

An analysis of the determinants of Foreign Direct Investments to OECD countries

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Abstract

This study examines the determinants of inward foreign direct investment to OECD countries. The focus is on horizontal FDI. The purpose of the research is to contribute to the ongoing research, and adding value. This is done by using a dynamic perspective of time, and controlling for country-specific characteristics. The thesis uses panel data covering all 36 OECD countries over a 23 year long time period, 1995-2017. Three regressions have been done using a linear fixed effects model, as well as four addition regressions testing the robustness of the results. Earlier studies have received spread results, as have this study. It found market size, economic stability, trade openness, and currency value as significant determinants of the inward flow of FDI to OECD countries.

Keywords: Foreign Direct Investment, Fixed Effect Model, Horizontal FDI, OECD, MNE

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1. Introduction

This study focuses on horizontal foreign direct investment (FDI), specifically what determines the FDI inflows to OECD countries. The combined perspective of FDI determinants and OECD countries has an important role in the economic globalization. It is the multinational enterprises (MNE) located in developed countries that contribute with the largest part of direct investments made on the global market (UNCTAD, 2018). The amount of FDI around the world has increased over the last two decades (Mistura and Roulet, 2019). The liberalization of trade restrictions has contributed to increased multinational funding's and enabled expansions on international markets. This has generated knowledge spillovers and contributed with expertise to the foreign country (Mistura and Roulet, 2019). Accordingly, FDI and the determinants of the investment choice makes this study an important contribution to the research field. In addition, earlier studies on FDI have produced mixed results over the years. The same determinants that have shown to have strong impacts in some areas have weak or no impacts in other countries or on other continents (Alam et al., 2013).

FDI has an important role when it comes to the economic growth and development of an economy. It can affect the receiving economy with technological spillovers, increased productivity, and increase competitiveness (Stehrer and Woerz, 2009). For investing firms motivating factors are to enter new markets, further growth within specific industries, and to reach a larger consumer base. Consequently, investing abroad can lead to geographical gains through new markets for the investing firm, benefiting the common governance characteristics within these geographical areas (Kudina and Jakubiak, 2012). FDI is dependent on political-, social-, market-, cultural-, and institutional factors. Investing in a foreign market is also a way of diversifying and spreading the risk. Diversification is of importance to avoid country-specific- or market shocks. The location decision of FDI is therefore of importance from an investor point of view (Alam et al., 2013).

This study's objective is to contribute to the ongoing research on the determinants of FDI; with the specific focus on the determinants of FDI inflows to OECD countries. The study uses panel data, controlling for country (fixed effects) and other country-specific characteristics such as EU membership, euro currency and countries formerly occupied by the Soviet Union. The study also uses two sub-time periods in order to capture the dynamic

perspective and analyze the relationship over time. The study is conducted using current data to receive up to date results. Through this, the study aims to describe the determinants behind FDI, and therefore also ways of attracting foreign investments. For this reason, the study may be of importance to enhance economic growth and enjoy the benefits of FDI for both developed- and developing economies.

This paper will attempt to answer the research question:

What determines foreign direct investment (FDI) inflows to OECD countries?

The thesis will only consider OECD countries, and they will primarily be viewed as individual countries, rather than as a group. The study will solely focus on horizontal FDI,¹ vertical FDI will not be studied because it is primarily done to developing countries (Krugman et al., 2018). The thesis will also be limited to analyzing the inflows of FDI to the receiving country, it will not consider the outflow of FDI from OECD countries.

The structure of this thesis starts with the introduction where i.e. research question and limitations are presented. In the following section, background, the different types of FDI are defined together with the recent trends of inward flows of FDI within OECD. Thereafter, previous studies on the subject will be presented, followed by theories on FDI. Following that section, method, regression model, variables and data sources will be presented. Then comes the data analysis, and finally the conclusion and summary of the study.

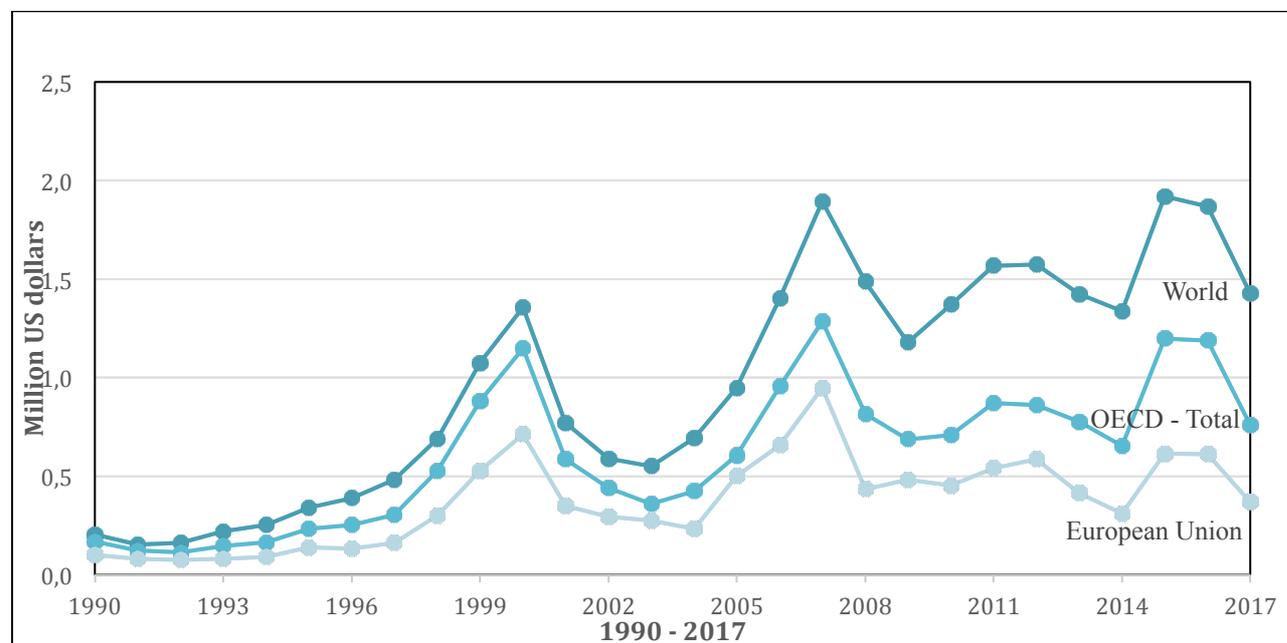
¹ Horizontal FDI is when a business establish-, or invest in an enterprise on a foreign market, which operates and produces on that market (Aizenman and Marion, 2004).

