



**Foreign Direct Investment according to different countries’
stages of Human Development**

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Master Dissertation in Finance and Taxation

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August 2017

Biographic Note

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Acknowledgments

I would like to recognise the support that my parents have always given me in the writing of this dissertation and throughout my academic life, they have always given me advice, encouragement and the means with which I could develop my studies and knowledge of the world.

I would also like to express my gratitude to Professor Francisco Vitorino Silva, with his knowledge, guidance, good disposition and readiness to help. I would also like to thank Professor Elísio Brandão, as well as the remaining professors and teachers I had in the Masters in Finance and Taxation in the School of Economics and Management of the University of Porto, without their guidance it would have been a more difficult task elaborating this Masters dissertation.

Lastly, I want to mention the assistance and support I received from my colleagues and peers during the course of the Master's degree, and my friends that always supported me and helped me with ideas and suggestions.

Abstract

This investigation studies Foreign Direct Investment determinants with a framework different from the major research present in the literature related to FDI. Its aim is to study and give insights into the reported differences in FDI determinants in the literature. This framework uses thirteen pillars as FDI determinants, which are synthesized recurring to a wide spectre of variables representing nations' characteristics selected from literature namely from The World Competitiveness Reports of The World Economic Forum. The results of the econometric models estimated by GLS, with data from 186 countries, indicate significant differences on FDI determinants according to the different human development stage; therefore policies regarding FDI attraction must be shaped according to the stage of human development of each country and the specific determinants. The effect of the recent financial crisis in investors decisions regarding FDI was also studied using a structural change test. The results indicate that there was a significant shift in FDI flows.

Este estudo investiga os determinantes do Investimento Direto Estrangeiro com uma estrutura conceptual diferente da presente na generalidade da literatura relacionada com IDE. O objetivo é estudar e dar evidências acerca das diferenças observadas na literatura dos determinantes de IDE. Esta estrutura usa treze pilares como determinantes de IDE, que são um resumo de uma vasta diversidade de variáveis, representando as diferentes características, selecionadas da literatura, das nações, nomeadamente escolhidas do The World Competitiveness Reports do The World Economic Forum. Os resultados dos modelos econométricos estimados por GLS, com dados de 186 países, apontam para diferenças significantes nos determinantes de IDE entre países com diferentes níveis de desenvolvimento humano; por isso políticas relacionadas com a atração de IDE têm que ser elaboradas de acordo com os níveis de desenvolvimento humano de cada nação e os determinantes específicos. Os efeitos da recente crise financeira nas decisões de investimento relativas a IDE são também estudadas usando um teste de mudança de estrutura. Conclui-se com os resultados que houve uma mudança significativa nos fluxos de IDE.

Keywords: Foreign Direct Investment, Determinants, Human Development Index Levels, Principal Component Analysis, Taxes

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Chapter I Introduction

International transfers are an important characteristic of globalization. These transfers are vital for the flow of wealth, promotion of economic growth, transfer of technology, knowledge and ideas and the promotion of better relations between countries and cultures. Foreign Direct Investment (FDI) is one of the main transfers that is present in the world today, and one of the most important for the creation of economic growth in the long turn, being critical to the formation of capital. The case of developing countries, that lack the physical and human capital necessary to explore all the growth potential of their own resources, is one case that can demonstrate the beneficial effects of FDI on the economic output of a country and consequently benefit the society of that country.

The definition of Foreign Direct Investment adopted in this study is as specified by the World Data Bank. The definition is the following: “Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments”.

FDI is an important factor for economic growth¹ (Iamsiraroj (2016)), it has grown in recent years, despite the fallout of the recent economic crisis and has had for the last forty years a substantial growth, due to a more liberal approach to the international flow of goods and monetary values and the increasing observation that many developing countries are starting to become sources of FDI, despite their traditional role as hosts. Considering the economic benefits FDI can bring to a country (Chan et al (2014)) many countries want to attract investors and because of this there is an increasing competition between nations to improve their national economic outlook, for this reason many countries try to adopt policies to attract investors, many times competing by decreasing statutory tax rates, giving more investment freedom and fiscal incentives, disregarding sometimes other factors that can attract FDI (Cooray et al. (2014)).

¹ And economic growth, by itself can be a determinant of FDI (Iamsiraroj (2016)) and (Chan et al. (2014)).

FDI has direct and indirect effects on the economic and social environment. The direct effect is the creation of new wealth. This creation of wealth is based on the creation of occupations (reducing unemployment), and increasing income for part of the population. The creation of wealth is also based on the use of capital to produce more products or services. This creation of wealth can also be considered as an increase in income for the countries public finances, providing more funds to government in the form of corporate taxes and income tax from workers. Considering indirect effects, the new income that is paid to the workers as salary, will increase their income and it may increase their consumption, stimulating the economy, this stimulus can result in the conception of new opportunities for development of new industries and services that support business and social needs. Another indirect effect is the possibility of technological spill-overs. Multinationals that come to a new country bring their technology with them, the know-how is taught to the workers, this development of human capital is not exclusive to the multinational, and workers can pass this knowledge on to other companies in which they work, or when they leave the multinational and become entrepreneurs themselves. This increases total productivity. Another indirect effect of improving FDI determinants, through policies, is that it can also affect in a positive manner domestic investment, since the characteristics that attract foreign investment can also benefit domestic companies, and therefore increase domestic investment, and further increase economic growth. There is also evidence that FDI can have influence over the political scenario, especially in the developing world, and influence economic and social policies (Feng (2014)), but the evidence points to two conflicting effects, one pro-democracy and another pro-authoritarian, so FDI may not contribute in the same direction for the political development of developing countries.

The main objective of this study is to provide evidence that FDI determinants are different in countries with different levels of development and further the discussion on this subject. In the Global Competitiveness Report of the World Economic Forum 2016-2017 Professor Sala-I-Martin et al. discussed “The Twelve Pillars of Competitiveness” and divided the pillars in three groups. Countries in different stages of economic wealth would be more attractive to investment if they developed better the pillars that are more reactive in the group that they fitted into (Table 1). While it does not indicate that these

are the only pillars that affect competitiveness in the respective stage, but it indicates that they can be the most reactive, other pillars might also influence but not as significantly.

In the Global Competitiveness Report” it is possible to analyse that to create each countries competitiveness score it is used weights on the pillars. The weight will be greater in the pillars that are considered key in the stage that the country is in. For example, if a country is in stage 2, then pillars “Higher Education and training”, “Goods market efficiency”, “Labour market efficiency”, “Financial market development”, “Technological readiness” and “Market size” are going to have a higher weight than the other pillars when computing the countries competitiveness score. Accordingly, this study has the goal to show that there are differences in the determinants of FDI, these differences should be in line with the Reports analysis.

Stages of Development	GDP per capita (US\$)	Key drivers
Stage 1; Factor-driven	<2000	1. Institutions; 2. Infrastructure; 3. Macroeconomic environment; 4. Health and primary education.
Transition	2000 - 2999	
Stage 2; Efficiency-driven	3000 – 8999	5. Higher Education and training; 6. Goods market efficiency; 7. Labour market efficiency; 8. Financial market development; 9. Technological readiness; 10. Market size.
Transition	9000 – 17000	
Stage 3; Innovation-driven	>17000	11. Business sophistication; 12. Innovation

Table 1, Key drivers for each economic stage, Source: World Economic Forum, “The Global Competitiveness Report 2013-2014: Full Data Edition”, Geneva, 2013, p.9-10.

For this study, the variable considered to assort countries into groups is the “Human Development Index (HDI)” instead of the “GDP per capita (in US dollars)”. The reason is that the economic variable has a limited scope, while the HDI variable captures more information that can be considered when an investor selects where to make his investments. It indicates social and economic information due to the contents included in the Index (proxies for literacy, health and wealth of a population), this information has a wider scope and can give more insights into the risks of the investing in that particular

country in comparison with others. With this change, for Stage 1 it will be considered “low development countries”, for Stage 2 “medium development countries” and for Stage 3 “high development countries”, instead of the “GDP per capita (in US dollars)” values. The criteria for the assortment for each level of development is discussed in the section regarding methodology².

The main contribution of this study is giving empirical evidence that the FDI determinants vary, according to the level of human development, giving new insights and a new framework for the study of FDI determinants and fiscal policies. These insights can partly explain differences in FDI literature regarding the difference in results of the determinants of FDI. This study also contributes to the literature with studying the effects that the recent financial crisis had on investors decisions, and therefore affected FDI inflows to all countries present in the analysis.

Analysis of FDI determinants does not lead to the same results regarding the same determinants, heterogenous countries and different periods analysed may be a reason for this occurrence. Localization and distance between country investment host and country investment source have evidence that are determinants of FDI (Qian & Sandoval-Hernandez (2016))³, there is also evidence that specific areas may have their own differentiators for attracting FDI, for example Latin America and the Caribbean (Williams (2015)) as well as Asia (Mottaleb & Kalirajan (2010)). Nonetheless there does not exist a complete consensus of many characteristics being FDI determinants or deterrents. This may occur due to the possibility that the effects that variables have on FDI may be lessened by the presence of other variables, or the variables themselves may have conflicting direct and indirect effects on FDI. This study gives new insights into the effect that development has in influencing FDI inflows, and therefore gives insights to which effects are more predominant for attracting FDI for countries in different stages of development. This study also gives insights regarding the effects the recent financial crisis had on investors patterns, since with the results found it was concluded that there was an impact of the recent financial in investors patterns of investment.

² See sub-chapter 3.1.

³ The mentioned study has the aim to study the relation between FDI and corruption distance between host and source countries, still in the results it is possible to observe that the variable they use as a proxy for distance is highly significant.

The study has the following structure. Chapter 2 has the review of the literature regarding FDI determinants, with a special focus on tax influence over FDI, and it also contains the development of this study's hypothesis. Chapter 3 introduces the methodology and data used. Chapter 4 contains the results of the estimation process specified in Chapter 3, as well as a robust analysis concerning the effect of the recent financial crisis in FDI inflows. Chapter 5 discuss the concluding remarks of this study, as well as limitations and perspectives for future research.

Chapter II Literature Review

The study of FDI plays an important role in research, and can provide valuable insights for the development of country policies to attract investment and grow the local economy. Foreign investment can create a new dynamic in a country and provide a factor for growth, development and technological progression (Albulescu (2015)), mainly through knowledge spill-overs. Attracting Foreign investment has been a priority for many countries, developed and developing, to attract and bring new energy to their economies, and many compete usually through fiscal policies (Egger & Raff (2015)). This chapter presents the literature that was reviewed and considered relevant for this study.

One of the major issues concerning Foreign Direct Investment is why do companies invest, and do not seek another method to grow, namely outsourcing. To this question the Eclectic OLI Paradigm (Dunning (2001)) gives an answer. Companies invest due to benefiting from ownership (O) advantages, localization (L) advantages and internalisation (I) advantages. These advantages help to obtain bigger profits in the future and fulfil the companies' objectives. These are mostly internal company components, but it is also necessary to include external variables that influence or constraint the business environment. According to the OLI paradigm there are three types of location advantages. The first type is for the exploitation of natural resources for the production process, saving costs or reducing risk. The second type is to supply the domestic market of the recipient country⁴, the reason is to increase sales and gain strategic advantages. The third type is to delocalise all or a portion of the production process to gain trade advantages or costs reduction⁵. In this study, there is no separation for these types of FDI, it is used net FDI inflows as the variable to study.

In the literature, we can encounter many determinants of FDI, which seem to indicate that external factors are important when companies choose where to invest, one of the major factors, alongside others is tax rates. Tax rates are a deterrent that has a lot

⁴ Also called Market seeking FDI or Horizontal FDI.

⁵ Also called Vertical FDI

of visibility and is considered theoretically a strong deterrent of FDI, but in the literature, it has found mixed results.

The mixed results found in the literature can be a consequence of the same variables capturing different effects, and it can be possible that in certain countries or time periods some effects are more predominant than other effects, and so differences are the result between scientific articles. Thus, it is necessary for countries that want to improve their attractiveness to develop not only one specific determinant but a broader set to be able to attract FDI (Diaconu (2016)).

2.1 Foreign Direct Investment Determinants

Our focus with this study is FDI determinants. We observe that there are differences in the literature regarding FDI determinants, (Kinuthia & Murshed (2015)). Many of the differences can be explained as differences in countries studied as well as different proxies utilized as variables, and different periods studied. To further the discussion of the literature we decided to adopt the framework from “The Global Competitiveness Reports”, change the segmentation criteria, from “GDP per capita” to “Human Development Index” This is a new way of studying this subject, that as far as we known no one has done, and it gives insights into explaining differences in the literature. The key feature in this study is the framework adopted from “The Global Competitiveness Report”, three main factors, for three different segments that divide the countries, these factors include thirteen pillars representing (proxy) a characteristic of a nation. Each characteristic has a set of variables, which functions as proxies for that characteristic. The variables are selected from amongst the literature and some of the variables used in the recent Competitiveness Reports.

It is possible to find evidence in the literature that these characteristics are important determinants and deterrents of FDI. Looking at each pillar individually it is presented the literature review regarding the pillars. It should be noted that these pillars can be correlated with each other. A strong institutional framework can stabilize the macroeconomic environment and promote better education, improved infrastructures, a more enticing environment for trade and development of the financial markets. Plentiful literature has given more insights into these relations studying the causal effects between determinants and FDI (Pradhan et al. (2017)).

One other effect that is mentioned in the literature is the effect that the presence of certain characteristics to be able to reap more efficiently the benefits of FDI (Iamsiraroj & Ulubaşoğlu (2015)), this gives insights that there are characteristics that can attract FDI can also improve FDI benefits for the local economy, reaping the maximum potentialities of their domestic resources.

