MASTER OF SCIENCE IN ECONOMICS

The determinants of FDI in Portugal

A Sectoral Approach

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ABSTRACT

Dissertation Title: The determinants of FDI in Portugal – A Sectoral Approach

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The present Master dissertation is a pioneer study whose main objective is to identify the determinants of foreign direct investment (FDI) in Portugal, in nine main economic activities. In order to assess that, two models were constructed using the OLS estimator with time series data from 1980 to 2009 for the Portuguese economy.

The results suggest that FDI in the primary sector (namely, in mining activities) exhibit little dependence on economic conditions, as well as FDI towards the utilities sector, which demonstrated to be only influenced by the GDP per capita. By contrast, investments in the secondary sector showed to be largely determined by the macroeconomic environment, mainly to changes in the degree of openness to trade, exchange rate and minimum wage. Furthermore, this was the only industry that confirmed the importance of the existent clusters for the attraction of FDI.

The results also indicate that, for all tertiary industries, the wealth of the country is one of the most important variables, which suggests that FDI towards these activities aims to supply the domestic market. Still for some tertiary industries, it was shown evidence for the relevance of the corporate tax rate, labor market flexibility, openness to trade and exchange rate.

Using the conclusions obtained from the model, it is possible to elaborate a set of more cost-effective policies aimed to improve the attractiveness of the country for foreign multinational enterprises and, consequently, take advantage of the externalities created by the bigger flows of FDI.

SUMÁRIO EXECUTIVO

Título da Dissertação: Os Determinantes do IDE em Portugal – Uma abordagem sectorial

Autor: Andreia Severiano

A presente dissertação de Mestrado é um estudo pioneiro que tem como objectivo a identificação, em nove actividades económicas, dos determinantes de investimento directo estrangeiro (IDE) em Portugal. Para o efeito, foram estimados dois modelos a partir do método dos mínimos quadrados ordinários, que usam séries temporais de 1980 a 2009 para a economia portuguesa.

Os resultados sugerem que o investimento estrangeiro no sector primário (nomeadamente nas indústrias extractivas) é pouco dependente das condições económicas, assim como o IDE direccionado para o sector das *utilities*, que demonstrou ser apenas influenciado pelo PIB per capita. Os investimentos no sector secundário evidenciaram ser bastante sensíveis ao ambiente económico, sobretudo a variações no nível de abertura comercial, na taxa de câmbio e no salário mínimo. Este foi o único sector em que ficou comprovado a importância da existência de *clusters* para a atracção de IDE.

Os resultados indicam também que, para a generalidade do sector terciário, a riqueza do país destaca-se como uma das variáveis mais importantes, o que sugere que o IDE nestas actividades visa explorar o mercado interno. Ainda para algumas indústrias terciárias, foi demonstrada a relevância do imposto sobre os rendimentos das empresas, da flexibilidade laboral, da abertura comercial e da taxa de câmbio.

Com os resultados obtidos deste estudo, é possível elaborar um conjunto de políticas mais eficientes, de forma a melhorar a atractividade do país para as empresas multinacionais estrangeiras e, consequentemente, tirar partido das externalidades geradas pelos maiores fluxos de IDE.

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1. INTRODUCTION

Foreign direct investment (FDI) has experienced a dramatic rise over the last decades in most countries of the world. According to UNCTAD (2001), the annual growth rate of FDI was, on average, more than 20% in 94 developing and industrialized countries for the period 1986-2000. This expansion is strongly associated with the globalization and liberalization processes, the increased economic integration worldwide and the reductions of barriers to trade and to cross-border investment. Accompanying this global trend, the Portuguese economy has also received massive flows of foreign direct investment (FDI) during the last three decades. Surely, this foreign capital was crucial to foster the dynamism of the local economy, mainly through the creation of jobs and the transfer of technology and know-how.

Inevitably, this enormous increment in international movements of capital was accompanied by an increasing interest of academics to assess the motivations that lead foreign multinational enterprises to invest in a specific place. Using these studies, policy makers are able to identify the factors that are responsible for the increase in inward FDI and consequently, they are able to manipulate these variables in order to attract more FDI to their own country. However, for economic purposes, FDI should not all be treated in the same way since after the classical Hirchman (1958), numerous recent studies (Alfaro, 2003; Alfaro & Charlton, 2007; Wang, 2009) have demonstrated that the externalities to the real economy differ greatly with the type of industry whose investment is directed to. Therefore, the extent of these externalities must be considered when balancing the cost of incentives provided to foreign investors with the expected benefits from that investment.

The purpose of this paper is to identify the determinants of FDI in Portugal at an industry level, during the period 1980-2009. It was impossible to find any previous study about this subject for the Portuguese economy. In addition to this, it was not possible to find any econometric study for any country or region that assesses the determinants of FDI at a more detailed level than just the distinction between the primary/secondary/tertiary sector. In this paper it is analyzed the determinants of FDI in nine economic activities that cover the three sectors of the economy. With the information obtained, it would be possible to find a better

alignment between the targets for FDI inflows in each industry with the policies created to attain this objective.

The paper is organized as follows: Section 2 reviews previous studies relative to the determinants of FDI; Section 3 explains the econometric model and presents the results; Section 4 uses the results of the previous section to describe the policy implications of the model; Section 5 concludes, describes the main limitations of this paper and presents suggestions for future research on this subject.

2. LITERATURE REVIEW

2.1. The host country determinants of FDI

There is a wide range of literature examining the host country's determinants of FDI. Early work has distinguished two different types of cross-border investment, based on the key motives for the firm to engage in multinational activities: "horizontal" and "vertical" FDI. The first occurs when a firm aims to serve a foreign market whose trade or transport costs are significantly high and/or there are economies of scale at the firm level. By contrast, vertical FDI theory assumes that countries have different factors' costs and, therefore, a multinational firm seeking to minimize costs will locate each production stage in the market where the input prices are the lowest. This distinction plays an important role when one tries to examine the extent to which a certain factor affects inward investment.

Some variables are considered in most studies as key factors for the attraction of foreign investment. The next part analyses these factors.

2.1.1. Taxes

It is intuitive that, in an open international capital market, tax increases in one location will repel FDI to other location. Several empirical studies have analyzed the sensitivity of FDI in relation to taxation, despite the difficulties that arise when one tries to estimate tax elasticity of FDI. In particular, the complexity of the tax system in the home and host

countries and the imperfect data collection, of both capital flows and tax rates, distort the estimates obtained.

De Mooij and Ederveen (2005) collected 31 empirical studies that examined the relationship between taxation and FDI activity and transformed the 427 tax elasticity contained in the papers into uniformed semi elasticity. The authors found that the average semi-elasticity value was -3.72. However, this number hides a wide range of estimates, due to the high heterogeneity of data, methodologies and specifications used in the different papers. A sectoral analysis was done by Stöwhase (2005)[1] that demonstrates that tax rates have no impact on FDI in the primary sector, reflecting that investment in this kind of activities is mainly resource driven. However, the same does not hold for the manufacturing and service sectors, where tax rate differentials have a significantly deterrent effect on FDI.

2.1.2. Political Stability

Literature results regarding the effect of political stability on foreign capital flows are somewhat mixed. According to Lucas (1990), "the Law of Diminishing Returns implies that the marginal product of capital is higher in the less productive (i.e., in the poorer) economy. If so, then if trade in capital good is free and competitive, new investment will occur only in the poorer economy, and this will continue to be true until capital-labor ratios, and hence wages and capital returns, are equalized". However, looking at the distribution of cross-border investment flows at the worldwide level, developing and transition economies absorbed only half of global FDI inflows (UNCTAD, 2010). Lucas, being aware that this implication of the theory is generally not supported by empirical data, adds in the paper that only political risks constitute an important limitation to capital flows.

Kim (2010) did an empirical study whose results were aligned with the Lucas' argument: after controlling for other macroeconomic variables, politically stable countries generate large investment flows to countries with low levels of political stability. Bellak et al. (2008) find that countries more abundant in capital receive less FDI, which also reflects the Law of Diminishing Returns.

[1] He considered FDI outflows from Germany, the United Kingdom and the Netherlands into several European countries, between 1995 and 1999.

2.1.3. Macroeconomic Stability

Macroeconomic uncertainty implies higher costs for the companies, since they need to incur in extra expenditures to ensure protection against risks and to establish and enforce contracts. Due to the difficulty of finding an appropriate measure of macroeconomic stability, most empirical studies have used the inflation rate as a proxy of that, since there is a strong and positive correlation between inflation rate and economic instability. As a matter of fact, high inflation periods in developing countries were coincident with low FDI inflows and vice-versa (Sayek, 2009). However, Walsh and Yu (2010) did not find a significant impact of inflation on the attraction of FDI flows in any economic sector (at least once the real effective exchange rate is controlled for), perhaps due to the fact that the countries covered in the sample are relatively stable.

2.1.4. Labor market flexibility

Tight job protection acts as an entry barrier for multinational enterprises, since it hinders firms in the effort of adjustment to market conditions. Görg (2005) and Javorcik and Spatareanu (2005) have proved, using data from different developed countries, that tight job protection policies has an adverse influence on inwards investment. Nevertheless, the two studies differ on the results obtained in relation to the importance of labor market flexibility in the manufacturing and service sector. While the latter paper showed that labor flexibility matters more for the service sector than for investments in manufacturing, Görg (2005) found that exit costs are more relevant for investment decisions in the secondary sector. Despite the repelling effect that employment protection exerts on inward FDI, Dewit et al. (2009) highlighted that the lack of labor flexibility also prevents existing firms to move production to other countries. In this way, rigidities in the job market reduce outward foreign investment.

2.1.5. Labor cost and quality

Part of cross-border investments are motivated by the pursuit of lower labor costs, especially in labor intensive industries that do not need highly educated employees. For other types of investment, firms seek for an educated labor force rather than cheap labor.

Therefore, empirical evidence about the effect of labor costs and education level on the attractiveness of FDI is not consensual. For instance, Rodríguez & Pallas (2008) find evidence of the importance of human capital in Spain, while Walsh and Yu (2010) show that human capital has little influence on FDI flows. Regarding labor costs, Bellak et at. (2008) find that a 1% increase in unit labor costs decreases FDI by 0.6%, *ceteris paribus*, in a set of ten European countries.

2.1.6. Clusters

Clusters may be defined as "a geographical proximate group of companies and associated institutions in a particular field, linked by commonalities and complementarities"[2]. Clusters are extremely important because they foster the diffusion of information and knowledge, create economies of scale and form a network of customers and suppliers. Therefore, the existence of a cluster enhances the comparative advantage of a certain sector, which in turn will attract more foreign investment to that industry (Qiu, 2003). Several studies (e.g. Bellak et al., 2008; Bensebaa, 2005) have found that new FDI is attracted to be located close of existing FDI, because in this way firms can enhance their competitiveness or simply because the existence of other firms signals favourable national environment for FDI.

2.1.7. Market size

The market size is particularly important in cases where the multinational firm wants to serve a foreign country that involves high transport or trade costs. Since the total cost of freight increases significantly with the amount of volume traded, and because a larger market size usually means that the total quantity sold will be higher, it may become more profitable for foreign firms to locate their productive units in the country where the goods are consumed. In addition to the larger potential demand, firms may also benefit from lower costs due to economies of scale when the market size is bigger. In this context, market size can be measured by the country's total income, as well as by the number of inhabitants (i.e., consumers), since both imply a higher number of units sold. Several studies (for instance,

[2] Michael Porter, *On competition*, p.199

Billington, 1999; Walsh and Yu, 2010; Jaumotte, 2004) support the importance of the economic growth and income of a certain country for the attraction of FDI.

2.1.8. Exchange rate

Literature results concerning the effect of exchange rate variations on FDI flows have been somewhat mixed. Philips and Esfahani (2008) did a thorough collection of previous literature about the impact of exchange rates on FDI. The authors have concluded that "for the results at the aggregate level, 64% of these papers find that a depreciation of the host country's currency increases inward FDI." One of the studies that contradicts this result is MacDermott (2008), whose paper covers 55 countries for the period 1980-1997. The author has found that weak host currencies have an adverse impact on FDI flows, probably due to the reasons that cause currency devaluation (in particular, low interest rates and high inflation).

2.1.9. Openness to Trade

In principle, an open economy is associated with higher inflows of vertical FDI, as low trade or transport costs are regarded as cheaper factor prices for the multinational firm. On the other hand, it is considered that a high degree of openness of the host country has a negative effect on horizontal FDI, since multinational firms find it more attractive to invest in the foreign country when trade barriers impose a considerable cost for the firm. However, empirical studies show that openness to trade is usually a significant explanatory variable for both types of FDI. For instance, Walsh and Yu (2010) found that openness has a strongly positive and significant effect in attracting FDI towards the service sector, whose activities are mainly non-tradable. The coefficient associated with the openness variable was negative for primary FDI and positive for manufacturing FDI, but with much smaller magnitude and significance levels than for services FDI.

2.1.10. Institutions

The quality of institutions should be a very relevant determinant of FDI due to a variety of reasons. Firstly, the risk of expropriation is higher in a country whose protection of property rights is weak. Secondly, poor governance is linked with low economic growth, which should diminish FDI activity. Thirdly, an environment of corruption increases uncertainty and the cost of doing business. Unfortunately, it is difficult to find an accurate measure for institutional quality and, consequently, the results obtained from most econometric analysis suffer from this inherent limitation. Possibly it is due to this fact that empirical results that aim to relate FDI with institutional quality are vague. Wei (2000) used several measures of corruption and in all cases it was found a strong and negative effect on FDI. But curiously, Hines (1995) found that FDI inflows in the US declined significantly after the enactment of Foreign Corrupt Practices Act in the U.S. in 1977, a law that stipulated penalties for U.S. multinational firms engaged in bribery.

2.2. Literature on sectoral determinants of FDI

Despite the exhaustive number of studies aiming to find the factors that attract foreign capitals, only more recently academics started focusing on the determinants of FDI at a sectoral level. Indeed, the factors that investors take into consideration when planning to invest abroad vary with the type of industry. Again, there is a clear lack of consensus amongst the vast majority of the empirical studies, regarding the significance and direction of the effect of the potential explanatory variables of FDI.

2.2.1. Primary sector

It is not easy to find empirical studies about the determinants of FDI towards the primary sector, since this type of investment is mainly resource driven and this element cannot be appropriately captured in an econometric analysis. One of the few studies belongs to Walsh and Yu (2010), who have concluded that macroeconomic variables have little impact on primary sector FDI, which was an expected result since investments in resources extraction

have little connection with macroeconomic improvements. For the OECD countries, Nauwelaerts and Beveren (2005) have found that inward FDI in the primary sector is concentrated in a small number of countries that are well endowed in terms of natural resources.

2.2.2. Secondary sector

Capital flows directed to the manufacturing sector exhibit much more linkages with the macroeconomic environment than FDI towards the primary sector. Walsh and Yu (2010) show that GDP growth, trade openness, clusters and a depreciated real effective exchange rate are good for manufacturing FDI. Nauwelaerts and Beveren (2005) conclude that the high concentration of manufacturing industries in the OECD countries has largely to do with clusters of knowledge. For Sweden, Karpaty and Poldahl (2006) find that capital intensity, skills and energy intensity have a positive and statistically significant impact on manufacturing FDI. Golub (2009) and Lipsey (2002) emphasize the distinct treatment given by the host country to FDI towards the secondary sector from FDI in the service activities. Policies aimed to attract foreign investment such as tax breaks, changes in competition law and subsidies are more focused on the secondary sector, which reflects the fact that manufacturing FDI often involves moving production from one location to another.