2. Background

FDI is one of the economic activities behind the increase in international trade and capital flows worldwide. The FDI are largely made by MNEs that controls the production on both the domestic market and on foreign markets (Helpman, 2006). The objective when a MNE makes a FDI is to establish a long lasting investment in the host economy and also a long-lasting relationship with the affiliates. A multinational affiliate is the controlled firm of which the multinational parent firm owns at least ten percent (Krugman, 2018). If the amount of control is at 50 percent or more the, affiliated company is defined as a subsidiary (Contessi et al., 2009). The OECD definition of FDI is when a multinational parent has at least ten percent of the ownership in a foreign-based enterprise (Contessi et al., 2009).

FDI flows have increased noticeably during the last two decades (Mistura and Roulet, 2019), as can be viewed in *diagram 1*. It shows the total FDI inflows to OECD countries between 1990 and 2017. As a reference point, it also shows the inward flow of FDI to both the European Union, and to the world in total.

Diagram 1. Inward flows of FDI



Note: Data measured in US\$ at current prices in millions, measured on an annual basis.

Source: UNCTAD stat.

The FDI flows within the OECD countries have increased as a consequence of less restrictiveness. The positive growth of inward FDI flows worldwide has led transition- and developing economies to make up for a larger share of the total FDI flows within the last years than they did before (Mistura and Roulet, 2019). These trends are captured in *diagram 1*. It is also visible that almost 50 percent of FDI have been placed in OECD countries.

There are two types of FDI; horizontal FDI, and vertical FDI. Horizontal FDI primarily occurs between developed countries. It is characterized by the receiving firm replicating the production of the parent firm. One of the primary reasons for this type of investment is to locate the production closer to the customer base, and in doing so also reducing costs. Vertical FDI is when the receiving firm does not replicate the parent firm but rather becomes one part of the production process. Hence, the production chain is broken up, and parts of the production process are moved to the other country. Vertical FDI is primarily made to developing countries with the goal of reducing production costs (Krugman et al., 2018).

In addition to FDI, there is offshoring and outsourcing. Offshoring is when a firm re-allocates parts of the production in another country. Outsourcing is when a firm buys a service from another firm (Krugman et al., 2018). This thesis will only study the inward flow of horizontal FDI to OECD countries. It will not take vertical FDI, offshoring, outsourcing, or outflow of FDI into account. These restrictions are partly to limit the study and partly to amplify the focus of the research question.

3. Previous Studies

The liberalization of restrictions on international investments has been progressing over the last two decades leading to an increased amount of investments across nations. Following this, the studies on the decisions and determinants of FDI have become considerable (Mistura and Roulet, 2019). The studies presented below on FDI flows between OECD countries have been chosen as they connect to this study's research question. Empirical studies which attempt to detect important determinants that affect FDI have also been considered. Previous research has tested different analytical methods to analyze FDI flows. This study will use the fixed effect model as an econometric method to study the determinants of FDI inflows.

In the empirical literature, there have been many efforts to identify the most important determinants of FDI on a macroeconomic level. According to Arbatli (2011) market size is of importance when attracting horizontal FDI inflows. The size of the economy measured by the GDP per capita is also an important factor (Bevan and Estrin, 2004). Other contributing factors of FDI decisions are inflation and market stability (Arbatli, 2011; Economou et al, 2017).

The gravity model explains bilateral trade flows based on the distance between countries and their respective economic dimension (Bénassy-Quéré et al., 2005). Bénassy-Quéré et al. (2005) use the model for horizontal FDI in a paper that studies the flows of FDI in 11 OECD countries between the years 1984-2000. The result shows that the tax differences within corporate taxation are significant for understanding the choice of location when engaging in FDI (Mistura and Roulet, 2019; Bénassy-Quéré et al., 2005).

Mistura and Roulet (2019) use an augmented gravity model to estimate the effects of liberalizing investment restriction on FDI. The paper uses unbalanced data, and studies 60 countries, both developing, and advanced economies over a twenty-year long period. According to the results, a reform to liberalize FDI restrictions by 10% could lead to an average increase of 2.1% of bilateral FDI in stocks, as measured by the OECD FDI Regulatory Restrictiveness Index. Their study shows the effects of FDI to be larger in the service sector but have positive effects in the manufacturing sector as well. In the study the independent variables used are i.e. (1) market size and growth potential, (2) trade openness, (3) corporate taxation, and (4) real bilateral exchange rate.

A study by Alam and Zulfiqar Ali Shah (2013) looked at potential determinants of FDI for ten OECD countries over the years 1985-2009. The research paper uses FDI as an independent variable. According to their study, market size, labor costs and quality of infrastructure were main determinants of FDI. They found that in the short-run there is a two-way relationship between market size and labor costs. Additionally, the quality of infrastructure causes both market size and labor costs. Their study also claims that low labor costs are preferred by investors, and that countries should focus on improving the quality of their infrastructure in order to attract FDI.

