(0.369)	-1.080 ***	(0.370)	-1.234 ***	(0.372)
Switzerland	-1.143 ***	(0.401)	-1.520 ***	(0.418)	-1.164 ***	(0.419)	-1.299 ***	(0.42)
Turkey	-3.359 ***	(0.190)	-3.660 ***	(0.201)	-3.356 ***	(0.200)	-3.606 ***	(0.205)
United Kingdom	0.171 ***	(0.029)	-0.036	(0.041)	0.132 ***	(0.035)	0.048	(0.039)
Log Likelihood	-56,695		-56,664		-56,692		-56,682	
Pseudo-R <sup>2</sup>	0.1917		0.1922		0.1917		0.1919	
Nr of alternatives	29		29		29		29	
Nr of cases	20,875		20,875		20,875		20,875	
Nr of observations	601,091		601,091		601,091		601,091	

Conditional logit model with country fixed-effects. Agglomeration effects data for Greece in 1998 and 1999 are not available implying the loss of 11 cases and 4603 observations. Robust standard errors clustered by company (in parentheses). Following McFadden 1974, the Pseudo-R<sup>2</sup> is defined as  $1 - L_1/L_0$ , where  $L_1$  is the log likelihood of the full model and  $L_0$  is the log likelihood of the "constant only" model. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively.

The STR has the lowest coefficient but also proves significant and it shows a lower impact when compared to the study of Buettner and Ruf (2007). However, as Buettner and Ruf acknowledge, the fact that in their study the STR proves to have a greater impact suggests that the location of subsidiaries by German multinationals may be partially driven by profit shifting opportunities.



As already discussed in Chapter 3, the EATR should be the best measure of the tax burden for real investments and the results show that it has the most negative coefficient of the three tax measures. The estimated coefficient indicates that a decrease of 1 pp. of the EATR raises the odds ratio by about 3.1%. The impact on the country's location probability can also be obtained by computation of the marginal effects. Following Cameron and Trivedi (2009), the marginal effects of a conditional logit model can be defined as

$$\frac{\partial p_{ij}}{\partial x_{ij}} = p_{ij}(1 - p_{ij})\beta \quad (5)$$

Therefore, as the marginal effects are non-linear across  $p$  it becomes necessary to estimate them for certain levels of probability. For instance, if we assume a country with a current location probability of 3.5%<sup>15</sup> and with a certain level of tax rate, then if the tax rate decreases by 1 pp. the marginal effect on the probability is about 0.1 pp., equivalent to an approximate 3% increase.

Once the impacts on the location probabilities are non-linear, if we take the United Kingdom, for example, a decrease in the tax rate by 1 pp. induces a gain of around 0.55 pp. in its probability, equivalent to a 2.4% increase. This is because the United Kingdom has a probability of receiving a FDI project of approximately 22.6%, the highest among the 29 countries. Generalizing, the marginal effects are non-linear across the level of probability, such that it decreases for higher initial probabilities.

Comparably, Devereux and Griffith (1998) find that a 1 pp. decrease in the EATR increases the odds ratio by about 6.8% which is more than twice our result. As for the study of Buettner and Ruf (2007), it points to an increase of the odds ratio by about 2.5% when the STR decreases 1 pp. This is more than three times larger than our results for the STR. On the other hand, for a similar measure of the EATR as used in our research, Buettner and Ruf found an impact on the odds ratio of only -1.3%, although not statistically significant at a 10% level of confidence.

It is also interesting to compare the impact of the EATR with the impact of some of the control variables. For instance, the decrease of 1 pp. in the EATR will have a similar effect to a decrease in the labour costs (yearly nominal compensation per employee) of about 950 € per employee. As for the GDP growth rate, it would have to increase by about 0.4 pp. This clearly suggests that corporate income tax rates can be instrumental for policy makers in order to attract FDI.

## 5.2. Euro area, European Union and core/periphery

We shall now discuss three specifications of our model which were devised in order to study the differences in the impacts of taxes on the location of FDI, depending on whether the host country is part of the euro area, part of the European Union or part of Europe's core. This is done by iterating EATR with a dummy variable for each one of the three groups of countries.