2.2.3. Tertiary sector

When the determinants of FDI are analyzed for the tertiary sector at a cross-country level, it is necessary to take into consideration that foreign investment towards the service industries are more spread across countries and that international competition to attract this type of FDI is not as fierce as in the case of manufacturing FDI, which reflects the non-tradable nature of many services (Nauwelaerts and Beveren, 2005; Lipsey, 2002). Additionally, a large number of countries impose economic, regulatory and ownership constrains in certain services' activities, notably in public utilities, transportation (namely air and maritime transport) and financial services. Golub (2009) focuses on regulatory restrictions in these types of industries and concludes that there is a negative correlation between the FDI stocks in the service sector as a ratio to population, and FDI restriction scores. Walsh and Yu

(2010) find that services FDI have considerable macroeconomic linkages, but they are somewhat different from the set of determinants of manufacturing FDI. They find evidence for the positive impact of clustering effects, openness, real effective exchange rate and GDP growth.

2.3. Literature on the Determinants of FDI in Portugal

As mentioned before, there is no existing study for Portugal that assessed the determinants of FDI at sectoral level. Nevertheless, one can find several papers that analyze the variables that influence FDI inflows in the country. In what follows, it is presented a set of previous works about the determinants of FDI in Portugal.

Probably, the first thorough study on this subject was done by Matos (1973), who listed the attracting factors of inward FDI in Portugal that were: political and monetary stability, the existence of natural resources (namely mining, tourism and pulp), the lower labor costs with respect to the European countries, the easy access to credit, the relatively lower corporate tax rate and the privileged access to the EC and EFTA markets. The author also adds that the weaknesses of the Portuguese internal market constituted the main drawback for foreign investing firms. Another study was conducted by Taveira (1984) that found evidence for the importance of market size and concentration, the ability of foreign firms to differentiate their products and the government non-interference for both export and domestic market oriented firms. In addition, labor costs were found relevant for export oriented firms. Overall, results confirmed the hypothesis that market seeking (horizontal) FDI is predominant in Portugal.

A more recent work (Guimarães et al., 2000) used individual plant level data relative to greenfield investments to assess the relevance of agglomeration economies on inward FDI. They find evidence supporting the importance of agglomeration economies and urbanization effects. They also conclude that labor costs become insignificant after controlling for the educational level of the work force. Other studies in Portugal have concluded for the minor importance of low labor costs (Morais, 1994; Fontoura, 1996). Tavares and Taveira (2006) focused on the influence of human capital on the attractiveness of Portugal's FDI, finding that it affects positively inward FDI.

Leitão and Faustino (2010) analyzed inward flows of FDI in Portugal from the European countries for the period 1996-2006. Through both static and dynamic panel data estimators, the results confirmed the importance of lower wages and of market size in the attraction of cross-border investment. Unexpectedly, results showed that inflation has a positive and significant influence on inward FDI. Dynamic panel approach also showed that openness to trade has a positive impact on FDI, whereas geographical distance has a repelling effect.

Overall, literature results demonstrate that firms prefer to invest in countries with inexpensive input factors, with sound economic and political environment and with great potential for expansion. However, for some variables there is a clear lack of consensus, which shows that each country or region has its own peculiarities. Therefore, the factors that were identified in this section will be used in the next one, in order to explore the determinants of FDI for Portugal.

3. ECONOMETRIC SPECIFICATION

3.1. Data

The data used in this analysis are annual gross FDI inflows in Portugal with observations from 1980 to 2009. The official data source is the Bank of Portugal, since it is the entity in charge of collecting this type of data. Nevertheless, the information published on BP*stat* does not cover some industries that are important to this study, such as FDI flows in the primary sector. Furthermore, other impediments in the effective access to this data forced the use of other sources. Therefore, the data used in the analysis was published by the GEE[3] and covers the period 1996-2009. Previous years were collected in Moreira & Dias (2008), who had gathered data from the Bank of Portugal, ICEP[4], INE[5] and other previous studies about FDI in Portugal.

[3] Gabinete de Estratégia e Estudos (GEE) - Office of Strategy and Studies, from the Ministry of Economy, Innovation and Development in Portugal.
[4] Instituto do Comércio Externo de Portugal (ICEP) – Institute for the External Trade of Portugal
[5] Instituto Nacional de Estatística (INE) – National Statistics Institute

Since the objective of this study is to identify the determinants of FDI at a sectoral level, FDI was disaggregated into nine activities covering the three main sectors of the economy. For convenience purposes, abbreviations of the activity were used. Table 1 shows the correspondence between the abbreviation of the economic activity and the industries included on it.

Table 1: Abbrevations

Abbreviation	Description
agric	Agriculture, hunting, forestry, fishing
mining	Mining and quarrying
manuf	Manufacturing
electr	Electricity, gas steam, air-conditioning supply, water supply, sewerage, waste management and remediation activities
const	Construction
retail	Wholesale and retail trade, repair of motor vehicles and motorcycles, accommodation and food service activities
transp	Transportation and storage, information and communication
financ	Financial and insurance activities
firmsserv	Real estate activities, businesses to firms

Table 2 describes the macroeconomic variables used in the model and their data sources. Although most of the variables are self-explanatory, others deserve a further explanation in order to fully comprehend their importance. One of these variables is *gdp_sector*, which is relevant to capture clustering effects in a certain sector. Although most of the studies use the stock of FDI to assess the existence of agglomeration economies, the same was not possible in this study due to lack of data about the stock of FDI disaggregated by industry since 1980. As regards *ln_exch_rate*, the analysis should explore the effects of changes in the exchange rate between the national currency and the currency of each country generating the FDI flow. However, due to data limitations and for sake of simplicity, only the exchange rate between the Portuguese currency and the US dollar, the most common currency in international transactions, is used.

Table 2: Variable description

Variable	Measure	Source
CRT	Combined corporate income tax rate	OECD Stat
dif_CTR	Difference between the corporate income tax rate in Portugal and the OECD average	OECD Stat
labor_rigid	Strictness of employment protection - overall, version 1	OECD Stat
ln_minwage	Real minimum wages in euros in log, base year 1980	Pordata
openness	Trade-to-GDP ratio, in current prices and in current exchange rates	OECD Stat
gdp_growth	Real GDP growth	OECD Stat
lngdpcapr	Real GDP per capita in euros, base year 1980	Ameco Online Database, own computations
ln_exch_rate	Exchange rate (national currency per US dollars) in log	OECD Stat
schooling	real rate of population with high school education	Pordata
CPI	inflation rate, annual growth in %	OECD Stat
lnlc_sector	Average real salary in euros of the sector concerned, base year 1980, in log	Pordata
gdp_sector	Ratio of the value added of the sector concerned in nominal GDP	Bank of Portugal (for data 1980-1995), INE (for data 1996-2009), own computations
fdi_sector	Gross inflows of FDI in the sector concerned in euros, constant prices, base year 1980, in log	GEE Database(for data 1996-2009), article of Moreira & Dias (for data 1980-1995)

As seen in table 2, all nominal variables were transformed in real variables using 1980 as the base year. Furthermore, all the variables exhibiting a trend were used in logs.

Some of the variables identified in the literature review as being relevant for explaining FDI flows were not possible to include in this model for 2 main reasons. Firstly, for some of the variables there is no data going as back as 1980 (for instance, political risk and the quality of institutions). Therefore their inclusion in the model would imply a significant reduction in the size of the sample. Secondly, other variables relevant to explain inward FDI had no appropriate measure and, as a result, it is extremely difficult or even impossible to include them in the model. Examples of such variables are the abundance of natural resources, the regulatory framework and the cultural and linguistic ties among the home and host FDI countries.

3.2. First Model

As stated before, the objective of this paper is to assess the determinants of FDI inflows in Portugal at a sectoral level. For this purpose, it is developed an econometric model whose empirical specification reads

$$y_t = c + \alpha y_{t-1} + X'_t\beta + u_t$$

where t denotes the time dimension t=1,2,…30. The dependent variable y_t is the log of inward FDI for each sector in real terms, y_{t-1} is the one-year lagged log of FDI inflows of the sector concerned and X_t is the vector of macroeconomic variables. The inclusion of y_{t-1} violates the strict exogeneity condition and therefore, it is assumed that this variable is contemporaneously exogenous. Despite this drawback for the model, y_{t-1} captures the dynamic nature of FDI and also mitigates the autocorrelation problem. As far as variables included in vector X_t are concerned, there is no apparent reason to think that they are not strictly exogenous (apart from *gdp_growth*, but it will not be used in this part).

Firstly, it was chosen a set of regressors that were suitable to explain total FDI inflows and then it was used the same variables to assess their impact on inward FDI of each sector. The variables were selected in such a way that diverse dimensions of the determinants of foreign investment could be analyzed: *labor_rigid* to evaluate the influence of labor market conditions; *openness* to estimate the effect of the internationalization of the economy; *ln_exch_rate* to assess the influence of changes in relative prices due to currency fluctuations (the inclusion of this variable led to the exclusion of *CPI* from this regression due to the high correlation between exchange rate and inflation); *ln_minwage* to analyze whether multinational firms decide to invest in Portugal in order to exploit low labor costs (again, the inclusion of a variable related to salaries led me to exclude *gdpcapr* of this regression, due to the high correlation existing between real salaries and real GDP per capita); *dif_CTR*[6] to account for the impact of taxation.

Taking into account the characteristics of the model, the OLS estimator seems appropriate. The estimations were carried out using the Stata program 11. After running the regressions,

[6] It was also tested the significance of corporate income tax rate instead of the difference between this rate in Portugal and the average of the OECD countries. The latter was much more relevant in explaining FDI inflows.

it was tested whether the model violates the no serial correlation and the homoskedasticity assumptions. In order to assess that, the Breusch-Godfrey and the Breusch-Pagan tests were used, whose results can be found in annex 2. None of the activities exhibits heteroskedastic errors, but two of them (*financ* and *agric*) do not obey to the no serial correlation property, which implies that inference analysis cannot be done for these two sectors. To overcome this problem, the model used standard errors robust to both heteroskedasticy and serial correlation obtained by the Newey-West estimation method for standard errors. It is important to note that the Newey-West standard errors were used only in *agric* and *financ* sectors. Therefore, the regressions obey to the asymptotic properties of OLS under which the Gauss-Markov theorem holds.

Table 3 presents the main results.

Table 3: Results

	total	*agric*	*mining*	*manuf*	*electr*	*const*	*retail*	*transp*	*financ*	*firmsserv*
lagged	0.5372**	0.386**	0.4644**	0.4415***	-0.0222	0.5786***	0.5748***	0.119	0.486***	0.6362***
	(0.1325)	(0.170)	(0.1817)	(0.1509)	(0.2592)	(0.1290)	(0.1480)	(0.2009)	(0.190)	(0.1566)
labor_rigid	-0.4959	0.3646	-0.7935	-0.0294	-4.6853	-0.2548	-0.5195	-2.3627**	-0.4845	0.9407
	(0.6092)	(0.6710)	(1.3372)	(0.5057)	(5.3771)	(0.7431)	(0.6244)	(1.1287)	(0.6245)	(0.7133)
openness	0.0639***	0.0592**	0.081	0.0722***	0.02563	0.0309	0.0506*	0.0843*	0.0739***	0.0534*
	(0.0190)	(0.0226)	(0.0552)	(0.0209)	(0.0892)	(0.0283)	(0.0257)	(0.0460)	(0.0243)	(0.0283)
ln_exch_rate	1.3176**	0.023	-1.159	1.6416***	4.7113	1.1478*	0.9678	2.939**	0.9476	1.7269**
	(0.5098)	(0.6214)	(1.1081)	(0.5678)	(3.6554)	(0.5910)	(0.5872)	(1.1038)	(0.6214)	(0.7969)
ln_minwage	3.652*	0.9096	-3.584	5.4514**	8.0253	0.4604	4.0584	4.1966	0.7735	5.2218*
	(1.9467)	(2.2137)	(4.9854)	(2.3080)	(27.1277)	(2.5903)	(2.4902)	(4.4969)	(2.1055)	(2.6466)
dif_CRT	-0.057	-0.099**	-0.0592	-0.0349	-0.079	-0.1774**	-0.0279	-0.1054	-0.084*	-0.0764
	(0.0389)	(0.0398)	(0.0992)	(0.0391)	(0.2561)	(0.0650)	(0.0450)	(0.0798)	(0.0457)	(0.0650)
_const	-10.82	-3.5761	15.41	-17.8799*	-5.5969	1.8293	-11.3038	-3.1048	0.4048	-21.894*
	(8.240)	(10.642)	(23.9531)	(9.3148)	(121.3076)	(12.5675)	(10.6581)	(19.7217)	(9.0859)	(11.9725)
R^2	0.9596		0.4908	0.9509	0.7058	0.9142	0.9461	0.8776		0.9376
No. of observ.	29	29	29	29	21	29	29	29	29	29

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Regardless of the limitations described above, the results obtained were very interesting. The findings suggest the model to be robust. R^2 indicates good explanatory power and the F-statistic shows the model jointly significant at 1% significance level in all the economic activities except *mining*, whose p-value of the F statistic is slightly above 0.01.

It is possible to observe that the sign of the coefficient associated for each variable does not change across the sectors, when the same is statistically significant. What does differ across the industries is the magnitude and the degree of significance of each macroeconomic variable considered. It is also interesting to note that the set of significant economic factors is the same for total FDI and manufacturing FDI, which may be explained by the fact that the secondary sector was the most attractive one in the majority of the years covered by this study.

As expected, macroeconomic factors have little relevance for foreign investment in *mining*, since it is mainly resource driven. This is visible by the absence of significant variables and by the value of R^2, which is the lowest among all industries. The *agric* sector has more linkages with the economic conditions, but they have a much lower explanatory power than in the other economic activities. Furthermore, FDI towards utilities industries is also minimally affected by improvements in macroeconomic conditions, suggesting that privatization policies and changes in regulatory framework were the main motives for foreign investment in this sector, as pointed by Golub (2009) and Alesina et al. (2005). Note also that in this sector there are only 21 observations, which is explained by the fact that foreign investment in utilities was nonexistent until 1988.

The regressions show that *openness* variable has a positive and statistically significant effect on all the sectors apart from the *mining* and the two sectors that are fully non-tradable due to its nature (*elect* and *const*). Although it may not be intuitive the fact that openness is relevant for FDI in the services sector[7], which is mainly horizontal investment, this result has appeared frequently in the literature. A possible explanation for this fact was given by Walsh and Yu (2010) suggesting that "openness to trade is correlated with some type of economic liberalization that also generates a sound economic environment for the service sector"[8].

The *ln_exch_rate* variable is significant in four of the industries considered. In line with most studies on the subject, a depreciation of the national currency has an attracting effect for foreign firms to invest in Portugal. As far as the strictness of employment (*labor_rigid*) is concerned, the coefficient associated with this variable has a negative sign for most of the industries, but it is only significant for the *transp* industry. The findings also show the

[7] In 2007, services exports accounted for 25% of total exports. In 1995, this ratio was 21%.
[8] Walsh and Yu (2010), p.10

negative impact of *dif_CTR* on FDI flows in three economic sectors (*agric*, *const* and *financ*).