Wei (2000) looked at how corruption impacts FDI and got different results on his study than Alam and Zulfiqar Ali Shah got on the same variables. In the study by Wei (2000) a significant correlation was found both between corruption and FDI, as well as for tax rates and FDI. An increased level of corruption does according to the findings in this study lead to a decreased level of FDI. It also found that an increased corporate tax on MNEs in the receiving countries reduces the amount of inward FDI.

When studying Japanese FDI flows Takagi and Shi (2011) found that a volatile exchange rate increased FDI and that a depreciation of the Japanese yen against a host country reduced outward FDI. Likewise, Kiyota and Urata (2004) found that depreciation of a host country's currency attracted FDI, contradictory to Takagi and Shi's findings, they found that a volatile exchange rate discouraged FDI (Kiyota and Urata, 2004). The findings by Alam and Zulfiqar Ali Shah (2013) showed no impact on FDI based on exchange rates.

The objective of this paper is to contribute to the ongoing research on the determinants of FDI. The studies presented above connects to the research question and states the determinants that have been of importance within the field of trade when attracting foreign investments. This study will attempt to point out the determinants of FDI over a time frame between 1990-2017. To receive up to date result the study is conducted using current data.

4. Theory

To understand and answer the research question as well as determining the explanatory variables of FDI, this section will illustrate and discuss four theoretical approaches on FDI. Historically FDIs have been analyzed using both macroeconomic and microeconomic determinants (Chawla and Rohra, 2015; Denisia, 2010). Empirically the topic has been studied within a theoretical field that points out the importance of a company's local competitiveness and trade decisions as vital determinants when making an investment decision (Faeth 2009).

Following the economic globalization and the expanding markets, FDI have counted for one of the fastest growing economic activities worldwide (Helpman, 2006). New theories have been developed attempting to illustrate the importance of the characteristics of a firm and other organizational features through i.e. internalization theory and the OLI paradigm (Helpman, 2006; Dunning, 2000). By focusing on firm-specific features, these theories contribute to a better understanding of the location decision and the underlying motives behind FDI. Consequently, the determinants of FDI can be illustrated and better understood in line with the theories that attempt to show new patterns within trade and FDI.

4.1 Trade theory

Having in mind the previously mentioned theories, one of the first theoretical attempts to explain the topic was based on the Heckscher-Ohlin model. The HO model explains the reasons behind trade and countries engaging in bilateral economic activities. It studies trade between two-factor economies whose endowment is capital and labor. The model attempts to explain that the reason for trade opportunities and capital flows across countries is their different factor endowments. In this model, FDI is viewed as part of the international capital trade (Faeth, 2009; Krugman et al., 2018). This theory's main determinants are *higher return on capital*, *lower labor costs*, as well as *exchange risk* due to different currencies (Chawla and Rohra, 2015).

Trade theory was one of the first theoretical fields that tried to explain FDI (Faeth, 2009). Amongst these are Ricardo's theory on competitive advantages from 1817 and Mundell's model on international trade from 1957 (Denisia, 2010). Ricardo's model involves two

countries, two factors of production with perfect mobility, which produce two products. Mundell's model uses two countries, two production factors, producing two goods, using two identical production functions in two countries. Though these models developed trade theory, they all failed to explain the underlying reasons behind FDI (Denisia, 2010). For this reason, they were primarily used before the 1960s (Denisia, 2010; Faeth, 2009).

Since then, various theories have been developed trying to explain and examine FDI (Denisia, 2010; Faeth, 2009). The common characteristic of these newer theories is that they are examining the perspective of the investing firms (Faeth, 2009). One of these theories is Internalization Theory, it tries to explain the reasons for FDI through the emergence of MNEs (Denisia, 2010).

4.2 Internalization theory

Internalization theory was introduced by Buckley and Casson in 1976 (Chawla and Rohra, 2015; Denisia, 2010; Wadhwa and Reddy, 2011). The theory tries to explain the growth of MNEs and their motivation for engaging in FDI (Denisia, 2010). It shows that imperfect markets make it possible to generate profits through internal markets (Chawla and Rohra, 2015; Wadhwa and Reddy, 2011). The decision by firm owners and managers whether or not to internalize is assumed to be rational, hence markets will only be internalized when the expected benefits outweigh the expected costs. Accordingly, profit maximization is one of the explanations for internalization (Buckley, 2018; Chawla and Rohra, 2015). In addition to profit maximization the authors found that the decision to internalize is dependent on *firm specific factors* (information, knowledge, and specific competence), *industry specific factors* (product character, economies of scale, and market size), *region specific factors* (distance and cultural difference), as well as *nation specific factors* (financial and political climate). All of which boils down to the rational choice of the firms in whether or not to engage in FDI (Buckley, 2018; Wadhwa and Reddy, 2011).

The three claims that the theory is based upon are (1) firms try to maximize profit (expected capital return, and necessary investments), (2) existing market imperfections in the intermediate production, which provides potential benefits there, (3) When internalization happens across borders, MNEs are formed (Chawla and Rohra, 2015).

4.3 The eclectic OLI paradigm

Another of these theories is the eclectic ownership, location and internalization paradigm (OLI) which was developed by John Harry Dunning in 1979. The theory is based on three advantages *ownership*, *location*, and *internalization* that explains FDI. These three advantages are underlying factors behind a firm’s decision to expand and become multinational. Dunning’s theory is helpful when making a decision concerning FDI, stating that some of the most important factors are market size, prices, and location. The eclectic paradigm has been used as a way of thinking about MNEs and what drives FDI (Dunning, 2000).

Table 1. The eclectic paradigm theory

Ownership advantages	Location advantages	Internalization advantages
The ownership advantage can be a trademark or a patent or another mobile asset that a MNE has in possession.	Location advantages are when the mobile asset used on the domestic market also- or instead can be used on a foreign market.	Internalization advantages can be considered as having the power to control the use of the asset.