Institutions

The quality of the institutional environment can influence investment performance. These institutions can be defined political systems, economic organization and the set of laws and security in the country. Strong institutions that protect investors rights and increased security, reduce risk of investments, promoting a more stable environment with less uncertainty for investors. While in the case of arbitrary expropriations, nationalizations and low efficiency of contract enforcement, investors take a significantly higher risk, since for arbitrary reasons their investments may be appropriated or suffer from not having the minimal level of legal protection. This can deter a lot of investors that would otherwise be interested in completing their investments. The general theory accepted is that institutions evolve to compensate market failures, and so institutions enhance efficiency. Some research has pointed in the direction that institutions are highly significant for the capture of FDI (Silajdzic & Eldin Mehic (2012), GÖK & DoĞRuel (2016)⁶, Silajdzic & Eldin Mehic (2012), Henry et al. (2015)⁷ Tuomi (2011)⁸, Shang-Jin Wei (2000), Lysandrou et al. (2016)). Within the institutions pillar security is included. Crime has evidences of being a deterrent of FDI, since it increases risk and uncertainty for investors (Brown & Hibbert (2017)), but there is also evidence that crime does not affect FDI (Juan Carlos & Martin (2015)). Still there can be mixed effects, for example corruption can be a deterrent of FDI (Primorac & Smoljić (2011), Saksonova (2014)) since it can translate into higher costs to pay bribes and assure security and access to the needed infrastructure. Reducing corruption can also increase tax revenue and therefore increase revenue for governments without having to adjust tax rates (Ketkar et al. (2005)). But there is also evidence that corruption can entice FDI (Egger & Winner (2005), Bellos & Subasat, (2012)), companies willing to pay for quicker access to resources and markets or limit access from competitors or even reduce complex

⁶ This study also found that investment in human capital and economic growth also attract FDI, but infrastructure does not attract FDI, the cause for this latter effect was stated that the ways to improve infrastructure in developing countries are not well planned and may not have an unbiased objective.

⁷ This study also concluded that trade also as a positive effect in the attraction of FDI for Central and South America and the Caribbean Islands.

⁸ This study also found that labour qualification, market size are considered attractive by companies investing in South Africa, exchange rate volatility, crime and regulatory instability are deterrents of investment.

bureaucratic issues that delay decisions and increase costs, can find in more corrupt countries facilitation to reach their goals and circumvent restrictions and regulations.

Infrastructure

The means of communication and transport of goods are important for business to be facilitated. An extensive and roads not easily blocked by traffic or obstacles or natural disasters (if roads are not very well maintained there could be more accidents, more loss of cargo, more delays, and loss of profits), an all-embracing and well maintained railroad system (to increase the volume of transport of goods, and this transport can be done more efficiently), good port facilities for storage of cargo and maintenance of vessels (these installations are vital for trade since in 2014 nearly 80% of world merchandise trade was done seaborne⁹), a solid aircraft infrastructure with frequent traffic (for the swift transport of the necessary human capital to the necessary locations in good conditions), a complete and efficient distribution of electricity (accessing electrical power is critical for companies in any sector, an increased cost of accessing due to insufficient infrastructure, and the inefficiencies in the production process of the electrical supplier that can affect price of electricity can be a high cost for business, a well-established supplier of electricity and with an extensive distribution network of electrical power can diminish costs) and water (easy access to water for the production process can reduce costs for obtaining it and easy access to water is important for the health of the population) can attract investment. If these systems of communication are not provided there will be inefficiencies, delays, and increased costs in the production and transportation processes for businesses, reducing profits. There is evidence in the literature that physical infrastructure is a determinant of FDI (Kinda (2010)¹⁰, Khadaroo & Seetanah, (2010)¹¹).

⁹ Source UNCTAD, Review of Maritime Transport 2015.

¹⁰ In this study, it is also found in the results that improving financial infrastructure attracts FDI in developing countries.

¹¹ It was also found in this study that market size, investment climate and openness are determinants of FDI in a sample of 20 African countries.

Macroeconomic Environment

A stable and growing macroeconomic environment will provide a perspective that the economy has the possibility of providing surplus to investors. An economy that is growing demonstrates that there are opportunities for investment, purchasing power is increasing for the population, there are more services and/or industry that can facilitate more investment, there is a stability that can give investors the security that their investment decisions will not face unforeseen events. A volatile economic environment increases uncertainty and risk of the investment, which can increase costs and reduce attractiveness for many investors (Asamoah et al. (2016)¹², Sánchez-Martín et al. (2014), Boateng et al. (2015), Bekana (2016)¹³). Nonetheless the evidence is not always in accord. Ang (2008)¹⁴ found that economic volatility has a positive effect on FDI stock in Malaysia, arguing that this may happen due to investors perceiving this volatility as a higher risk, and therefore the possibility for greater returns on their investments, as in general economic theory. Salotti & Trecroci (2016) analysed the effect of government debt find evidence that high public debt has a negative relation with private investment and productivity growth, this gives evidence that public debt stability is important for investors when they take their decisions, more debt might mean more instability in fiscal policies in the future and macroeconomic poor performance in the future.

Health

Health, despite being considered as consumption of goods, health affects human capital productivity, firstly at the individual level than at a macroeconomic level. Healthier workers are more productive physically and mentally and less susceptible to disease, since healthier populations are more productive their wage will be higher creating an increased demand in the market that investors can exploit. On the other hand, an unhealthy population is less productive and more susceptible to be absent from work due

¹² The results of this study also state that institutions quality as a positive relation with FDI and can help mitigate the effects of volatility.

¹³ This study of FDI determinants in Ethiopia, also found that literacy, infrastructure and institutions are determinants of FDI.

¹⁴ It was also found for the case of Malaysia that better financial market development, trade openness, depreciation of the exchange rate and infrastructure promote FDI, whilst corporate tax rates are deterrents of FDI.

to worker illness or a member of the family being ill. Consequently, low productivity generates low wages, and with these low wages nutrition and health spending values diminish, reducing even more health and therefore creating a poverty trap (Alsan, Bloom, & Canning (2006))¹⁵. In countries in which the populations access to healthcare is low companies may need to compensate workers with health insurance coverage, to not support funeral costs, sick leaves and low employee morale, that affect negatively profits. There is evidence in the literature that health is a determinant of FDI (Salike (2016))¹⁶.

Primary Education

Literacy and primary education are for populations a basic education that gives the basic mental instruments to learn and develop basic skills and tasks. A person that has only primary education can learn to undertake a simple function in the productive process, more complex tasks will become a bigger burden for them when comparing with a worker that has more years of schooling, and therefore it would be needed more time and resources expending in their training. However, for companies seeking for cheap labour for their processes (that are of a complex nature), basic education gives the necessary tools to facilitate the learning experience for the workers, while if the workers had a higher education they would be more productive but also would cost more to hire, for this reason higher education can be a deterrent for FDI (low-technological FDI). Cleeve et al. (2015) using several measures of human capital quality found that literacy has a positive relation with FDI for countries in Africa.

Higher education and training

Higher education and training will increase workers productivity and increase the number of complex tasks the worker can perform. The presence of qualified labour can increase the attractivity for FDI (Youssef (2001)), attracting more medium and high skill based work, increasing the possibilities of knowledge spill-overs for domestic companies,

¹⁵ Study analysed low and medium income countries.

¹⁶ Analysing Chinese regions, the results also present that higher education of the population is a FDI determinant, as well as market size and human capital endowment, while productivity has a negative relation with FDI.

since more qualified workers can more easily learn new technology and production techniques, and then transmit these knowledge to domestic firms if they change from foreign companies to domestic enterprises. It is in the interest of local governments to try and qualify their labour supply and share that information with foreign investors (Iwai & Thompson (2012)) to expose the quality of human capital present in their countries. Nevertheless, this increase in productivity will also increase wages. This increase in wages can deter investment in areas where there is a lower skilled based work, the increase in productivity of the potential worker does not compensate the increased cost with his wage (Doytch & Eren (2012))¹⁷. Deichmann et al. (2003) using factor analysis found that the factor representing social and human capital, in their regressions was found to be the most important factor for capturing FDI¹⁸ in Eurasian Transition States, showing that for countries that are close to developed countries in terms of their own development, quality of human capital is a determinant of FDI.

Goods market efficiency

The capacity to allocate goods to their pretended space within a country, or allocating easily between countries it is not simply based on the quality of infrastructures present, but also on the regulations that affect trade and transport within and outside the country. Tariffs can deter investors from locating their companies, since they can increase the difficulty and costs of transporting goods and resources from one country to another, hurting the profitability of the investment. The level of trade of a country indicated by the variable “Openness”¹⁹ can be considered has the opposite of tariffs, the higher this variable the higher international trade is and therefore the higher the possibilities for new international trade arrangements to be established. This is a characteristic that has been

¹⁷ In this study, it is possible to observe this event in the results regarding the agricultural sector, their variable that is a proxy for higher education and training as a negative coefficient.

¹⁸ It was also found that investment environment and the development of financial markets are determinants of FDI, while resource scarcity was found to have a negative relation with FDI.

¹⁹ Calculated as the sum of Exports and Imports of a country divided by the Gross Domestic Product of the respective country.

well documented in the literature as a determinant of FDI (Liargovas & Skandalis (2012), Li et al. (2016)²⁰, Hunady & Orviska (2014))²¹.

Labour market efficiency

The efficiency of the labour market can help investors find the more suitable environment to hire the necessary employees (with the required qualifications) for their projects. The abundance of labour and its qualification can be determinant for investors when choosing where to invest. The absence of the necessary human capital for the production process, or the lack of a pool that can be easily accessed to satisfy future needs of more human capital, or adjust rapidly due to legal constraints can deter investors. The increased participation of female citizens in the labour market demonstrates more availability of workers and more diversity of employees and their skills, contributing positively to satisfy investors goals²². Labour market regulations can diminish the ease of adjusting and contribute to decreasing profits for investors, due to a reduction in adjustment speed for their human capital needs. Labour market regulations can also increase unemployment since they can restrict the existence of some job offers that do not pay a minimum wage, but for which there are workers that would still accept the job for the offered rate. This can increase the unemployment rate, which might translate into a negative relation between FDI and unemployment. Another reason for occurring this relation is that high levels of unemployment may indicate that macroeconomic environment of a country is not stable and investments may find a riskier host. Still it should be referred that the presence of unemployment may attract investors due to the fact of existing labour that is willing to work, showing availability of human capital for new companies to enter the market (Strat et al. (2015)).

²⁰ Studying the effect of the ASEAN-China Free Trade Agreement, they concluded that the new trade agreement had a positive impact on attracting FDI.

²¹ In this study of 26 EU countries, it was also found that macroeconomic environment, labour regulation and labour costs are significant in attracting and deterring FDI.

²² Blanton & Blanton (2015) obtained results that indicate that women's rights can be determinants of FDI.

Financial market development

Access to financial markets, especially credit can be vital for many enterprises. Credit restrictions, reduced possibilities to access foreign credit can hamper the completion of an investment opportunity, without easy access to credit many investment opportunities may not be selected due to the absence of the necessary funds or financial support. Desbordes & Wei (2017) find that financial development of countries affects directly (increasing access to foreign markets) and indirectly (supporting overall economic activity) FDI²³. Also, there is evidence of bi-directional positive causality between FDI and financial development (Agbloyor et al. (2013))²⁴. The sturdiness of the financial area is also attractive to investors, since it is expected that with the solidity of the banking sector credit will flow more easily. Ushijima (2008) found that in Japan the strength of domestic banks has a positive relation with FDI, suggesting that the reliability of the financial system is a determinant of FDI. Ang (2009) discussed that the financial development of Thailand's economy helped to exploit the beneficial effects of FDI.

Notwithstanding there is also a view in the literature that FDI can be negatively correlated with financial market development. FDI can exist and be attracted to countries that are financially underdeveloped, institutionally weak and riskier, where there are no strong debt and equities markets, so FDI can be a substitute investment for multinationals for these markets. Agbloyor et al. (2013) instead of a portfolio investment (Foreign Portfolio Investment, FPI).

Technological readiness

To attract high technological investment, it is necessary the existence of infrastructure and basic knowledge to use information and communication systems by human capital. The development of physical networks and infrastructure necessary to make possible for the general population access to the new means of communication, creating the opportunity for the development of technological capabilities that are valuable for the increase in productivity in their work environments can be important for

²³ Their study was based in FDI bilateral flows.

²⁴ This study also concludes that a stable macroeconomic environment, better infrastructure, better institutions and more openness to trade attract FDI.

investors. This development decreases technology transfer cost for multinationals that want to invest because it increases the host country's capability to absorb technology (Goswami (2013)). Lee (2001) states that to increase developing countries technological progress to equal the technological sophistication level of developed countries, ICT must be made available and it is necessary that the human capital has secondary and tertiary education. Addison & Heshmati (2003) conclude that ICT adoption is a determinant for attracting FDI in developing countries, giving evidence of the growing role of ICT in business.

Market size

There are distinctive effects that this pillar can capture, multinational corporations can reduce their costs by using economies of scale and concentrate production on a single large facility in a country that has the conditions, and reduce production costs. A small market might not be able to reach the minimum efficient scale to compel investors to transfer capital for the production process. Another objective of the investment is supplying the domestic market. If the market size is big and there are opportunities that aren't exploited by domestic companies than foreign investors can decide to start supplying the local market, investing in the country. The output of the new production facilities is mainly focussed in the domestic market, so the size and income of the country's population will be determinant to attract investment. Empirical evidence regarding this pillar can be found in the literature (Salike (2016), Khadaroo & Seetanah, (2010)).

Business sophistication

The level of business sophistication that facilitates the development of companies or development of industry and services is important for investors. The higher the ease in which to "do business" the lower the bureaucratic costs and other judicial and legal costs that investors must support for starting and running a business. These costs (even the potential costs, for example insolvency) are taken into consideration and there is evidence in the literature that a good record of easing of business regulation is important for

investors (Bayraktar (2013), Vogiatzoglou (2016), Corcoran & Gillanders (2015), Zvezdanovic (2013)). Countries which have undertaken reforms to improve their business environment stand to attract more FDI, and by facilitating investment regulations, they can also support domestic investment.

Innovation

For many companies, it is important innovation for a successful future, innovating in products and processes. Countries that have a considerable expenditure in Research and Development (R&D) (Villaverde & Maza (2015)) and have shown to be successful in obtaining results from the innovation process (via patents, scientific publications and development of new products), have more labour specialized in innovation, in creating new products or ideas, or upgrading an already existing product or idea. There are more opportunities to find creative and qualified labour force which can bring new ideas and technology to foreign companies that decide to invest in that country, and therefore new prospects to existing multinationals. To attract investment that can increase a countries' technological level²⁵, harnessing more benefits of FDI it should possess an educated human capital and technological capabilities that can boost technological transfers (Iacovoiu (2015)).

²⁵ Which can increase productivity and therefore wealth, helping developing countries escape the poverty cap.

2.2 Foreign Direct Investment and Taxes

An additional analysis that is inserted in this study is a tax analysis. There exist many evidences that tax rates are a deterrent to FDI, but also many studies that do not find taxes relevant to the attraction of FDI.

The aim of an investment is to gain returns, and the highest returns possible. Taxes reduce profits, and therefore reduce the returns of an investment. Investors have different opportunities to choose from when making their investments so they will tend to find the best opportunities in which to get the highest returns, looking at the short, medium and long terms. Standard investment theory will indicate that they will invest when at a certain level of risk, the return of the investment is higher, the level of risk that is chosen is dependent of the investors preferences. Taxes while they may not interfere with risk assessment, affect returns, so for identical investment opportunities in which only tax rates differ, the country with the lower tax rate will attract the investor. This theoretical scenario is very difficult to come by since hardly there are investment opportunities that are equal in all aspects apart from tax rates, but it gives the insight that taxes can be a deterrent of FDI.