A rather surprising result is the positive sign of the coefficient of *ln_minwage*[9], which suggests that a raise in the real minimum salary attracts more FDI. This indicates multinational firms do not choose to invest in Portugal to take advantage of low labor costs, but instead they invest in the country mainly to serve the Portuguese internal market – horizontal FDI. This result is in line with previous studies (Taveira, 1984; Morais, 1994; Fontoura, 1996) about the determinants of FDI in Portugal and with the Ernst&Young attractiveness survey for Portugal (2010), which have concluded that FDI in the country is mainly driven by the market-seeking motive. Another fact supporting this theory is that employees working in foreign-controlled firms have, on average, higher productivity (OECD, 2008[10]) and higher salaries than those working in national firms (Eurostat, 2008; Ministry of Labor and Social Security). For instance, during the period 1991-1999, foreign firms paid, on average, 4.5€ per hour (at constant prices of 2000), while the average salary of national firms was 3.3€ per hour (Quadros de Pessoal, Ministry of Labor and Social Security).

Therefore, the positive coefficient of *ln_minwage* may indicate that a raise in the real minimum wage increases the purchasing power of the population, which in turn translates into more opportunities for foreign firms to exploit the Portuguese domestic market. However, it is difficult to find a reasonable explanation for the fact that it is the manufacturing sector the one with the biggest coefficient for *ln_minwage*.[11]

In the *retail* sector, only one macroeconomic variable (*openness*) was significant. This could be seen as a surprise. This sector is one of the most representatives of the tertiary sector in terms of FDI and previous studies have found evidence of the linkages between

[9] *ln_minwage* had a positive and significant coefficient even after controlling for schooling. However, because the inclusion of schooling in the regression barely altered the results and because it never was significant, it was excluded from the model.

[10] Figure 1.13

[11] It may be worthwhile mentioning that, perhaps, if it was used the difference between the minimum wage in Portugal and the OECD average instead of *ln_minwage*, the sign of the coefficient for this variable would probably be negative, reflecting the importance of the fact that Portugal has cheap labor relatively to other developed countries, but not compared with most of the developing economies. As it is not possible to measure accurately the difference between the minimum salary in Portugal and the industrialized countries during the last 30 years, the variable *ln_minwage* may not capture entirely the importance of lower labor costs in Portugal for the attraction of FDI from other developed countries.

services FDI and macroeconomic improvements. This issue will be addressed in the next chapter.

To conclude this part, additional regressions were run in order to test the relevance of the adhesion of Portugal to the European Economic Community in 1986 and the introduction of the euro in 1999. Portugal's accession to the European Community is regarded as a market size enlargement and therefore, it could be interesting to analyze its impact on FDI inflows. This was done by including a dummy variable taking the value zero for the period before 1985 and one for the period after 1986. The results can be found in annex 2. This dummy variable was not statistically significant neither for total FDI inflows nor for any of the economic activities considered. This may be explained by the fact that the adhesion of the country to EEC was a gradual process, whose effects cannot be attributed just to a specific year. Furthermore, because this dummy divides the sample in two parts that are very unequal, the interpretation of the result needs some caution. Consequently the dummy was excluded from the regressions.

It was also tested whether the introduction of the euro in 1999 implied a significant change in inward FDI. In order to assess that, it was included a dummy variable that takes the value 0 for the period before 1998 and 1 for the after 1999. The results can be found in the annex 2. Disappointingly, the findings show that this dummy variable has a negative coefficient, but not statistically significant.

3.3. Second model

In this part, the set of independent variables was adjusted for each of the nine economic activities. In this manner, it is possible to test whether sector specific characteristics are relevant to explain FDI inflows. There are two sector specific variables additionally tested in this part. These are *gdp_sector* and *lnlc_sector*, to evaluate respectively the influence of clustering effects and of average real salaries in the specific sector.

Additionally, in order to enlarge the number of potential explanatory variables of the model, *schooling*, *gdp_growth*, *gdpcapr* and *CPI* were included. To avoid multicollinearity, the last two variables were never tested in conjunction with one of the wage variables and the exchange rate. The variable *schooling* was never statistically significant in any of the

sectors. This is why it does not appear in any of the following regressions. Another important remark is the fact that *gdp_growth* is potentially an endogenous variable, since inward FDI can promote economic growth, which in turn will probably affect FDI inflows. Therefore, it was adopted the IV estimator when testing the importance of *gdp_growth* as a determinant of FDI. Theoretically speaking, ideal instruments should be variables correlated with *gdp_growth*, but not with the error term. However, perfect instruments are hard to obtain. In this case, it was used consumption growth, government expenditures growth and the unemployment rate as instrumented variables. Perhaps unexpectedly, the *gdp_growth* variable was nonsignificant in all sectors and was thus excluded in the following model.

In view of the fact that the small number of observations constitutes a limitation of this study, a problem more acute due to the high number of potential explanatory variables, thus implying a significant loss of degrees of freedom, the solution was to test several reduced specifications of the model until the final model was found. The potential hazard of this unorthodox strategy is the existence of omitted variables that would generate biased results. In this way, it was computed the Ramsey RESET test[12] to assess the existence of omitted variables.

Once again the OLS estimation method was used. After running the regressions in Stata the Breusch-Pagan test for heteroskedasticity and the Breusch-Godfrey test for autocorrelation were performed. As before, all regressions have residuals with constant variance, but the sectors *agric* and *financ* exhibit serial correlation. As a result, it was used Newey-West standard errors just for these 2 sectors.

For agriculture, none of the additional potential explanatory variables was found significant. In this way, the model was reduced to account for the impact of *openness* and *dif_CTR*, the same factors previously found relevant. Despite the small number of explanatory variables, the RESET test did not accuse the existence of omitted variables.

Regarding FDI towards extractive industries (*mining*), none of the potential variables was found significant even at 10% significance level. As mentioned before, this confirms that

[12] Ramsey Regression Equation Specification Error Test (RESET). This test is useful to detect general functional form misspecifications.

foreign enterprises in this sector are immune to macroeconomic improvements, when they determine the location of their investments in mining activities.

For the secondary sector (*manuf*), the results are similar to the ones obtained in the previous model. The only difference is the inclusion of the sector-specific variable *gdp_manuf*, which shows strong clustering effects of manufacturing activities, a fact that has been mentioned in several studies (Nauwelaerts and Beveren, 2005; Guimarães et al., 2000; Walsh and Yu, 2010). Despite the variable *dif_CTR* being nonsignificant at 10% level (as the p-value is 0.16) it becomes relevant when using robust standard errors.[13] Therefore, it is plausible that corporate taxing exert a negative influence on manufacturing FDI. Apart from the sign of the coefficient associated with the minimum wage, all the results are aligned with the majority of previous studies about the determinants of manufacturing FDI and were analyzed before.

For the utilities sector, the only relevant variable was *gdpcapr*. The fact that a higher real GDP per capita is associated with higher investment in public utilities is intuitive, since a wealthier population demands more reliable services with cleaner technologies and with higher security of supply. As mentioned before, an index relative to barriers to entry would probably also be significant to explain cross-border investment in utilities. However, the lack of measurement for this factor led to exclude them in the model.

When it comes to FDI in construction, the variables found significant were, once again, *dif_CTR* and *ln_exch_rate*. None of the additional variables tested in this part revealed to be statistically significant and therefore the model was simplified in order to account only for the effect of taxation and the exchange rate. Nevertheless, the RESET test did not accuse the existence of omitted variables.

Concerning the *transp* FDI, the set of relevant variables is barely unchanged from the previous model. Once more, *openness* and *labor_rigid* are found significant[14], as well as *gdpcapr*. The econometric tests rejected the importance of clustering effects as well as labor costs in this sector. Overall, the results support the idea of the importance of the

[13] I opted for using the standard errors obtained by the Davidson and MacKinnon (1993) standard errors, instead of the classic Eicker-Huber-White standard errors, since with this approach the variance-covariance matrix seems to converge more quickly, as sample size n increases, to the correct variance-covariance estimates. Therefore, this method is more appropriate for smaller sample sizes.

[14] With robust standard errors, the *ln_exch_rate* also becomes significant. Therefore, it is plausible that exchange rate depreciation affects positively inward FDI into this sector.

domestic market and of labor market conditions for multinational enterprises to invest in Portugal, which makes sense taking into account the nature of the service.

For the *retail* sector, only *gdpcapr* and *openness* were significant. The intuition for the relevance of these 2 results in the tertiary sector was presented above. The fact that this sector, which is one of the most representatives in terms of FDI inflows in Portugal, has so little linkages with the macroeconomic environment deserves future research.

In regards to the financial sector, the model violated the no serial correlation property. Therefore, it was used Newey-West standard errors that showed that *openness*, *ln_exch_rate* and *dif_CTR* were the relevant variables to explain FDI flows towards financial industries.

Previously, the variables found significant for the real estate activities and services to firms sector (*firmsserv*) were *ln_exch_rate*, *ln_minwage* and *openness*. Here, the minimum wage was replaced by *lngdpcapr* because it seems more appropriate for this type of industry, since the average salary in this industry is well above the minimum salary (Quadros de Pessoal, Ministry of Labor and Social Security). Real GDP per capita has a strong influence on *firmsserv* FDI, with elasticity above 3%. The factors that are sector-specific were not found relevant to explain FDI inflows in this industry.

Overall, there was not a significant change from the previous model. The most interesting results obtained in this part were the fact that real GDP per capita affects most of the economic activities of the tertiary sector and also the fact that FDI towards the manufacturing industries is strongly influenced by clusters, which is a result that was already found for Portugal. By contrast, neither the tertiary nor the primary sector appears to exhibit agglomeration economies.

Due to the fact that there are no previous studies examining the determinants of FDI for most of the economic activities considered in this paper, it is not possible to make comparisons about most of the results obtained. For instance, it is hard to find a reasonable explanation for the fact that labor market rigidities affect only FDI in one of the industries considered in this study (transport and communication), or why corporate tax rate affects

only 3 industries which are completely distinct (agriculture, construction and financial activities).

4. POLICY IMPLICATIONS

This chapter uses the results obtained in the previous chapter to establish policy guidelines in order to improve the attractiveness of Portugal for foreign investing firms.

One factor considered important for most of the industries considered is trade openness. Therefore, a policy recommendation is to lower non-tariff barriers to trade since they are well above the OECD average (Figures 3.1-3.4). The OECD (2008) report considers that, despite substantial improvements in the last years, there is still room to lower port and airport charges, and to improve the efficiency of customs procedures, logistics and technical requirements. Another important component that acts as a trade barrier to foreign trade is the quality of transport infra-structures. The OECD (2008) recognizes that the highway network in Portugal has been substantially improved, but also points that the rail network and logistics in ports need to be improved.

For manufacturing FDI, there is strong evidence of the importance of clustering effects. However, Portugal has not been able to manage correctly the agglomeration of industries within the country. Indeed, in Michael Porter's book (1998) it is made a comparison between the dimensions of clusters in the U.S. and in Portugal, to illustrate the differences between a highly advanced economy and a middle-income country. Figure 3.5 shows a picture taken from his book that shows the distribution of clusters in Portugal. A policy recommendation is to ease linkages and communication between domestic firms and foreign multinational enterprises and to direct government efforts and funds to certain key industries with strong potential for creating a large and internationally-competitive cluster, in a consistent manner over time.

Currently, the combined corporate tax rate in Portugal at 26.5% is slightly higher than the OECD average. Furthermore, it is well above European catching-up economies such as Hungary, Czech Republic, Slovak Republic and Poland, all of them with 19% of combined corporate tax rate (OECD database). Therefore, it is recommended that, as soon as public finances are in a sustainable path, the corporate tax rate should be lowered in order to

attract more foreign investment, especially to agriculture, construction, finance and manufacturing.

In service industries, which are mainly directed to the internal market, it was evident the importance of the robustness of the internal demand for the attraction of FDI was evident. In this case, the policy implications are vast, since measures to boost the domestic market are more complex and involve improvements in several the domains of the economy, such as employment, taxation, productivity and education.

5. Conclusions, Limitations and Future Research

5.1. Conclusions

This study represents the most comprehensive work about the determinants of FDI at a sectoral level for the Portuguese economy. This is particularly relevant since previous literature demonstrated that externalities generated by foreign investment vary according to the sectors. Furthermore, the Portuguese agency to promote foreign investment, AICEP, has identified a set of economic activities considered "prominent sectors" due to their high potentialities in terms of future return and linkages to the real economy. Therefore, the implementation of the most cost-effective measures to promote foreign investment towards these specific sectors is crucial.

The results obtained yield a number of insights about attracting foreign direct investment. A common relevant variable for the three economic sectors was openness to trade, reflecting not only the export commitment of foreign firms, but also the correlation between international movements of goods and international flows of capital. Another common variable for all service industries is real GDP per capita. This result is intuitive as tertiary industries are mainly aimed at supplying the domestic market. Other common findings were that total level of education, sector specific average real salary and economic growth were never significant for any economic activity.

Another interesting result obtained is that only the manufacturing sector exhibits agglomeration economies. And perhaps, the most unexpected finding of the model is that, in general, foreign investing firms do not choose to invest in Portugal to take advantage a cheap work force, since a raise in the real minimum wage was found to affect positively FDI inflows.

A weaker exchange rate appears to attract more foreign investment to the economy, especially for the industries of construction, manufacturing and businesses to firms. A reduction in the corporate tax rate would also be welcomed by foreign multinational enterprises (and also national firms), in particular by the industries of agriculture, construction, financial and businesses to firms. Employment strictness appears to be a significant constraint only for firms in the transport and communication industry.

As expected, investment in the extractive industries and in the utilities sector exhibit little linkages with economic factors. This is because there are other underlying factors that cannot be captured by the model, such as the abundance of natural resources and privatization policies.

5.2. Limitations

The fact that this study was aimed just to find the determinants of FDI in the Portuguese economy in order to capture its own peculiarities has the drawback of limiting the size of the sample. As a result, few regressors were used in the model due to the lack of degrees of freedom. Furthermore, as it was not possible to find data since 1980 for some potential explanatory variables, such as institutional quality and political stability, this led to the exclusion of these variables from the model, or else it would lose half of the number of observations.

Another weakness is that it does not take into account some factors that are essential for the occurrence of some investments, such as bilateral treaties, tax breaks, cultural and language linkages, and the attribution of subsidies for a particular investment. The exclusion of these factors is inevitable due to the fact that this dissertation analyses industry-level data instead of firm-level data, since the latter is confidential.

As any pioneer study, it was not possible to make an appropriate comparative analysis that would undoubtedly enrich this work. Probably, the existence of a similar study might have contributed to the finding of a better set of regressors for each economic activity.

5.3. Suggestions for Future Research

It would be interesting to construct an index of FDI restrictions for some service industries frequently subject to ownership restrictions, such as telecommunications, transports, tourism, electricity and finance and to include this index in an econometric model. This could be done, for instance, using the formula developed by Golub (2009).

It is also important to explore is the fact that wholesale and retail services, accommodation and food services appear to exhibit so little linkages with economic factors. Since this sector is amongst the ones that attract more FDI inflows, further research would be important to understand the determinants of foreign investment towards this type of service industry.

Another subject that is in line with the theme of this thesis is the impact of sectoral FDI on Portugal's economic growth. Such a study could complement this one in the sense that policy makers must know both the determinants and the spillovers of FDI in each sector, in order to create a suitable package of incentives for foreign multinational enterprises to invest in the country.