Source: Franco et al., 2008; Dunning 1980.

Dunning also describes four different types of motivations that lie behind a FDI. The first one is *market-seeking* FDI. A firm with market-seeking incentives wants to exploit on the foreign market where some of the factors that drive the firm under these conditions are market size and market growth in the foreign country (Dunning, 2000; Franco et al., 2008). The second one is the *resource-seeking* motive behind FDI. The natural resources in the host country and the availability of raw materials, which cannot be found in the home market, are what drives the investment. Lower cost for raw materials is also crucial, as well as capitalizing on unskilled labor (Franco et al., 2008). *Rationalized seeking* FDI aims to make labor more efficient and reduce the labor cost, as well as operational costs by i.e. taking advantage of the factor endowments in the host country (Franco et al., 2008). The last one is *strategic asset seeking* FDI. Firms invest in the foreign country to gain R&D capacities and knowledge, as well as to increase its competence with information the firm did not have before (Dunning, 2000; Franco et al., 2008).

4.4 Institutional theory

Institutional theory is a relatively new theory developed in the last decades. It studies empirical FDI theories such as the Internationalization theory, and the Eclectic OLI paradigm

in order to consolidate the FDI contexture and further develop the theories. One example is the extended OLI theory where Dunning and Lundan have developed a new element with focus on the ownership advantages. Political variables and tax policy determinants are also focus areas of institutional theory, according to Chawla and Rohra (2015). Tax policy and lower corporate tax levels are other ways to attract FDI and affect the choice of location. Within the institutional approach, Bénassy-Quéré et al (2003) show in their analysis that a relatively high tax rate does discourage FDI inflows. Hubert and Pain (2002) deem that the corporate tax may affect the location decision and the level of FDI inflow. An effective rate of the corporate tax may be seen as an increasingly important factor and a component behind the choice of location, hence it stands as an attracting factor to FDI (Hubert and Pain, 2002; UNCTAD, 1998).

The United Nations Conference on Trade and Development, UNCTAD, has developed a classification system and framework for determinants on inward FDI (UNCTAD, 2002). The classifications state five determinant variables of inward FDI; (1) policy variables, (2) business variables, (3) market-related economic determinants, (4) resource-related economic determinants and (5) efficiency-related economic determinants. UNCTAD (2002) annually publishes a World Investment Report to lift the trends within the field of FDI both in developing and developed countries.

Table 2. UNCTAD's classification of FDI determinants

Determinants/Variables	Examples
Policy Variables	Tax policy, trade policy, macroeconomic policy, privatization policy
Business Variables	Investment incentives
Market-related Economic Determinants	Market size, market growth
Resource-related Economic Determinants	Natural resources, raw materials, technology, labor availability
Efficiency-related Economic Determinants	Infrastructure of communication and transportation, labor productivity

Note: In the left column are UNCTAD's classifications of FDI determinants and to the right are examples of measurements for these variables.

Source: UNCTAD, 2002 in Chawla and Rohra, 2015.

The theories presented in this section will together with previous studies on the subject lay the foundation for this thesis. The determinants of inward FDI to OECD countries bottom in the choices made by decision makers. The Heckscher-Ohlin model explains the reasons

behind trade between countries (Faeth, 2009; Krugman et al., 2018). Internalization theory and the OLI paradigm explain and shed light on the importance of firm-specific characteristics. Together with the institutional theory they contribute to the understanding of underlying factors of FDI (Helpman, 2006; Dunning, 2000). Tying it together with UNCTAD's classification of FDI determinants (UNCTAD, 2002), there are national as well as firm-specific underlying causes for engaging in FDI. Keeping these theories and previous studies as a framework this study will attempt to find which determinants are significant for the inward flow of FDI to OECD countries.

5. Data and Model

This thesis aims to test the determinants of inward FDI to OECD countries, using eight independent variables² and FDI. The study analyses panel data from the 36 OECD member countries over time from 1995 to 2017 OECD. The OECD member countries are listed in Table 3.

Table 3. Countries of observation

Australia	France	Korean Republic	Portugal
Austria	Germany	Latvia	Slovak Republic
Belgium	Greece	Lithuania	Slovenia
Canada	Hungary	Luxembourg	Spain
Chile	Iceland	Mexico	Sweden
Czech Republic	Ireland	Netherlands	Switzerland
Denmark	Israel	New Zealand	Turkey
Estonia	Italy	Norway	United Kingdom
Finland	Japan	Poland	United States

Due to a restricted amount of data on primarily the countries formerly occupied by the Soviet Union (Table A1), the earliest year of the study is 1995. This study uses unbalanced data due to missing data for the variables FDI, market size, trade openness, R&D, labor cost, and institutional stability (Table 4).

5.1 Data

There are various determinants of FDI that has been used prior to this study. The Heckscher-Ohlin model points out labor cost and return on capital as some of the crucial determinants (Chawla and Rohra, 2015). Dunning (1980) highlights determinants in the eclectic OLI paradigm, such as patent, access to markets, management skills and material costs (Chawla and Rohra, 2015). Political factors such as degree of nationalism and degree of administrative efficiency are parts of the institutional approach (Root and Ahmed, 1978). Economic and financial incentives are also used within the institutional theory, e.g. tax policy (Chawla and Rohra, 2015). Alam et al. (2013) attempt to estimate possible determinants on FDI that captures the link between FDI and OECD countries. Variables used in their study are market size, labor cost, trade openness, corporate tax, and inflation.

² The eight explanatory variables are market size, economic stability, trade openness, R&D, tax policy, labor cost, institutional stability, and currency value.

In order to answer the research question “What determines foreign direct investment (FDI) inflows to OECD countries?” this study uses a selection of variables based on empirical papers, relevant theories and UNCTAD’s classification.