Nevertheless, reducing taxes just to attract FDI is not as simple as the previous exercise would indicate, there is a trade-off in choosing to reduce tax rates to attract FDI to further economic growth, the loss of revenue for the government. Taxes are an important source of revenue for the national budget, especially Corporate income taxes, reducing this revenue may reduce the funds necessary to improve or maintain the current level of quality of infrastructure, security, education, health, government budget balance and other aspects of a country in which the government has a role to be of service to society. This may cause a secondary and negative effect on other FDI determinants. Reduction in spending on infrastructures, may deteriorate the means of communication and transport between businesses and higher transportation costs for companies, reducing spending on security may compel investors to hire private security companies or other enterprises to protect their workers and assets from criminal activity, or sabotage activity (especially present in countries that suffer from a terrorist activity and organized crime),

reducing education spending may reduce the quality of labour present in the country and needed for more knowledge base work, or support services for business (including having well trained civil servants and bureaucrats), reducing high-tech investment, and reducing health spending may decrease the health of the population and therefore increase the number of days that people can't work due to sickness, decreasing efficiency for business. If the level of spending does not reduce nor the level of revenues increases than the budget will deteriorate, this will deteriorate the perception of budget stability that the country has for investors, reducing its attractiveness. Attracting FDI has benefits for the local economy, but it may take time for these benefits to make a significant impact in the economy. The other effects may also take time to impact the economy, this time effects may differ, some being visible already in the short term and others being visible only in the medium/long term. It should be pointed out that in this scenario there would be a conflict of effects and that the final result would depend on the effect that would be predominant. The predominant effect can vary from country to country since the conditions for investment, the preferences and characteristics of the investors may vary, leading to different objectives and different instruments used for investments, so different results would be expected. Sanjo (2012) developed a theoretical model that reached the conclusion that if country risk is different for two countries, depending on the assessment of the probability of that risk, a country with a bigger tax rate can still be favoured over a country with a smaller fiscal tax rate, if the country with a bigger tax rate has also a large enough market. While the previous exercise is mainly theoretical it can point out a reason for taxes having different results in empirical studies, taxes may affect not only perceptions for investors and the bottom line net profits of an investment but also other determinants or deterrents of FDI, taken into consideration the different interconnections that are present. There is empirical evidence that taxes may not be a deterrent of FDI, Görg et al. (2009)²⁶ find that multinationals are seduced by countries with redistributive social welfare policies, one possible explanation as already been referred above, government revenues if well spent can improve multinationals business environment (with social welfare policies, it is increased social stability and reduce risk)²⁷ and therefore attract foreign investment and promote domestic investors to invest in the

²⁶ For 18 OECD countries.

²⁷ Göndör & Nistor (2012) also find the same relation, if macroeconomic environment is unattractive due to lack of funds by government, it deters FDI, despite low tax rates.

country. Still in the present study it is followed the mainstream literature that states that taxes are a deterrent of FDI.

Taxes are considered deterrents of FDI since their mere existence reduces net profits (AbdİOĞLu et al. (2016))²⁸ that the investor receives as returns of his investment. This reduction can deter investors who can try to see other locations that offer an inferior tax rate. Though the relation may not be so obvious and there can be other factors that influence the relation between taxes and FDI. For example, Azémar & Delios (2008) find that the higher GDP per capita is the lower the influence tax rates exert on FDI, this may indicate that if the country is wealthy, the influence that wealth exerts over FDI is stronger than the influence that corporate taxes have. Gale & Orszag (2005) develop an economic model that argues that the decrease in tax rates, increases government debt, this increases the interest rate for public debt and this transmits to an increase in the national interest rate. This increase in interest rates increases the cost of opportunity for investors, since instead of investing in a new venture, they can choose to deposit the capital to receive the higher profits that come from a higher interest rate, reducing the attractiveness of investing. Continuing the effect of the relation between taxes and public debt on FDI, Kopczevska et al. (2016) found evidence that different taxes affect public debt differently, they found that reducing income tax rates increases public debt, and reducing capital tax rates also has the same effect in public debt but in a lower scale.

There is plenty literature that finds evidence of taxes having a negative relation with FDI. Desai et al. (2004) conclude that indirect taxes have a positive and strong relation with direct taxes and that both types of taxes are costly for investors and therefore reduce FDI inflows. Demekas et al. (2007) also finds that high tax rates discourage FDI that is targeted at non-privatization investment. Pereira (2011) found for fifteen European countries that corporate income tax plays an influent part in attracting investment in the long and short term. Mandinga (2015) also found for Small Island Developing States²⁹ that corporate income tax rate influence negatively in the short and long term the attraction of FDI. AbdİOĞLu et al. (2016) found evidence that corporate tax rates have a negative relation with FDI inflows, due to decreasing localization advantages, by

²⁸ Analysis of 18 OECD countries.

²⁹ See Mandinga, C A. V. C., (2015) "The effect of corporate income tax rate on foreign direct investment in small island developing states". Faculty of Economics, University of Porto, Master's Thesis. July /2015

reducing net profits. (Tung & Cho, 2000) found that tax concessions in China attract investment, and therefore fiscal incentives are determinants of FDI. (Juan Carlos & Martin, 2015) also found that tax exemption benefits increase FDI inflows in Mexican states.

Despite the existence of many results that indicate that taxes, and especially corporate income tax rates, are deterrents of FDI many studies conclude that taxes are insignificant or influence weakly FDI attractiveness (Hunady & Orviska, 2014), (Görg et al., 2009), (Gale & Orszag, 2005).

2.3 Hypothesis

The intention of this study is to analyse the differences in FDI determinants, comparing countries with different levels of HDI.

With this aim three hypotheses are formulated, in context with the literature:

H1: Factor-driven variables are determinants of FDI in low development countries;

H2: Efficiency-driven variables are determinants of FDI in medium development countries;

H3: Innovation-driven variables are determinants of FDI in high development countries.

In low development countries, according to economic theory, the competition between companies will be more due to factor endowments, natural resources and unskilled labour force with low productivity and low wages. For investing it is important that there is a general environment in the nation that is friendly to investors and their rights, strong public and private institutions, a good infrastructure for the transport of goods, an improving macroeconomic scenario and basic education and healthcare, to provide a basic skillset for learning to do simple tasks and the health to accomplish them (H1). In this phase, FDI is considered to be mainly directed at reducing costs of production, low skilled labour and proximity with resources for the production process.

With the passage of time, the countries competitiveness will rise, with this productivity, wages and development will rise, consequently there will be a necessity to increase efficiency in production, because wages have risen and the prices cannot alter. Competitiveness is increasingly driven by higher education and training, efficient goods markets, well-functioning labour markets, developed financial markets, the ability to harness the benefits of existing technologies, and a large domestic or foreign market (H2). In this stage, there begins to exist FDI directed at supplying the countries market (called tariff jumping FDI), then it begins also to attract higher skilled work, since there is also a higher skilled labour, and the support services for more complex business models. The

internal market size plays a role of also the final market of the foreign investors, since wages have risen and consumption, by consequence.

Then countries will pass into an organization where there will be the need to constantly innovate the production process and the products (H3), since the wages will have risen as well as the level of development. At this final stage investment is mostly for the development of new products, new business models and new ideas, there is much high skilled labour and the supports needed to develop innovation, advanced technology and more efficient methods of production.

While it is not expected that these factors are the only to be determinants in each of the segments, it is expected for them to be determinants. It is expected that differences occur in the segments mainly in variables that are not considered keys in one segment are not relevant in that segment, but are considered relevant in the segments where they are keys.

An additional hypothesis is formulated to study the effects of taxes on FDI:

H4: Tax rates are deterrents of FDI in every stage of development.

There is evidence in the literature that tax rates are important in attracting FDI, and in fact many countries try to attract overseas investment by reducing their tax rates, usually corporate tax rates, as reviewed for the case of eastern European countries when they joined the European Union (Tudor & Appel (2016)), the main western European countries wanted the new eastern countries to increase their profit tax rates to levels similar as the ones practiced in the European Union, so that the western countries would not lose their competitiveness in attracting investment. Tax competition can therefore be used to attract investment.

Chapter III Methodology

3.1 Process

Considering the wide literature concerning FDI, and the vast number of variables and determinants, that have miscellaneous results, it was found necessary to bring a large set of variables, present in the literature and in “The Global Competitiveness Reports”. This section will introduce the models and methods of analysis.

To study the Hypothesis and assess the determinants of FDI and the differences that might occur between different countries it is utilized two models, Model A to test the hypothesis at a more specific level and Model B with all the selected variables to determine if these results are robust. The models are presented below with their respective meaning:

$$\text{Model A: } FDI_{i,t} = \beta_0 + \beta_s * Pillars_{s,i,t} + \beta_r * Taxes_{i,t} + \mu_{i,t}$$

$$\text{Model B: } FDI_{i,t} = \beta_0 + \beta_j * Factor_{j,i,t} + \beta_p * Efficiency_{p,i,t} + \beta_k * Innovation_{k,i,t} + \beta_x * Taxes_{i,t} + \mu_{i,t}$$

$FDI_{i,t}$ – foreign direct investment inflows; β_0 – constant; β_s – vector of coefficients for the Pillars variables; $Pillars_{s,i,t}$ – vector of values for the Pillars variables; β_r – coefficient for the Tax variable in Model A; β_j – vector of coefficients of the factor-driven variables; $Factor_{j,i,t}$ – vector of values for the factor-driven variables; β_p – vector of coefficients of the efficiency-driven variables; $Efficiency_{p,i,t}$ – vector of values for the efficiency-driven variables; β_k – vector of coefficients of the innovation-driven variables; $Innovation_{k,i,t}$ – vector of values for the innovation-driven variables; $Taxes_{i,t}$ – Total Tax variable; β_x – coefficient for the Tax variable in Model; $\mu_{i,t}$ – error term; i – country; t – year.

The focus of this study is a country based analysis, for this purpose 186 countries are selected. In this selection, it was considered the necessity to bring as much countries

as possible to the analysis and of all development levels. To analyse FDI determinants, it can be used a cross-section analysis (studying several countries for a specific date), a longitudinal approach (analysing one country for a determined period of time) or a panel data approach (analysing multiple countries for a specific period of time). Time series are used to improve the information and achieve more robust results, a ten-year period (yearly data), ranging from 2005 to 2014, is selected. This range is selected mainly due to data limitation, many variables do not have data prior to 2005 and after 2014. Panel data is therefore used since it gives more information and less collinearity among the variables and permits the study of the dynamics of adjustment (Baltagi (2005)), therefore the estimators of the panel data approach are more robust statistical estimators for the relationships between the variables. Considering that in many variables there exists missing data, the estimations have unbalanced panel data as their inputs.

It is used a Generalized Least Squares (GLS) approach for the estimation process. It is favoured this approach for it can control the presence of heteroscedasticity (a violation of one of the classical conditions for OLS estimation) in the cross-section, cross-section weights were used for this purpose. To control serial correlation effects the estimation process is fitted with a robust correlation correction for arbitrary heteroskedasticity and serial correlation³⁰.

The correction method assumes that the errors for a cross-section are heteroskedastic and serially correlated (cross-section clustered). The coefficient covariances are calculated using a White cross-section clustered estimator: where the summations are taken over individuals and individual stacked data. The estimator is designed to accommodate arbitrary heteroskedasticity and within cross-section serial correlation.

To this study, it is important to consider the highest number of countries possible since the proposed argument is to analyse differences between countries. To consider as much of the data as possible, the number of observations required per each variable was set to 1200. One exception was needed to assure that at least there was a variable per pillar³¹. After this procedure, it remained a high number of variables. To avoid

³⁰ See Appendix 1.

³¹ The variable is “Unemployment rate” with 1106 observations.

multicollinearity issues, it is used principal component analysis to choose the more significant variables for the estimation process, for every pillar with more than one variable. It is found that this procedure is a less arbitrary method of choosing the more significant variables for the estimation process.

Principal component analysis is used with the objective of reducing the data to have a more manageable set of variables and avoid multicollinearity issues. Multicollinearity occurs when two or more independent variables have a high correlation which means that one can be a predictor variable of another, this occurrence bias the results and can be interpreted as adding variables that are not needed to the models, despite the high number of variables researched there is a need to construct a parsimonious model. Principal component analysis is concerned with explaining the variance-covariance structure of a set of variables through linear combinations of these variables. The analysis will reduce the initial set of variables to a small number of principal components, revealing relationships that were not previously suspected (Johnson and Wichern (2007)). This procedure will facilitate reaching a more parsimonious model, without the loss of significant information. This analysis was reproduced for every pillar in which there was more than one variable assigned. The criteria for selecting the variables are:

- 1) Cumulative proportion of the eigenvalues of the principal components should reach 60%;
- 2) Only the most influent variable would be selected per principal component.

When these criteria are insufficient to select variables, other criteria are specified according to the information. (See Annex 2)

Due to the high number of variables selected after the restrictions with the limit of observations and principal component analysis, it was necessary to analyse the correlation matrix between these variables. Some of these variables have high correlations, so there would arise the issue of multicollinearity between the independent variables. To reduce this issue the variables that presented the highest correlations were eliminated, maintaining at least one variable per pillar. With this methodology multicollinearity issues were minimized.

It is used the “Human Development Index” (“HDI”) variable as the variable for dividing the sample. It is found that this variable is a more comprehensive variable to capture investors’ preferences. The “Human Development Index” captures social and economic perspectives of a country it gives a broader perspective of the level of risk and profitability of a country, giving more information to investors, than the GDP per capita variable, which is included in the “Human Development Index”. The sample was divided in “Low development countries”, “Medium development countries” and “High development countries”. The values used to allocate the observations to each group are the same as the “Human Development Report” of 2016. A “Low development country” has an HDI value of up to 0.55, a “Medium development country” has an HDI value between 0.55 and 0.80 and a “High development country” has an HDI value above 0.80. It is included in the “Medium development segment” the countries considered by the report has with a “Medium development” and with a “High development”. With an univariate analysis of the statistics of each segment, the conclusion reached was that countries that in the report were categorised as “High development” had more similarities with countries categorised as “Medium development” instead of countries labelled as “Very high development”. During the ten-year period, countries change from segment to segment, according to their respective evolution.

3.2 Variables and Data

The variables selected are retrieved mostly from the “Global Competitiveness Reports” and the remaining are retrieved from the literature. These variables that have been considered in various studies have mixed results, sometimes found to be statistically insignificant or significant with the expected result or significant with unexpected results. This section will introduce the variables, their definitions, descriptive statistics and correlations.

