

MASTER

FINANCE AND TAXATION

THE EFFECT OF CORPORATE INCOME TAXATION ON FOREIGN DIRECT INVESTMENT

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BIBLIOGRAPHY

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ABSTRACT

This dissertation aims to study the effect of corporate income taxation on Foreign Direct Investment (FDI) in the European context. For the 27 European Union (EU) member states, we investigate the effect of corporate income taxation on FDI inflows stock and three non-tax factors: economic stability, labour force quality and market size.

Using data from Eurostat and OECD, the sample consists in 378 country-year observations, considering the period between 2006 and 2019. The regression models were estimated through the method of Estimated Generalized Least Squares (EGLS) with period random effects.

The results indicate a negative relation between corporate income taxation and FDI inflows stock, in which EATR (Effective Average Tax Rate) and statutory tax rate seem to be significant. For non-tax factors, both GDP *per capita* and public debt exhibited a positive and significant relation with FDI. That means countries with larger market size and those with higher economic stability exhibit higher levels of FDI inflows stock.

By contrast, the quality of labour force is negatively related with FDI inflows stock, which is contrary to what we predicted. The financial crisis had a negative, but not significant effect.

Keywords: Foreign Direct Investment (FDI), Taxation, Corporate Income Taxes, Tax Burden

RESUMO

Esta dissertação visa estudar o impacto da tributação sobre o rendimento corporativo no Investimento Direto Estrangeiro (IDE) no contexto europeu. Para os 27 estados-membros da União Europeia (UE), investigamos o efeito da tributação sobre o rendimento corporativo no stock de influxos de IDE e de três fatores não-fiscais: estabilidade económica, qualidade da força de trabalho e tamanho de mercado.

Utilizando dados do Eurostat e da OCDE, a amostra consiste em 378 observações país-ano, considerando o período entre 2006 e 2019. Os modelos de regressão foram estimados pelo método dos Mínimos Quadrados Generalizado (EGLS) com efeitos temporais aleatórios.

Os resultados indicam uma relação negativa entre a tributação sobre o rendimento corporativo e o stock de influxos de IDE, da qual a EATR (taxa de imposto média efetiva) e a taxa de imposto estatutária aparentam ser significante. Para os fatores não-fiscais, tanto o PIB *per capita* como dívida pública exibem uma relação positiva e estatisticamente significativa com o IDE. Isto significa que países com maior tamanho de mercado e aqueles com maior estabilidade económica exibem maiores níveis de stock de influxos de IDE.

Pelo contrário, a qualidade da força de trabalho está negativamente relacionada com o stock de influxos de IDE, o que é oposto ao que estava previsto. A crise financeira tem um impacto negativo, mas não estatisticamente significativo.

Palavras-chave: Investimento Direto Estrangeiro (IDE), Tributação, Imposto sobre o Rendimento Corporativo, Carga Fiscal

CONTENTS

BIBLIOGRAPHY	4
ACKNOWLEDGEMENTS	5
ABSTRACT	6
RESUMO	7
CHAPTER 1 - INTRODUCTION	1
CHAPTER 2 - LITERATURE REVIEW AND RESEARCH HYPOTHESES	5
CHAPTER 3 - DATA AND METHODOLOGY	10
3.1. Sample	10
3.2. Variables	11
3.3. Methodology	12
CHAPTER 4 - RESULTS	15
4.1. Univariate results	15
4.2. Multivariate results	23
CHAPTER 5 - CONCLUSIONS	28
APPENDIX	30

LIST OF TABLES

Table 1 - Data source and characterization of variables used in regressions	11
Table 2 - Correlation matrix.....	12
Table 3 - Sign of coefficients considered in the previous equations.....	14
Table 4 - Descriptive statistics of the variables	16
Table 5 - Total population and GDP (all in thousands) in Portugal, Ireland and Czech Republic in 2006 and 2019	17
Table 6 - Panel data estimation considering only EATR as a tax variable.....	23
Table 7 - Panel data estimation considering only statutory tax rate as a tax variable.....	25
Table 8 - Comparison of the sign of the coefficients between what was predicted initially and the estimation results	26
Table 9 - Confirmation of research hypotheses	27

LIST OF FIGURES

Figure 1 - FDI inflows stock as percentage of GDP in Portugal, Ireland and Czech Republic and EU-27, 2006-2019.....	18
Figure 2 - Effective Average Tax Rate for corporations in EU-27, Portugal, Ireland, and Czech Republic, 2006-2019	Erro! Marcador não definido.
Figure 3 - Statutory tax rate for corporations in Portugal, Czech Republic, Ireland, and EU-27, 2006-2019.....	20
Figure 4 - Public debt as percentage of GDP in EU-27, Portugal, Ireland, and Czech Republic, 2006-2019	21
Figure 5 – Percentage of secondary school attainment of 25-64 years old population in Portugal, Ireland, Czech Republic, and EU-27, 2006-2019..	Erro! Marcador não definido.
Figure 6 - GDP <i>per capita</i> in Euros in EU-27, Ireland, Czech Republic, and Portugal, 2006-2019.....	22
Figure 7 - GDP growth rate (%) in EU-27, 2006-2019.....	30

CHAPTER 1 – INTRODUCTION

The aim of this dissertation is to study the effect of corporate income taxation on Foreign Direct Investment (FDI) in the European context, by considering the 27 European Union (EU) member states for the period between 2006 and 2019. We evaluate the effect of these taxes on FDI attraction and the effect of three non-tax factors, being them: economic stability (given by public debt), market size (through GDP *per capita*) and labour force quality.

According to the Organization for Economic Cooperation and Development (OECD), FDI is “a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor” (OECD, 2008). The main goal is to establish a long-term relationship with a high degree of influence in the direct investment¹ and it can be accomplished in several ways².

Studying this topic is important especially for policymakers because “many countries see attracting foreign direct (investment) as an important element in their strategy for economic development” (Cheng & Kwan, 2000) since FDI is regarded as a mean of getting new technology, knowledge and many other spillovers. Moreover, both domestic saving and investment levels are not always sufficient in the economies. So, the only mechanism policymakers can take is designing measures whose aim is attracting foreign capital³.

That is why Billington (1999) considers that “the role of multinational enterprises (MNEs) in the global economy is becoming increasingly important”. More precisely, this type of investment made by multinational enterprises has many positive contributions for the economies, emphasizing the technological progress and the diffusion of knowledge, contributing by consequence for the economic growth⁴. The mechanism behind this

¹ The ownership needs to be greater than or equal to 10% of the voting power in an enterprise company (OECD, 2008).

² According to Hartman (1985), the most explicit forms of FDI are through “transfers of funds abroad by a parent firm, either as loans to or equity investments in subsidiaries”. In detail, De Mooij & Ederveen (2003) characterize FDI in two categories: “(i) direct net transfers from the parent company to a foreign affiliate, either through equity or debt, and (ii) reinvested earnings by a foreign affiliate”. They also describe the four main components of FDI: investment in equipment, mergers, and acquisitions (more precisely, the financial flows associated to this operations), joint ventures and investment in financial capital and equity increases.

³ According to the OECD (2008), whenever investments are made from foreign companies, additional capital is injected into the economy, having by consequence an impact on its economic performance.

⁴ For Borensztein *et al.* (1998), “FDI is an important vehicle for the transfer of technology”. It is even more important than domestic investment because the investment made by multinational corporations is a major channel for the access to advanced technologies, contributing for the increasing of the technological level of the countries.

premise is that “FDI is a composite bundle of capital, know-how and technology” (Balasubramanyam et al., 1999)⁵. For that reason, it promotes technology transfers and skill diffusion, being these two relevant elements for promoting productivity.

The gains from this type of investment spill more than multinational firms: domestic firms benefit from FDI as well through the diffusion of technology, knowledge, or even high-skilled workers, contributing for more productive domestic companies⁶. Knowledge brought by multinationals will spread over to domestic firms and increase their productivity⁷, benefiting the growth of the economies in general. For instance, it has been demonstrated a positive relation between FDI and economic growth, as Iamsiraroj (2016) demonstrated for 124 cross-country data.