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Annex 1

EVOLUTION OF FDI IN PORTUGAL

After decades of relative isolation, in the 1980s Portugal got involved in a catch-up process towards the European income levels, reflecting the growing European integration market. This necessarily implied reforms to open up the economy and improve the productivity levels of the country. Consequently, over the last three decades, it is possible to observe a completely new attitude towards FDI. While in the beginning of the 1980s there were fierce FDI restrictions relative to some economic sectors and towards the presence of foreign firms, in the XXI century Portuguese governments strive and spend large amount of funds[15] to encourage foreign firms investing in Portugal and also to promote the internationalization of the Portuguese firms.

This section highlights the different phases of evolution of FDI in Portugal, both in terms of growth as well as in terms of sectoral distribution of FDI flows. This analysis is very interesting since it shows clearly the volatile and dynamic nature of foreign investment, as well as the evolution of policies about FDI, which is something that should be taken into account when one does this type of study.

1. Period 1980-1989

In the beginning of the 1980s there was a contraction in FDI flows at worldwide level, due to the instability of interest and exchange rates, as well as the recession of the early decade. However, this global trend was not observed in Portugal, since the compound annual growth rate (CAGR) of gross FDI inflows was 37% from 1980 to 1985. This was the period when Portugal started preparing to become a member of the European Economic

[15] On the webpage of AICEP, it is described some instruments to finance FDI projects that are considered especially important for the country. Besides fiscal benefits, the other instruments are PIN (Projectos de Potencial Interesse Nacional), PIN+ and QREN. The benefits vary mainly according to the sector invested, the number of jobs created and the amount of investment, but other factors may be also taken into account, such as energy efficiency of the buildings, I&D spending and the region where the investment is done.

Community (EEC). Consequently, the country introduced economic reforms aiming to open the economy and to attract foreign capital. One of these measures was the *Sistema Integrado de Incentivos ao Investimento*, published in June of 1980, which aimed at attracting FDI projects by providing incentives that would be adjusted in accordance with the expected return of that investment to the economy, namely in terms of job creation and modernization of the sector. However, it was not until 1986 that the prior authorization procedure for foreign investment was removed. This meant FDI started being permitted unless otherwise restricted, while before FDI was prohibited unless previous authorization was granted[16].

In the second half of the 1980s, cross-border investment trends changed and FDI flows grew strongly at the global level, accompanying the expansion of world output and policy developments in terms of privatization, deregulation and debt-equity swaps in most developed market economies. According to UNCTAD (1991), the annual average growth of world FDI outflows was 28.9% between 1983 and 1989 (Figure 1.1), while exports grew 9.4% and the world GDP advanced 7.8% in the same period. In Portugal, FDI inflows grew at a CAGR of 52%, from 1985 to 1989. This strong rise occurred not only due to the global expansion of international capital flows, but also because of the accession of Portugal to the European Community on January 1st 1986. In that same year, the Portuguese government created the *Foreign Investment Law* (*Lei do Investimento Estrangeiro*, regulatory decree number 24/86 of 18 July 1986) stating that investment from non-EC countries would be subject to assessment and negotiation, while investment by EC-firms was not subject to this safeguards clause.

It was the manufacturing sector the one that registered the highest inflows of Portuguese FDI during the 1980s, contrasting with the pattern observed in most of developed countries at that time, when foreign capital flows were already mainly towards the services sector. The fact that Portugal had inexpensive, abundant and uneducated labor relative to the rest of the industrialized world explains why FDI was mainly directed to the secondary sector until 1989. As far as the public utilities[17] sector is concerned, there is not any register of FDI inflows from 1980 to 1988, reflecting the fact that the sector was subject to restrictions on the ownership of the firms' capital.

[16] OECD, 1994
[17] Electricity, gas and water supply

As a matter of fact, the privatization program in Portugal was only launched in 1989 as a result of the 1988 Constitutional reforms.[18] The financial sector also benefited from this privatization process and this was visible by the decline of the state banks' presence in the market, which went down from 89% to 39% during 1987-1992.

Figures 1.2 and 1.3 illustrate the share of each economic activity in total FDI inflows. Despite manufacturing industries had absorbed the majority of Portuguese FDI inflows until 1989 in absolute values, its relative weight on the total of inwards FDI declined from 48.7% in 1980 to 26.9% in 1989. During the same period, the share of Portugal's FDI directed to the primary sector also deteriorated from 14.1% to 2.6%. Consequently, industries of the tertiary sector had a growing importance in the attraction of cross-border investment, namely in the real estate activities and services to firms (with a gain of 22.2 percent points), the construction sector (that grew 8.3 p.p.) and the financial activities (whose relative weight increased by 8.7 p.p.).

2. Period 1990-2003

In the beginning of the 1990s, ICEP[19] listed a set of target industries that were considered especially relevant for the market development in Portugal. These were the automotive industry, biotechnology (including pharmaceuticals), food processing, information technology, hospital and surgical equipment and ceramics and plastics. However, these industries were not aligned with the incentives provided by the government for investing multinational enterprises, since they were directed towards agriculture, energy, telecommunications, tourism, industry and trade sectors.

From 1990 until 1992, the financial activities' industry was the most attractive sector in Portugal for foreign investors (still reflecting the privatization process), followed by real estate activities and other services to firms and by the manufacturing industry. In 1993, the secondary sector comes back to the top position, capturing 32.3% of the entire inwards FDI

[18]There were a number of decree-laws enacted from 1988 to 1993 that allowed private capital to enter in utilities' firms. The decree-law nº 449/88 was the basis for the privatization process, which was reinforced by the decree-law nº 336/91. These two laws were fundamental for private firms to enter in the industries of steelmaking, petroleum refining, basic petrochemicals, gas and electrical production and distribution. The decree-law nº 379/93 was relevant for the partial privatization of the sector of water supply and sanitation.
[19] Instituto do Comércio Externo de Portugal

in Portugal, which represents a jump from 1992 when manufacturing FDI corresponded only to 19.2% of the total (Figures 1.4-1.6). This jump was largely driven by the Autoeuropa investment[20], which was the biggest foreign investment ever made in Portugal. This project was vital to attract a number of other firms related to the automotive, electronics, metalworking and mechanical engineering sectors in the coming years. Furthermore, the creation of Autoeuropa was also advantageous because it improved the image of Portugal abroad, since a project of that dimension requires modern infra-structures, skilled and abundant labor, as well as political and macroeconomic stable environment. Despite the huge dimension of this investment, figure 1.4 shows total FDI and manufacturing FDI declined in 1993. This was consequence of the recession felt in Portugal and in Europe in that year, which contracted international movements of capital.

From 1995 until 2003, the manufacturing sector was the most attractive for foreign investors in Portugal (Figure 1.7). But despite these massive flows of foreign capital, data from the European Commission (2001) reveals Portugal's productivity growth in manufacturing during the 1990s decade was the lowest among the fifteen countries of the European Union. The loss of the leading position in 2004 is temporary and not relevant to attribute that fact to the enlargement of the European Union to Central and Eastern European countries.

From 1996 to 2001, there was an enormous and continuous increase in inwards FDI growing 35%[21] annually. This was also a very dynamic period of the Portuguese economy, whose average annual real GDP growth rate was 3.7%. The period corresponded also with the transition of the country to European Monetary Union and included the realization of the world exhibition known as Expo'98. This was relevant in the improvement of infra-structures, boosting tourism flows and projecting the image of the country abroad. Throughout this 5-year period, it was possible to witness a further decline in the relevance of the primary sector in the attraction of foreign capital, whilst tertiary industries (particularly, the wholesale and retail trade, accommodation and food service sector) registered a gain in absolute and relative terms (Figures 1.8 and 1.9).

[20] The Autoeuropa Project resulted from a joint-venture between Volkswagen and Ford in 1991. The factory started producing in 1995 and required a total initial investment of 1,970 million euro.
[21] CAGR

3. Nowadays

From 2003 onwards, the gross FDI inflows have been relatively stable, as illustrated by figures 1.10-1.12. Even with the global financial crisis severely affecting international movements of capital[22] and trade, the total FDI inflows in Portugal declined only slightly in 2009. But despite high total FDI inflows, the share of new firms in total investment has been small, with the bulk being done by foreign firms already present. This could be a matter of some concern, because it reveals that the perceived attractiveness of Portugal for potential foreign investors is being reduced.

In terms of sectoral distribution, the same pattern was observed across 2003-2009, with the dominance of the manufacturing industries, wholesale and retail trade, accommodation and food services activities and real estate activities and services to firms.

On the webpage of AICEP[23], the Portuguese investment promoting agency, there is a list of industries considered "prominent sectors" due to its elevated potentialities in terms of expected return and due to the interaction effects with the local firms. These industries are: renewable energy, pharmaceuticals, chemicals, tourism, automotive, pulp and paper, information technologies, electrical and electronic, moulds and forest products. They are generally in line with the three sectors identified by the Eurostat (2008) as being the ones that generated the highest proportion of sectoral value added by foreign-controlled firms in Portugal: electrical and optical equipment, transport equipment and chemicals, chemical products and man-made fibers.

Another subject worth mentioning is the survey conducted annually by Ernst&Young. This interviews business leaders of foreign multinational firms to assess the attractiveness of the Portugal for investment decisions. The last survey (Ernst&Young, 2010)[24] indicated that in order to make Portugal a more attractive country for foreign investors, it is necessary to improve the business environment in the country, namely in education and training system, tax levels and fiscal complexity, innovation, judicial system and labor flexibility. The same survey also reveals that the most attractive factors of the country were Portuguese language

[22] The global FDI flows declined 39% in 2009, according to UNCTAD
[23] Agência para o Investimento e Comércio Externo de Portugal
[24] For the survey, 204 international business leaders were interviewed in order to assess the attractiveness of Portugal regarding direct investments. The parent nationalities of the companies are representative of investments in Europe.

and culture, quality of life and telecommunications infrastructure. According to this study, Portugal's main competing countries are Spain, followed by Germany and Poland. Western Europe countries are considered by 2/3 of foreign investors as the main competing countries for Portugal, which suggests that they are not looking for inexpensive work force. Regarding the sectors considered the most important driver of Portugal's growth in the next 2 years, the majority of the investors pointed tourism and leisure, followed by information and communication technologies and business to business services, excluding finance.

Figure 1.1. FDI inflows in Portugal by sector (1980-1989)

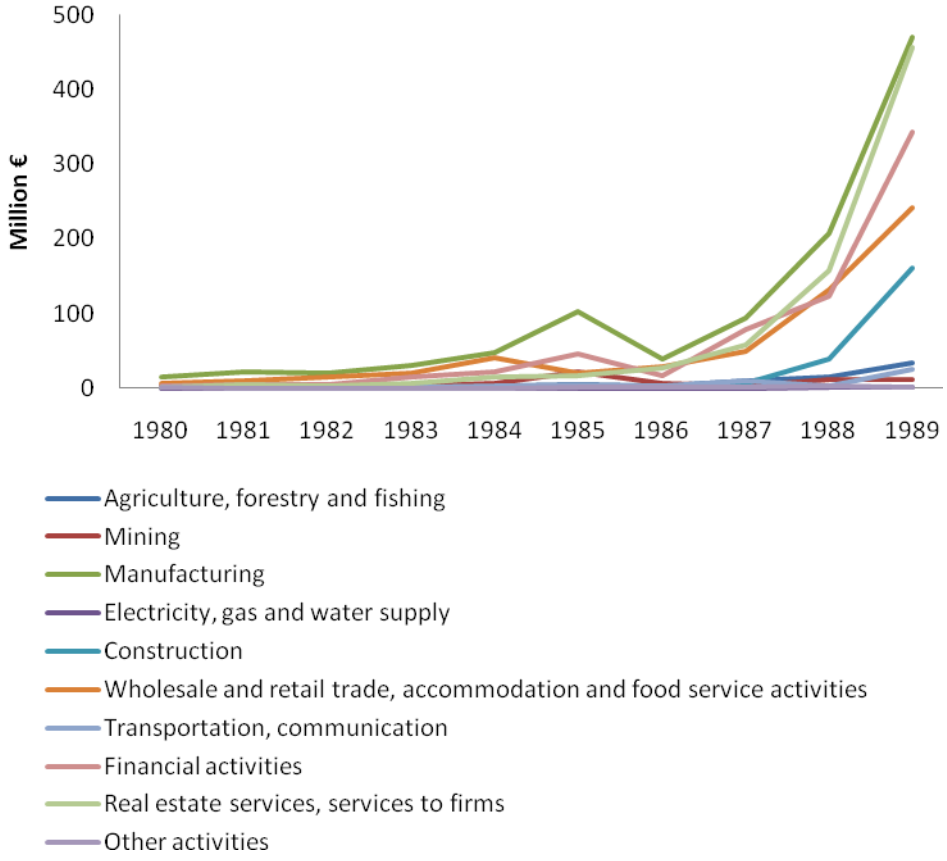


Figure 1.2. Share of each sector in total gross FDI inflows in Portugal (1980)

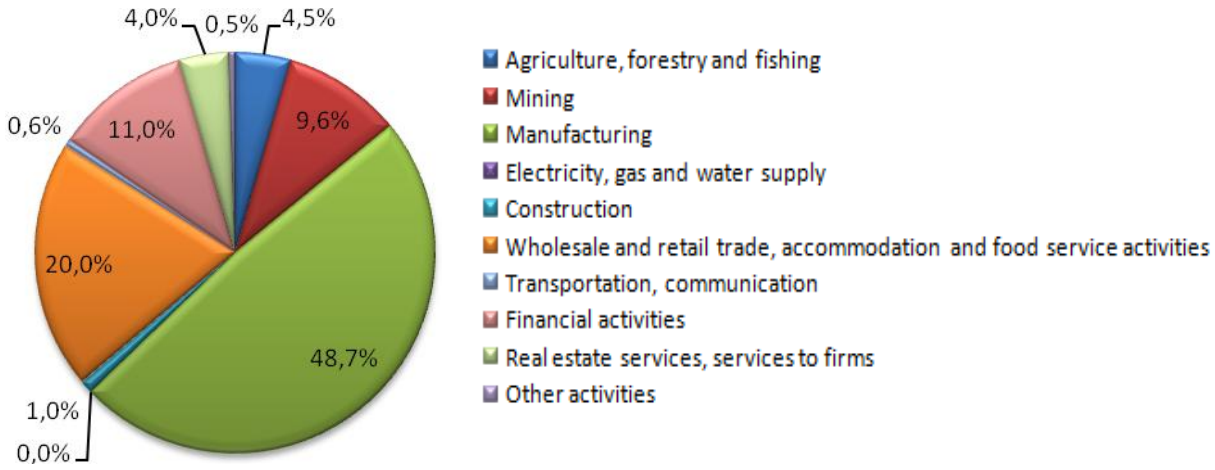


Figure 1.3. Share of each sector in total gross FDI inflows in Portugal (1989)

Figure 1.4. FDI inflows in Portugal by sector (1990-1995)