Dependent variable:

FDI

The dependent variable is FDI inflows. It is measured as the logarithm of the FDI value. FDI is calculated by multiplying the FDI net inflows as a percent of GDP with GDP. GDP is measured in constant 2010 US\$.

Independent variables:

Market size (Size)

Market size is one of the founding pillars when studying the determinants of FDI, especially within horizontal FDI. Market size is often measured as a country’s total GDP or in GDP per capita (Mistura and Roulet, 2019; Wadhwa and Reddy, 2011). It is an important factor in the OLI paradigm as one of the *market seeking* motivating factors behind FDI (Dunning, 2000; Franco et al., 2008). It is also included in the internalization theory as part of the *industry specific factors* influencing FDI decisions (Chawla and Rohra, 2015; Wadhwa and Reddy, 2011). In addition, it is in the UNCTAD framework as a *market related economic determinant* (Chawla and Rohra, 2015).

The expected value of this study is that a growing market will attract FDI (Table 4). In this study, market size will be measured in total GDP in million US\$ (constant 2010 US\$) in logarithmic form.

Economic stability (Ec. Stab)

Economic stability is a measurement that has been used in several studies. Alam and Zulfiqar Ali Shah (2013) found no correlation between inflation and FDI, while Arbatali (2011) claim that inflation is an important factor when deciding on the location for FDI (Arbatali, 2011; Economou et al, 2017). In this study, inflation will be used as a variable for economic stability measured through the consumer price index (CPI). 2010 is the base year.

Trade openness (Trade)

An economy's degree of trade openness can according to Mistura and Roulet (2019) be reflected by its border restrictions. In their study total-trade-to-GDP ratio of the receiving country is used. UNCTAD sections the variable trade openness as a policy variable.

According to previous studies, trade openness is considered a key variable when explaining FDI (Chawla and Rohra, 2015). The expected result is that a larger trade openness will attract inward FDI (Table 4). In this study, the ratio of total trade as a percentage of GDP in its logarithmic form will be used to measure trade openness.

Research and Development (R&D)

According to the internalization theory, one of the main determinants behind the decision to internalize production is dependent on *firm specific factors* such as specific skills, knowledge, or information (Buckley, 2018; Chawla and Rohra, 2015; Wadhwa and Reddy, 2011). It is also included in the OLI theory as *strategic asset seeking*, that businesses engage in FDI to gain knowledge and R&D capacities, it did not have prior to the investment (Dunning, 2000; Franco et al., 2008). R&D expenditures are also included in the UNCTAD framework (Table 2). Based on these theories, a positive correlation between R&D and FDI is expected to increase the FDI inflows (Table 4).

In this study, R&D is defined as the gross domestic spending on R&D within a country (constant 2010 US\$).

Tax policy (Tax)

Tax policy is as part of the institutional theory. According to this theory, the corporate tax rate is an important factor which may affect the location decision as well as the level of FDI inflows (Hubert and Pain, 2002). A low corporate tax will attract FDI inflows (Chawla and Rohra, 2015), while a high corporate tax risk discouraging FDI from that location (Bénassy-Quéré et al, 2003). Tax policy is also one of the *policy variables* that impact FDI (Table 2). Effective tax policy may be an important factor influencing the decision of the FDI location (UNCTAD 1998; Hubert and Pain 2002). Earlier studies have used tax policy as a determinant of FDI. Mistura and Roulet (2019) used standard statutory corporate tax rate of the receiving country. Bénassy-Quéré et al (2005) based an entire paper on tax policies impact on FDI, using the apparent tax rate in the study.

In this study, a high or increasing corporate tax rate is expected to decrease inward FDI (Table 4). This study will use the statutory corporate income tax rate.

Labor cost (L. Cost)

According to the OLI paradigm, one of the motives behind FDI is to reduce labor costs and for example take advantage of lower costs for unskilled labor in foreign countries. It is part of the *resource seeking* motive, as well as the *rationalized seeking* motive behind FDI (Franco et al., 2008). In the UNCTAD framework labor cost is included in the *resource related economic determinants* that impact inflows of FDI (Table 2). High labor costs are expected to decrease inward FDI. This study will measure labor cost by looking at the relative unit labor cost (overall economy) indices.

Institutional stability (Inst. Stab)

The variable corruption does have an impact on inward FDI and is classified as a *policy variable* in the model (Table 2). Corruption is also a recurring variable used in papers describing the determinants of FDI. Wei (2000) found that an increase in corruption in a host country decreases the amount of inward FDI. Whereas Alam and Zulfiqar Ali Shah (2013) found no significant correlation between the two. In this study, institutional stability will be measured by the corruption perception index showing the level of corruption in the receiving country. The data captures the estimated level of corruption in the public sector by giving each country an indicator ranging from 0 to 10. A higher corruption index indicates a lower level of corruption. Earlier studies of the impact of institutional stability on FDI have showed mixed results (Wei, 2000).

Currency value (Currency)

The impact of currency value and exchange rates on inward FDI has been investigated in several earlier studies with diverse results. Research has shown that a volatile exchange rate attracts FDI (Takagi and Shi, 2011), while other studies found the opposite (Kiyota and Urata, 2004), and some found no correlation between them (Alam and Zulfiqar Ali Shah, 2013). To further investigate if currency value is a determinant of inward FDI this study will use an indicator measured in local currency per US\$ in logarithmic form.

Table 4 summarizes each variable together with its abbreviation, the sources of the data used, and the expected result of each independent variable.