With respect to the euro area, the results suggest that investors do in fact take into consideration the elimination of the currency risk once they invest inside the euro area. This is fairly expectable especially if they intend to serve more euro area countries with their investment. Additionally, the euro has proven to be a relatively strong currency since its creation and particularly against the US dollar since 2002. This may be seen as attractive for foreign investors who would be able to repatriate their "euro profits" with substantial exchange gains<sup>16</sup>.

As for the European Union, the effect is statistically insignificant, which is understandable taking into consideration the possible benefits for a foreign investor who chooses among our set of 29 European

<sup>15</sup> Equivalent to all 29 countries having the same probability of receiving a FDI project i.e.  $p = 100\%/29 \approx 3.5\%$ . Appendix C shows the estimated probabilities of a country receiving a FDI project given by the basic model with EATR.

<sup>16</sup> On the other hand, this appreciation of the euro can also be harmful in attracting FDI as the investments became relatively more expensive for foreigners. See Bloningen (2005) for a review of literature that addresses the complex impact of exchange rates on FDI.

countries. Almost all of the countries, if not all, that do not belong to the European Union, have trade agreements either with the union itself or with its major countries. This, in turn, eliminates the more obvious advantages of being part of the EU – the free movement of people, goods, capital and services. Moreover, as the literature suggests, even the benefits of the EU enlargements for the new members may be counterbalanced by losses in some older member states (Breuss, 2001).

The countries within Europe's core benefit from the most significant smoothing effect over the impact of their corporate tax rate on the probability to receive a FDI project. In fact, the coefficient is approximately three times the one of the euro area<sup>17</sup>. This provides evidence, in accordance with the literature, in the sense that the core countries are able to set higher taxes than the periphery ones, below a certain limit, without harming their ability to attract foreign investments. As discussed in Chapter 3, this occurs due to the immeasurable benefits that the core countries provide to foreign investors which, in this research, prove to be of greater relevance than the benefits associated with the euro area.

Quantitatively, the impact on the odds ratio of an increase in the EATR by 1 pp. is reduced by approximately 0.5 pp. if a country is part of the euro area. The equivalent marginal effect, for a current probability of 3.5%, decreases by about 14%. As for the country being part of Europe's core as opposed to the periphery, the impact on the odds ratio falls by around 1.5 pp. and the marginal effect at the same current level of probability decreases by about 44%.

The present results also indicate that given two hypothetical countries identical in all respects but the level of corporate taxes, their location probability of investment is the same when, for example, the EATR is approximately 28.7% in the core country and 16% in the peripheral one. Comparatively, the location probability is the same when, for example, the EATR is approximately 18.6% in a country within the euro area and 16% otherwise.

In order to further assess the benefits of the elimination of exchange risk within the euro area, we performed two additional specifications of the model. These consist of two separate estimations with the iteration of EATR with the dummy variable for euro area, one including only the projects originating within the euro area, and another including all other projects. Despite a slight loss of significance of the iterated term when the estimation includes only the projects originating within the euro area – with a p-value of 0.075 – the results show the expected difference in the smoothing effects. While the investors from outside the euro area reduce the impact of the EATR on the odds ratio by approximately 17%, the investors originating within the euro area show a smoothing effect of about 43%.

This finding is consistent because it implies that investors based in the euro area value the elimination of the exchange risk much more than other investors. The euro area investors are able to eliminate the exchange risk in two dimensions: (1) outflows and inflows of capital between the base country and the host country, and (2) throughout the transactions inside the euro area; while the investors based outside the euro area only eliminate the second dimension of the exchange risk.

The results seen in this Chapter suggest that the countries inside the euro area or part of Europe's core should be able to set higher tax rates than other countries. In fact, according to the data used in this research, in 2006 the EATR was on average 30.4% in core countries against 23.0% in the peripheral countries. Similarly, the average EATR for the euro area countries was 29.9% against 21.6% for the countries outside the euro area.

### 5.3. Project characteristics

---

<sup>17</sup> Notice that some countries belong to the euro area but not to the core, and vice-versa. In order to capture possible correlated effects, we ran the model with the iteration for core and euro area simultaneously. The two coefficients remained significant and in the same proportion.

In this section we analyse how the response of FDI to taxes depends on specific characteristics of each project, such as the fact of it being a new investment or an expansion, as well as its sector and capital intensity.