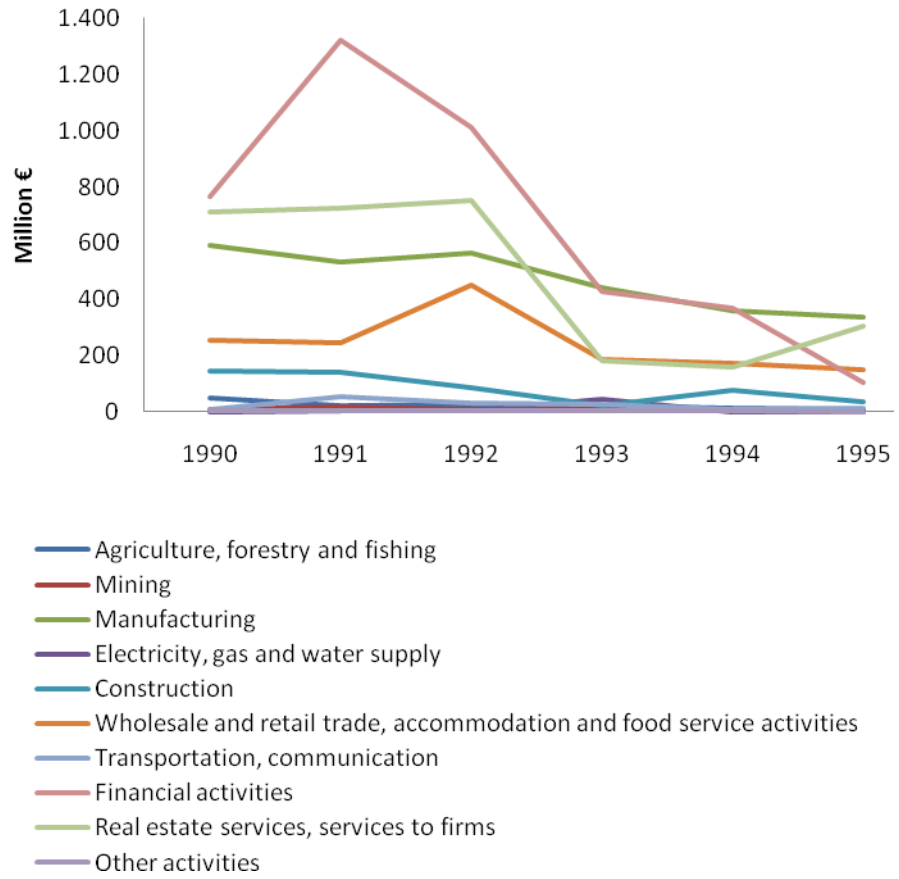


Figure 1.5. Share of each sector in total gross FDI inflows in Portugal (1990)

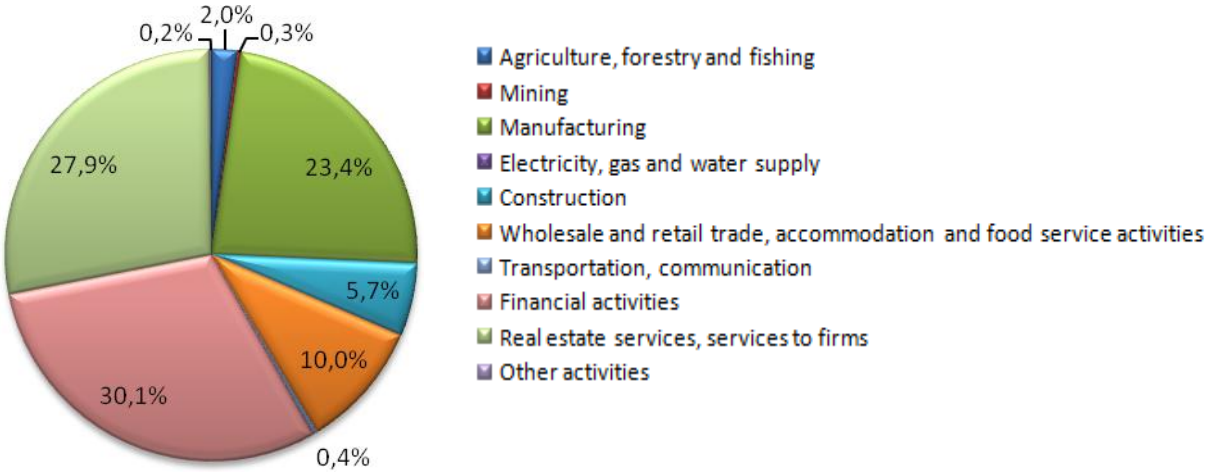


Figure 1.6. Share of each sector in total gross FDI inflows in Portugal (1993)

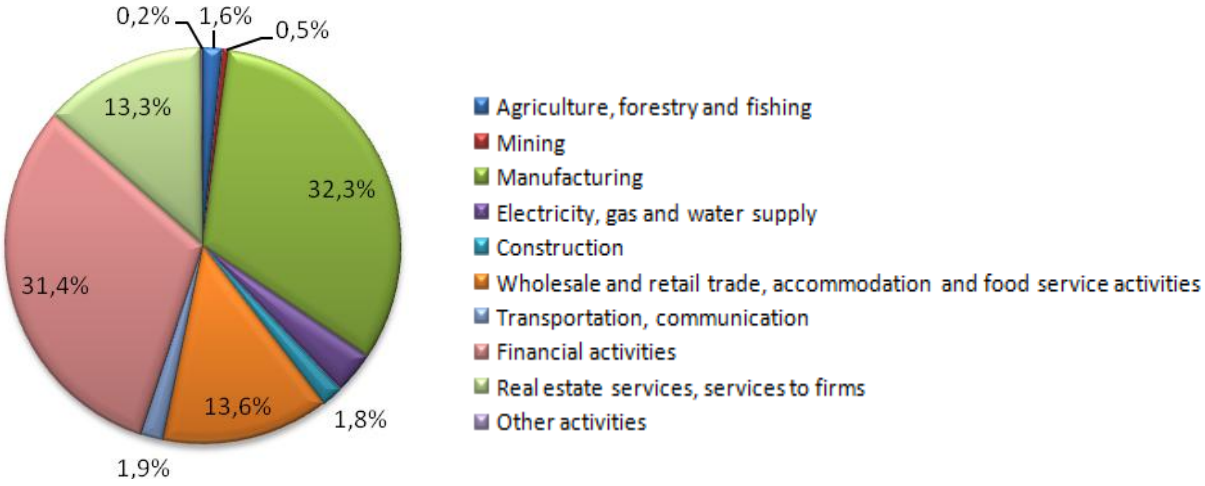


Figure 1.7. FDI inflows in Portugal by sector (1996-2002)

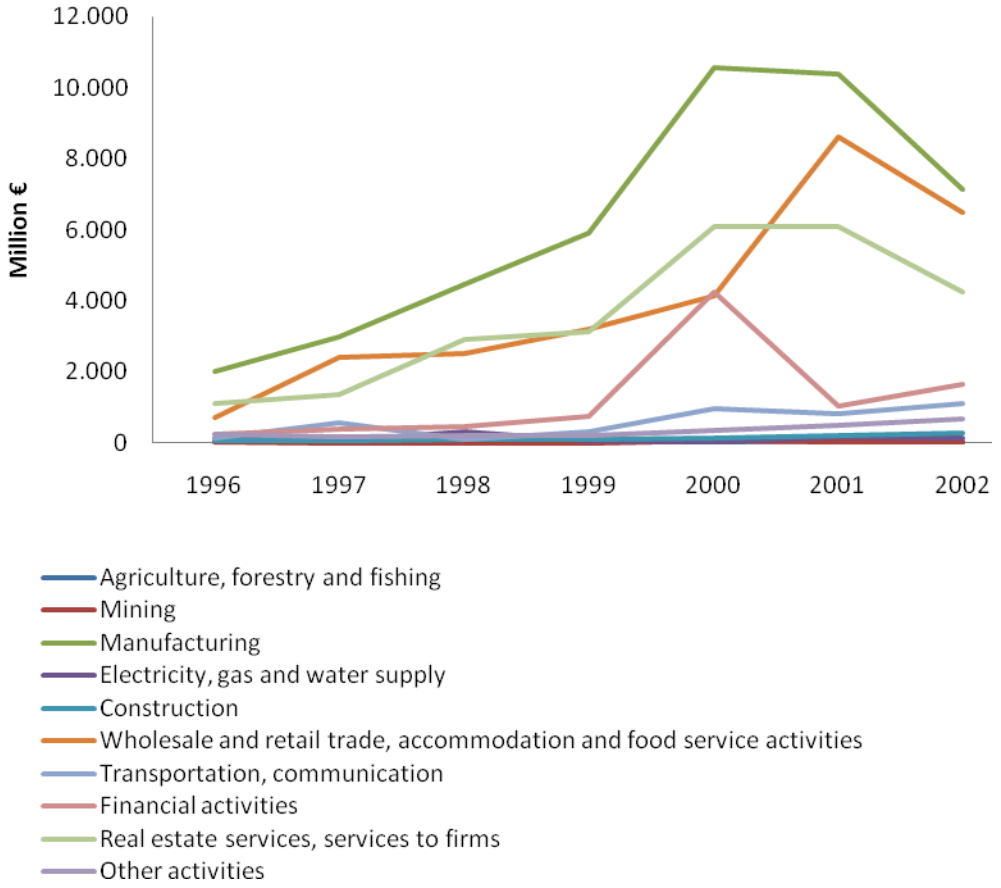


Figure 1.8. Share of each sector in total gross FDI inflows in Portugal (1996)

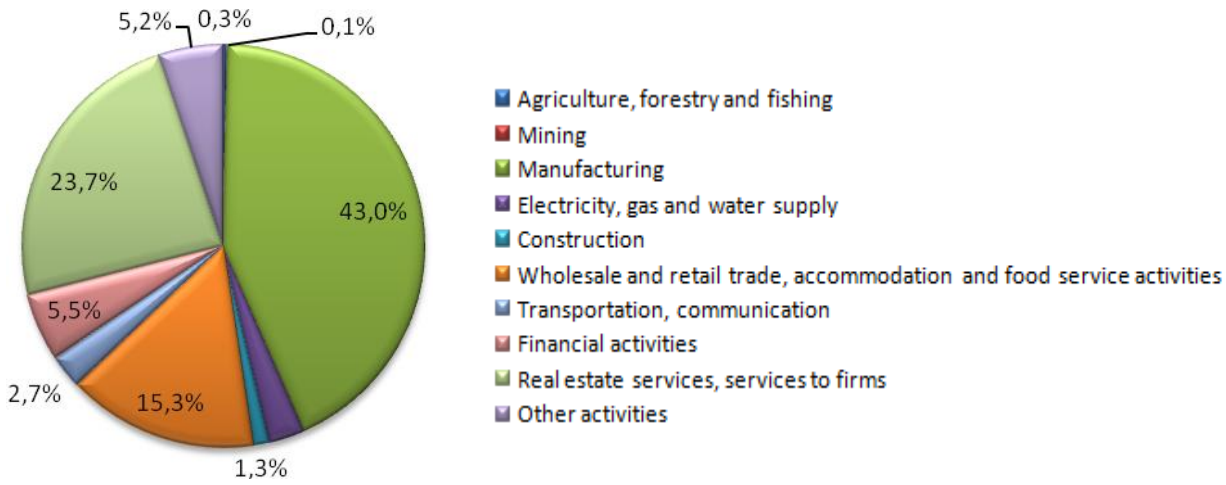


Figure 1.9. Share of each sector in total gross FDI inflows in Portugal (2001)

Figure 1.10. FDI inflows in Portugal by sector (2003-2009)

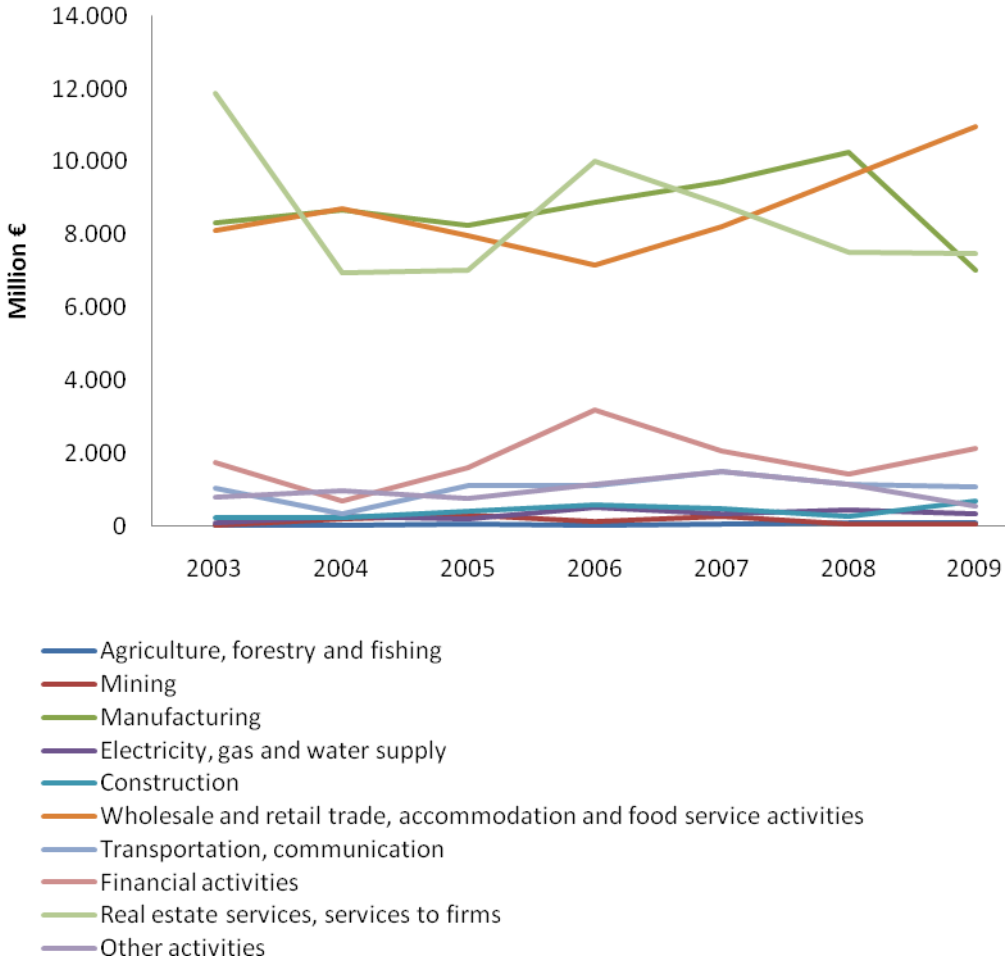


Figure 1.11. Share of each sector in total gross FDI inflows in Portugal (2004)

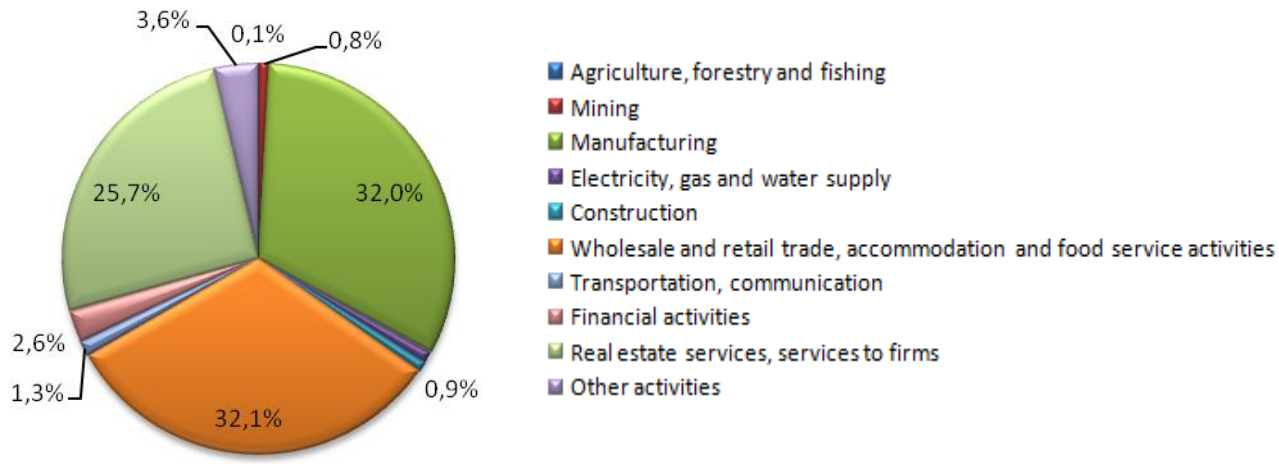


Figure 1.12. Share of each sector in total gross FDI inflows in Portugal (2009)