That is the reason why national policies tend to focus on attracting FDI. For instance, it is necessary to know what determinates an attractive jurisdiction.

The most referred determinant in the literature is taxation⁸, especially corporate income taxation because it is the type of taxes that directly affects organizations no matter their origin. The real fact is that tax policy is one of the most used mechanisms by governments to create a favourable and attractive environment for investment.

When the question is taxation, there is no unanimity about which measure represents better corporate tax burden: Effective Average Tax Rate (EATR) or statutory tax rate. The truth is there is a wide discussion about this topic for many years and there is no common answer so far.

Beyond taxation, in recent times it has been appearing a considerable number of authors demonstrating that taxation is not the most important factor. It has been referring non-tax factors with greater power of influence on FDI attraction. GDP is the most common case and the study of Hunady & Orviska (2014) demonstrated that GDP *per capita* has a significant impact on FDI attraction, being this a more important element than taxation for this type of investment.

⁵ “There are some more fundamental reasons that support the attractiveness of FDI, such as advanced technology, skills, research and development (R&D) and know-how to host countries. These intangible assets would be useful for host countries to stimulate productivity and economic growth” (Iamsiraroj, 2016)

⁶ According to Javorcik (2004), domestic firms become more productive since they gain access to new, improved, or less costly intermediate inputs produced by multinationals.

⁷ For Keller (2009) firms that engage in FDI tend to be more productive than the ones operating only in domestic markets because of the possibility of interacting with foreign firms.

⁸ Since the 1980's, many authors have analysed how FDI is influenced by corporate taxes.

In the study of Hunady & Orviska (2014), it was analysed the key determinants of FDI for the 26 EU member states (Estonia were excluded) for the period 2004-2011, with the main focus on the impact of taxation (more precisely, statutory and effective tax rates). The authors consider as well non-tax factors such as labour and firing costs, GDP *per capita* and public debt.

With panel data they used OLS regressions with fixed effects and concluded that all non-tax factors they added were more significant for FDI than taxes. They found a significant relation of cost of labour, GDP *per capita* and public debt on FDI, being all these more significant than tax rates on FDI attraction.

Taking as a benchmark the methodology adopted in this study, this dissertation will analyse two indicators of corporate income taxation that are more referred in the literature to explain FDI attraction (*i.e.*, EATR and statutory tax rate). Moreover, it will be used as non-tax factors GDP *per capita* and public debt as Hunady & Orviska (2014) did. However, it will be considered the quality of labour force instead of labour costs given the European context. We must have in mind that, in general, EU labour force is highly educated, so the quality of labour force appears as a good measure to include in this study by reflecting better the reality of the European labour force.

Given the short time period considered by Hunady & Orviska (2014), this investigation will consider a larger period of time and will cover the most recent years, which is something that the referred study had not done. It is important to emphasize since the 2010's FDI inflows have been increasing all over the world in general and in the EU context this was highly noted through the years of this decade. We also emphasize that during this period occurred the financial crisis of 2008 and that event influenced the behaviour of FDI inflows stock in the European Union, so we will take it into account as well in the analysis.

This dissertation is as an attempt to clarify all the big questions within academic environment about the effect of corporate taxation by investigating if corporate income taxation is, in fact, the most influenceable variable for FDI attraction or if there is another factor that can be even more important than taxes. By clarifying what are the main determinants that FDI potential investors consider when choosing the destination of their capital, policymakers can design more efficient measures. By consequence, they achieve greater results for their economies and probably without spending so many resources.

As this dissertation uses the same methodology as Hunady & Orviska (2014) we expect almost the same results for corporate income taxation, market size and economic stability. As labour is measured by school attainment and not by costs, it will be expected a positive relation between quality of labour force and FDI inflows, as it will be seen in the next section.

This dissertation is organized as follows: in this introduction, the main goal is to give a clarification of all the steps adopted in this study and then, in chapter 2, we made a literature review, in which we present the determinants that will be considered, including the importance of taxation and other non-tax factors. That includes the presentation of what previous studies had concluded. Chapters 3 and 4 explain all the methodology and database, including the descriptive statistics and the main results, respectively. Finally, in chapter 5 we present the main conclusions of this dissertation.

In the next chapter, we will make a brief literature review and the investigation hypothesis will be presented as well.

CHAPTER 2 – LITERATURE REVIEW AND RESEARCH HYPOTHESES

This chapter reviews the prior literature related to the two dimensions affecting FDI (corporate income taxation and the three non-tax factors considered in this study) and defines the investigation hypotheses.

Studying FDI provides important insights for the development of the economies, especially for designing policies regarding foreign investment. According to Hunady & Orviska (2014) “foreign direct investment (FDI) is generally perceived as one of the factors accelerating economic growth”. It is widely accepted that FDI is an important channel for accessing new technologies⁹, knowledge, capital and many other relevant elements¹⁰. Mencinger (2003) considers that FDI encourages economic growth since it is a good substitute for domestic savings and investment, and it promotes a productivity increase in domestic firms.

For instance, governments tend to focus a prominent part of their policies into attracting foreign capital because they hope that all of these spillovers brought by multinationals will spread over domestic firms, and by consequence, domestic organizations become more productive, contributing positively to economic growth. Javorcik (2004) states that the increase in domestic firms’ productivity happens because firms get access to less costly products or even new or improved production techniques.

For this reason, governments implement different policies in order to create a favourable and attractive environment for investment with the main goal of benefiting from all these positive externalities provided by these investments. So, it is essential to know what are the factors that attract FDI for a certain territory.

In the literature, we can encounter many external factors affecting FDI decisions. One of the most mentioned factors is taxation, especially corporate income taxation. The first studies about taxation impact date back to the 1980’s, when FDI inflows in the United States were analysed in order to estimate the effect of different forms of taxation in firms’ investment decisions. Hartman (1985) was one of the first authors demonstrating if

⁹ In the neoclassical model of Solow (1957), each factor (capital and labour) shows diminishing returns to scale and this discourages both domestic savings and investment (since in this model savings equals investment). So, economic growth can only happen through the increasing of labour force or technological progress and this last element is obtained with FDI.

¹⁰ For Cheng & Kwan (2000), FDI is “an amalgamation of capital, technology, marketing, and management.”.

investment decisions of new companies are influenced by tax rates and he also found that the effect of taxes is distortionary.

As the main goal of investments is generating the highest returns possible, corporate income taxation is a distortionary element. That is because it interferes with risk taking in FDI decisions, so taxes reduce profits, and therefore reduces the returns of an investment. By consequence, taxation can be a deterrent of FDI, so that is why it is generally accepted the existence of a negative relation between corporate income taxation and FDI inflows¹¹. In the famous Ruding Report¹², it is stated corporate taxes having a negative impact on the inflows of foreign investment and that effect is quite significant. De Mooij & Ederveen (2003) verified empirically that a 1 p.p. reduction in tax rates can increase FDI by 3%. The same negative relation was demonstrated by Wijeweera *et al.* (2007), but with a slightly lower impact. For instance, it is expected the same relation in this study, so the first hypothesis is presented below:

H1: Corporate income taxation is inversely related with FDI inflows stock.

Despite this consensus about a negative relation between corporate income taxation and FDI inflows, there is a large discussion about which proxy representing corporate income tax rate has the strongest effect on foreign investment. EATR and statutory tax rate are referred more often because they are widely recognized as the best proxies to represent corporate tax burden.

We can define statutory tax rate as the tax rate in which taxpayers are obliged to pay by Law¹³. This indicator is usually defined relative to a tax base, as Schaffer & Turley (1999) highlight in their study about the differences between EATR and statutory tax rate. When EATR is compared with statutory tax rate, authors refer that EATR has the advantage that “cash flows associated with specific new investment projects can be isolated” (Devereux & Griffith, 2003)¹⁴, so it is considered a better representative measure for corporate tax

¹¹ Desai *et al.* (2005) highlight the existence of a negative relation between taxes and FDI.

¹² In this report, Ruding (1992) evaluates the importance of taxation for business decisions in the CEC (Commission of the European Communities) member states (currently named as EU) with respect to the location of investment and the international allocation of profits between organizations. The main goal was determining if taxation differences across member states would lead to internal market distortions.