Table 4. Data sources and expected results

Variable name	Abbreviation	Data source	Expected results
FDI	FDI	World Development Indicator of World Bank	
Market size	Size	World Development Indicator of World Bank	+
Economic stability	Ec. Stab	World Development Indicator of World Bank	+/-
Trade openness	Trade	World Development Indicator of World Bank	+
Research & Development	R&D	OECD Statistics from OECD Data	+
Tax policy	Tax	OECD Statistics from OECD Tax database*	-
Labor cost	L. Cost	OECD Statistics from OECD Data FRED Database	-
Institutional stability	Inst. Stab	Transparency International Database	+/-
Currency value	Currency	OECD Statistics from OECD Data	+/-

* Note: Data for Chile, Iceland, Lithuania, Slovenia, South Korea, and Turkey for the years 1995-1999 have been taken from KPMG's Corporate Tax Rate surveys; Majcen et al., 2009; Edwards et al., 2008.

5.2 The fixed effect regression model

A linear fixed effects regression model is used for the panel of 36 OECD countries. The model will be applied to this study to control for country-specific characteristics. The fixed effect method can be applied to panel data and is a useful way to control for possible omitted variables. These omitted variables that are controlled for are entity specific and do not change over time, such as country characteristics (Stock and Watson, 2015).

The panel fixed effect regression model for country has been commonly used as a standard methodology within the field of FDI among the various existing modeling approaches (Arbatali, 2011; Economou et al, 2017). Empirical tests have concluded that there within the field of FDI exist no single theory, but a variety of theoretical frameworks and models (Dellis et al., 2017; Faeth, 2009). Accordingly, the model used in this study is based on previous literature and using determinants that are relevant and have been identified. In addition, the model uses clustering. Clustering is used to make the regression robust to heteroscedasticity. That entails that the standard errors in the regression do not have constant variance (Stock

and Watson, 2015). Worth noting is that the model uses 36 clusters which could give an incorrect precision of the estimates that are either too high or too low, due to the low number of clustering objectives.

The model includes the eight explanatory variables (Table 4) together with the dependent variable, FDI. Four of the variables are in logarithmic form to better fit the estimated linear regression model. Hence, this will solve non-linearity issues between the explanatory variables and the dependent variable. Because of how the dependent variable is measured, the regression model controls for GDP to isolate the effect of larger countries having more FDI.

Estimating the model, assuming a linear relationship between the dependent and the independent variables, the model uses fixed effects on country, and clusters on country. It uses the equation below:

$$\log(FDI)_{it} = \beta_0 + \beta_1 * \log(Size)_{it} + \beta_2 * Ec.Stab_{it} + \beta_3 * \log(Trade)_{it} + \beta_4 * R\&D_{it} + \beta_5 * Tax_{it} + \beta_6 * L.Cost_{it} + \beta_7 * Inst.Stab_{it} + \beta_8 * \log(Currency)_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

Where $\log(FDI)$ is the FDI inflows for country i , at time period t . β_0 is a constant, ε is the error term, and α_i is fixed effect on country.

To analyze how the relationship between the independent variables and FDI changes over time, two more regressions have been used. In line with the research done by Yang (2007), two sub-periods can be used to study the relationship over time. According to Bijsterbosch and Kolasa (2009), studying sub-periods is also a way to see how determinants evolve over time. The 1995 to 2017 time period has been divided into two sub-periods, 1995-2006 and 2007-2017. Both regressions use fixed effect on country for the two periods. Dividing the groups at this particular point in time is arbitrary. However, the cut-line between 2006 and 2007 corresponds closely to the start of the financial crises, thus the crisis separates the first group from the second. The equation used for *regression 2* and *regression 3* is the same as equation 1. However, in these two regressions, t differs corresponding to which of the two time periods is used.

Moreover, there is a risk for omitted variables, as other variables can have an effect on FDI. The unbalanced data might also be a source of possible bias.

5.3 Robustness testing

To test the robustness of the fixed effect regression model several regressions have been made in line with e.g. Dellis et al., (2017). Adding different econometric specification to the underlying *regression 1* will test the sensitivity of the result to changes (Dellis et al., 2017). Regressions have been made controlling for dummy variables for EU membership, euro currency and countries formerly occupied by the Soviet Union (Table A1). The indicator variables have been added to the fixed effect regression. Doing the fixed effect regression for *regression 1* controlling for only EU membership, the variables market size, economic stability, trade openness, and currency value were significant. Trade went from being significant at a level of 95% to a level of 99%. Controlling for only euro currency yielded significance for market size, economic stability, and currency value. Controlling for EU membership and euro currency together, gave significance for all four variables. The Soviet Union as a control variable was omitted in the regression because of collinearity in all regressions.

The pooled OLS model can also be applied to a panel data analysis. The model pools the observations together, ignoring the differences within countries. Pooled regression will work as a better estimate if the observations were independent of one another (Stock and Watson, 2015). The pooled OLS model has been used, and yielded significance for market size and trade openness at a 99% level. Institutional stability was significant at a 95% level. Both market size and trade openness are significant in *regression 1* (Table 6). Institutional stability was not significant in either *regression 1, 2 or 3*.

6. Analysis

In the regression analysis, 36 countries are included with data covering a 23 year long time period. The purpose is to examine the determinants of inward FDI in OECD countries. The study uses a significance level of 95%.

Descriptive statistics have been conducted to describe the features of the data set. Table 5 presents statistics on the mean, standard deviation, minimum, maximum and the number of observation are presented to describe the conditions of the eight explanatory variables and the dependent variable. Statistics are provided for all variables, and *FDI*, *Size*, *Trade*, and *Currency* are in logarithmic form.