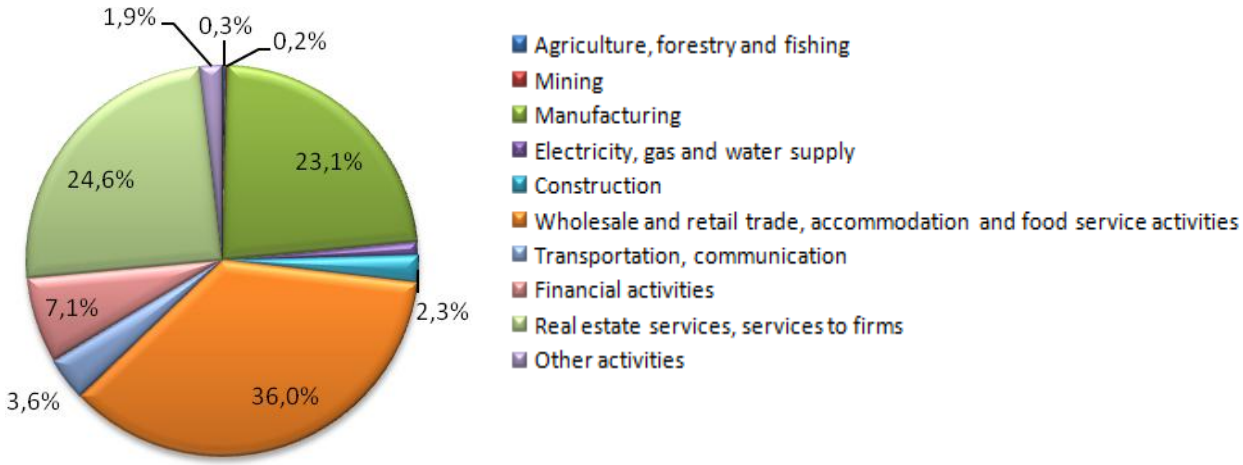
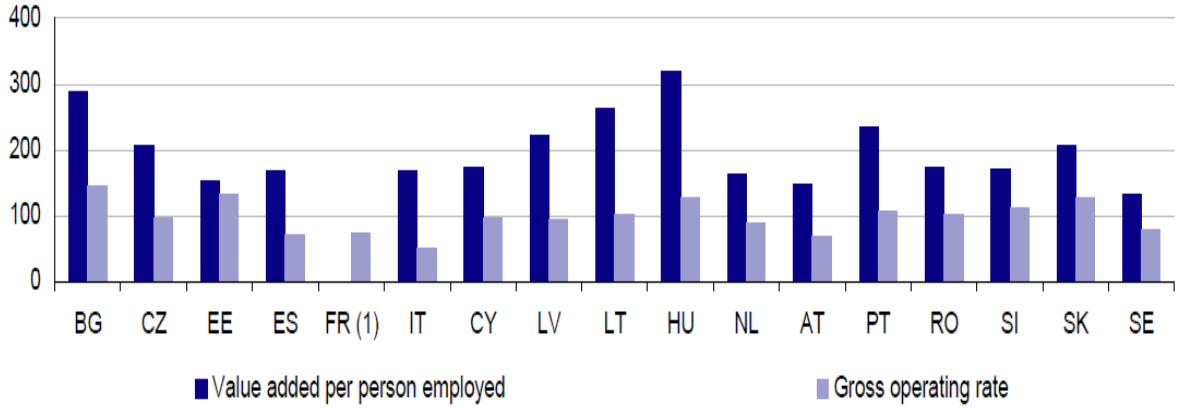


Figure 1.13. Value added per person employed and gross operating rate for foreign-controlled enterprises, non-financial business economy (national-controlled enterprises = 100)



(1) Value added per person employed not available.

Source: Eurostat, 2008

Annex 2

Figure 2.1. Stata output for total FDI gross inflows

```
. regress fdi_total lagfdi_total labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	77.1686748	6	12.8614458	Number of obs	= 29
Residual	3.25134935	22	.147788607	F(6, 22)	= 87.03
				Prob > F	= 0.0000
				R-squared	= 0.9596
				Adj R-squared	= 0.9485
Total	80.4200241	28	2.87214372	Root MSE	= .38443

fdi_total	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_total	.537184	.1325495	4.05	0.001	.2622931	.8120749
labor_rigid	-.118497	.4959337	-0.24	0.813	-1.147001	.9100065
openness	.0639102	.0190354	3.36	0.003	.0244332	.1033871
ln_exch_rate	1.317646	.5097846	2.58	0.017	.2604178	2.374875
ln_minwager	3.651605	1.946692	1.88	0.074	-.3855867	7.688797
dif_CTR	-.0570947	.0388782	-1.47	0.156	-.1377232	.0235338
_cons	-10.81818	8.240832	-1.31	0.203	-27.90862	6.272265

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_total

         chi2(1)      =     0.69
         Prob > chi2  =   0.4065

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.028	1	0.8666
2	0.593	2	0.7436
3	4.636	3	0.2005

H0: no serial correlation

Figure 2.2. Stata output for FDI gross inflows in agriculture, hunting, forestry and fishing sectors

```
. regress fdi_agric lagfdi_agric labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	10.0589295	6	1.67648825	Number of obs	= 29
Residual	9.54148011	22	.433703642	F(6, 22)	= 3.87
				Prob > F	= 0.0087
				R-squared	= 0.5132
				Adj R-squared	= 0.3804
Total	19.6004096	28	.700014628	Root MSE	= .65856

fdi_agric	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_agric	.3863355	.1907511	2.03	0.055	-.009258	.7819289
labor_rigid	.3646227	.8082648	0.45	0.656	-1.311616	2.040861
openness	.0591884	.0316443	1.87	0.075	-.0064378	.1248146
ln_exch_rate	.022975	.5974442	0.04	0.970	-1.216049	1.261999
ln_minwager	.9096482	2.982005	0.31	0.763	-5.274652	7.093949
dif_CTR	-.0990128	.0659908	-1.50	0.148	-.2358692	.0378437
_cons	-3.573144	14.78015	-0.24	0.811	-34.22531	27.07902

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_agric

         chi2(1)      =     0.10
         Prob > chi2  =   0.7531

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	5.575	1	0.0182
2	5.871	2	0.0531
3	5.890	3	0.1171

H0: no serial correlation

Figure 2.3. Stata output for FDI gross inflows in agriculture, hunting, forestry and fishing sectors (Corrected for serial correlation)

```
. newey fdi_agric lagfdi_agric labor_rigid openness ln_exch_rate ln_minwager dif_CTR, lag(3)

Regression with Newey-West standard errors          Number of obs  =        29
maximum lag: 3                                      F( 6, 22)      =     15.78
                                                    Prob > F       =    0.0000
```

fdi_agric	Coef.	Newey-West Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_agric	.3863355	.1700102	2.27	0.033	.0337559	.738915
labor_rigid	.3646227	.6710701	0.54	0.592	-1.027091	1.756337
openness	.0591884	.0225541	2.62	0.015	.012414	.1059628
ln_exch_rate	.022975	.6213815	0.04	0.971	-1.265691	1.311641
ln_minwager	.9096482	2.213666	0.41	0.685	-3.681214	5.50051
dif_CTR	-.0990128	.0398483	-2.48	0.021	-.1816532	-.0163724
_cons	-3.573144	10.64213	-0.34	0.740	-25.64356	18.49727

Figure 2.4. Stata output for FDI gross inflows in mining and quarrying activities

```
. regress fdi_mining lagfdi_mining labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	25.7533577	6	4.29222628	Number of obs	= 29
Residual	26.7229287	22	1.21467858	F(6, 22)	= 3.53
				Prob > F	= 0.0133
Total	52.4762864	28	1.87415309	R-squared	= 0.4908
				Adj R-squared	= 0.3519
				Root MSE	= 1.1021

fdi_mining	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_min~g	.464385	.1817078	2.56	0.018	.0875461	.8412238
labor_rigid	-.7934903	1.337257	-0.59	0.559	-3.566791	1.979811
openness	.0809957	.0552379	1.47	0.157	-.0335606	.1955521
ln_exch_rate	-1.15917	1.108121	-1.05	0.307	-3.457273	1.138933
ln_minwager	-3.584905	4.985417	-0.72	0.480	-13.92403	6.754218
dif_CTR	-.0591856	.0992402	-0.60	0.557	-.2649972	.1466261
_cons	15.41033	23.95309	0.64	0.527	-34.26534	65.086

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_mining

         chi2(1)      =     0.12
         Prob > chi2  =   0.7252

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	1.291	1	0.2559
2	1.376	2	0.5026
3	1.377	3	0.7109

H0: no serial correlation

Figure 2.5. Stata output for FDI gross inflows in manufacturing activities

```
. regress fdi_manuf lagfdi_manuf labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	71.8005552	6	11.9667592	Number of obs	29
Residual	3.70576495	22	.168443861	F(6, 22)	71.04
				Prob > F	0.0000
Total	75.5063201	28	2.69665429	R-squared	0.9509
				Adj R-squared	0.9375
				Root MSE	.41042

fdi_manuf	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_manuf	.4415311	.1508565	2.93	0.008	.1286739	.7543883
labor_rigid	-.0294142	.5056748	-0.06	0.954	-1.07812	1.019291
openness	.0722416	.020939	3.45	0.002	.0288168	.1156664
ln_exch_rate	1.641637	.5678488	2.89	0.008	.4639909	2.819284
ln_minwager	5.451395	2.307966	2.36	0.027	.6649657	10.23782
dif_CTR	-.0349317	.0391443	-0.89	0.382	-.1161119	.0462486
_cons	-17.87986	9.314792	-1.92	0.068	-37.19755	1.437839

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_manuf

         chi2(1)      =     1.01
         Prob > chi2  =   0.3152

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.208	1	0.6484
2	0.432	2	0.8059
3	1.348	3	0.7178

H0: no serial correlation

Figure 2.6. Stata output for FDI gross inflows in the construction sector

```
. regress fdi_const lagfdi_const labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	80.0218049	6	13.3369675	Number of obs	29
Residual	7.5149243	22	.341587468	F(6, 22)	39.04
				Prob > F	0.0000
				R-squared	0.9142
				Adj R-squared	0.8907
Total	87.5367292	28	3.12631176	Root MSE	.58445

fdi_const	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_const	.5785583	.1289918	4.49	0.000	.3110456	.846071
labor_rigid	-.2547591	.7431207	-0.34	0.735	-1.795897	1.286379
openness	.0309435	.0283358	1.09	0.287	-.0278213	.0897083
ln_exch_rate	1.147728	.5910064	1.94	0.065	-.0779441	2.3734
ln_minwager	.4603512	2.590324	0.18	0.861	-4.911652	5.832354
dif_CTR	-.1774446	.0649866	-2.73	0.012	-.3122187	-.0426706
_cons	1.829284	12.56751	0.15	0.886	-24.23413	27.8927

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_const

         chi2(1)      =     0.94
         Prob > chi2  =   0.3317

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	0.378	1	0.5386
2	0.816	2	0.6650
3	4.041	3	0.2570

H0: no serial correlation

Figure 2.7. Stata output for FDI gross inflows in the utilities sector

```
. regress fdi_elect lagfdi_elect labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	72.4365075	6	12.0727512	Number of obs	= 21
Residual	30.1965894	14	2.15689924	F(6, 14)	= 5.60
				Prob > F	= 0.0038
				R-squared	= 0.7058
				Adj R-squared	= 0.5797
Total	102.633097	20	5.13165484	Root MSE	= 1.4686

fdi_elect	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_elect	-.0221987	.259231	-0.09	0.933	-.5781939	.5337965
labor_rigid	-4.685287	5.377061	-0.87	0.398	-16.21794	6.847362
openness	.0256304	.0892424	0.29	0.778	-.1657754	.2170362
ln_exch_rate	4.711359	3.655401	1.29	0.218	-3.128696	12.55141
ln_minwager	8.025293	27.12765	0.30	0.772	-50.15774	66.20832
dif_CTR	-.0790327	.2560648	-0.31	0.762	-.6282371	.4701717
_cons	-5.596886	121.3076	-0.05	0.964	-265.7759	254.5821

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_elect

         chi2(1)      =     0.03
         Prob > chi2  =   0.8653

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.517	1	0.4719
2	2.412	2	0.2994
3	3.124	3	0.3730

H0: no serial correlation

Figure 2.8. Stata output for FDI gross inflows in the sector of wholesale and retail trade, accommodation and food services activities.

```
. regress fdi_retail lagfdi_retail labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	91.7974854	6	15.2995809	Number of obs	29
Residual	5.22559226	22	.237526921	F(6, 22)	64.41
				Prob > F	0.0000
				R-squared	0.9461
				Adj R-squared	0.9315
Total	97.0230777	28	3.46510992	Root MSE	.48737

fdi_retail	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_ret~l	.5748304	.1480181	3.88	0.001	.2678596	.8818011
labor_rigid	-.5194809	.6243752	-0.83	0.414	-1.814356	.7753941
openness	.050558	.0257216	1.97	0.062	-.0027852	.1039013
ln_exch_rate	.967838	.5872254	1.65	0.114	-.249993	2.185669
ln_minwager	4.058375	2.490254	1.63	0.117	-1.106096	9.222846
dif_CTR	-.0278543	.0449845	-0.62	0.542	-.1211466	.0654379
_cons	-11.30378	10.65807	-1.06	0.300	-33.40727	10.79971

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_retail

         chi2(1)      =     1.51
         Prob > chi2  =   0.2198

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.020	1	0.8880
2	0.092	2	0.9550
3	7.621	3	0.0545

H0: no serial correlation

Figure 2.9. Stata output for FDI gross inflows in the transport and communication sector

```
. regress fdi_transp lagfdi_transp labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	125.495638	6	20.9159397	Number of obs	29
Residual	17.5111457	22	.795961169	F(6, 22)	26.28
				Prob > F	0.0000
Total	143.006784	28	5.10738514	R-squared	0.8776
				Adj R-squared	0.8442
				Root MSE	.89217

fdi_transp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_tra~p	.1118938	.2008786	0.56	0.583	-.3047029	.5284905
labor_rigid	-2.362666	1.128688	-2.09	0.048	-4.703423	-.0219096
openness	.0842512	.0459599	1.83	0.080	-.0110637	.1795662
ln_exch_rate	2.939023	1.103775	2.66	0.014	.6499335	5.228113
ln_minwager	4.196608	4.496931	0.93	0.361	-5.129456	13.52267
dif_CTR	-.1033709	.079832	-1.29	0.209	-.2689323	.0621904
_cons	-3.104844	19.72171	-0.16	0.876	-44.00517	37.79548

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_transp

         chi2(1)      =     1.32
         Prob > chi2  =   0.2512

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.183	1	0.6689
2	0.919	2	0.6316
3	2.164	3	0.5391