¹³ According to Schaffer & Turley (1999) definition.

¹⁴ The basic approach for EMTR is to “construct a forward-looking hypothetical marginal investment project, for which the impact of tax on the cost of capital can be computed” (Devereux & Griffith, 2003). According to Devereux & Griffith (2003), if we consider cash flow corporation tax (used only on economic rents), in marginal investments EMTR is zero because this type of investments are not taxed. However, this measure cannot capture how taxes can affect location decisions where an investment is expected to generate economic rent. On the other hand, EATR has the power to capture this effect, so it is highlighted as being a more complete measure.

burden. Buettner & Ruf (2007) found that statutory tax rate has a stronger predictive power when compared with EATR for a panel of German multinationals. On the other hand, Devereux & Griffith (2003) concluded that EATR is the most important determinant for FDI inflows. The same conclusion was reached by De Mooij & Ederveen (2003) by finding that FDI seems to be more responsive to effective or average tax rates than to statutory tax rates. Hunady & Orviska (2014) considered both tax rates in their analysis to the European Union member states and they found EATR seemed to have the highest predictive power on FDI inflows.

Apart from this, there is no consensus regarding what FDI determinants are the most important. If some studies highlight taxation as the most important factor influencing foreign investment decisions, others demonstrate that there are many other determinants beyond taxes with higher degree of influence on FDI attraction. Wijeweera *et al.* (2007) found that “non-tax determinants, including market size, labour costs, bilateral trade and exchange rates, consistently exert a statistically significant impact on FDI inflows”. In addition, Billington (1999) found that GDP, unemployment or even interest rates have a beneficial effect on FDI, *i.e.*, a positive relation with FDI inflows, which is precisely a contrary effect compared with taxation.

Hunady & Orviska (2014), the study taken as a benchmark in this dissertation, found a significant impact of five elements on FDI in the EU: labour costs, GDP *per capita*, public debt, firing costs and openness of the economy. It is highlighted the fact of these factors can be at least as equally important as taxes, but national governments often forget them when designing FDI attraction policies. They also found in this study that labour costs have a negative relation with FDI inflows, as well as firing costs and public debt. The other referred determinants exhibit a positive relation. These conclusions are quite similar to what Wijeweera *et al.* (2007) and Billington (1999) had demonstrated previously.

The quality of labour force is given by the qualifications labour force¹⁵ available in the economy. This is considered an important element to stimulate economic growth. We will measure the quality of the labour force by the secondary school attainment, which is given by the percentage of population who concluded at least the secondary school level (ISCED

¹⁵ “Human capital includes the general skills of workers, but it also includes their knowledge of firm-specific technology, managerial skills specific to the organization, and efficient communication skills with co-workers” (Kim & Park, 2013)

2011 level 3¹⁶). The reason behind the importance of this variable is demonstrated by Borensztein *et al.* (1998), who stated that FDI and human capital are complementary, meaning that “the contribution of FDI to economic growth is enhanced by its interaction with the level of human capital in the host country”. Moreover, the magnitude of the positive effect that FDI has on economic growth depends on the stock of human capital available in the host economy.

Kim & Park (2013) complement this finding by demonstrating that FDI is attracted by a high-educated labour force, meaning a positive relation between the quality of labour force and FDI. They highlight that, when secondary school attainment increases, unskilled workers tend to become more efficient because of the knowledge diffusion, so the production level of firms increases. Noorbakhsh *et al.* (2001) state that more qualified workers can more easily learn new technologies and production techniques, and then transmit this knowledge to domestic firms if they change from foreign companies to domestic enterprises. By consequence, more efficient firms lead to economic growth and that is potentiated by foreign investment.

For instance, the third hypothesis is about the impact of the quality of labour force for FDI:

H2: Countries with higher labour force quality exhibit higher levels of FDI.

When the question is about public debt effect, this measure is considered by many authors as a good indicator representing economic stability of a country. Leitão & Faustino (2010) concluded that one of the strongest effects on FDI in Portugal was precisely economic stability. The positive relation between these two elements was demonstrated by Hunady & Orviska (2014) as well. According to Salotti & Trecroci (2016), the reason is that higher levels of public debt mean more instability in fiscal policies and this fact influences investors negatively in FDI decisions. In stable economies it is likely to observe a stable tax system since governments do not have the need to reform the tax system to achieve more tax revenue. So, as third hypothesis, it is expected a negative relation between public debt and FDI inflows stock, which means that the more stable is the country, the higher FDI inflows will be:

¹⁶ According to UNESCO definition, ISCED 2011 level 3 are “programmes at the upper secondary education level are more specialised than those at lower secondary education”. For international purposes, the used term for this level is upper secondary education.

H3: Countries with higher economic stability (*i.e.*, lower public debt) exhibit higher levels of FDI.

Lastly, when evaluating market size effect, GDP *per capita* appears as a good proxy to represent this dimension. According to Bénassy-Quéré *et al.* (2007) “GDP *per capita* covers attractive features such as consumers’ purchasing power, labour productivity or institutions”. It is also referred that when GDP *per capita* is high, real wages of domestic consumers tend to be higher, meaning a higher purchase power as well. For that reason, we expect a positive relation between these two elements, as Chakraborty & Basu (2002) found by investigating a possible cointegration between FDI and economic growth in India. Regarding the evaluation of market size effect on FDI, it is presented the fourth hypothesis, which predicts this positive relation:

H4: Countries with larger market size (*i.e.*, higher GDP *per capita*) exhibit higher levels of FDI.

Beyond representing market potential (or purchase power), that positive relation with Foreign Direct Investment is always statistically significant. In the study of Edwards (1990) it was found the existence of a tendency for MNEs (Multinational Enterprises) choosing countries with larger market size to host their investments. Furthermore, evaluating this dimension is crucial because entry in a country different from the origin “will be more profitable in countries with large local markets” (Fajgelbaum *et al.*, 2015), meaning higher market potential in countries with higher levels of GDP *per capita*.

CHAPTER 3 – DATA AND METHODOLOGY

3.1. Sample

The data used in this dissertation is about the 27 EU-member states, in which United Kingdom was excluded because of the “Brexit”¹⁷ as this event influenced all macro and microeconomic indicators for this country in recent years, so it could skew the results in this study and, for this reason, it was eliminated from the sample.

Time period goes from 2006 to 2019 and the main goal is to demonstrate how FDI decisions were influenced in the recent decades, with a special focus on corporate income taxation effect. The choice of this period is related with the databases because we only have complete data for all variables starting only in 2006. For that reason, the sample consists of 378 country-year observations. Regarding the financial crisis of 2008, we defined the period of crisis considering the years with the lowest values of GDP growth rate in the European Union (see Appendix). As the most relevant decreases of that indicator occurred between 2008 and 2012, we can say that the crisis occurred during these years. As a result, the control variable for the crisis will be a dummy in which it considers this period.

Although this sample contains countries whose EU accession occurred after 2006¹⁸, that will not affect the results in this study because all these countries had to face the EU-accession process in which they needed to implement complex reforms in their economies¹⁹ and that happened in the years before the accession. Furthermore, it is important to analyse EU as a whole because it provides a better photography about how FDI inflows stock is influenced in the European context.

In order to analyse the effect of corporate income taxation and the three non-tax determinants, we used panel data, in which “individuals are observed at several points in time” (Schmidheiny, 2012). That means the existence of two dimensions in the variables: cross sectional and time-series. The first one is constituted by all the 27 EU member states, and the time-series component is about the study of the annual observations of each country between 2006 and 2019.

¹⁷ “Brexit” is the name given to the United Kingdom’s departure from the European Union. This event occurred officially at the end of 2020, after a referendum in 2016 in UK in which was approved this departure from the EU.

¹⁸ For example, Croatia joined EU in 2013. Bulgaria and Romania became EU member states in 2007.

¹⁹ All the new EU member states had to “implement complex reforms in many areas such as the rule of law, the economy, the fight against corruption and organised crime” (European Commission, 2020).