The variables are divided accordingly into three categories: Factor-driven; Efficiency-driven; Innovation-driven, and these categories will have their respective pillars.

Factor-driven pillars: Institutions; Infrastructure; Macroeconomic environment; Health; Primary education; Efficiency-driven pillars: Higher education and training; Goods market efficiency; Labour market efficiency; Financial market development; Technological readiness; Market Size; Innovation-driven pillars: Business sophistication; Innovation.

As a Tax variable, it is used “Total tax rate” (TTR) of the World Data Bank. The total tax rate measures the amount of taxes payable by medium-size businesses after accounting for deductions and exemptions, expressed as a share of commercial profits. The taxes withheld (such as sales or value added tax or personal income tax) but not paid by the company are excluded. The total tax rate is designed to provide a comprehensive measure of the cost of all the taxes a business bears.

As a segmentation variable, it is included the “Human Development Index” (HDI). The index is composed by three dimensions (Long and healthy life, Knowledge and A decent standard of living) that report a proxy for a countries development. To look at a countries development accurately more information is needed, nevertheless this variable can fulfil the role of development proxy for this study.³²

³² The data was manually collected from the Human Development Reports present in the United Nations Development Programme website (<http://hdr.undp.org>).

The variables that compose the pillars are retrieved from “The Global Competitiveness Reports” and from the literature and assorted accordingly to each pillar, functioning as proxies for that pillar. In this study, the “Health and primary education” pillar is divided in two pillars “Health” and “Primary education”, making a total of thirteen pillars.

Category	Factor	Indicator	Description	Source
Factor driven (F1)	Institutions	Homicide rate (F1_hm)	Number of homicides per 100000 population.	United Nations Office on Drugs and Crime
		Control of Corruption (F1_cc)	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Data Bank
		Rule of law (F1_ri)	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Data Bank
	Infrastructure	Railroad density (F1_rld)	Kilometres of railroad per 100 square kilometres of land.	World Data Bank
		Electrification rate (F1_ehr)	Share of population with access to electricity.	World Data Bank
		Electric power losses (F1_epl)	Electric power transmission and distribution losses as a percentage of output.	World Data Bank
		Access to improved drinking water (F1_drw)	Percentage of the population using an improved drinking water source.	World Data Bank
		Registered carrier departures worldwide (F1_cdw)	Domestic take-offs and take-offs abroad of air carriers registered in the country.	World Data Bank
	Macroeconomic environment	Debt coverage ratio (F1_dcr)	General government gross debt as a percentage of general government revenue.	International Monetary Fund
		Government budget balance (F1_gbb)	General government budget balance	International Monetary Fund
		General Government gross debt (F1_ggd)	Gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future, as a percentage of GDP	International Monetary Fund
		Real interest rate (F1_rir)	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.	World Data Bank
		Gross national savings (F1_gns)	Gross disposable income less final consumption expenditure after taking account of an adjustment for pension funds.	International Monetary Fund
Industrial value-added (F1_iva)		Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.	World Data Bank	
Inflation (F1_if)		Annual percentages of average consumer prices are year-on-year changes.	International Monetary Fund	
GDP as a share of world GDP (F1_wgdp)		Gross domestic product based on purchasing power parity as a percentage of world GDP.	International Monetary Fund	
Health	Infant mortality (F1_ifm)	Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year.	World Data Bank	
	Life expectancy at birth (F1_lfx)	Number of years a new-born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Data Bank	
	Health expenditure per capita (F1_hex)	Total health expenditure is the sum of public and private health expenditures as a ratio of total population.	World Data Bank	
Primary education	Primary gross enrolment rate (F1_pel)	Number of students enrolled in the primary level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education	UNESCO Institute for Statistics	
	Literacy rate adult male (F1_lam)	Adult literacy rate is the percentage of people ages 15 and above whom can both read and write with understanding a short simple statement about their everyday life.	World Data Bank	
	Literacy rate adult female (F1_laf)	Adult literacy rate is the percentage of people ages 15 and above whom can both read and write with understanding a short simple statement about their everyday life.	World Data Bank	
		Secondary enrolment rate (E2_sel)	Number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education.	UNESCO Institute for Statistics

Efficiency driven (E2)	Higher education and training	Tertiary enrolment rate (E2_tel)	Number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of.	UNESCO Institute for Statistics	
		School life expectancy (E2_sle)	Number of years a person of school entrance age can expect to spend within the specified level of education.	UNESCO Institute for Statistics	
		Mean years of schooling (E2_mys)	Average number of completed years of education of a country's population aged 25 years and older, excluding years spent repeating individual grades.	UNESCO Institute for Statistics	
	Goods market efficiency	Openness (E2_op)	Exports plus Imports divided by current GDP, as a proxy for how open the nation is in terms of international commerce.	World Data Bank	
		Tariff rate, applied, weighted mean, all products (E2_tf)	Weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country.	World Data Bank	
	Labour market efficiency	Female wage and salaried workers (E2_fws)	Percentage of women aged 15-64 participating in the labour force as wage and salaried workers divided by the percentage of men aged 15-64 participating in the labour force as salaried workers.	International Labour Organization	
		Unemployment rate (E2_unp)	Number of persons who are unemployed as a percentage of the total number of employed and unemployed persons.	International Labour Organization	
	Financial market development	Domestic credit to private sector (E2_dcp)	Financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	World Data Bank	
		Corporate bond issuance volume (E2_cbi)	Total volume of newly issued corporate bonds by private entities in industries other than finance, holding companies and insurance, divided by GDP in current USD.	World Data Bank	
		Commercial bank branches (E2_cbb)	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks and are physically separated from the main office but not organized as legally separated subsidiaries.	World Data Bank	
		Market capitalization of listed companies (E2_mc)	Total value of listed companies to GDP.	World Data Bank	
		Bank nonperforming loans (E2_bnpl)	Value of nonperforming loans divided by the total value of the loan portfolio (including nonperforming loans before the deduction of specific loan-loss provisions).	World Data Bank	
		Share of asset held by top 5 banks (E2_satb)	Assets of the five largest banks as a share of total assets of commercial banks.	World Data Bank	
		Banks' regulatory capital ratio (E2_bkrcc)	Ratio of total regulatory capital of banks to their assets, weighted according to the risk of those assets.	World Data Bank	
	Technological readiness	Fixed broadband internet subscriptions (E2_fbi)	Fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 Kbit/s.	World Data Bank	
		Internet users (E2_intu)	Internet users are individuals who have used the Internet (from any location) in the last 12 months.	World Data Bank	
		Mobile cellular subscriptions (E2_mobc)	Subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology.	World Data Bank	
	Market Size	Population (E2_pop)	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values are midyear estimates.	World Data Bank	
		GDP per capita (E2_gdpc)	GDP is expressed in current U.S. dollars per person.	International Monetary Fund	
	Innovation-driven (I3)	Business sophistication	Cost required to start a business (I3_crsb)	Ratio of total cost to start a business to the economies income per capita.	World Data Bank
			Time required to start a business (I3_trsb)	Number of days required to start a business.	World Data Bank
			Procedures required to start a business (I3_prsb)	The number of procedures required to legally operate a commercial or industrial firm are recorded, including interactions to obtain necessary permits and licenses and to complete all inscriptions, verifications, and notifications for starting operations.	World Data Bank
			Cost to build a warehouse (I3_cbw)	Cost is recorded as a percentage of the warehouse value (assumed to be 50 times income per capita).	World Data Bank
Cost to register property (I3_crp)			Cost is recorded as a percentage of the property value, assumed to be equivalent to 50 times income per capita. Only official costs required by law are recorded.	World Data Bank	
Resolving Insolvency cost (I3_ric)			Cost of resolving insolvency procedures as percentage of estate.	World Data Bank	
Innovation		Number of scientific and technical articles (I3_scta)	Scientific and technical journal articles refer to the number of scientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences	World Data Bank	
		Patent application (I3_patl)	Patent applications are worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention--a product or process that provides a new way of doing something or offers a new technical solution to a problem.	World Data Bank	

		Trademark application (13_trdl)	Number of international trademark applications issued directly or through the Madrid System by country of origin per 1000 population.	World Intellectual Property Organization
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Table 2, Variables included in this study with their respective code, definition, source and organisation, except for the “FDI”, “HDI” and “Total tax rate variables”.

These 51 variables, are selected according to the literature on FDI determinants and “The Global Competitiveness Reports”. Many variables are selected from “The Global Competitiveness Reports” and are already systematized into their respective pillars in the reports, the other variables are assorted according to the pillars that they are proxies. It is possible to predict that multicollinearity issues are going to arise due to the presence of a high number of variables and with many of them serving as proxies to capture the same effect, so it was developed, as described in the previous sub-chapter, a method to reduce the probability of occurrence of this problem.

Discussing the predicted signs of the variables, it is expected that if the pillar is improved than it will affect in a positive way FDI inflows. For example, the variable “Rule of Law” if it increases, it improves the Institutions pillar, with the predicted relation being positive with FDI inflows. Nevertheless, there are variables that have a negative relation with their respective pillar, for example the variable “Unemployment rate” has a negative relation with its pillar (Labour market efficiency), the higher the unemployment rate the less efficient is the labour market, and so less attractive the country will be for investors, the same happens for the variables “Bank non-performing loans”, “Cost to build a warehouse”, “Resolving insolvency cost”.

In Table 9 (See Annex 1) it is presented the descriptive statistics for the data collected. Analysing the data, it can be stated that the panel of variables is very heterogeneous with different scales and ranges. All variables have uncompleted data, this missing data is random, and almost all the countries have no complete data in each variable. Understandably many of the variables have too few observations to contribute into the estimation of a robust model, so it was needed to restrict the variables admissible to the multivariate analysis, based on the number of observations.

Variables	Segment	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
FDI	High	2.85E+10	8.47E+09	7.34E+11	-2.97E+10	6.33E+10	505
F1_RL	High	1.047608	1.123551	2.120458	-1.549452	0.752878	525
F1_CDW	High	436280.6	123206.5	10095197	721.0680	1422764.	456
F1_GNS	High	24.68529	22.86200	64.71700	-5.118000	10.75670	493
F1_DCR	High	5.424872	0.196991	264.3033	0.000000	25.56406	505
F1_LFX	High	78.49140	79.44878	83.98049	66.50488	3.336165	513
F1_PEL	High	102.3751	101.6898	129.4152	80.68657	5.600054	451
E2_SEL	High	103.1552	101.3462	164.8117	64.19695	12.90370	459
E2_OP	High	115.8678	95.92302	455.4151	24.76583	81.65245	507
E2_SATB	High	82.95356	86.45826	100.0000	32.48936	15.32616	438
E2_BNPL	High	4.374747	2.800000	44.97207	0.082000	5.313560	466
E2_UNP	High	7.631398	6.800000	36.00000	0.300000	4.873048	465
E2_INTU	High	63.38383	68.71000	98.16000	4.020000	21.85045	525
E2_POP	High	24093595	7180100.	3.19E+08	34852.00	48936609	525
I3_CBW	High	2.608454	1.200000	58.90000	0.100000	4.933156	485
I3_RIC	High	9.834021	9.000000	38.00000	-1.000000	6.308673	485
I3_TRDL	High	64754.30	14398.00	707681.0	1.000000	123539.7	523
TTR	High	40.05237	40.10000	137.4000	10.70000	18.16846	485
FDI	Medium	6.26E+09	8.55E+08	2.91E+11	-1.14E+09	2.50E+10	820
F1_RL	Medium	-0.322123	-0.385957	1.332728	-1.893788	0.639636	831
F1_CDW	Medium	111123.0	21056.00	3356756.	0.000000	316451.4	673
F1_GNS	Medium	22.74903	21.06250	67.49000	-9.996000	12.65351	726
F1_DCR	Medium	13.62693	0.341066	280.4789	0.000000	38.90048	812
F1_LFX	Medium	70.77543	72.13171	79.96080	46.24137	5.177992	813
F1_PEL	Medium	106.2569	106.1582	141.9934	80.10088	9.288910	681
E2_SEL	Medium	84.01713	86.47208	127.7327	27.37131	14.90158	605
E2_OP	Medium	90.36522	87.52067	213.5193	0.217687	32.86403	806
E2_SATB	Medium	79.49741	80.21970	100.0000	30.24355	15.79437	539
E2_BNPL	Medium	6.501749	4.100000	59.75700	0.010000	6.363629	557
E2_UNP	Medium	9.855451	8.000000	37.60000	0.300000	6.673606	532
E2_INTU	Medium	26.34717	22.52000	76.92000	0.163877	18.28273	818
E2_POP	Medium	49054966	5807787.	1.36E+09	19907.00	1.89E+08	831
I3_CBW	Medium	4.877239	2.100000	77.80000	-1.000000	8.190633	804
I3_RIC	Medium	14.71294	14.50000	42.00000	-1.000000	10.25205	804
I3_TRDL	Medium	15746.98	709.0000	1355484.	1.000000	100216.4	748
TTR	Medium	42.57450	39.80000	217.9000	0.400000	20.71691	804
FDI	Low	6.39E+08	1.66E+08	3.56E+10	-7.12E+09	2.15E+09	443
F1_RL	Low	-0.886919	-0.891794	0.481490	-1.951647	0.444136	443
F1_CDW	Low	18953.86	9486.000	601977.0	0.000000	44018.00	278
F1_GNS	Low	16.59892	16.26900	92.62600	-28.78600	12.06095	413
F1_DCR	Low	45.59200	0.070682	8349.026	0.000000	489.3684	443
F1_LFX	Low	57.95406	58.50012	72.47122	41.75961	5.755995	443
F1_PEL	Low	100.5513	100.9746	149.9517	43.44108	22.85683	367
E2_SEL	Low	37.13648	36.65342	83.26802	9.908220	13.33750	294
E2_OP	Low	70.36326	63.49885	321.6317	0.167418	36.51862	402
E2_SATB	Low	84.26181	87.11048	100.0000	34.70176	14.94009	231
E2_BNPL	Low	10.83362	8.350000	49.90132	0.964372	8.695149	166
E2_UNP	Low	8.225275	5.400000	31.20000	0.100000	7.244256	91
E2_INTU	Low	5.437898	3.000000	43.40000	0.065239	6.570156	433
E2_POP	Low	30716724	13654025	1.21E+09	153146.0	86055598	440
I3_CBW	Low	17.32426	7.400000	258.6000	-1.000000	33.07356	437
I3_RIC	Low	18.11098	18.00000	60.00000	-1.000000	13.75818	437
I3_TRDL	Low	417.4589	35.00000	8206.000	1.000000	1063.387	353
TTR	Low	63.05950	42.70000	339.1000	11.20000	64.56413	437

Table 3, Descriptive statistics of the selected variables used in the estimation process for each segment.