H0: no serial correlation

Figure 2.10. Stata output for FDI gross inflows in the financial sector

```
. regress fdi_financ lagfdi_financ labor_rigid openness ln_exch_rate ln_minwager dif_CTR

      Source |       SS       df       MS              Number of obs =      29
-------------+------------------------------           F(  6,    22) =   20.13
       Model |  55.1293789     6  9.18822981            Prob > F      =  0.0000
    Residual |  10.0424355    22  .456474341           R-squared     =  0.8459
-------------+------------------------------           Adj R-squared =  0.8039
       Total |  65.1718144    28  2.3275648            Root MSE      =  .67563

------------------------------------------------------------------------------
  fdi_financ |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lagfdi_fin~c |   .4860495   .1593208     3.05   0.006     .1556384    .8164606
 labor_rigid |   -.484502   .8649114    -0.56   0.581    -2.278218    1.309214
    openness |   .0739892   .0326746     2.26   0.034     .0062263    .1417521
ln_exch_rate |   .9476532   .7212299     1.31   0.202    -.548086     2.443392
 ln_minwager |   .7735054   3.003898     0.26   0.799    -5.456198    7.003209
     dif_CTR |  -.0839984   .0658214    -1.28   0.215    -.2205036    .0525069
       _cons |   .4048121   14.54535     0.03   0.978    -29.7604     30.57003
------------------------------------------------------------------------------

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_financ

         chi2(1)      =     0.59
         Prob > chi2  =   0.4417

. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation

----------------------------------------------------------------------------
    lags(p) |          chi2               df                 Prob > chi2
------------+---------------------------------------------------------------
          1 |         3.379                1                        0.0660
          2 |         4.740                2                        0.0935
          3 |         4.742                3                        0.1917
----------------------------------------------------------------------------
                     H0: no serial correlation
```

Figure 2.11. Stata output for FDI gross inflows in the financial sector (corrected for serial correlation)

```
. newey fdi_financ lagfdi_financ labor_rigid openness ln_exch_rate ln_minwager dif_CTR, lag(3)

Regression with Newey-West standard errors          Number of obs  =        29
maximum lag: 3                                      F(  6,    22)  =     75.07
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
  fdi_financ |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lagfdi_fin~c |   .4860495   .1989973     2.44   0.023     .0733543    .8987447
 labor_rigid |   -.484502   .6245191    -0.78   0.446    -1.779675    .8106712
    openness |   .0739892   .0243468     3.04   0.006     .0234969    .1244814
ln_exch_rate |   .9476532   .6213949     1.53   0.141    -.3410409    2.236347
 ln_minwager |   .7735054   2.105489     0.37   0.717    -3.593011    5.140022
     dif_CTR |  -.0839984    .045677    -1.84   0.079    -.1787267     .01073
       _cons |   .4048121   9.085954     0.04   0.965    -18.4383     19.24793
------------------------------------------------------------------------------
```

Figure 2.12. Stata output for FDI gross inflows in real estate activities and businesses to firms sector

```
. regress fdi_firmsserv lagfdi_firmsserv labor_rigid openness ln_exch_rate ln_minwager dif_CTR
```

Source	SS	df	MS		
Model	105.018967	6	17.5031612	Number of obs	= 29
Residual	6.98776662	22	.317625756	F(6, 22)	= 55.11
				Prob > F	= 0.0000
				R-squared	= 0.9376
				Adj R-squared	= 0.9206
Total	112.006734	28	4.00024048	Root MSE	= .56358

fdi_firmss~v	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_fir~v	.6362211	.1566084	4.06	0.001	.3114351	.9610071
labor_rigid	.9406988	.7133091	1.32	0.201	-.5386138	2.420011
openness	.0534094	.0282573	1.89	0.072	-.0051926	.1120115
ln_exch_rate	1.726901	.7969389	2.17	0.041	.0741512	3.379651
ln_minwager	5.22184	2.646602	1.97	0.061	-.2668763	10.71056
dif_CTR	-.0763712	.0649984	-1.17	0.253	-.2111697	.0584273
_cons	-21.89412	11.97245	-1.83	0.081	-46.72345	2.935216

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_firmsserv

         chi2(1)      =     0.29
         Prob > chi2  =   0.5875
```

```
. estat bgodfrey, lags (1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.206	1	0.6497
2	1.633	2	0.4420
3	3.161	3	0.3675

H0: no serial correlation

Figure 2.13. Stata output for total FDI gross inflows, with dummy EEC

```
. regress  fdi_total  lagfdi_total openness dif_CTR ln_exch_rate  labor_rigid  ln_minwager  EEC
```

Source	SS	df	MS
Model	77.1784895	7	11.0254985
Residual	3.24153463	21	.154358792
Total	80.4200241	28	2.87214372

Number of obs = 29
F(7, 21) = 71.43
Prob > F = 0.0000
R-squared = 0.9597
Adj R-squared = 0.9463
Root MSE = .39289

fdi_total	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_total	.5442251	.1383119	3.93	0.001	.2565899	.8318604
openness	.0653865	.0203158	3.22	0.004	.0231375	.1076354
dif_CTR	-.0468428	.0568478	-0.82	0.419	-.1650642	.0713786
ln_exch_rate	1.200861	.6970915	1.72	0.100	-.2488204	2.650542
labor_rigid	-.0971522	.5138577	-0.19	0.852	-1.165778	.9714733
ln_minwager	3.580173	2.00956	1.78	0.089	-.5989356	7.759281
EEC	.1020889	.4048606	0.25	0.803	-.7398647	.9440425
_cons	-10.95028	8.438298	-1.30	0.208	-28.49868	6.598126

```
. estat bgodfrey, lags(1 2 3)
```

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	0.045	1	0.8314
2	0.577	2	0.7493
3	4.749	3	0.1912

H0: no serial correlation

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         H0: Constant variance
         Variables: fitted values of fdi_total

         chi2(1)      =     0.60
         Prob > chi2  =   0.4380
```

Figure 2.14. Stata output for total FDI gross inflows, with dummy euro

```
. regress fdi_total lagfdi_total dif_CTR labor_rigid openness ln_minwager ln_exc
> h_rate eur
```

Source	SS	df	MS
Model	77.1889805	7	11.0269972
Residual	3.23104361	21	.15385922
Total	80.4200241	28	2.87214372

Number of obs	29
F(7, 21)	71.67
Prob > F	0.0000
R-squared	0.9598
Adj R-squared	0.9464
Root MSE	.39225

fdi_total	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_total	.5653833	.1559371	3.63	0.002	.2410943	.8896722
dif_CTR	-.0508539	.0432286	-1.18	0.253	-.1407526	.0390447
labor_rigid	-.0873226	.5132414	-0.17	0.867	-1.154667	.9800212
openness	.0668704	.0210624	3.17	0.005	.0230687	.110672
ln_minwager	3.912333	2.111956	1.85	0.078	-.4797199	8.304385
ln_exch_rate	1.301072	.5221463	2.49	0.021	.2152095	2.386935
eur	-.1244432	.3425495	-0.36	0.720	-.8368139	.5879276
_cons	-12.45262	9.536374	-1.31	0.206	-32.28459	7.379357

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_total

         chi2(1)      =     0.57
         Prob > chi2  =   0.4485

. estat bgodfrey, lags(1 2 3 )

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.001	1	0.9695
2	0.806	2	0.6683
3	4.919	3	0.1778

H0: no serial correlation

Figure 2.15. Stata output for FDI gross inflows in agriculture, hunting, forestry and fishing sectors – reduced model

```
. regress fdi_agric lagfdi_agric dif_CTR openness
```

Source	SS	df	MS
Model	9.94932166	3	3.31644055
Residual	9.65108793	25	.386043517
Total	19.6004096	28	.700014628

Number of obs	29
F(3, 25)	8.59
Prob > F	0.0004
R-squared	0.5076
Adj R-squared	0.4485
Root MSE	.62132

fdi_agric	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_agric	.3592946	.1720161	2.09	0.047	.0050209	.7135683
dif_CTR	-.0986273	.0579155	-1.70	0.101	-.2179064	.0206519
openness	.0516598	.0253878	2.03	0.053	-.0006274	.1039471
_cons	1.952168	2.090559	0.93	0.359	-2.353418	6.257755

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_agric

         chi2(1)      =     0.15
         Prob > chi2  =   0.7018

. estat bgodfrey, lags(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	4.133	1	0.0421
2	4.256	2	0.1191
3	4.586	3	0.2048

H0: no serial correlation

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_agric
       Ho:  model has no omitted variables
                  F(3, 22) =      0.66
                  Prob > F =      0.5845
```

Figure 2.16. Stata output for FDI gross inflows in agriculture, hunting, forestry and fishing sectors – reduced model (Corrected for serial correlation)

```
. newey fdi_agric lagfdi_agric dif_CTR openness, lag(2)

Regression with Newey-West standard errors          Number of obs   =        29
maximum lag: 2                                      F(  3,    25)   =     23.95
                                                    Prob > F        =    0.0000
```

fdi_agric	Coef.	Newey-West Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_agric	.3592946	.154561	2.32	0.029	.0409702	.677619
dif_CTR	-.0986273	.0263455	-3.74	0.001	-.1528867	-.0443678
openness	.0516598	.0189334	2.73	0.011	.0126657	.0906539
_cons	1.952168	1.186849	1.64	0.113	-.4921927	4.396529

Figure 2.17. Stata output for FDI gross inflows in manufacturing activities – reduced model

```
. regress fdi_manuf lagfdi_manuf ln_exch_rate dif_CTR  openness gdp_indus ln_minwager
```

Source	SS	df	MS
Model	72.2738024	6	12.0456337
Residual	3.23251772	22	.146932624
Total	75.5063201	28	2.69665429

```
Number of obs =      29
F(  6,    22) =   81.98
Prob > F      =  0.0000
R-squared     =  0.9572
Adj R-squared =  0.9455
Root MSE      =  .38332
```

fdi_manuf	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_manuf	.4987991	.1377799	3.62	0.002	.213061	.7845372
ln_exch_rate	1.652944	.5288871	3.13	0.005	.5560996	2.749789
dif_CTR	-.0556591	.0383222	-1.45	0.161	-.1351345	.0238162
openness	.073122	.0192262	3.80	0.001	.0332492	.1129948
gdp_indus	9.595835	5.343631	1.80	0.086	-1.486178	20.67785
ln_minwager	5.789722	1.979501	2.92	0.008	1.684489	9.894955
_cons	-22.63399	6.91743	-3.27	0.003	-36.97987	-8.288123

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_manuf

         chi2(1)      =     1.57
         Prob > chi2  =   0.2106

. estat bgodfrey, lag(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.523	1	0.4694
2	2.858	2	0.2395
3	4.652	3	0.1991

H0: no serial correlation

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_manuf
       Ho:  model has no omitted variables
                  F(3, 18) =      1.86
                  Prob > F =      0.1726
```

Figure 2.18. Stata output for FDI gross inflows in manufacturing activities – reduced model (with robust standard errors)

```
. regress fdi_manuf lagfdi_manuf ln_exch_rate dif_CTR  openness gdp_indus ln_minwager, vce(hc2)

Linear regression                               Number of obs =         29
                                                F(  6,    22) =     173.21
                                                Prob > F      =     0.0000
                                                R-squared     =     0.9572
                                                Root MSE      =     .38332
```

fdi_manuf	Coef.	Robust HC2 Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_manuf	.4987991	.1682835	2.96	0.007	.1498004	.8477977
ln_exch_rate	1.652944	.5872342	2.81	0.010	.4350952	2.870794
dif_CTR	-.0556591	.0231019	-2.41	0.025	-.1035696	-.0077486
openness	.073122	.0193933	3.77	0.001	.0329028	.1133412
gdp_indus	9.595835	4.360271	2.20	0.039	.5531861	18.63848
ln_minwager	5.789722	2.786209	2.08	0.050	.0114773	11.56797
_cons	-22.63399	10.23746	-2.21	0.038	-43.8652	-1.402793

Figure 2.19. Stata output for FDI gross inflows in utilities – reduced model

```
. regress fdi_elect lagfdi_elect lngdpcapr
```

Source	SS	df	MS		
Model	72.2790607	2	36.1395304	Number of obs =	21
Residual	30.3540361	18	1.68633534	F(2, 18) =	21.43
				Prob > F =	0.0000
				R-squared =	0.7042
				Adj R-squared =	0.6714
Total	102.633097	20	5.13165484	Root MSE =	1.2986

fdi_elect	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_elect	-.14861	.2491122	-0.60	0.558	-.6719753	.3747553
lngdpcapr	15.86806	4.295315	3.69	0.002	6.843936	24.89218
_cons	4.234598	1.073382	3.95	0.001	1.979505	6.489691

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_elect
       Ho:  model has no omitted variables
                  F(3, 15) =      0.50
                  Prob > F =      0.6876

. estat bgodfrey, lags(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	2.032	1	0.1540
2	2.047	2	0.3594
3	2.464	3	0.4818

H0: no serial correlation

```
.

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_elect

         chi2(1)      =     2.24
         Prob > chi2  =   0.1348
```

Figure 2.20. Stata output for FDI gross inflows in the construction sector – reduced model

```
. regress fdi_const lagfdi_const dif_CTR ln_exch_rate
```

Source	SS	df	MS		
Model	79.3174017	3	26.4391339	Number of obs	29
Residual	8.21932747	25	.328773099	F(3, 25)	80.42
				Prob > F	0.0000
				R-squared	0.9061
				Adj R-squared	0.8948
Total	87.5367292	28	3.12631176	Root MSE	.57339

fdi_const	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_const	.6709226	.0998765	6.72	0.000	.4652231	.8766221
dif_CTR	-.1762321	.0631948	-2.79	0.010	-.3063841	-.04608
ln_exch_rate	1.17538	.5289735	2.22	0.036	.0859383	2.264821
_cons	3.763944	1.077313	3.49	0.002	1.545177	5.98271

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_const
       Ho:  model has no omitted variables
                  F(3, 22) =      0.77
                  Prob > F =      0.5258

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_const

         chi2(1)      =     0.35
         Prob > chi2  =   0.5552

. estat bgodfrey, lags(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.068	1	0.7950
2	0.119	2	0.9424
3	2.315	3	0.5096

H0: no serial correlation

Figure 2.21. Stata output for FDI gross inflows in the sector of wholesale and retail trade, accommodation and food services activities – reduced model

```
. regress  fdi_retail  lagfdi_retail lngdpcapr  openness
```

Source	SS	df	MS		
Model	92.1355246	3	30.7118415	Number of obs =	29
Residual	4.88755311	25	.195502125	F(3, 25) =	157.09
				Prob > F =	0.0000
				R-squared =	0.9496
				Adj R-squared =	0.9436
Total	97.0230777	28	3.46510992	Root MSE =	.44216

fdi_retail	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_ret~l	.5573804	.1264476	4.41	0.000	.2969568	.817804
lngdpcapr	2.575067	.8585658	3.00	0.006	.8068177	4.343316
openness	.0413168	.0222033	1.86	0.075	-.0044118	.0870455
_cons	2.080972	1.50447	1.38	0.179	-1.017541	5.179485

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_retail
       Ho:  model has no omitted variables
                  F(3, 22) =      1.97
                  Prob > F =      0.1476

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_retail

         chi2(1)      =     0.72
         Prob > chi2  =   0.3969

. estat bgodfrey, lags(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.256	1	0.6127
2	0.288	2	0.8658
3	2.794	3	0.4245

H0: no serial correlation

Figure 2.22. Stata output for FDI gross inflows in the transport and communication sector – reduced model