Panel data have many advantages when compared with cross-sectional or time-series data:

- (i) This type of data usually has more degrees of freedom and more sample variety and that contributes for more efficient econometric estimates²⁰;
- (ii) It captures better the complexity of human behaviour, which provides the construction and testing more complex hypotheses;
- (iii) Provides a better control of omitted variables as panel data contains information about intertemporal and individuality of individuals/entities;
- (iv) It provides lower collinearity across variables; and
- (v) It simplifies statistical inference because computation of this data is simpler than cross-sectional or time-series data (it is possible to analyse nonstationary time series, for example).

3.2. Variables

The dependent variable is FDI inflows stock as percentage of GDP. Beyond this, we used two explanatory variables related with corporate income taxation and other three for the non-tax determinants. We also have a dummy variable related to the period of the financial crisis of 2008. All of them are summarized and characterized in the following table:

Table 1 - Data source and characterization of variables used in regressions

Variable	Characteristic	Database source
Foreign Direct Investment (FDI)	FDI inflows as percentage of GDP	Eurostat
Effective Average Tax Rate (EATR)	Effective average tax rate (for corporations) – using Devereux & Griffith methodology	OECD
Statutory Tax Rate (Statutory)	Statutory tax rate for corporations	Eurostat
Labour Force Quality (School)	Percentage of population (between 25 and 64 years old) in a country who concluded at least the secondary school (ISCED 2011 level 3)	Eurostat
GDP <i>per capita</i> (GDP_ <i>per capita</i>)	GDP <i>per capita</i> in EUR adjusted by price purchasing party	Eurostat

²⁰ This is something highlighted by Hsiao (2007) in his study about panel data characteristics.

Public debt (Public_Debt)	Public debt as percentage of GDP	Eurostat
Financial crisis of 2008 (Crisis)	Dummy variable (1 = years between 2008 and 2012; 0 = otherwise)	-----

3.3. Methodology

To test how FDI inflows stock is influenced by all the determinants referred previously, two empirical models are used. These two models only differ by the variable related with corporate income taxation: the first model has EATR, and the statutory tax rate is considered in the second model.

We verified if multicollinearity was present in the explanatory variables, meaning that two variables should not be highly related with each other. When multicollinearity is present, we must eliminate one of them from the model to avoid this problem. Regarding the correlation matrix presented below, we observe the existence of this problem.

Table 2 - Correlation matrix

	EATR	STATUTORY	PUBLIC_DEBT	SCHOOL	GDP_PERCAPITA	CRISIS
EATR	1.000000	0.941764	0.406852	-0.536113	0.380623	0.002799
STATUTORY	0.941764	1.000000	0.387229	-0.522984	0.362823	0.011749
PUBLIC_DEBT	0.406852	0.387229	1.000000	-0.426862	-0.012610	-0.060093
SCHOOL	-0.536113	-0.522984	-0.426862	1.000000	-0.054593	-0.097975
GDP_PERCAPITA	0.380623	0.362823	-0.012610	-0.054593	1.000000	-0.041476
CRISIS	0.002799	0.011749	-0.060093	-0.097975	-0.041476	1.000000

Given the similarity of EATR and statutory tax rate, these two variables are highly correlated as they have a value of correlation of 0,94. As Hunady & Orviska (2014) did, we will estimate the models including only one these two variables at time to avoid multicollinearity problems and we predict that the estimations will get better results using this methodology.

All the variables related to non-tax factors and the dummy variable related to the crisis are considered in both models, so the models are quite similar. Therefore, they have the following forms:

$$(1) FDI_{it} = \beta_0 + \beta_1 EATR_{it} + \beta_2 public_debt_{it} + \beta_3 school_{it} + \beta_4 GDP_percapita_{it} + \beta_5 crisis_{it} + \mu_{it} \quad (i = 1, 2, \dots, n; t = 1, 2, \dots, 14)$$

$$(2) FDI_{it} = \beta_0 + \beta_1 statutory_{it} + \beta_2 public_debt_{it} + \beta_3 school_{it} + \beta_4 GDP_percapita_{it} + \beta_5 crisis_{it} + \mu_{it} \quad (i = 1, 2, \dots, n; t = 1, 2, \dots, 14)$$

In which:

- i represents the countries individually and t the year;
- FDI is FDI inflows stock as percentage of GDP;
- $EATR$ is the Effective Average Tax Rate applied to corporations;
- $Statutory$ is the Statutory Tax Rate applied to corporations;
- $Public_debt$ is the total of public debt of the country as percentage of GDP;
- $School$ is the percentage of population (between 25 and 64 years old) with at least the secondary school level concluded;
- $GDP_percapita$ is the Gross Domestic Product *per capita* in Euros;
- $Crisis$ is the control variable for the period of the financial crisis, and it is defined with 1 (for the years of 2008-2012 period) and 0 (for the years outside that period).

We estimate the models using the Estimated Generalized Least Squares (EGLS) with period random effects. Given the results of the Hausman test²¹, the using of random effects model is more suitable in this situation.

That is the same framework considered by Dornean *et al.* (2012)²² and Economou (2019). This last author studied the impact of FDI determinants alongside the impact of economic freedom on FDI inflows in four South European economies for the period 1997-2017, with a special focus on the financial crisis of 2008. To evaluate the effect of the crisis, he also used a dummy variable to distinguish the years of the financial crisis and examine the impact of this event for Greece, Portugal, Italy, and Spain.

Regarding this framework and considering all hypotheses presented previously, we expect the following signs for the coefficients considered in the previous equations:

²¹ The null hypothesis of the Hausman test (H_0) is that the random effects model is preferable. For model (1), the Chi-square statistic is 20,47 and it is 20,66 for model (2). Considering a 0,01-alpha level (and a Chi-Square distribution with 4 degrees of freedom), in both cases the null hypothesis cannot be rejected as the statistics are over 18,47. That means the using of random effects model is more appropriate in both cases.

²² In this study, the authors investigated the effect of the financial crisis of 2008 on FDI flows for Central and Eastern European countries (in which they are EU member states as well).

Table 3 - Sign of coefficients considered in the previous equations

Coefficient related with:	Signal
EATR	-
Statutory	-
Public_debt	-
School	+
GDP_percapita	+
Crisis	-

CHAPTER 4 – RESULTS

4.1. Univariate results

Starting with univariate results, table 2 shows the descriptive statistics in the entire sample of all variables referred in the previous section. Therefore, we observe that the mean of FDI inflows stock is about 420,1% of GDP. There is a relevant gap between the maximum and the minimum as they are, respectively, 9561,6% (registered in 2015 in Luxembourg) and 11,7% of GDP (registered in Greece in 2012). Furthermore, given the value of the median (about 61,7% of GDP), we can say that in this variable there is a high disparity of values, especially across countries. This is also proved by the standard deviation of 1241,57.

About corporate income taxation, both EATR and statutory tax rate present similar descriptive statistics: the value for standard deviations are quite small for both (6,6 and 7,7, respectively). On average, EATR is about 20,9% and statutory tax rate 23,1%, in which EATR oscillates between 8,8% and 38,4% and statutory taxation between 10% and 44,4%. The gap between the maximum and the minimum for these variables is also quite similar.

Focusing now on non-tax factors, we need to highlight GDP *per capita* because it is the variable with the highest standard deviation of this group of variables and that reflects the existing differences between economic dimension across countries. The values go from 4.500€ to 84.420€ (minimum and maximum values for this variable, respectively), so the average GDP *per capita* is 25.020,61€.

Public debt exhibits an average value of about 61,8% of GDP and it can be characterized as having a relevant disparity of values as well because the minimum value registered was 3,8% (in Estonia - 2007) and the maximum 181,2% (in Greece - 2012), although standard deviation is not as big as the other variables referred before.

Regarding the variable *School*, we refer that, on average, countries have 76,6% of the population who concluded at least the secondary school level. However, the values for these variables oscillate between 26,5% (registered in Malta in 2005) and 94,8% (registered in 2007 in Lithuania).

Lastly, for the period considered in this study, about 35,7% are concerning the years of the financial crisis (given the value of the mean for *Crisis*).