Analysing the data in Table 3 in each segment it is possible to see that FDI is higher in the high segment, and that the tax variable is higher in the low segment and in the same segment it presents the biggest variation. Considering all the variables the medium segment is the one that is predominant³³, it has the more observations, followed by the high segment, and the low segment has only a smaller amount of observations in comparison to the high segment.

Below it is presented the Pearson correlations for the variables used in the models. Analysing the correlations in Table 4 and focusing the analysis on the FDI variable it is possible to see that there are signs that are not the same as the predicted as the case of the variables “Openness”, that as a negative but very weak correlation, and “Total tax rate”, that as positive correlation when the expected is a negative correlation, for example.

Reviewing the correlations for all countries it is possible to see, as in the other segments differences³⁴ from the predicted signs, regarding FDI relations. This indicates that the results may be very different from the expected, as it is evident in the Results chapter, where there are some variables with signs that are not as expected, that are in that chapter explored. Two examples present in Table 4 are the variables “Openness” and “Total tax rate”. “Openness” has a slightly negative correlation with FDI, when it is expected as referred in the Literature review a positive relation and “Total tax rate” has a positive correlation with FDI, when the expected according to the Literature review is a negative correlation.

Despite the efforts to reduce multicollinearity issues, we can still observe that there are strong correlations between variables. For example, looking at Table 4 we can see a strong correlation between the variables “Trademark application” and “Registered carrier departures worldwide” (0.825351), and in Table 11 (See Annex 1) it is also possible to state a high correlation between the variables “Population” and “Registered carrier departures worldwide” (0.864787). We can state that despite the precautions taken to minimize multicollinearity, it may still occur, and no further reductions were made in order to maintain at least one variable per pillar and maintain the framework proposed to

³³ This occurs since countries considered by the Human Development Reports as “high development” and “medium development” are included in this segment.

³⁴ See Annex 1.

study FDI determinants. The “Macroeconomic environment”, “Financial market development” and the “Business sophistication” pillars have two variables as proxies since, through correlation analysis it was verified that hardly multicollinearity issues would arise from these variables and these variables capture conflicting effects in their respective pillars, so their inclusion in the estimation process can help better understand the different effects that the pillars have on FDI inflows.

	FDI	F1_RL	F1_CDW	F1_GNS	F1_DCR	F1_LFX	F1_PEL	E2_SEL	E2_OP	E2_SAT B	E2_BNP L	E2_UNP	E2_INTU	E2_POP	I3_CBW	I3_RIC	I3_TRDL	TTR
FDI	1.000000																	
F1_RL	0.248152	1.000000																
F1_CDW	0.639338	0.220718	1.000000															
F1_GNS	0.242901	0.076299	0.281698	1.000000														
F1_DCR	- 0.116968	- 0.011617	- 0.165433	- 0.274119	1.000000													
F1_LFX	0.210971	0.669923	0.234603	0.062642	0.028084	1.000000												
F1_PEL	0.094009	0.170875	0.126301	0.039362	0.039351	0.018961	1.000000											
E2_SEL	0.224763	0.610380	0.182238	0.003907	0.079439	0.662594	0.006199	1.000000										
E2_OP	- 0.009856	- 0.317998	- 0.237649	- 0.169697	0.233539	0.186105	0.343050	0.082214	1.000000									
E2_SAT B	0.042224	0.303495	0.079192	0.027333	0.188434	0.093474	0.071067	0.166636	0.142947	1.000000								
E2_BNP L	- 0.172867	- 0.240336	- 0.203854	- 0.189442	0.139985	0.191517	0.152467	0.098239	0.013157	-0.014908	1.000000							
E2_UNP	- 0.166487	- 0.104264	- 0.166071	- 0.395461	0.158188	0.173457	0.134293	0.041731	0.088957	0.084000	0.370249	1.000000						
E2_INTU	0.263358	0.790710	0.243881	0.085301	0.072266	0.689562	0.205732	0.655261	0.299454	0.189395	-0.160764	0.070281	1.000000					
E2_POP	0.447619	0.156865	0.684417	0.364692	0.102173	0.127903	0.110733	0.170212	0.213020	-0.187867	-0.064339	0.139419	0.162748	1.000000				
I3_CBW	- 0.033247	- 0.291466	- 0.042021	- 0.030572	0.031782	0.462665	0.114057	0.366135	0.114963	-0.087005	0.231610	0.215601	0.253168	0.177412	1.000000			
I3_RIC	- 0.135704	- 0.464503	- 0.111624	- 0.026677	0.050794	0.338075	0.016965	0.319422	0.066784	-0.215625	0.195582	0.029115	0.392706	0.095636	0.216367	1.000000		
I3_TRDL	0.592963	0.216140	0.825351	0.261834	0.118363	0.263736	0.081395	0.182422	0.166452	-0.002418	-0.132417	0.100026	0.257950	0.594255	0.047286	0.048139	1.000000	
TTR	0.127171	0.194718	0.208936	0.018017	0.164050	0.035225	0.372059	0.101714	0.302680	-0.202867	-0.053366	0.076228	0.106750	0.245692	0.073298	0.088067	0.226758	1.000000

Table 4, Pearson correlations for the selected variables for all countries.

Chapter IV Results

4.1 Main model results

After discussing the methodology concerns, and the procedures to assure a more robust output explained, the process and the necessity of their employment, it is presented the results of the model estimations. The estimations were divided in three segments according to the development of the countries, and for each segment the two models were estimated. It was also proceeded with an estimation with all the countries to compare results.

Analysing the results of the high segment, looking first at Model B it is possible to state that of the Innovation-driven variables only “Cost to build a warehouse” is significant but not with the predicted sign, validating weakly H3, we can also note that the tax variable is not significant, not validating H4. The “Cost to build a warehouse” variable as a positive coefficient, but it was expected a negative sign, since it is a cost that is supported by investors, a possible reason to explain this sign is the possibility that in higher income countries the cost of permits is more expensive in countries which are wealthier and since these countries can attract more FDI, this variable may be capturing another effect. “Internet users” is a variable that also is significant but with the contrary sign to the expected, the correlation with FDI is positive (0.266029), so multicollinearity may still be an issue regarding this variable. The “Gross national savings” variable as a negative sign that can be explained that some of the FDI is for market capture and since there might be a tendency to save and not spend on consumption, it can deter some investors (Horizontal FDI), another reason may be that the more savings the country has, the more resources it has for investment, so there will be more competition for investment opportunities, this can deter foreign investors. The “Share of assets held by top five banks” variable has a positive and significant coefficient in Model B, this may be interpreted that countries in which there are strong banks, there is more financial security in the country, and more security when doing business with banks. In Model B, it is possible to see that there are three factor-driven pillars that are significant (“Infrastructure”, “Macroeconomic environment”, “Primary education”), five efficiency-

driven pillars that are significant (“Higher education and training”, “Goods market efficiency”, “Financial market development”, “Labour market efficiency”, “Technological readiness”) and one innovation-driven pillar that is significant (“Business sophistication”). In Model A, we can state that all pillars are significant with the expected signs, validating H3 and there is also validation for H4, since the tax variable has a negative and highly significant coefficient. In the high segment validation of H3 comes mostly from Model A, this can mean that in the presence of more characteristics “Business sophistication” and “Innovation” do not play an influential role in attracting FDI inflows, H3 finds weak validation in Table 5.

Variables	High segment		Medium segment		Low segment		All countries
	Model B	Model A	Model B	Model A	Model B	Model A	Model B
C	- 54333248712.08 **	17572294947.57* **	- 9963600985.68* **	- 10009707332.13 **	-6603365814.95	3844672344.55* **	- 22304852886.78 **
F1_rl	-472063275.04		-595527733.44**		- 7274313835.7* **	218595118.9	-1.80527911.89
F1_cdw	46059.97***		45858.91***		92245.5**	48293.33***	37716.89***
F1_gns	-205787505.48**		-8943293.72		-406990831.47	10635217.66	-70289615
F1_dcr	- 489189319.88** *		-39118793.19		-312038383.08	-8218561.81**	- 181855356.55** *
F1_ifx	-79395838.19		162734897.92** *		942657.15	-43798645.45***	-4623220.91
F1_pel	323773378.83*		-40706843***		42178778	-10201990.58***	85366478.15***
E2_sel	240998483.97**		27992635.59***	143016448.43** *	-202631315.96		101060299.15** *
E2_op	69217152.83***		-2901406.78	-24737785.25**	8527680.25		45997944.75***
E2_satb	186534401.11** *		23474867.70***	13775467.85	-34054908.2		70506775.65**
E2_bnpl	-87889629.92		44656497.73	-161078602.11**	-42934913.14		-38005630.76
E2_unp	-456958646.59**		-61047524.43***	- 177866178.48** *	184953663.05*		- 241468149.37** *
E2_intu	- 131344703.22** *		-21360871.26***	127036486.16** *	117790062.8		11563674.78
E2_pop	-2.58		-3.27	82.29***	55.2***		18.71
I3_cbw	329809300.14**	51383590.63	52179239***		12998949.13		117979629.25** *
I3_ric	43908041.82	-518430870.79***	-39355905**		104541633.8		-25158997.53
I3_trdl	28664.13	242292.86***	116557.09***		-248451.86		84269.34***
TTR	10511997.85	-138530216.35***	-7290938.21	-1864149.09	271883023.55	-1056919.87**	-12225076.86
Cross-section weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
White correction	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.462158***	.481252***	0.824982***	0.692916***	0.988780***	0.917232***	0.675403***
Obs.	317	484	294	313	23	226	637

Table 5, Results of the GLS estimation for the segments. *, **, *** indicates level of significance, respectively 10%, 5%, 1% levels of significance.

Regarding the results of the medium segment, Model A validates H2, every pillar is significant, with the expected sign, except for the variable “Openness” which has a negative sign, this can be explained by the intuition that FDI has a more tariff jumping role, more openness to foreign trade means more openness to competition and if the objective is to produce and sell in this country, openness increases exposure to other foreign competitors. H4 does not encounter validation in this segment, suggesting that in medium development countries taxes are not a deterrent of foreign direct investment. In this segment, some unexpected results appear in Model B. The variable “Rule of Law” has a sign contrary to the predicted, “Rule of Law” is a variable that can be considered as a proxy for the countries risk, in this segment higher risk might mean a higher return, so the higher this variable, the higher the return of the investment, attracting more foreign direct investment. “Primary enrolment rate” also has a negative coefficient, it is possible that this variable may be capturing another effect, since the correlation with FDI is positive (0.126046) in this segment. “Internet users” also has a negative sign in this segment, the correlation with FDI is positive (0.114033), so multicollinearity may still be an issue regarding this variable, and for his reason the sign is not the expected. The variable “Cost to build a warehouse” also has a positive coefficient, the reason may be the same as for the previous segment. In Model B, it is possible to see that there are four factor-driven pillars that are significant (“Institutions”, “Infrastructures”, “Health”, “Primary education”), four efficiency-driven pillars that are significant (“Higher education and training”, “Financial market development”, “Labour market efficiency”, “Technological readiness”) and two innovation-driven pillars that are significant (“Business sophistication”, “Innovation”). This segment presents the highest number of determinants that are statistically significant in Model B, this may suggest that this segment attracts more varied types of FDI than in other segments (Resource based investment, “Tariff jumping” FDI, Cost based investment and Innovative investment). In this segment, there exists strong evidence of H2, in Model A all “Efficiency-driven” pillars are significant, and in Model B only two pillars are not statistically significant, and therefore are not considered determinants of FDI in that segment for that model.

Examining the results of the low segment it is possible to see validation for H1 and weak validation for H4. Observing Model A there are two results that are worth mentioning. The “Primary enrolment rate” and “Life expectancy at birth” variables have

coefficients with negative signs, which are not expected, it is possible that these variables may report other effects, since they lose significance in Model B. In Model B, the “Rule of law” variable as a negative coefficient, which can have the same explanation as in the previous segment. The “Unemployment rate” variable as a positive coefficient in Model A that changes its sign in Model B and is more strongly significant, but considering the correlation with FDI in this segment (0.758688) it is possible that the effect unemployment has in this segment is the higher the unemployment rate the higher the offer of labour which in can translate for investors that for that country there exists a large labour pool that can satisfy their human capital requirements for the immediate period and further expansions (Strat et al., 2015). One limitation of this segment and therefore the analysis of Model B must be made with caution is the low number of observations that made into the estimation process, a limitation that occurs due to the lack of complete data for all countries. Nevertheless, Model B in this segment has two factor-driven pillars (“Institutions”, “Infrastructure”) and two efficiency-driven pillars (“Labour market efficiency”, “Market size”) significant. In this segment, there is strong evidence of H1 in Model A, since all pillars except for the “Institutions” pillar are statistically significant, while in Model B there exists only moderate validation of H1, since only two pillars are significant.

Considering the model with all the countries included there is no support for H4, and only four pillars are statistically insignificant, providing strong support for the other nine pillars as determinants of FDI. All the variables that are statistically significant have the expected signs except for the variable “Cost to build a warehouse”, the explanation for this occurrence may be the same as the one for the high and medium segments.

It can be observed in the high segment that the “Institutions”, “Health”, “Market size” and “Innovation” are not significant, while in the medium segment the pillars that are not significant are “Macroeconomic Environment”, “Goods market efficiency” and “Market size” and in the low segment the pillars that do not have statistical significance are “Macroeconomic Environment”, “Health”, “Primary Education”, “Goods market efficiency”, “Financial market development”, “Technological readiness”, “Business sophistication” and “Innovation”. But there is also a pillar that is constantly significant, “Infrastructure”, this is one pillar that has a constantly positive and significant relation with FDI in all segments. Still there exists an example of pillars that are significant in all

the segments and do not have the same impact in attracting FDI, the case of the variable acting as proxy for “Labour market efficiency” pillar has a negative coefficient in the high and medium segments and a positive coefficient in the low segment³⁵, showing that what can be a determinant in one situation can be a deterrent in another situation³⁶, it depends on the predominant effect, the type of FDI that is directed for that segment. It is possible to confirm that there are differences in the determinants when the countries development level differs.

It is also possible to conclude that there are differences across the different segments, these differences show that one possible determinant of FDI inflows is the Human Development Index. This conclusion is expected since the Human Development Index is comprised of variables presented in this study that are found to be statistically significant. To validate this reasoning, it is proceeded with another estimation using the HDI variable as an independent variable, results are presented below (Table 6).