```
. regress fdi_transp lagfdi_transp  lngdpcapr  openness  labor_rigid ln_exch_rate
```

Source	SS	df	MS		
Model	126.003474	5	25.2006948	Number of obs	= 29
Residual	17.00331	23	.739274347	F(5, 23)	= 34.09
				Prob > F	= 0.0000
				R-squared	= 0.8811
				Adj R-squared	= 0.8553
Total	143.006784	28	5.10738514	Root MSE	= .85981

fdi_transp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_tra~p	.0505584	.1904924	0.27	0.793	-.3435051	.4446218
lngdpcapr	3.606452	1.842892	1.96	0.063	-.2058605	7.418764
openness	.0787748	.0423537	1.86	0.076	-.0088406	.1663902
labor_rigid	-1.923545	1.134178	-1.70	0.100	-4.26977	.4226806
ln_exch_rate	1.413194	.8963516	1.58	0.129	-.4410508	3.267438
_cons	10.70578	5.911794	1.81	0.083	-1.5237	22.93526

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_transp

         chi2(1)      =     0.66
         Prob > chi2  =   0.4166
```

```
. estat bgodfrey, lag(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.388	1	0.5332
2	0.646	2	0.7240
3	1.519	3	0.6778

H0: no serial correlation

Figure 2.23. Stata output for FDI gross inflows in the financial sector – reduced model

```
. regress  fdi_financ  lagfdi_financ openness dif_CTR   ln_exch_rate
```

Source	SS	df	MS		
Model	54.6343969	4	13.6585992	Number of obs	= 29
Residual	10.5374175	24	.439059063	F(4, 24)	= 31.11
				Prob > F	= 0.0000
				R-squared	= 0.8383
				Adj R-squared	= 0.8114
Total	65.1718144	28	2.3275648	Root MSE	= .66262

fdi_financ	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_fin~c	.5886742	.1221977	4.82	0.000	.3364705	.8408779
openness	.084943	.0296443	2.87	0.009	.0237602	.1461258
dif_CTR	-.0889286	.0641127	-1.39	0.178	-.2212508	.0433935
ln_exch_rate	.7617594	.6378279	1.19	0.244	-.5546526	2.078171
_cons	-.3468415	2.350074	-0.15	0.884	-5.197157	4.503474

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_financ

         chi2(1)      =     0.80
         Prob > chi2  =   0.3696

. estat bgodfrey, lags(1 2 3)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	5.350	1	0.0207
2	7.820	2	0.0200
3	7.989	3	0.0462

H0: no serial correlation

```
. ovtest

Ramsey RESET test using powers of the fitted values of fdi_financ
       Ho:  model has no omitted variables
                  F(3, 21) =      2.22
                  Prob > F =      0.1162

.
```

Figure 2.24. Stata output for FDI gross inflows in the financial sector (corrected for serial correlation)– reduced model

```
. newey  fdi_financ  lagfdi_financ openness dif_CTR   ln_exch_rate , lag(2)

Regression with Newey-West standard errors          Number of obs   =        29
maximum lag: 2                                      F(  4,    24)   =    108.92
                                                    Prob > F        =    0.0000
```

fdi_financ	Coef.	Newey-West Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_fin~c	.5886742	.1258296	4.68	0.000	.3289746	.8483737
openness	.084943	.02293	3.70	0.001	.0376178	.1322682
dif_CTR	-.0889286	.0451058	-1.97	0.060	-.1820225	.0041652
ln_exch_rate	.7617594	.4380128	1.74	0.095	-.1422547	1.665773
_cons	-.3468415	1.624991	-0.21	0.833	-3.700658	3.006975

Figure 2.25. Stata output for FDI gross inflows in real estate activities and businesses to firms sector – reduced model

```
. regress   fdi_firmsserv  lagfdi_firmsserv openness lngdpcapr dif_CTR ln_exch_rate
```

Source	SS	df	MS		
Model	105.56178	5	21.112356	Number of obs	= 29
Residual	6.44495372	23	.280215379	F(5, 23)	= 75.34
				Prob > F	= 0.0000
Total	112.006734	28	4.00024048	R-squared	= 0.9425
				Adj R-squared	= 0.9300
				Root MSE	= .52935

fdi_firmss~v	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lagfdi_fir~v	.3060534	.18724	1.63	0.116	-.081282	.6933889
openness	.0448891	.025919	1.73	0.097	-.0087285	.0985067
lngdpcapr	3.34242	1.318891	2.53	0.019	.6140858	6.070755
dif_CTR	-.0783745	.0592954	-1.32	0.099	-.2010364	.0442875
ln_exch_rate	1.07723	.5888012	1.83	0.080	-.1407985	2.295258
_cons	4.9349	2.228645	2.21	0.037	.3245974	9.545203

```
. estat bgodfrey, lags(1 2 3)
```

Breusch-Godfrey LM test for autocorrelation

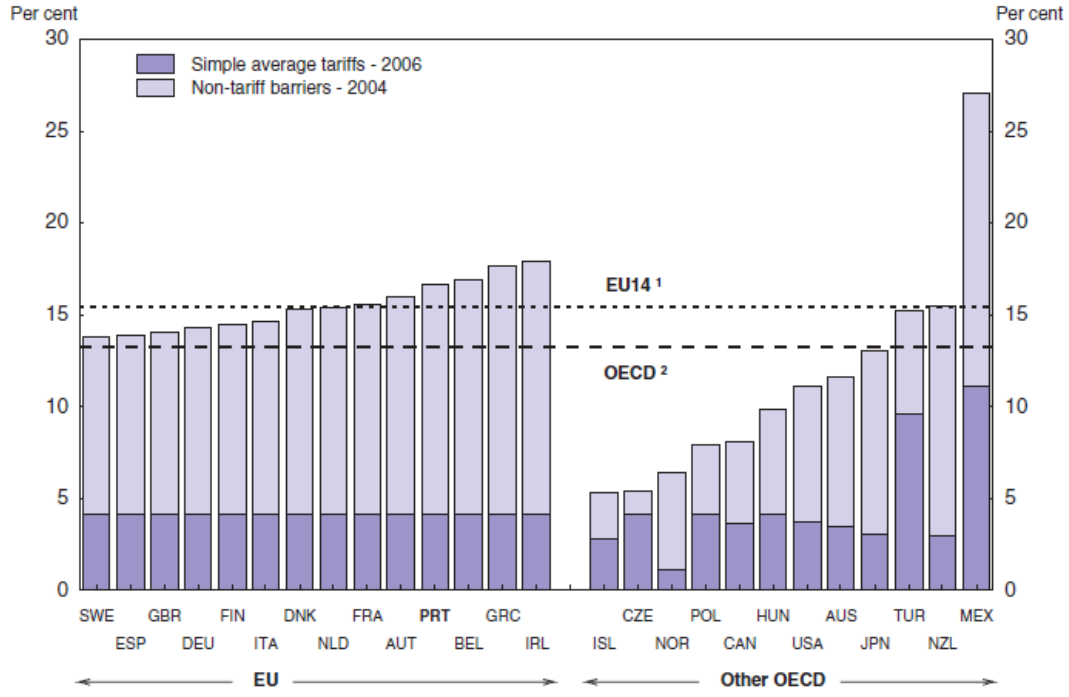
lags(*p*)	chi2	df	Prob > chi2
1	0.585	1	0.4445
2	0.640	2	0.7263
3	0.864	3	0.8342

H0: no serial correlation

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of fdi_firmsserv

         chi2(1)      =     0.76
         Prob > chi2  =   0.3827

. ovtest

Ramsey RESET test using powers of the fitted values of fdi_firmsserv
       Ho:  model has no omitted variables
                  F(3, 20) =      0.76
                  Prob > F =      0.5273
```

Annex 3

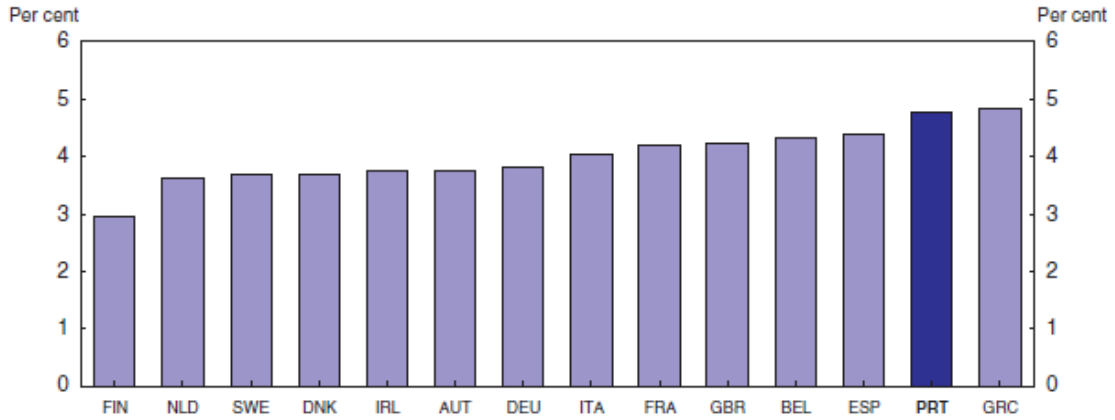
Figure 3.1. Total trade barriers (tariff and non-tariff) in comparison



1. EU14 is EU15 minus Luxembourg.
2. OECD does not include Korea, Luxembourg and the Slovak Republic.

Source: OECD, 2008

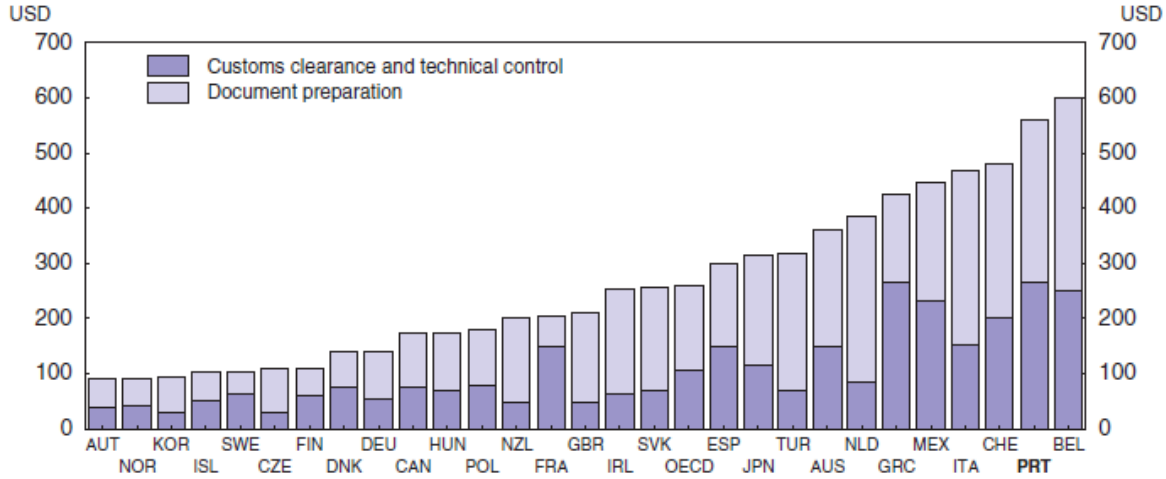
Figure 3.2. Trade weighted tariffs for manufacturing in the EU, 2004



1. Weighted average tariff rates with weights given by import values in each industrial sector from the STAN database.

Source: OECD, 2008

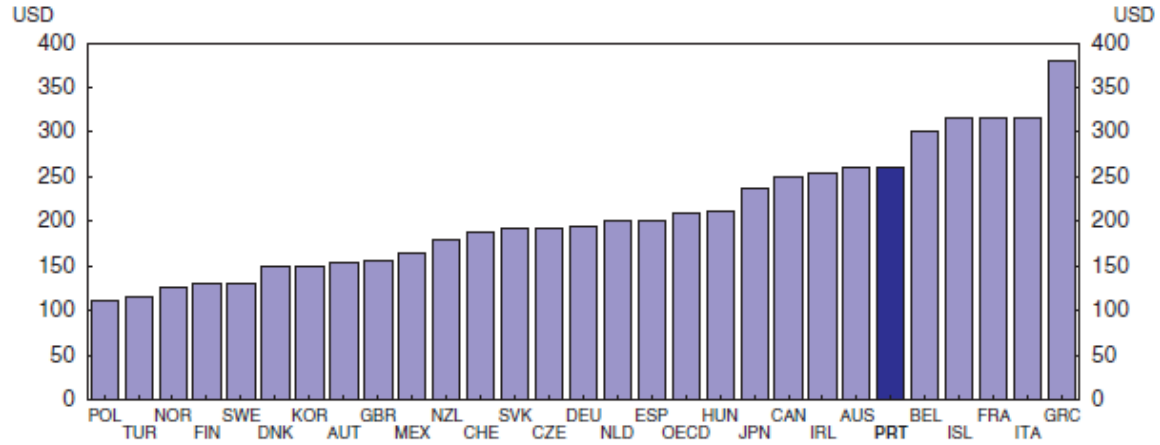
Figure 3.3. Customs and document costs of importing a container, 2007



1. Costs refer to importing a 20-foot container.

Source: OECD, 2008

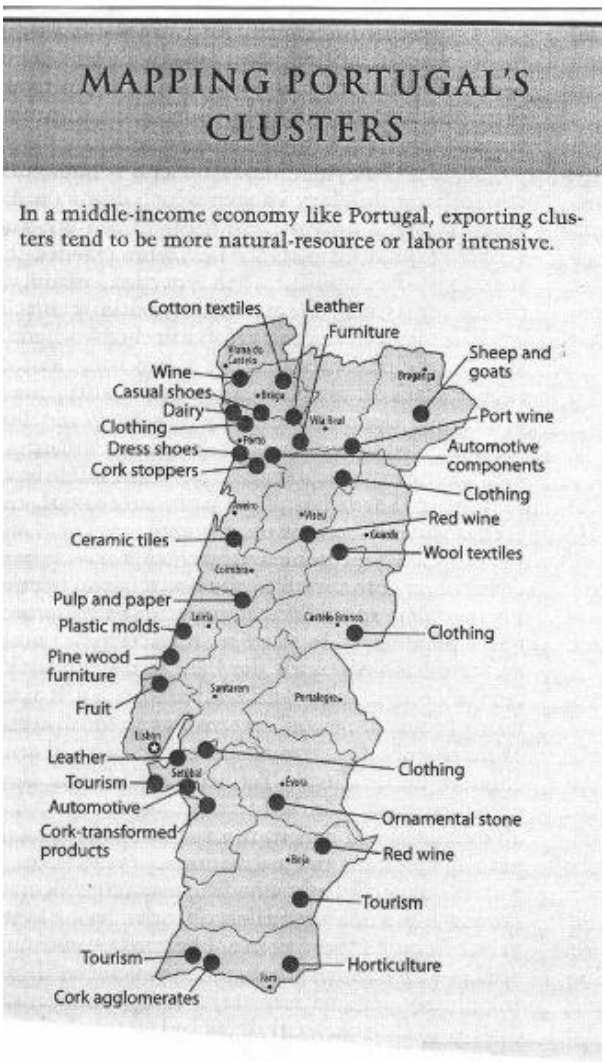
Figure 3.4. Port and terminal handling charges associated with importing a container, 2007



1. Charges refer to importing a 20-foot container.

Source: OECD, 2008

Figure 3.5. Clusters in Portugal



Source: Michael Porter, 1998