Table 4 - Descriptive statistics of the variables

Sample: 2006 2019

Common sample

	FDI	EATR	STATUTORY	PUBLIC_DEBT	SCHOOL	GDP_PERCAPITA	CRISIS
Mean	420.0963	20.86772	23.06794	61.79365	76.63386	25020.61	0.357143
Median	61.65000	19.60000	22.00000	55.10000	80.40000	20330.00	0.000000
Maximum	9561.600	38.40000	44.40000	181.2000	94.80000	84420.00	1.000000
Minimum	11.70000	8.800000	10.00000	3.800000	26.50000	4500.000	0.000000
Std. Dev.	1241.572	6.631743	7.353245	36.14991	14.55102	16355.21	0.479792
Skewness	5.125484	0.408559	0.119756	0.909238	-1.491291	1.454728	0.596285
Kurtosis	31.75513	2.502653	2.258548	3.816291	5.046172	5.678148	1.355556
Jarque-Bera	14678.06	14.41183	9.562101	62.57766	206.0513	246.2893	64.99111
Probability	0.000000	0.000742	0.008387	0.000000	0.000000	0.000000	0.000000
Sum	158796.4	7888.000	8719.683	23358.00	28967.60	9457790.	135.0000
Sum Sq. Dev.	5.81E+08	16580.47	20384.47	492669.5	79823.07	1.01E+11	86.78571
Observations	378	378	378	378	378	378	378

After analysing the descriptive statistics, it is relevant to analyse how was the evolution of the variables during the time considered in this study. For that reason, we consider in this analysis three similar countries in terms of population or GDP: Portugal, Czech Republic, and Ireland. When compared with Portugal, Czech Republic is a very similar country when it comes to dimension in terms of population and Gross Domestic Product. Ireland, on the other hand, had similar statistics at the beginning for GDP (in the first years after 2006), but over the years, its economy became bigger when compared with the other two countries, especially on GDP.

Table 5 - Total population and GDP (all in thousands) in Portugal, Ireland, and Czech Republic in 2006 and 2019

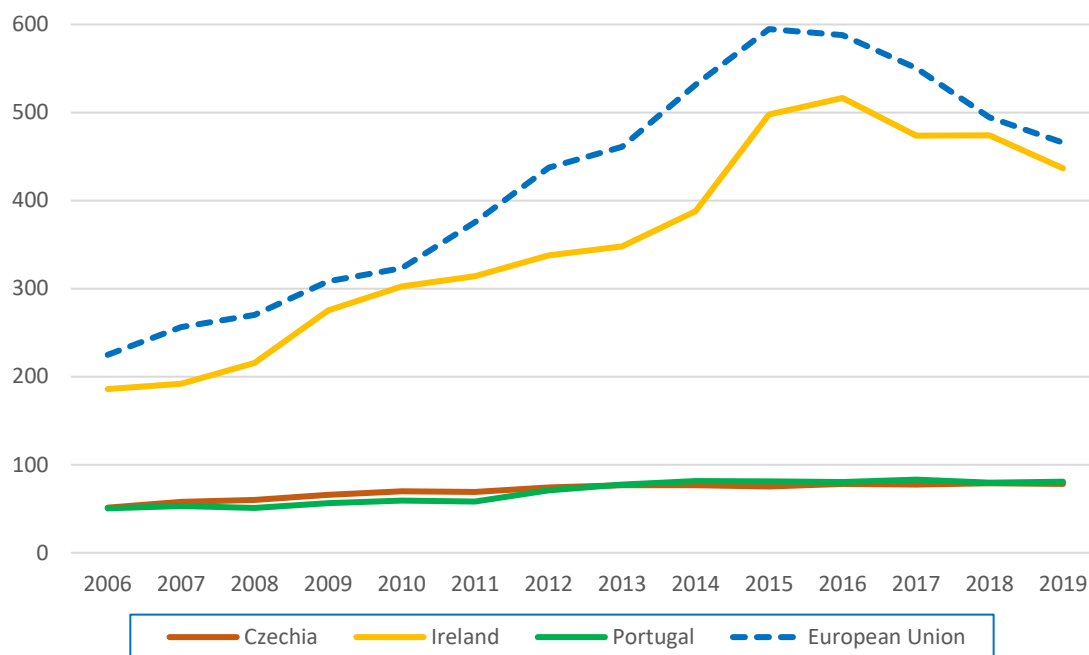
		Portugal	Czech Republic	Ireland
Population	2006	10,52	10,24	4,27
	2019	10,29	10,67	4,93
GDP (€)	2006	166,26	166,26	184,91
	2019	212,32	223,95	356,05

Source: Eurostat database, self-elaboration

Considering figure 1, we can say that since 2006 the average stock of FDI inflows has become increasingly important in the European Union if we consider this element as percentage of GDP. Considering the European Union average, until 2015 there is a strong and positive evolution of this indicator, followed by a slight decrease until 2019.

Ireland followed the same tendency as the European Union, and it is the country that is closer to the European average. This country registered the biggest increase as well, as its FDI inflows stock was 185,9% of GDP in 2006 and 436,7% of GDP in 2019. By contrast, Portugal and Czech Republic are quite similar about the evolution of this indicator: they both registered an increase of about 30 p.p. (in detail, 26,9 p.p. in Czech Republic and 30,2 p.p. in Portugal) and they were always very distant from the EU average.

Figure 1 - FDI inflows stock as percentage of GDP in Portugal, Ireland and Czech Republic and EU-27, 2006-2019



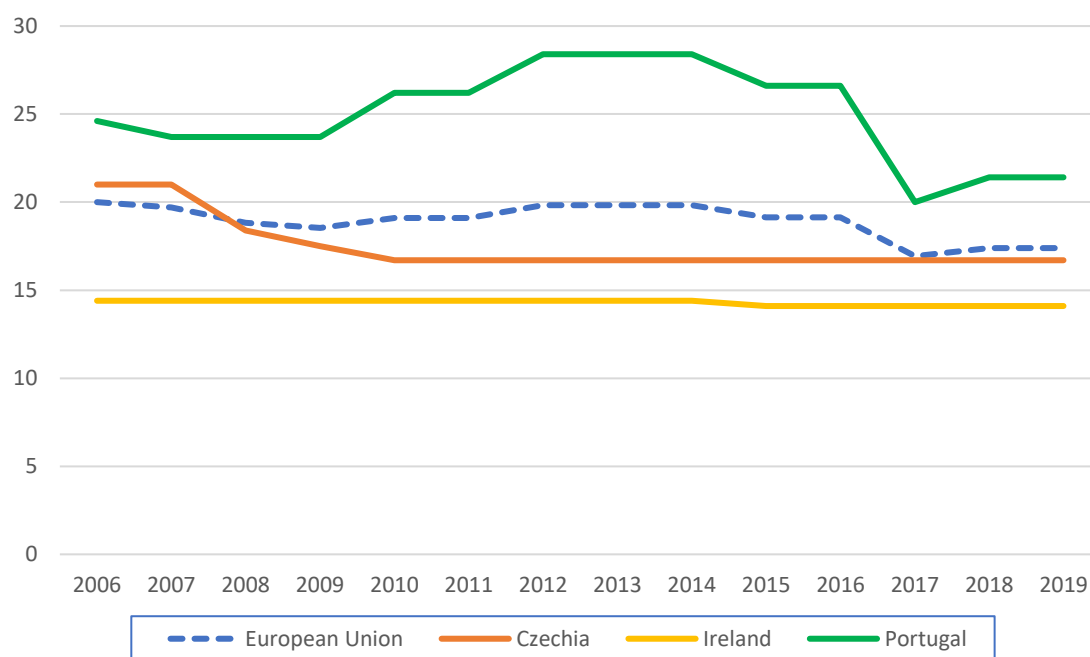
Source: Eurostat database, self-elaboration

The distribution of this variable is not normal given the data presented Table 3.

Considering the values about skewness and kurtosis, we conclude that FDI inflows stock distribution is not normal as it has, for example, a value of 5,1 for skewness (it is normal when it registers a value equal to zero). This fact is also confirmed if we consider the Jarque-Bera (JB) coefficients as the null hypothesis of the normal distribution is rejected given coefficient of $JB=14678$.