In this estimation, the variables that are a proxy for the “Primary education” and “Health” pillars are removed and replaced by the HDI variable, since these variables contribute to the construction of the index, and using them in the estimation could have led to multicollinearity issues.

Analysing the results of this estimation it is possible to state that the HDI variable is significant at a 5% level of significance and its’ coefficient has a positive sign, suggesting that HDI can be considered a determinant of FDI (Curtis et al. (2013)). H4 is not validated since the “Total Tax Rate” variable is insignificant. The results are similar to the previous estimation with the complete sample, the variable “Cost to build a warehouse” retains its positive coefficient, all the pillars with the exception of “Institutions” and “Technological readiness” are significant and with results that differ from the estimation with the complete data due to the “Market size” pillar becoming significant. One also interesting occurrence is the new statistical significance of the variable “Resolving insolvency cost” that shows an increase in the influence of the “Business sophistication” pillar.

³⁵ In the low segment, the predominant objective of investors may be to reduce production costs, therefore a substantial supply of labour and due to the high level of unemployment, this labour can also be cheaper, investors invest in countries with high unemployment to increase profits.

³⁶ It should also be taken into consideration for this analysis the limitation presented in the low segment.

Variables	Model B
C	-24225757276.23***
F1_rl	-741618329.6
F1_cdw	23278.57***
F1_gns	-105475729.87***
F1_dcr	-3235769631.15***
HDI	15926588621.78***
E2_sel	89239787.56***
E2_op	71059176.35**
E2_satb	76268526.93***
E2_bnpl	-76192928.70
E2_unp	-233971126.47***
E2_intu	2479724.79
E2_pop	45.6***
I3_cbw	98004368.34***
I3_ric	-114491001.78***
I3_trdl	88845.05***
TTR	9439965.97
Cross-section weights	Yes
White correction	Yes
Adjusted R ²	0.696327***
Obs.	660

Table 6, Results of the GLS estimation with the HDI variable. *, **, *** indicates level of significance, respectively 10%, 5%, 1% levels of significance.

It can be concluded that there are no typical determinants for each segment, according to the hypothesis, there are pillars that are significant in one segment and are not in the other segments, but it is possible to see, with these estimations that many determinants are important for the attraction of FDI, and should not be disregarded from governments that seek to attract FDI. There is weak evidence to sustain H4, taxes are not considered to be deterrents of FDI, with the results of this study, it is possible that when there are more factors considered, taxes are not deterrents for investors.

The significance of many determinants may indicate that policies should not have a focused approach on an aspect of the countries environment but a broader approach if possible.

There is evidence in this study that focusing merely on tax reductions and fiscal incentives to increase FDI attractiveness is not a very effective strategy, there are other determinants that are more influential to attract FDI inflows. We can observe this occurrence in Model A of the high segment and Model A of the low segment, both models present in Table 5. Taxes are strong deterrents of FDI in both models, but when it is added

the rest of the pillars in the respective Models B we can see that they do not significantly influence FDI, their influence is lessened by the presence of other characteristics.

4.2 Additional analysis

Observing the evolution of the level of FDI inflows and outflows shown in Figure 1 and Figure 2, it is possible to see that in the period of the recent financial crisis there occurred a significant break in the period from 2000 to 2002 and from 2007 to 2009.

The period of the recent financial crisis is included in this study's data, so as a robustness check it is performed a Chow test (Chow (1960)), having the breakpoint year as 2008. The Chow test can help determine if there is a structural break in two sub-samples of our original sample. If the structural break exists than the two sub-samples must be treated separately, so as to not bias the estimation results. The null hypothesis of the Chow test is that there is no break in structure and that the coefficients for the two sub-periods are statistically the same. This analysis is studied for the complete sample, high segment and medium segment, the low segment is not studied for lack of enough data.

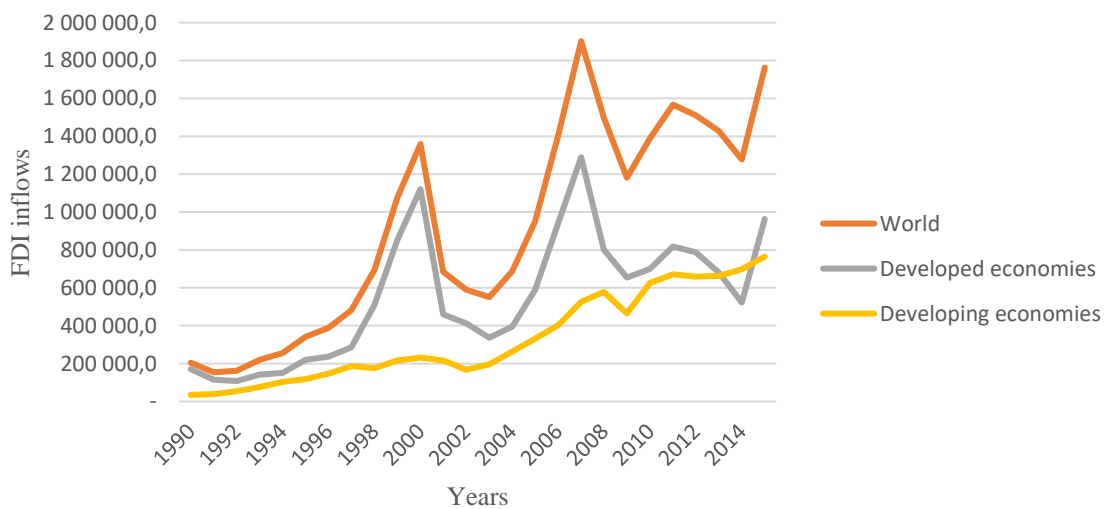


Figure 1, Net FDI inflows in the world, developed and developing countries.

It is used 2008 as a break point to study if the financial crisis affected FDI determinants. Hunady & Orviska (2014) found that the financial crisis had a negative impact in the European Union's capacity to attract FDI, using a 2008-year dummy, we can also see in the graphics the significant decreases of FDI flows in 2008, and after this period, developing countries start to play a more substantial role as host and source countries of FDI.

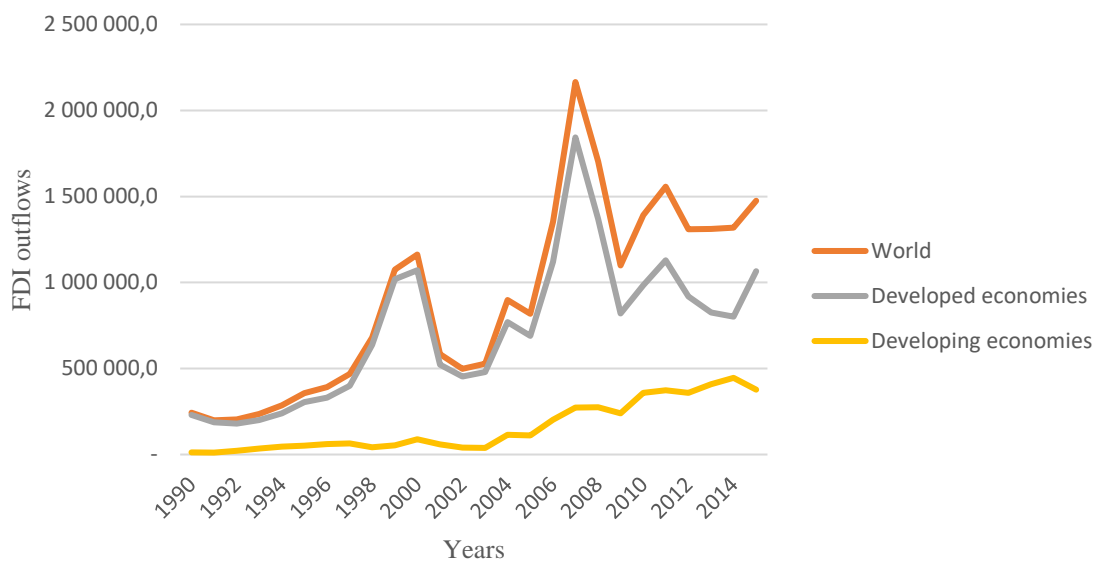


Figure 2, Net FDI outflows in the world, developed and developing countries.

The Chow test indicates³⁷ that we should reject the null hypothesis that there is no statistical significant difference in the structure of the regression between the two sub-periods. Still the results of the test should be considered with caution, since we cannot confirm the inexistence of heteroscedasticity, despite the procedures taken to reduce such issues, in the estimations.

It is presented in Table 7 the results for the complete data, high segment and medium segment for the two sub-periods (2005-2008; 2009-2014).

³⁷ See Appendix 2.

Variables	All countries (2005-2008)	All countries (2009-2014)	High segment (2005-2008)	High segment (2009-2014)	Medium segment (2005-2008)	Medium segment (2009-2014)
C	-1.06E+09	-3.35E+10***	-6.45E+09	-2.58E+11***	7.47E+09	-8.43E+09**
F1_rl	-1.38E+09**	-2.08E+09**	-2.66E+09	-5.52E+09*	-1.18E+09***	-1.13E+09***
F1_cdw	56734.57***	34277.03***	72421.45***	35769.89***	43854.62***	44962.67***
F1_gns	-1.97E+08***	-72608103*	-2.03E+08***	-2.74E+08*	-67446189***	-4720308
F1_dcr	-96379451**	-1.48E+08***	-1.53E+09***	-5.69E+08*	1.34E+08***	-44979858*
F1_lfx	54357648	-34558037	-3.16E+08	1.09E+09*	69647957	80594689
F1_pel	-87879844	1.29E+08***	2.11E+08	1.16E+09***	-1.40E+08***	9567531
E2_sel	66187028**	1.48E+08***	27337267	6.29E+08***	61092337***	47345225***
E2_op	3887778	44915037**	83843618***	1.41E+08***	-15242190**	-18282616**
E2_satb	75039553**	1.02E+08***	1.12E+08	-29615350	-9025286	8769498
E2_bnpl	75248703**	-8661234	-2.93E+08	1.29E+08	74468427***	59366121
E2_unp	-3.23E+08***	-2.77E+08***	-44268709	-7.05E+08***	-1.64E+08***	-1.63E+08**
E2_intu	1.41E+08***	53064083**	95907364	55290963	79273397***	19268791
E2_pop	23.32052**	15.96271	1.946980	-270.4557***	7.594972	-7.850726***
I3_cbw	50655052***	1.51E+08***	47618408	3.94E+08	-7150847	87429185***
I3_ric	-68676530	2090162	-89310710	-57718353	-78684953**	-39883239
I3_trdl	101305.3***	67666.12***	48992.83	58986.22***	230063.7***	112288.2***
TTR	-18687229	-22846671	-63095081	-72355594	17542498	-32697316**
Cross-section weights	Yes	Yes	Yes	Yes	Yes	Yes
White correction	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.956407***	0.811048***	0.645424***	0.642512***	0.975701***	0.871877***
Obs.	252	385	149	168	94	200

Table 7, GLS results for the sub-periods 2005-2008 and 2009-2014. *, **, *** indicates level of significance, respectively 10%, 5%, 1% levels of significance.

Analysing the differences for all countries between the two periods, it is possible to observe that primary education is only significant in the post crisis period, with the expected sign, the openness of the economy also is only determinant in the period post-crisis, ease of credit (considering the “Bank non-performing loans” variable) loses its significance as well as market size. These changes can be translated in investors becoming more concern regarding the qualifications of the work force, ease of international trade and being less concern with access to credit and the market size, investors beheld more the costs and productivity of their business rather than financing more investments (to capture market share or scale production). In regards with the results form sub-chapter 4.1, the results for the complete data in Table 7, the Technological readiness pillar is

significant with the expected sign and the Institutions pillar is also significant but with the sign contrary with predictions.

Considering the two periods for the high segment, in the post-crisis period Institutions became significant but with the contrary sign regarding expectations, Health and the Education pillars became statistically significant with the expected signs, Unemployment was also found to be a deterrent of FDI, Market size became also a deterrent and Innovation became a determinant³⁸, Macroeconomic environment also lost some of its influence. It can be concluded that from these results that investors became more concern with costs and productivity of their workers, they looked more into what the countries in this segment can do in terms of making their companies more competitive from an internal perspective, and not very concern with supplying local markets. In regards with the results form sub-chapter 4.1, the results for the complete data in Table 7, the Technological readiness pillar became insignificant as well as Business sophistication and Financial market development, whereas Health became weakly significant with the predicted sign, Market size became highly significant but with the opposite sign to predictions and Innovation also became highly significant with the expected sign.

Looking at the medium segment, in the period post crisis Macroeconomic environment loses significance, Primary education stopped being a deterrent of FDI, ease to get credit also lost its importance as well as Technology readiness and Insolvency costs, Market size became a deterrent of FDI as well as Taxes³⁹. In regards with the results form sub-chapter 4.1, the results for the complete data in Table 7, Taxes have some evidence of deterring FDI, Macroeconomic Environment also finds evidences of influencing FDI, while Health does not find such evidence, Openness also finds strong evidence of being a deterrent of FDI in medium segment countries⁴⁰, Technological readiness finds evidence of being a determinant of FDI with the expected sign, Market size also finds evidence of being a deterrent of FDI in the period post-crisis.

³⁸ Giving validation to H3.

³⁹ Giving weak validation to H4.

⁴⁰ This result further supports the hypothesis of medium development countries attract significant “Tariff jumping” FDI.

It is possible to state that there are variables that are asserting a strong influence over all the estimations in Table 7. Institutions have a negative influence⁴¹ over FDI inflows, the possible reason as already been discussed in sub-chapter 4.1., Infrastructures also have a significant and positive relation with FDI⁴², demonstrating that the quality of the means of communication and distribution of resources are an influential determinant of FDI (Kinda (2010)). Macroeconomic environment also is a strong determinant of FDI, especially public debt can be a strong deterrent of FDI (Salotti & Trecroci (2016)), Higher education and training also finds strong support of being a determinant of FDI, higher education is related with higher levels of worker productivity for companies (Youssef (2001)), Innovation as also evidence of being a robust determinant of FDI, more potentialities to create new products, brands and innovate processes increases the edge between a company and its rivals, and therefore the company with the bigger edge can reap high benefits.

Observing the differences between the two periods, there are effects that occur in every segment. Analysing the differences in estimation results for the two periods it is possible to see that Macroeconomic Environment loses influence as well as the financial sector stability. This may occur due to the instability verified in many economies, especially in the financial and public debt sectors, this instability had strong influences on economic growth worldwide and therefore, investors may have found poor strength while analysing the economic stability of a country. Basic and Higher Education have more influence in FDI flows in the post-crisis period, investors may have considered in the post-crisis more the beneficial effects education has on worker productivity, and the gains in efficiency in the workplace. Market size seems to assert a more negative influence over FDI, investors may have strayed away from investing in countries with a large population, and invest in countries with a lower internal market, reducing exposure to the fallout of the financial crisis.