Table 5. Summary of descriptive statistics

Variables	Mean	Standard Deviation	Min	Max	Number of Observations
FDI	27.59	1.77	19.77	31.93	770
Size	26.59	1.62	22.85	30.48	827
Ec. Stab	89.73	18.75	1.30	174.97	828
Trade	4.37	0.52	2.81	6.05	824
R&D	1.72	0.97	0.25	4.55	747
Tax	26.45	7.70	8.50	48.40	828
L. Cost	100.67	16.93	51.17	204.11	818
Inst. Stab	6.86	1.86	2.66	10.00	804
Currency	1.10	2.04	-3.08	7.25	828

As shown in Table 5 the number of observations for the variables varies between 747 to 828 observations, hence it uses unbalanced data. FDI, market size, trade openness, and currency value are all presented in their logarithmic form. R&D has a minimum value of 0.25 and a maximum of 4.55, and tax policy has a minimum of 8.50 and a maximum of 48.40. Labor cost has a minimum value of 51.17 and a maximum of 204.11. If the motive behind FDI is resource related the variation in costs between countries could impact where the FDI is placed. For the variable institutional stability, the minimum is 2.66 and the maximum is 10, where a lower value indicates more corruption. This shows that the amount of corruption within OECD countries varies; yet the variable mean is relatively high with a value of 6.86. Economic stability (CPI) has the minimum value of 1.30 and the maximum value 174.97, which show that inflation has varied with a large spread over the years 1995-2017. However, the standard deviation of 18.75 shows that 95% of the values are within the spread of 70.98 to

108.48. This is a reasonable spread considering many OECD countries have inflation goals of e.g. 2 or 3 percent per year. The FDI inflows to OECD countries from 1995 to 2017 have the minimum value of 19.77 and the maximum value 31.93 where the mean is 27.59, which is closer to the maximum value. Over these years there has been a positive trend of FDI inflows to OECD countries (Diagram 1).

Three fixed effect linear regressions is used, all with clustering, and fixed effect on country. *Regression 2* and *regression 3* were done using different years in order to get a dynamic perspective.

Table 6. Regression results for regression 1, 2 and 3. Dependent variable is FDI

Variable	Regression 1 1995-2017	Regression 2 1995-2006	Regression 3 2007-2017
Constant	-37.10	-28.22	-71.16*
Size	5.34**	1.98*	3.54**
Ec. Stab	-0.02*	-0.01	-0.05***
Trade	0.96*	0.87	1.56
R&D	-0.22	0.33	-0.41
Tax	-0.03	-0.05*	0.04
L. Cost	0.00	-0.01	0.01
Inst. Stab	-0.02	0.14	-0.03
Currency	0.68**	0.23	1.09
Prob > F	0.0000	0.0000	0.0002
R ²	0.76	0.80	0.79
Adjusted-R ²	0.74	0.78	0.76
Observations	678	342	336

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6 shows the results of the three regressions. It displays the coefficient of each variable, as well as the significance levels, from a significance level of 95% to 99,9%. *Regression 1* shows four significant determinants of FDI. These are market size, economic stability, trade openness, and currency value.

According to these results, an increase in market size or trade openness would increase FDI, which is in line with the expected results and corresponds to the results by Economou, et al (2017). The data on market size is also in line with the results by Alam and Zulfiqar Ali Shah (2013), but their study found no significance on economic stability, trade openness, or currency value. These two studies both found labor cost as a significant determinant (Economou, et al., 2017; Alam and Zulfiqar Ali Shah, 2013), which this study did not.

Earlier studies that include economic stability as a possible determinant of FDI, have gotten mixed results. The results of this study show that an increase in the variable economic stability (an increase in CPI) would lead to a decrease in FDI. These results are difficult to interpret because the values for some countries are relatively extreme compared to others. For e.g. Turkey's average calculated inflation based on consumer price index was 10,7 percent per year since 2010, while e.g. Norway has had a stable inflation of 2 percent per year on average since 2010. For this reason, it is difficult to draw conclusions on how economic stability determine FDI.

Earlier studies have received mixed results when including currency value as an independent variable. The results of this study indicate that an increase in the local currency per US\$ would increase FDI. In contrast to Takagi and Shi's (2011) result which found currency value as a significant determinant, but with the opposing sign. These differences could be caused by different regions or different time periods studied. By the significant result this study supports the findings by Mistura and Roulet (2019) but also opposes the results by Alam and Zulfiqar Ali Shah (2013), which found no significant correlation between currency value and FDI.

In accordance with Alam and Zulfiqar Ali Shah (2013) as well as Mistura and Roulet (2019) *regression 1* found no significant correlation for institutional stability, or tax policy. Apart from the results by Alam and Zulfiqar Ali Shah (2013) and Mistura and Roulet (2019), *regression 1* did not find significance on labor cost.

Regressions 2 yield significant coefficients for market size, and tax policy on a 95% significance level. Market size is significant in line with the results from *regression 1*, as well as the expected value (Table 4). Within this regression, tax policy is significant on a 95% significance level. It corresponds to the expected values (Table 4), but not the results from *regression 1*. The relationship that exists between tax policy and FDI, does according to this study only exist during the time period 1995-2006. These results are in accordance with Hubert and Pain's (2002) results, that tax competitiveness was important but also sensitive to the model's specifications.

Apart from *regression 1*, economic stability, trade openness, and currency value were not significant in *regression 2*. The results from *regression 2* for economic stability and currency value were in line with the results by Alam and Zulfiqar Ali Shah (2013). Trade openness is

considered a key variable determining FDI, hence this result was not in line with what was expected (Chawla and Rohra, 2015). The results of the remaining variable were in line with those of *regression 1*.

In *regression 3*, market size, and economic stability are significant in accordance with *regression 1*. Market size is significant at the same significance level, while the significance level of economic stability increased to 99,9%, compared to *regression 1*. This sudden increase could possibly be a response to insecure markets during, and following, the financial crisis. In accordance with *regression 2*, but apart from *regression 1*, trade openness, and currency value was not significant. The result for currency value is not significant. This is in line with the results by Alam and Zulfqar Ali Shah (2013). It was not expected that trade openness would not be significant.