Considering Effective Average Tax Rate, we must emphasize the stability of this indicator in Ireland. That happened because this rate did not vary between 2006 and 2014 (it was always 14,4%) and it only decreased 3 p.p. in 2015, being maintained until 2019. On average, EATR in European Union was not as stable as Ireland, but there were not any big variations over the years. In the case of Czech Republic, there was a progressive decrease of EATR between 2006 and 2010 (from 21% to 16,7%) and since then it was stable until 2019.

Figure 2 - Effective Average Tax Rate for corporations in EU-27, Portugal, Ireland, and Czech Republic, 2006-2019



Source: OECD database and self-elaboration

By contrast, Portugal is the most unstable country. In general, we can say that every three years this rate changes, contributing for a very unstable tax system. In 2006, EATR was 24,5% and the biggest value was achieved between 2012 and 2014 (28,4%). There was significant decrease between 2016 and 2017, followed by a small increase.

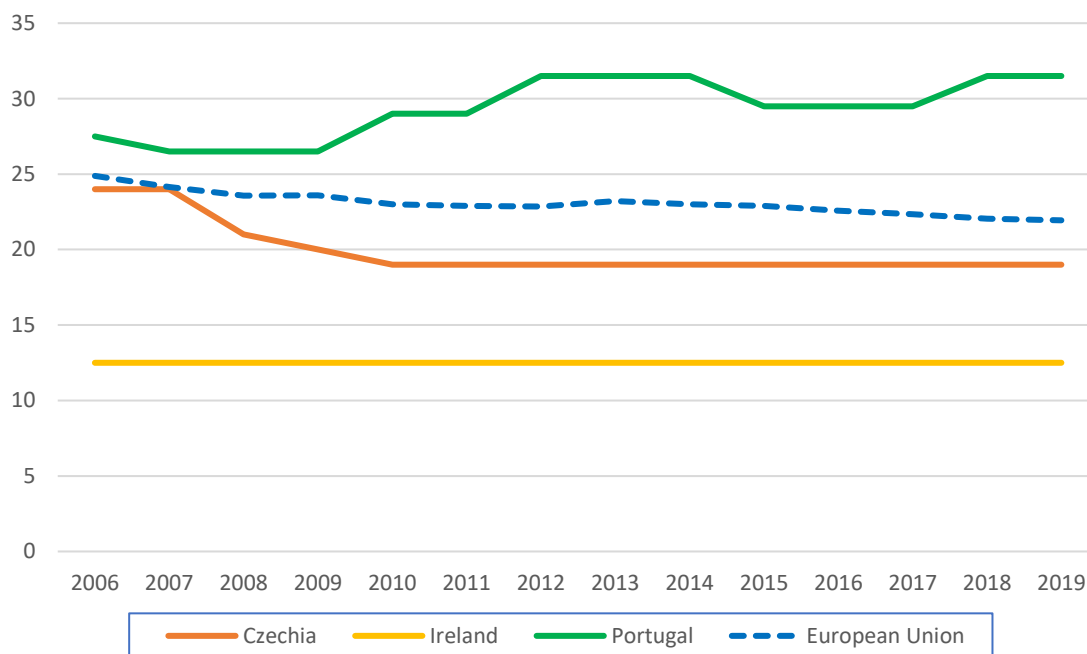
This is not a variable with normal distribution given the values presented on Table 2 ($JB=14,41183$). It has a kurtosis coefficient of 2,5 and the coefficient related to skewness is 0,4.

We can achieve the same conclusion about the non-existence of a normal distribution for statutory tax rate as the values presented on Table 2 are quite similar to EATR. It is also similar when the question is about its evolution over the years (considering Figure 3).

Ireland had always the same statutory tax rate of 12,5% between 2006 and 2019. Czech Republic, by contrast, decreased statutory tax rate from 24% (2006) to 19% (2010) and it never changed until 2019. Considering the European average, this tax rate had been continuously decreasing slightly.

Once again, the unstable tax system of Portugal is highlighted. Beyond being above the European average, statutory tax rate in this country has been increasing although that did not happen continuously.

Figure 3 - Statutory tax rate for corporations in Portugal, Czech Republic, Ireland, and EU-27, 2006-2019



Source: Eurostat database, self-elaboration

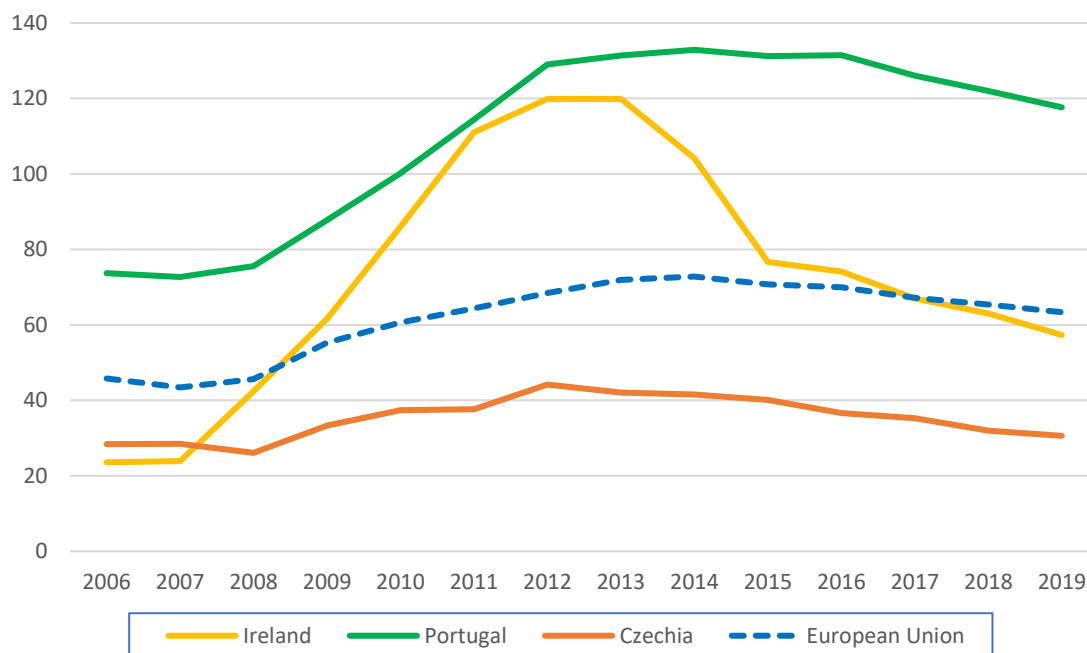
Focusing now on public debt (the graphic presented below), it is possible to observe that Czech Republic is the only country that was always below the average of the European Union and exhibited the lowest values compared with Portugal and Ireland since 2008.

In the specific case of Portugal, it is once again the country with the highest values (73,5% of GDP in 2006 and 117% of GDP in 2019), with a relevant increase of public debt between 2008 and 2012 (it covers the years that this country had IMF intervention).

However, the biggest increase in public debt was registered in Ireland, with a 96-p.p. increase between 2007 and 2013. In this indicator, this country is the one with the biggest oscillations. If we consider the 2006-2019 period, Ireland started as being the country with the lowest value of these three areas (2006), then in the subsequent years it significantly raised its public debt until 2013 and then it registered a significant decrease until 2019.