With this analysis, it is possible to see that there are differences in attracting FDI inflows regarding countries with different levels of Human Development. Despite the presence of strong determinants, regardless of the development level, there are effects

⁴¹ As in Table 5 when the variable “Rule of Law” is statistically significant it has a negative coefficient.

⁴² A result similar to the results in Table 5.

that vary according to the development level. It is also possible to state that the financial crisis had an effect on investment behaviour, and that there are persistent effects of the crisis in the studied segments. This study does not assert that this change is long-term, it is needed more information and another analysis to verify this hypothesis.

Chapter V Conclusion

Foreign Direct Investment is an important source for introducing a burst of new energy into stagnating or low growth economies, bringing a new dynamism and knowledge into economies. The determinants to attract FDI are various and are not the same for every country, certain characteristics are more relevant in some countries than in others, and what can be a determinant in one country maybe a deterrent in another, as the results of this study shows.

Adopting the structural framework of “The Global Competitiveness Reports” it was chosen 51 variables to be proxies of 13 pillars that in the literature are considered as determinants of FDI inflows. These 51 variables due to lack of data and multicollinearity issues were reduced to 16 variables, existing a minimum of one variable per pillar. It was used data of 186 countries from all continents and levels of human development for the period between 2005 to 2014. With this panel data, two models were estimated with the countries divided in three segments constructed with the use of the “Human Development Index” variable and it was also estimated a model with all the countries. With the analysis of the results of the main model estimations it is found validation of H1 and H2, H3 and H4 are weakly validated by the results. The results also indicate the strong positive influence that infrastructure has over FDI inflows, this variable had always a statistically significant and positive coefficient in all estimations.

It was verified the robustness of the main model estimations using a Chow test (Chow (1960)). The test indicated that the recent financial crisis had a significant impact in the way foreign investors make their investment decisions, consequently the estimations were repeated, with exception of the low segment⁴³, using only Model B. The regressions show that investors are more influenced in the post-crisis period by human capital quality and tend not to invest in countries with a large market size. The increase influence of human capital quality may derive from more concerns with productivity of workers by entrepreneurs, to eliminate internal inefficiencies. The negative influence of market size in the post-crisis period may derive from investors trying to disperse

⁴³ Due to lack of observations.

investments, since large economies suffered a great impact from the financial crisis, because they were the most exposed to the financial crisis, investing in small countries can reduce such risk in investments.

With this study, we can conclude that one of the factors that contributes for the differences verified in the literature is the level of Human Development of a country. Different investments can have different objectives, and to reach these objectives diverse instruments are used, and diverse characteristics influence the best results for investors, this combination to achieve the best outcome for the investor varies. Tariff jumping FDI as a different objective than investment used to reduce costs (labour and capital), so different approaches are needed to study thoroughly which effect is preponderant in each segment.

The present analysis as limitations being one of the limitations the presence of estimations with a low number of observations despite the control imposed on the variables regarding the number of observations. Another limitation is that in the principal component analysis it was not studied relations between variables of different pillars, since it was not relevant to the adopted framework, so there still prevailed, in a minimal mode, multicollinearity issues.

Notwithstanding the limitations of this study, it was encountered evidences of its main argument. To attract FDI, policies should act not only in one area of a countries environment but in a broader perspective, if possible, taking advantage of their own natural attractions respectively to the types of FDI. In accordance with the analysis of the impact of the recent financial crisis, countries should develop education policies that increase their countries' human capital quality, since it suffered an increase of influence in the post-crisis period, this education policies can also be related to policies to promote innovation that as show the results is a determinant of FDI inflows for medium and high development countries, and another policy concern should relate with providing infrastructure quality and extension. Fiscal policies, according with the results, have a lesser influence than other characteristics, and when planning fiscal measures with the purpose of attracting FDI inflows, governments should take into consideration the effects that these policies will have on other policies of economic and social natures, since by concentrating their efforts on one deterrent of FDI inflows, it is possible the new policies

can affect negatively other determinants of FDI inflows, and the predominant effect on FDI inflows will be negative, and FDI inflows decrease, despite the governments intentions.

Regarding the literature review and this study's' approach, a study comparing different types of taxes (Value Added Tax, Income Tax, Property Tax and other taxes) discriminated, within this framework of segmenting the countries can be important to discover more how investors react to different types of taxes in countries with different characteristics. This research can shed more light in considering how taxes influence FDI attractiveness and if there are different results for different segments. It would be also interesting an analysis at industry level with this framework, regarding development segments to understand in which sectors the effects that are preponderant. It can also be pertinent to investigate the effects the recent financial crisis in investors perspectives for investing abroad, and understand if the effect found in this study⁴⁴ was a short-term adjustment or a more long-term effect.

⁴⁴ In sub-chapter 4.1.

Appendix

Appendix 1 - White Robust Covariance Period Method

The White period method assumes that the errors for a cross-section are heteroskedastic and serially correlated (cross-section clustered). The coefficient covariances are calculated using a White cross-section clustered estimator:

$$\left(\frac{N^*}{N^* - K^*}\right) \left(\sum_i X_i' X_i\right)^{-1} \left(\sum_i X_i' \hat{\varepsilon}_i \hat{\varepsilon}_i' X_i\right) \left(\sum_i X_i' X_i\right)^{-1}$$

N^* is the total number of stacked observations, K^* is the total number of estimated parameters, X_i is a k-vector of regressors and $\hat{\varepsilon}_i$ is the estimation residuals.

The summations are taken over individuals and individual stacked data instead of periods. The estimator is designed to accommodate arbitrary heteroskedasticity and within cross-section serial correlation. The corresponding multivariate regression (with an equation for each period) allows the unconditional variance matrix $E(\varepsilon_i, \varepsilon_i') = \Omega_{Ti}$ to be unrestricted and varying with i , with conditional variance matrix $E(\varepsilon_i, \varepsilon_i' | X_i')$ depending on X_i^* in general fashion.

Appendix 2 - Chow test

In Table 8 it is presented the data collected for realizing the Chow test referred in Sub-Chapter 4.2. The results indicate that the null hypothesis if the test should be rejected, therefore there is a break in the structure relation in the periods before and after 2008.

Variables	Complete sample	High segment	Medium segment
Sum squared resid (entire period)	3,96E+23	3,35E+23	1,42E+22
Sum squared resid (2005-2008)	1,62E+23	1,44E+23	1,46E+21
Sum squared resid (2009-2014)	1,74E+23	1,41E+23	1,13E+22
Degrees of freedom	18	18	18
Observations	637	317	294
Test statistic	6,008933301	2,7621832	1,660524348
Critic value (5% level of significance)	1,5705	1,5705	1,5705
	Fobs > Fcrit	Fobs > Fcrit	Fobs > Fcrit
Results	Reject null hypothesis	Reject null hypothesis	Reject null hypothesis

Table 8, Chow test parameters and results.

The test statistic is calculated as follows:

$$\frac{S.sq.resid(2005 - 2014) - (S.sq.resid(2005 - 2008) + S.sq.resid(2009 - 2014))}{Number\ of\ coefficients}$$

$$\frac{Sum\ sq.\ resid(2005 - 2008) + Sum\ sq.\ resid(2009 - 2014)}{Number\ of\ observations - 2 * Number\ of\ coefficients}$$

This statistic follows a Snedecor's F distribution with parameters "Number of coefficients" and "Number of observations-2*Number of coefficients".

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Annex

Annex 1 – Data Characteristics

It is presented the descriptive statistics for all the variables researched for this study, Table 9.

Pillar	Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Institutions	F1_HM	8.077813	3.200000	93.20000	0.000000	12.65855	1271
	F1_CC	-0.040087	- 0.318586	2.556869	-1.836509	1.000405	1857
	F1_RL	-0.059529	- 0.275067	2.120458	-1.951647	0.977583	1860
Infrastructure	F1_RLD	2.754185	1.750681	13.00831	0.038093	2.970638	830
	F1_ELR	75.49671	94.10000	100.0000	0.555846	31.57099	1860
	F1_EPL	14.24847	11.53526	98.38337	0.494121	11.40336	1216
	F1_DRW	86.74427	93.40000	100.0000	37.10000	15.70077	1796
	F1_CDW	195037.6	24950.00	10095197	0.000000	846430.2	1438
Macroeconomic environment	F1_DCR	20.78850	0.211814	8349.026	0.000000	244.3500	1816
	F1_GBB	-1.125360	- 2.239000	122.1890	-40.31300	7.632268	1806
	F1_GGD	49.95001	40.53650	642.8750	0.000000	42.44061	1776
	F1_RIR	6.691412	5.278808	572.9363	-42.31018	22.44903	1426
	F1_GNS	21.73043	20.78800	92.62600	-28.78600	12.41751	1672
	F1_IVA	29.19668	27.26770	119.0268	3.163377	13.82924	1714
	F1_IF	5.890792	4.293000	156.9640	-72.72900	7.369431	1815
	F1_WGDP	0.553933	0.063000	19.42200	0.001000	1.805688	1783
	F1_IFM	28.04940	18.00000	128.1000	1.600000	25.37048	1840
	F1_LFX	69.81259	72.30954	83.98049	41.75961	8.969751	1821
Health	F1_HEX	958.3454	272.4118	9719.988	4.741027	1679.227	1830
	F1_PEL	103.6506	103.1567	149.9517	43.44108	13.45953	1545
	F1_LAM	87.51150	94.12146	99.99383	23.24747	14.96635	339
Primary education	F1_LAF	80.39145	90.31010	99.99587	8.939740	21.89444	339
	E2_SEL	80.50819	88.77457	164.8117	9.908220	27.79473	1393
	E2_TEL	38.47248	35.16515	119.7788	0.469570	27.21096	1233
Higher education and training	E2_SLE	13.27745	13.52498	20.46864	3.686330	3.135889	1061
	E2_MYS	9.382912	9.615260	13.78889	0.559630	2.593910	411
	E2_OP	93.53118	84.67264	455.4151	0.167418	54.90426	1770
Goods market efficiency	E2_TF	5.679627	4.335000	31.11000	0.000000	4.656988	1476
Labour market efficiency	E2_FWS	1.010692	1.059659	1.942584	0.227273	0.188193	900
Financial market development	E2_UNP	8.752080	7.200000	37.60000	0.100000	6.142194	1106
	E2_DCP	52.49791	38.43686	312.1536	1.201066	46.04031	1736
	E2_CBI	1.983350	1.455770	18.06867	0.001599	2.101085	619
	E2_CBB	18.11277	12.56551	253.1915	0.238069	18.67312	1723
	E2_MC	6.32E+11	6.16E+10	2.63E+13	1152430.	2.24E+12	777
	E2_BNPL	6.242177	3.859337	59.75700	0.010000	6.650976	1211
	E2_SATB	81.53351	84.15609	100.0000	30.24355	15.66224	1226
	E2_BKRG	16.56827	15.70000	45.30000	1.800000	4.950235	1135
	E2_FBI	8.483281	2.728098	44.58174	0.000000	10.97964	1737
	E2_INTU	31.87749	24.05000	98.16000	0.065239	27.78422	1833
Market size	E2_MOBC	81.35622	84.24610	237.3519	0.256471	44.95833	1853
	E2_POP	36636205	7437115.	1.36E+09	19907.00	1.36E+08	1857
	E2_GDPC	13402.32	4675.304	178713.2	140.8151	20732.70	1844
Business sophistication	I3_CRSB	48.73509	16.30000	1314.600	0.000000	99.45950	1781
	I3_TRSB	36.23139	23.00000	697.0000	0.500000	55.85472	1781
	I3_PRSB	8.443178	8.000000	21.00000	1.000000	3.364608	1781
	I3_CBW	7.222852	2.200000	258.6000	-1.000000	18.42695	1781

	I3_CRP	6.111173	5.000000	28.30000	-1.000000	5.078990	1781
	I3_RIC	14.08265	14.50000	60.00000	-1.000000	10.88174	1781
Innovation	I3_SCTA	9657.581	224.4500	414758.5	0.000000	38677.09	1656
	I3_PATL	20411.43	900.0000	928177.0	3.000000	83184.21	943
	I3_TRDL	27580.43	900.5000	1355484.	1.000000	99798.53	1666
Other variables	FDI	1.09E+10	8.60E+08	7.34E+11	-2.97E+10	3.89E+10	1825
	TTR	46.89708	40.40000	339.1000	0.400000	37.40556	1781
	HDI	0.689067	0.721096	0.971000	0.118000	0.165796	1804

Table 9, Descriptive statistics of all variables present in the study.

The correlations per segment of development are presented below for the variables selected for the estimation process, Table 10, Table 11 and Table 12.

	FDI	F1_RL	F1_CDW	F1_GNS	F1_DCR	F1_LFX	F1_PEL	E2_SEL	E2_OP	E2_SAT B	E2_BNP L	E2_UNP	E2_INTU	E2_POP	I3_CBW	I3_RIC	I3_TRDL	TTR
FDI	1.000000																	
F1_RL	0.457649	1.000000																
F1_CDW	0.329721	-	1.000000															
F1_GNS	0.036464	0.418185	0.499384	1.000000														
F1_DCR	0.001591	0.135636	0.220416	0.136212	1.000000													
F1_LFX	0.658453	0.292970	0.150154	0.550598	0.068073	1.000000												
F1_PEL	0.522196	0.517612	0.489380	0.129546	0.107318	0.010379	1.000000											
E2_SEL	0.253565	0.731638	0.483372	0.086233	0.261748	0.023661	0.489761	1.000000										
E2_OP	0.232230	0.170318	0.498338	0.168457	0.625487	0.378407	0.115028	0.390089	1.000000									
E2_SAT B	0.049441	0.022365	0.187923	0.076806	0.222947	0.052357	0.219570	0.269432	0.231315	1.000000								
E2_BNP L	0.187610	0.147726	0.123596	0.060509	0.160666	0.103297	0.387854	0.129358	0.055821	0.370495	1.000000							
E2_UNP	0.758688	0.415938	0.136973	0.142128	0.296403	0.580403	0.438771	0.202836	0.527420	0.136919	0.304995	1.000000						
E2_INTU	0.653832	0.371187	0.509599	0.077725	0.338778	0.506773	0.400507	0.567270	0.176621	-0.466810	0.045066	0.396435	1.000000					
E2_POP	0.528028	0.501843	0.771948	0.212821	0.272421	0.002544	0.633569	0.475199	0.507634	-0.094740	0.359916	0.219890	0.470180	1.000000				
I3_CBW	0.566186	0.609570	0.026231	0.698447	0.294793	0.755102	0.172326	0.264583	0.226170	0.133078	0.092478	0.522382	0.327821	0.201790	1.000000			
I3_RIC	0.027959	0.163736	0.533265	0.383532	0.098549	0.516490	0.438438	0.043300	0.259932	-0.051643	-0.308833	0.108173	0.170221	0.589705	0.267450	1.000000		
I3_TRDL	0.139109	0.170557	0.675907	0.507518	0.076885	0.260291	0.290605	0.321748	0.398386	-0.477226	-0.010115	0.008434	0.343541	0.581693	0.242354	0.498863	1.000000	
TTR	0.629676	0.492877	0.420761	0.067340	0.190014	0.443290	0.260662	0.351973	0.285255	0.041081	-0.107178	0.378987	0.524509	0.659590	0.436287	0.029482	0.356308	1.000000

Table 10, Pearson correlations for the low segment.