### 5.3.1 Expansions vs. New investments

With regard to different types of projects, one may argue that new investments and expansions react differently to variations of the corporate tax rates. As already discussed, according to the literature, it is expected that new investments are more sensitive to all types of country characteristics than expansions. In order to assess if indeed this occurs, we estimated a specification of our model where there is an interaction between EATR and a dummy variable that equals one when the project is a new investment and zero otherwise.

The result suggests that new investments are less sensitive to the tax rates when compared to expansions. A possible justification is that multinational companies may have several possible sites where they can expand their investments and so the choice between these alternatives is still dependent on the country's characteristics. This may blur the more intuitive justifications found in the literature such as economies of scale, agglomeration effects or even company's constraints regarding their previous decision (Swenson, 2001).

Another relevant aspect related to these two types of project considers the EMTR. As this tax measure is relevant for marginal investments it should more significantly affect expansions. Our results are significant and show the expected signs suggesting that expansions, in fact, turn out to be more sensitive to the EMTR than new investments.

Rolfe et al. (1993) show, using a survey of US firms' managers, that new projects are more sensitive to tax incentives that reduce their initial expenses (equipment and material exemption), whereas expanding firms prefer tax incentives that reduce profits. On this wise, our results can be justified by the fact that, essentially, both the EATR and the EMTR are capturing the way a country is taxing profits.

Another possible reason for why expansions reveal higher sensitivity to taxes than new investments is associated with the fact that new projects are mainly financed by new transfers and expansions are mainly financed with retained earnings. Therefore, as Hartman's (1984) study suggests, taxes negatively affect investments based on retained earnings but do not affect FDI based on new transfers<sup>18</sup>.

### 5.3.2. Industrial functions vs. Services

The influence of tax rates on location decisions may also vary throughout different sectors. A share of the research devoted to study this issue provides evidence for different kinds of impacts and suggests that some tax measures may be more appropriate to some sectors than others. In order to investigate such differences we estimated three specific models where a dummy variable equal to one for services and zero for industrial functions is iterated with each of the three tax measures.

Firstly, among all the tax measures, the EATR is the one with the highest coefficient in industrial functions, suggesting that, as industrial investments involve higher tax deductible expenses such as amortizations, they react more to EATR than to other tax measures. This finding is in accordance with the study of Stowhase (2002). Secondly, services are significantly less sensitive to all three tax measures. This corroborates the literature for both EATR and EMTR but with respect to the STR this finding is contradictory. The literature concerning profit shifting activities suggests that services' investments may be attracted particularly by low statutory tax rates (Devereux, 1992; Stowhase, 2002). Finally, the EMTR is

<sup>18</sup> These findings were later corroborated by some authors – e.g. Young (1988) – and contradicted by others – e.g. Slemrod (1990).

significantly more important for industrial functions than for services. This finding is consistent given that the industrial functions should be a type of investment that focuses more on exploring marginal profits.

Generalizing these results, it is arguable that industrial functions are more sensitive to corporate taxation than services, no matter the tax measure used. The reason for this may be related to the fact that industrial companies are more mobile companies, and more likely to compare taxes across locations (Wells, 1986). In addition, some industrial companies probably operate with smaller margins than service companies, implying that taxes can affect more severely the profit of the former rather than of the latter (Morisset and Pirnia, 1999)<sup>19</sup>.

### 5.3.3. Capital intensity

The last issue to be discussed concerning the project characteristics is the level of capital intensity of the investment projects. To our knowledge, this issue is also yet to be discussed in the literature. This issue is addressed through a specification which includes the iteration of the EATR with a variable measuring the capital intensity of the project (capital invested (\$) / nr of jobs created). The number of observations is significantly reduced as only 4,962 of the investment projects have available information on the capital invested and jobs created.

The coefficient for the iterated term of EATR and capital intensity of the project is positive and statistically significant suggesting that the more capital intensive the projects the less sensitive they are to taxes. This finding may be supported by the fact that more capital intensive projects should induce a higher level of amortization costs, reducing the taxable profits and consequently the sensitiveness to tax rates.

### 5.4. Taxes' volatility

The previous results reported in this article, and across the literature, suggest that the level of the tax burden is a significant determinant of FDI; it is plausible, though, that so is its volatility. A country that has its taxes changed frequently will induce a dose of uncertainty which may repel investors. Interestingly, this aspect was so far poorly addressed in the literature<sup>20</sup>. The specification of the model includes a measure of tax rate volatility which is the standard deviation of the current and last two periods (t, t-1 and t-2).