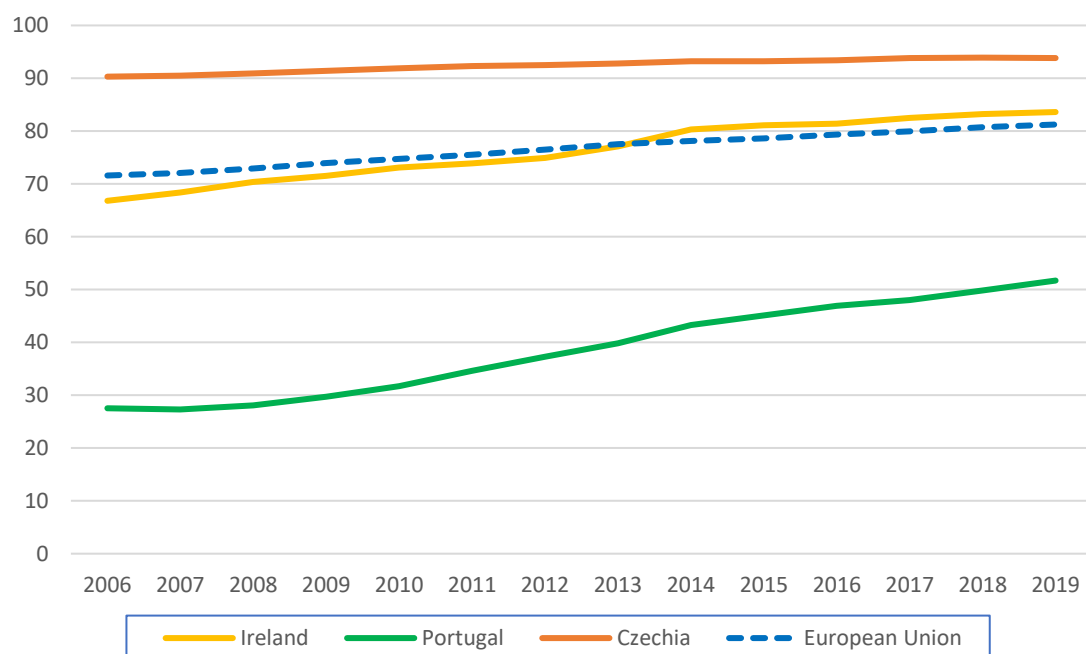
This variable does not have a normal distribution just like the other variables we have been analysing so far, as we can observe by Jarque-Bera test in Table 2.

Figure 4 - Public debt as percentage of GDP in EU-27, Portugal, Ireland, and Czech Republic, 2006-2019



Source: Eurostat database, self-elaboration

Figure 5 - Percentage of secondary school attainment of 25-64 years old population in Portugal, Ireland, Czech Republic, and EU-27, 2006-2019



Source: Eurostat database, self-elaboration

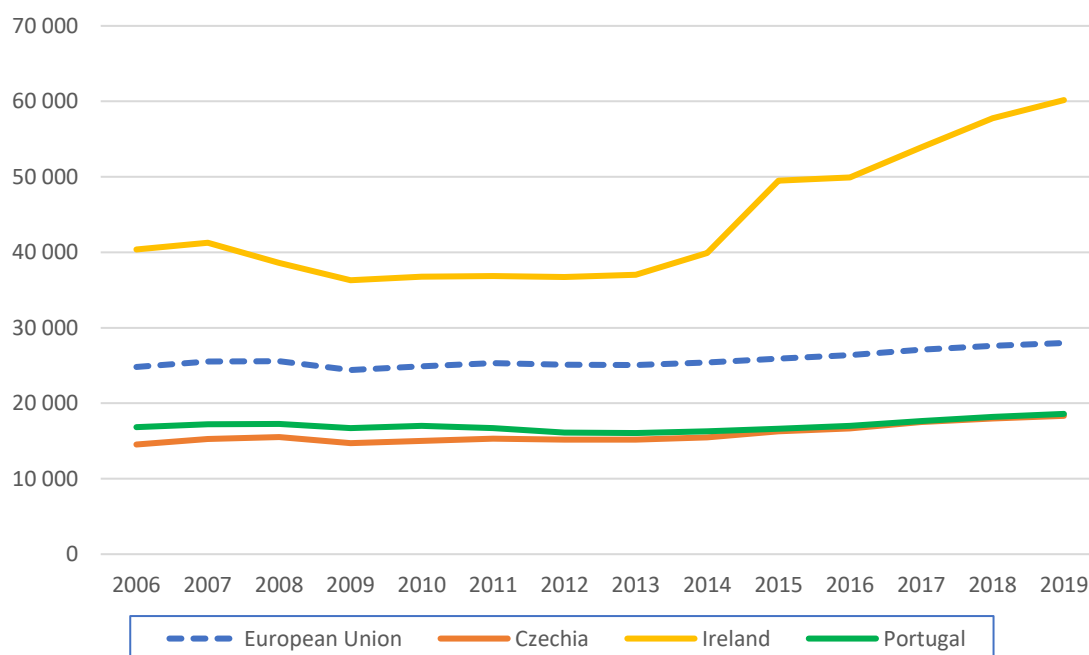
Considering the quality of labour force, all the three countries exhibit a positive tendency in this indicator. That means that the labour force available in the countries has becoming more qualified, as we can see through the graphic presented previously.

Between 2006 and 2019, Ireland followed very closely the average of the European Union, and Czech Republic was always above this average. However, the difference between this country and the EU average had become smaller over time.

Portugal, by contrast, is below the European average, although it had been decreasing this difference. In 2006, only 19,2% of the Portuguese population concluded at least the secondary school and this value raised to 51,7% in 2019, which means that in 13 years this country more than doubled the most-qualified population.

Considering once again the descriptive statistics table, the values presented for JB test in labour force quality ($JB = 206,0513$) prove that the null hypothesis of normal distribution is rejected.

Figure 6 - GDP *per capita* in Euros in EU-27, Ireland, Czech Republic, and Portugal, 2006-2019



Source: Eurostat database, self-elaboration

For GDP *per capita*, this variable does not follow normal distribution given the values presented on Table 2, just as the other variables referred before. When analysing the evolution of this variable between 2006 and 2019, all the three countries increased their GDP *per capita* over time, but in different dimensions. Portugal and Czech Republic were

always below the European average and the behaviour of this variable in both countries is very similar. Ireland, on the other hand, always exhibited values above the average of the EU, despite some ups and downs over time. In thirteen years, Ireland increased its GDP *per capita* from 40.390€ (2006) to 60.170€ (2019).

4.2. Multivariate results

The results presented on Table 6 (whose model only considers EATR as tax variable) give the information that the selected variables have an explanatory capacity of about 42,6% of the total variability of the dependent variable (which is FDI inflows stock as percentage of GDP).

Table 6 - Panel data estimation considering only EATR as a tax variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2187.205	358.6110	6.099103	0.0000
EATR	-36.39988	8.741723	-4.163925	0.0000
PUBLIC_DEBT	-6.869016	1.619174	-4.242297	0.0000
SCHOOL	-22.92594	3.562442	-6.435457	0.0000
GDP_PERCAPITA	0.049035	0.008365	5.861941	0.0000
CRISIS	-148.5254	87.22586	-1.702768	0.0894
Effects Specification				
			S.D.	Rho
Period random			0.000000	0.0000
Idiosyncratic random			936.2314	1.0000
Weighted Statistics				
R-squared	0.425615	Mean dependent var	420.0963	
Adjusted R-squared	0.417895	S.D. dependent var	1241.572	
S.E. of regression	947.2679	Sum squared resid	3.34E+08	
F-statistic	55.12985	Durbin-Watson stat	0.053593	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.425615	Mean dependent var	420.0963	
Sum squared resid	3.34E+08	Durbin-Watson stat	0.053593	

The Probability related to the F-statistic also proves that this proposed model can be accepted. Furthermore, based on the estimation results presented below, the estimated equation will be as follows:

$$\widehat{FDI} = 2187,21 - 36,40 EATR - 6,87 public_debt - 22,93 school + 0,05GDP_percapita - 148,53 crisis$$

Relatively to the impact of EATR on FDI inflows stock, this model suggests a negative and significant coefficient for any significance level ($\beta_1 = -36,40, p\ value = 0$). That means when EATR increases by 1 p.p., FDI inflows stock decreases about 36,4 p.p.

Consequently, there is a negative relation between EATR and FDI inflows stock as percentage of GDP, which is in line with H1.

We find that the coefficient for *Public_debt* is negative and significantly associated with FDI inflows stock ($\beta_2 = -6,87, p\ value = 0$). This result supports H3, in which predicted a negative relation between public debt and FDI inflows stock. By consequence, this analysis evidences that countries with higher economic stability (*i.e.*, lower public debt) exhibit higher levels of FDI. That is consistent with the results obtained by Hunady & Orviska (2014) and Salotti & Trecroci (2016).