The relationship between FDI and the determinants have shown to be varying across OECD countries over time. *Regression 1* found market size, economic stability, trade openness, and currency value as significant determinants of inward FDI. It did not find significant results for R&D, tax policy, labor cost, or institutional stability being determinants for inward FDI to OECD countries.

The results from *regression 2*, which only look at the time period 1995-2006, differ from *regression 1*. *Regression 2* also found market size as significant, but none of the other significant variables that *regression 1* found. *Regression 2* also found that tax policy was a significant variable.

Regression 3 measures the same things but over the time period 2007-2017. It found market size as significant, in line with the results from the earlier regressions. It also found economic stability as significant, in line with *regression 1*. It did not find any other variables as significant determinants of inward FDI.

7. Conclusion and Summary

According to Mistura and Roulet (2019) and Wadhwa and Reddy (2011) market size is seen as one of the founding pillars of FDI determinants. In this study, all three regressions show significant results indicating that an increase in market size will increase inward FDI to OECD countries.

Only one variable, economic stability became significant in two of the regressions. It shows that increased inflation would lead to a decrease in the inward flow of FDI. Worth noting is that it was not significant in the years prior to the financial crisis but became significant within the 99,9 percentile in the time period during and after the crisis. This particular event in history could be the cause of the increased importance of economic stability as a determinant of inward FDI.

Trade openness and currency value both gave significant results in *regression 1*, but not in either of the other regressions. In each of the regressions these variables received the same sign. A possible explanation could be that these two variables are important determinants in the longer time perspective, 23 years in this study, rather than the shorter periods.

The variable tax policy was only significant in *regression 2*. In addition, it also changes sign in *regression 3* compared to the other two regressions. Hence the results of an increased tax rate are difficult to analyze and should be studied further.

Neither of the regressions found significant results for the variables R&D, labor cost, nor institutional stability. This was not in line with the expected results but gives an important insight to the determinants of inward FDI to OECD countries.

In this study, the determinants of inward FDI to OECD countries are market size, economic stability, trade openness, and currency value. An increase in market size, trade openness, or currency value will lead to an increased FDI inflow. A decrease in economic stability, inflation, would according to the result lead to increased FDI inflow, however this result is problematic to interpret.

Furthermore, the relationship between the determinants and FDI, have shown to change when analyzing the two time periods. The regression found significant results for market size and tax in the earlier time period, and market size and economic stability in the later period. Both of these regressions also differed from the first regression, which stretched over a longer time period. For this reason, it would be of interest that future studies look closer at the dynamic perspective of time when analyzing the determinants of inward FDI. This is an area that is relatively scarcely studied for inward FDI to OECD countries. For future studies, a variable concerning tax policy or tax rates on inward FDI is also of interest, since the results in this study are mixed.

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Appendix

Table A1. OECD member countries and information about the dummy variables

OECD membership (since year)	Currency (since year)	EU membership since year	Formerly occupied by the Soviet Union
Australia (1971)	Australian dollar (1966)	-	0
Austria (1961)	Euro (1999)	1995	0
Belgium (1961)	Euro (1999)	1958	0
Canada (1961)	Canadian dollar (1950*)	-	0
Chile (2010)	Chilean peso (1975)	-	0
Czech Republic (1995)	Czech koruna (1993)	2004	1
Denmark (1961)	Danish krone (1950*)	1973	0
Estonia (2010)	Euro (2011)	2004	1
Finland (1969)	Euro (1999)	1995	0
France (1961)	Euro (1999)	1958	0
Germany (1961)	Euro (1999)	1958	0****
Greece (1961)	Euro (2001)	1981	0
Hungary (1996)	Hungarian forint (1950*)	2004	1
Iceland (1961)	Icelandic krona (1950*)	-	0
Ireland (1961)	Euro (1999)	1973	0
Israel (2010)	Israeli new shekel (1980)	-	0
Italy (1962)	Euro (1999)	1958	0
Japan (1964)	Japanese yen (1950*)	-	0
Korean Republic (1996)	South Korean won (1950*)	-	0
Latvia (2016)	Euro (2014)	2004	1
Lithuania (2018)	Euro (2015)	2004	1
Luxembourg (1961)	Euro (1999)	1958	0
Mexico (1994)	Mexican peso (1993**)	-	0
Netherlands (1961)	Euro (1999)	1958	0
New Zealand (1973)	New Zealand dollar (1967)	-	0
Norway (1961)	Norwegian krone (1950*)	-	0
Poland (1996)	Polish zloty (1950*)	2004	1
Portugal (1961)	Euro (1999)	1986	0
Slovak Republic (2000)	Euro (2009)	2004	1
Slovenia (2010)	Euro (2004)	2004	1
Spain (1961)	Euro (1999)	1986	0
Sweden (1961)	Swedish krona (1950*)	1995	0
Switzerland (1961)	Swiss franc (1950*)	-	0
Turkey (1961)	Turkish lira (2005***)	-	0
United Kingdom (1961)	British pound (1950*)	1973	0
United States (1961)	United States dollar (1950*)	-	0

* Note: These countries have had their currency since before 1950.

** Note Mexico has had the Mexican peso since before 1950 but adopted a newer version in 1993.

*** Note: Turkey has had the Turkish lira since before 1950 but in 2005 they adopted a newer version of the currency.

**** Note: Eastern Germany was occupied by the Soviet Union, however Western Germany was not. In this study Germany as a whole will be considered not having been occupied by the Soviet Union.

Source: OECD. List of OECD member countries, OANDA. Currency facts, EU. Countries, and Nationalencyklopedin. Soviet Unionen.

The euro was officially established January 1 1999 but was at the time only used in accountancy. The first hard money came January 1 2002, completing the transition to the euro.