The tax rates' volatility appears in fact to have a significant negative impact on FDI. However, the quantitative measure of the impact of the standard deviation is quite complex as there are several variations of the tax rate, over three periods, that result in the same standard deviation. For example, in order to cause a similar effect on the location probability as an increase of the EATR by 1 pp. the tax rates could decrease by about 2 pp. from t-2 to t-1 and increase by about 3.6 pp. from t-1 to t. Note that the unique quantitative implication is that an increase of 0.01 in the standard deviation reduces the odds ratio of the location probability by about 2.3%.

## 6. Conclusions

This article provides evidence for the role of corporate taxes in the foreign direct investment (FDI) location decisions. The use of a wide firm-level dataset grants an accurate representation of real investments. Three measures of corporate taxation are used together with several other country and project characteristics.

<sup>19</sup> These sectorial analyses are fundamental for countries' policy decisions. For example, both Ireland and the Netherlands are known for its enormous success attracting FDI particularly in the services activities; and this was made possible, partially by the strong fiscal stimulus that these countries provide.

<sup>20</sup> Edmiston et al. (2003) find that uncertainty regarding the tax laws does repel FDI.

The main results indicate that a decrease in the effective average tax rate (EATR) by 1 pp. increases the odds ratio of a country receiving a FDI project by about 3.1%. Assuming a country with a current location probability of 3.5%, if the EATR decreases by 1 pp. its location probability increases by approximately 3%. A similar effect would be exerted on the location probability through a decrease in the labour costs by around 950 €/year per employee or an increase in the annual GDP growth rate by about 0.4 pp.

Furthermore, this research addresses several matters that affect the impact of taxes on the location of FDI. We find that countries within the euro area or part of Europe's core are able to set relatively higher taxes than other European countries, in order to exert the same impact on the location probability. Regarding different types of projects, the results indicate that the industrial functions are more sensitive to taxes than services.

The eventual existence of firm-specific preferences for certain countries may be a limitation to the model used in this research. However, in our dataset only around 16% of the companies invest more than once which might be insufficient for capturing eventually significant firm-specific fixed-effects. An approach based on a panel logit model is then left for future research.

The existing literature is still far from providing a consensual size of the impact of corporate taxes on FDI. Also, the differences in the impacts of corporate taxes arising from project specific and country specific characteristics still require further research. In particular, one of the project specific issues addressed in this research – the capital intensity – is, to our knowledge, yet to be explored in the literature. Additionally, the corporate taxes' volatility is a topic which may be interesting for future research.

Notwithstanding, the results presented in this article suggest that setting corporate taxes carefully may be instrumental for policy makers in order to attract FDI. In fact, many of the empirical specifications addressed in this research indicate that it should even be possible to attract specific types of foreign investments by manipulating corporate taxation. Along with policy makers, these results may also prove relevant for multinational companies themselves as they are representative of some aspects of multinationals' behaviour.

## 5. References

- Auerbach, A.J. and K. Hassett (1993), "Taxation and foreign direct investment in the United States: a reconsideration of the evidence", in: Alberto Giovannini, R. Glen Hubbard and Joel Slemrod (eds.), *Studies in International Taxation*, University of Chicago Press
- Baldwin, R. and P. Krugman (2004), "Agglomeration, integration and tax harmonisation", *European Economic Review*, 48(1): 1-23.
- Bartik, T. J. (1985), "Business location decisions in the United States: Estimates of the effects of unionization taxes, and other characteristics of states", *Journal of Business & Economic Statistics*, 3: 14–22.
- Blonigen, B.A. (2005), "A review of the Empirical Literature on FDI Determinants", *Atlantic Economic Journal*, 33: 383-403.
- Borensztein, E., J. De Gregorio and J-L. Lee (1998), "How does foreign direct investment affect economic growth?", *Journal of International Economics*, 45(1): 115-135.
- Buettner, T. and M. Ruf (2007), "Tax incentives and the location of FDI: evidence from a panel of German multinationals", *International Tax and Public Finance*, 14(2): 151-164.
- Breuss, F. (2001), "Macroeconomic Effects of EU Enlargement for Old and New Members", WIFO Working papers, No. 143.