It is also possible to observe that the quality of labour force is negatively related with FDI inflows stock. The sign of the coefficient is contrary to what was predictable in H2. For instance, H2 is not confirmed, which means that countries with higher labour force quality exhibit lower levels of FDI. The reason behind this can be related with the cost of labour, in which it tends to be higher when the labour force is more qualified.

The coefficient for the *GDP_per capita* (whose variable is representing market size) is positive and statistically significant ($\beta_4 = 0,05, p\ value = 0$). That means when there is an increase of *GDP per capita*, FDI inflows stock registers an increase as well.

Regarding the effect of the financial crisis, the coefficient related to this variable is negative, meaning that during the years of the crisis, FDI inflows stock decreased. However, the coefficient is only statistically significant for a 10% significance level, for example. The effect of the crisis is in line to what was expected, but it is not as significant as it was predictable.

Table 7 - Panel data estimation considering only statutory tax rate as a tax variable

Dependent Variable: FDI
Method: Panel EGLS (Period random effects)
Sample: 2006 2019
Periods included: 14
Cross-sections included: 27
Total panel (balanced) observations: 378
White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1900.336	361.0114	5.263921	0.0000
STATUTORY	-23.92180	8.245862	-2.901067	0.0039
PUBLIC_DEBT	-7.372346	1.690691	-4.360552	0.0000
SCHOOL	-20.97476	3.453967	-6.072658	0.0000
GDP_PERCAPITA	0.047405	0.008185	5.791771	0.0000
CRISIS	-144.4115	87.73277	-1.646039	0.1006

Effects Specification		S.D.	Rho
Period random		0.000000	0.0000
Idiosyncratic random		943.1810	1.0000

Weighted Statistics			
R-squared	0.416616	Mean dependent var	420.0963
Adjusted R-squared	0.408775	S.D. dependent var	1241.572
S.E. of regression	954.6595	Sum squared resid	3.39E+08
F-statistic	53.13179	Durbin-Watson stat	0.050985
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.416616	Mean dependent var	420.0963
Sum squared resid	3.39E+08	Durbin-Watson stat	0.050985

Considering now the statutory tax rate instead of EATR, the results of that model are presented in Table 7. This model has a little less explanatory capacity than the previous one. This was predictable as Hunady & Orviska (2014) and Devereux & Griffith (2003), achieved the same results in their studies.

Given the values of all coefficients, the estimated equation will be:

$$\widehat{FDI} = 1900,34 - 23,92 \text{ statutory} - 7,37 \text{ public_debt} - 20,97 \text{ school} \\ + 0,05 \text{ GDP_percapita} - 144,41 \text{ crisis}$$

The coefficient for the statutory tax rate is negative and statistically significant for FDI inflows stock, which is in line to hypothesis expectations. This result indicates that, as in

the previous case, corporate income taxation is inversely related with FDI inflows stock. That means H1 is confirmed.

As expected, regression coefficients for public debt evidences a negative and statistically significant relation with FDI inflows stock ($\beta_2 = -7,37, p \text{ value} = 0$). The results suggest that countries with higher economic stability (*i.e.*, lower public debt) exhibit higher levels of FDI. For instance, H3 is also confirmed in this model.

The quality of labour force (given by *School*) exhibits a negative and significant coefficient for FDI inflows stock, as we observed in the previous model. Therefore, H2 is rejected in this estimation model as well.

We also observe a positive and significant relation between *GDP per capita* and FDI inflows stock. When *GDP per capita* increases 1 p.p., FDI inflows stock increases by 0,05 p.p. That means H5 is confirmed as we observed a positive relation between *GDP per capita* and FDI. This suggests that countries with higher *GDP per capita* (*i.e.*, higher market size) exhibit higher levels of FDI.

The coefficient related to *Crisis* is negative, but not statistically significant for significance levels lower than 10%. This is the same effect we observed in the previous model.

To summarize what was found in all these estimated models we made a comparison of the predicted sign of the coefficients with the results we got in these estimations:

Table 8 - Comparison of the sign of the coefficients between what was predicted initially and the estimation results

Coefficient related with:	Predicted sign	Sign in the estimated models
EATR	-	-
Statutory	-	-
Public_debt	-	-
School	+	-
GDP_percapita	+	+
Crisis*	-	-

*Even though it was found the predicted signal for the coefficient, the financial crisis is not statistically significant for all significance levels.

In general, the signs obtained in the estimations made previously are in line to what it was being expected. The only exception was the quality of labour force, which had a coefficient sign that was contrary to what we expected.

Considering the previous table, we can conclude that three hypotheses presented in this dissertation were confirmed and one was rejected given the estimation results.

Table 9 - Confirmation of research hypotheses

Research hypothesis	Result
H1: Corporate income taxation is inversely related with FDI inflows stock.	Confirmed
H2: Countries with higher labour force quality exhibit higher levels of FDI.	Rejected
H3: Countries with higher economic stability (<i>i.e.</i> , lower public debt) exhibit higher levels of FDI.	Confirmed
H4: Countries with larger market size (<i>i.e.</i> , higher GDP <i>per capita</i>) exhibit higher levels of FDI.	Confirmed

CHAPTER 5 – CONCLUSIONS

The main objective of this dissertation was understanding how corporate income taxation and other three non-tax determinants (quality of labour force, GDP *per capita* and public debt) influenced Foreign Direct Investment inflows stock in the 27 EU member-states between 2006 and 2019.

Compared with previous studies, we considered a larger period, and we covered the most recent years. The effect of the financial crisis of 2008 was also considered by adding a dummy variable, whose goal was verifying the effect of this phenomenon on FDI.

Panel data used in this study was obtained from Eurostat and OECD databases. We made two models, in which they were only different by the tax rate considered given the high correlation between EATR and statutory tax rate.

Most results of this dissertation are in line to what it has been demonstrated in previous studies as the results in the two models were quite similar. Tax variables exhibited a negative relation with FDI, which confirms an inverse relation between corporate income taxation and FDI inflows stock. When comparing the model with EATR and the other with statutory tax rate, the first one exhibited a bigger explanatory capacity than the second.

Given the presented hypothesis and the results obtained for non-tax factors, only the variable related to the labour force had the contrary effect for FDI inflows stock. The quality of labour force is inversely related with FDI, and we expected that this variable could be positively related. We considered the quality of labour force (given by school attainment) and not the cost as previous authors considered given the European context of high-educated population.

Market size (given by GDP *per capita*) and economic stability (whose proxy is public debt) had the predicted signals in their coefficients. Both are positively related with FDI inflows stock, and they are statistically significant for this variable as well. That means countries with larger market size and those with higher economic stability exhibit higher levels of FDI inflows stock.

Lastly, the effect of the years of the financial crisis on FDI is negative, but not as significant as we predicted, meaning that the crisis itself was not a crucial factor influencing Foreign Direct Investment in EU-member states.

It is also important to highlight that this dissertation presented some limitations, especially on the variables related with corporate income taxation and the financial crisis. For the first one, the using of EATR and statutory tax rate as proxies for corporate tax burden does not cover all the specifications of the tax systems of the countries. We must have in mind that we are talking about very complex systems, especially in Southern Europe countries. For this reason, these measures cannot cover all the features of the tax systems like the instability generated by government changes, bureaucracy, the period to accomplish tax obligations and the mode of how these are done (related with payment methods, for example), etc. Moreover, for the financial crisis it is hard to capture all the effects of this phenomenon through a single variable. These limitations might be worth to explore in further studies in the future.

APPENDIX

GDP growth rate in the European Union

Dornean *et al.* (2012) defined that the period of crisis occurred in the years of 2009, 2010 and 2011. On the other hand, Economou (2019) considered the financial crisis by using a dummy variable for crisis pertaining to the period 2009-2013.

In the graphic presented below, we can see that GDP growth rate registered the lowest values in the European Union between 2008 and 2012. For this reason, we defined the financial crisis as the period occurred between 2008 and 2012 (highlighted with the blue area), which is in line with the previous authors.

Figure 7 - GDP growth rate (%) in EU-27, 2006-2019



Source: Eurostat database, self-elaboration

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