	FDI	F1_RL	F1_CDW	F1_GNS	F1_DCR	F1_LFX	F1_PEL	E2_SEL	E2_OP	E2_SAT B	E2_BNP L	E2_UNP	E2_INTU	E2_POP	I3_CBW	I3_RIC	I3_TRDL	TTR
FDI	1.000000																	
F1_RL	-0.014358	1.000000																
F1_CDW	0.961989	0.004600	1.000000															
F1_GNS	0.511474	0.033785	0.541713	1.000000														
F1_DCR	-0.112734	0.113108	-0.137603	-0.352819	1.000000													
F1_LFX	0.098248	0.174775	0.058673	0.053965	0.098972	1.000000												
F1_PEL	0.126046	-0.107450	0.147203	0.029944	-0.014314	0.163958	1.000000											
E2_SEL	0.042999	0.177629	0.004740	0.066567	0.062912	0.197191	0.037176	1.000000										
E2_OP	-0.270746	0.242506	-0.304525	0.016064	0.206879	0.117421	-0.418893	-0.080312	1.000000									
E2_SAT B	-0.052360	0.136420	0.105207	0.062168	0.254896	0.074094	0.020686	0.059245	0.150452	1.000000								
E2_BNP L	-0.142822	-0.041799	-0.194966	-0.095333	0.063724	0.055140	-0.193888	0.174942	0.151180	-0.051448	1.000000							
E2_UNP	-0.196837	0.142588	0.212464	0.382457	0.196431	0.202907	0.186695	0.123202	0.114223	0.150651	0.234444	1.000000						
E2_INTU	0.114033	0.265760	0.103932	0.001379	0.065977	0.432856	0.143863	0.380013	0.110812	-0.028389	0.021652	0.016551	1.000000					
E2_POP	0.817570	0.016137	0.864787	0.550475	0.120158	0.027291	0.117623	0.130910	0.276498	-0.170472	-0.137113	0.201110	0.079523	1.000000				
I3_CBW	0.076208	-0.087042	0.093690	-0.101745	0.171297	-0.025172	-0.092851	0.055008	0.075125	-0.230029	0.324468	0.219652	0.105635	0.292202	1.000000			
I3_RIC	0.055720	0.231788	0.055828	0.126140	0.136965	0.108712	0.162737	0.065171	0.081592	-0.113252	0.155232	0.083122	0.076178	0.061000	0.169797	1.000000		
I3_TRDL	0.916965	0.000354	0.896490	0.474226	0.076677	0.108738	0.077841	0.034634	0.187704	0.023378	-0.124268	0.145178	0.086614	0.765552	0.064071	0.086391	1.000000	
TTR	0.308276	0.236483	0.312705	0.246497	0.215989	0.074882	0.389799	0.144476	0.341395	-0.120815	-0.058514	0.222525	0.088624	0.319708	0.020528	0.065489	0.254787	1.000000

Table 11, Pearson correlations for the medium segment.

	FDI	F1_RL	F1_CDW	F1_GNS	F1_DCR	F1_LFX	F1_PEL	E2_SEL	E2_OP	E2_SAT B	E2_BNP L	E2_UNP	E2_INTU	E2_POP	I3_CBW	I3_RIC	I3_TRDL	TTR
FDI	1.000000																	
F1_RL	0.303703	1.000000																
F1_CDW	0.371882	0.393586	1.000000															
F1_GNS	0.033656	0.103222	0.079501	1.000000														
F1_DCR	0.132682	0.031107	0.234375	0.162769	1.000000													
F1_LFX	0.217179	0.652118	0.451192	0.005330	0.034000	1.000000												
F1_PEL	0.163595	0.155819	0.173029	0.169486	0.201441	0.022633	1.000000											
E2_SEL	0.275263	0.527740	0.277806	0.119274	0.220817	0.429109	0.157482	1.000000										
E2_OP	0.024062	0.202754	0.322762	0.253146	0.368308	0.068214	0.433043	0.189961	1.000000									
E2_SAT B	0.065913	0.352643	0.091523	0.083137	0.179896	0.106622	0.092969	0.248889	0.100326	1.000000								
E2_BNP L	0.168001	0.232975	0.169491	0.327638	0.326384	0.052810	0.101428	0.032531	0.043505	0.073175	1.000000							
E2_UNP	0.154946	0.297552	0.099672	0.455952	0.093245	0.143878	0.003401	0.080857	0.089622	0.036019	0.623952	1.000000						
E2_INTU	0.267180	0.768292	0.351708	0.101785	0.049832	0.568653	0.168124	0.507552	0.218132	0.216528	-0.066921	0.137860	1.000000					
E2_POP	0.163278	0.074903	0.669946	0.057938	0.242185	0.177047	0.216498	0.010697	0.454431	-0.454846	-0.112222	0.099088	0.022139	1.000000				
I3_CBW	0.008583	0.297954	0.057337	0.099809	0.025850	0.123531	0.046731	0.077550	0.017554	-0.198264	0.124499	0.279020	0.250780	0.007390	1.000000			
I3_RIC	0.259467	0.523323	0.331443	0.084020	0.059054	0.223634	0.054006	0.367210	0.033631	-0.262703	0.174756	0.165958	0.467862	0.111522	0.204577	1.000000		
I3_TRDL	0.309212	0.280874	0.700940	0.041302	0.196220	0.423874	0.199981	0.202348	0.282551	-0.101176	-0.061485	0.018810	0.325553	0.627782	0.064805	0.134491	1.000000	
TTR	0.011374	0.290526	0.086130	0.279509	0.135923	0.057240	0.393912	0.073579	0.331115	-0.260047	-0.041807	0.079217	0.158137	0.343188	0.100050	0.131913	0.216710	1.000000

Table 12, Pearson correlations for the high segment

Annex 2 – Principal Component Analysis

Principal component analysis by pillar for the selection of the variables utilized in the estimation procedures. This analysis is used to select the variables to input in the estimation process. Variables are grouped by pillar. These variables have met the criterium of at least 1200 observations. It is presented the number of principal components, their respective eigenvalues, cumulative proportion and variable weights. It is also indicated the variables that are chosen to be submitted to the third criterium of analysis of the Pearson correlations with the intent of reducing multicollinearity issues.

Institutions:

Number of principal components	Eigenvalues	Cumulative proportion	
1	2.086417	0.6955	
2	0.866120	0.9842	
3	0.047463	1	
Principal components	Variables		
	Control of Corruption	Rule of Law	Homicide rate
PC1	0.659414	0.672755	-0.335520
PC2	0.283821	0.190492	0.939765
PC3	-0.696146	0.714922	0.065329

Table 13, Principal component analysis for the Institutions pillar, 1271 observations of 1860.

Since the correlation between the variables “Control of Corruption” and “Rule of Law” is 0.948791, it is selected from the first principal component the variable only the variable “Rule of Law”.

Infrastructure:

Number of principal components	Eigenvalues	Cumulative proportion		
1	2.158310	0.5396		
2	0.967921	0.7816		
3	0.627399	0.9637		
4	0.145192	1		
Principal components	Variables			
	Energy power loses	Access to improved drinking water	Electrification rate	Registered carrier departures worldwide
PC1	-0.434974	0.618490	0.627399	0.186112
PC2	-0.096903	-0.175351	-0.180001	0.963048
PC3	0.893936	0.319178	0.247475	0.194320
PC4	0.047808	-0.696310	0.716049	0.011862

Table 14, Principal component analysis for the Infrastructure pillar, 1045 observations of 1860.

Variables “Electrification rate” and “Registered carrier departures worldwide” are selected.

Macroeconomic environment:

Number of principal components	Eigenvalues	Cumulative proportion				
1	2.265164	0.3236				
2	1.150761	0.4880				
3	1.061820	0.6397				
4	0.881648	0.7656				
5	0.651135	0.8586				
6	0.610678	0.9459				
7	0.378794	1				
Principal components	Variables					
	Debt coverage ratio	Government gross debt	Gross national savings	Inflation	Industrial value added	GDP as a share of world GDP
PC1	-0.307632	0.411436	0.541374	0.030365	0.515689	0.045193
PC2	0.052168	-0.108736	0.226320	-0.520432	0.080997	0.755987
PC3	0.613777	0.385359	0.044020	-0.562079	0.068016	-0.389009
PC4	0.486019	0.257520	0.133038	0.612244	0.258744	0.182667
PC5	-0.222772	0.756376	-0.196450	0.026886	-0.526951	0.245403
PC6	-0.468865	0.084155	0.186476	-0.159532	0.093827	-0.413356
PC7	0.142281	-0.155309	0.750127	.106205	-0.607823	-0.103246

Table 15, Principal component analysis for the Macroeconomic environment pillar, 1554 observations of 1860.

Variables “Debt coverage ratio”, “GDP as a share of world GDP” and “Gross national savings” are selected.

Health:

Number of principal components	Eigenvalues	Cumulative proportion	
1	2.322752	0.7743	
2	0.609385	0.9774	
3	0.067863	1	
Principal components			
Principal components	Variables		
	Infant mortality	Life expectancy at birth	Health expenditure per capita
PC1	-0.610556	0.629540	0.480521
PC2	0.411195	-0.266564	0.871701
PC3	0.676860	0.729811	-0.096112

Table 16, Principal component analysis for the Health pillar, 1791 observations of 1860.

It is selected the “Life expectancy at birth” variable, since it is highly correlated with the other two variables (-0.926067 with “Infant mortality” and 0.556290 with health expenditure per capita”), besides matching the criteria.

Primary education:

By limit of observations only “Primary enrolment rate” is selected.

Higher education and training:

Number of principal components	Eigenvalues	Cumulative proportion
1	1.769007	1.769007
2	0.230993	2
Principal components		
Principal components	Variables	
	Secondary enrolment rate	Tertiary enrolment rate
PC1	0.707107	-0.707107
PC2	0.707107	0.707107

Table 17, Principal component analysis for the Higher education and training pillar, 1071 observations of 1860

It is selected the “Secondary enrolment rate” variable since it captures two distinct effects in the principal components.

Goods market efficiency:

Number of principal components	Eigenvalues	Cumulative proportion
1	1.215241	0.6076
2	0.784759	1
Principal components	Variables	
	Openness	Tariffs
PC1	-0.707107	0.707107
PC2	0.707107	0.707107

Table 18, Principal component analysis for the Goods market efficiency pillar, 1446 observations of 1860

It is selected the “Openness” variable since it captures two distinct effects in the principal components.

Labour market efficiency:

By limit of observations only “Unemployment rate” is selected.

Financial market development:

Number of principal components	Eigenvalues	Cumulative proportion			
1	1.789203	0.3578			
2	1.060200	0.5699			
3	0.901498	0.7502			
4	0.736245	0.8974			
5	0.512854	1			
Principal components	Variables				
	Domestic credit to private sector	Bank nonperforming loans	Share of asset held by top 5 banks	Banks regulatory capital ratio	Commercial bank branches
PC1	0.590151	-0.370199	0.042446	-0.515458	0.497168
PC2	0.101502	-0.148314	0.909543	-0.059271	-0.370027
PC3	0.305425	0.824477	0.261282	0.139098	0.373278
PC4	0.057070	-0.401441	0.157088	0.787626	0.436528
PC5	0.738158	0.006261	-0.279259	0.301806	-0.534800

Table 19, Principal component analysis for the Financial market development pillar, 889 observations of 1860.

Variables “Domestic credit to private sector”, “Share of asset held by top 5 banks” and “Bank nonperforming loans” are selected.

Technological readiness:

Number of principal components	Eigenvalues	Cumulative proportion		
1	2.429916	0.8100		
2	0.489390	0.9731		
3	0.080695	1		
Principal components	Variables			
	Internet users	Mobile cellular subscriptions	Fixed broadband internet subscriptions	
PC1	0.618618	0.519538	0.589400	
PC2	-0.222792	0.835369	-0.502516	
PC3	-0.753443	0.179552	0.632523	

Table 20, Principal component analysis for the Technological readiness pillar, 1714 observations of 1860.

It is selected the variable “Internet users” since it is highly correlated with the other two variables (0,678966 with the variable “Mobile cellular subscriptions” and 0.902313 with the variable “Fixed broadband internet subscriptions”).

Market size:

Number of principal components	Eigenvalues	Cumulative proportion
1	1.051612	0.5258
2	0.948388	1
Principal components	Variables	
	Population	GDP per capita
PC1	-0.707107	0.707107
PC2	0.707107	0.707107

Table 21, Principal component analysis for the Market size pillar, 1844 observations of 1860.

It is selected the “Population” variable since it captures two distinct effects in the principal components.

Business sophistication:

Number of principal components	Eigenvalues	Cumulative proportion				
1	1.909924	0.3183				
2	1.217452	0.5212				
3	0.920997	0.6747				
4	0.826677	0.8125				
5	0.612204	0.9145				
6	0.512747	1				
Principal components	Variables					
	Cost to build a warehouse	Cost to register property	Cost required to start a business	Procedures required to start a business	Resolving insolvency cost	Time required to start a business
PC1	0.255885	0.409869	0.521766	0.462760	0.230048	0.476678
PC2	0.530684	0.381321	0.114569	-0.465121	0.361694	-0.461174
PC3	0.034628	-0.419578	-0.297107	0.181215	0.832843	0.089534
PC4	0.788214	-0.412840	-0.137661	0.263120	-0.346507	-0.005672
PC5	0.133711	0.498286	-0.748020	-0.067857	-0.050561	0.408825
PC6	-0.111973	0.303036	-0.218809	0.680324	-0.002067	-0.620411

Table 22, Principal component analysis for the Business sophistication pillar, 1781 observations of 1860.

The selected variables are “Cost required to start a business”, “Cost to build a warehouse” and “Resolving insolvency cost”.

Innovation:

By limit of observations only “Trademark application” is selected.