Cameron, A.C. and P.K. Trivedi (2009), *Microeconometrics: Methods and Applications*, Cambridge, Cambridge University Press.

de Mooij, R.A. and S. Ederveen (2003), "Taxation and foreign direct investment: A synthesis of empirical research", *International Tax and Public Finance*, 10(6): 673-693.

Devereux, M.P. (1992), "The Ruding Committee Report: An Economic Assessment", *Fiscal Studies*, 13(2): 96-107.

Devereux, M.P. and R. Griffith (1998), "Taxes and the location of production: evidence from a panel of US multinationals", *Journal of Public Economics*, 68: 335-367.

Devereux, M.P. and R. Griffith (2003), "Evaluating Tax Policy for Location Decisions", *International Tax and Public Finance*, 10: 107-126.

Dunning, J. (1980), "Towards an eclectic theory of international production: some empirical tests", *Journal of International Business Studies*, 11: 9-31.

Dunning, J. (1981), *International Production and the Multinational Enterprise*, George Allen & Unwin, London

Edmiston, K, S. Mudd and N. Valev (2003), "Tax Structures and FDI: The deterred Effects of Complexity and Uncertainty", William Davidson Working Paper 558.

Ernst & Young (2011), *Restart: European attractiveness survey*, Ernst & Young.

European Commission (2001), "Company taxation in the internal market", Commission staff working paper COM (2001), 582 final, Luxembourg.

Hartman, D. G. (1984), "Tax policy and foreign direct investment in the United States", *National Tax Journal*, 37: 475-488

Hartman, D. G. (1985), "Tax policy and foreign direct investment", *Journal of Public Economics*, 26: 107-121.

Hines, J.R. Jr. (1996), "Altered States: Taxes and the Location of Foreign Direct Investment in America", *American Economic Review*, 86(5): 1076-1094.

Huizinga, H. and L. Laeven (2008), "International profit shifting within multinationals: A multi-country perspective", *Journal of Public Economics*, 92(5-6): 1164-1182.

Krugman, P. (2001), "Increasing Returns and Economic Geography", *The Journal of Political Economy*, 99(3): 483-499.

McFadden, D. (1974), "Conditional logit analysis of qualitative choice behaviour", in *Frontiers in Econometrics*, ed. by P. Zarembka, New York: academic Press, 105-142.

Markusen, J. (1995), "The boundaries of multinational enterprises and the theory of international trade", *Journal of Economic Perspectives*, 9 (2), 169–189.

Morisset, J. and Pirnia, N. (1999), 'How tax policy incentives affect foreign direct investment: A Review', World Bank Policy Research WP.

Mundell, R. (1961), "A Theory of Optimum Currency Areas", *American Economic Review*, 51: 657-665.

OECD (2008), *OECD Benchmark Definition of Foreign Direct Investment – Fourth edition*, France.

Overesch, M. and J. Rincke (2008), "The Dynamics of Corporate Tax Setting in Europe, 1984-2006", CESifo Working Paper No. 2535.

Phillips, J. M. and E. P. Goss (1995), "The effect of state and local taxes on economic development: A meta-analysis", *Southern Economic Journal*, 62: 320–333.

Slemrod, J. (1990), "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison", in: Assaf Razin and Joel Slemrod (eds.), *Taxation in the Global Economy*, Chicago, IL: University of Chicago Press, 79-122.

Stowhase, S. (2002), "Profit Shifting Opportunities, Multinationals, and the Determinants of FDI", *Discussion Papers in Economics*, University of Munich.

Swenson, D.L. (2001), "Transaction type and the effect of taxes on the distribution of foreign direct investment in the United States", in: J.R. Hines (eds.), *International Taxation and Multinational Activity*, University of Chicago Press.

Rolfe R.J., D.A. Ricks, M.M. Pointer and M. McCarthy (1993), "Determinants of FDI Incentive Preferences of MNEs", *Journal of International Business Studies*, 24(2): 335-355.

Wells L. (1986), "Investment Incentives: An unnecessary Debate", *CTC Reporter*, autumn.

Young, K. H. (1988), "The effects of taxes and rates of return on foreign direct investment in the United States", *National Tax Journal*, 41, 109-121.