CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Bachelor thesis

2018 **Rubi Gjika**

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

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Does money laundering determine the direction of FDI?

Bachelor thesis

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Supervisor: **Mgr. Michal Paulus**

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Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all resources and literature I have used.

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Prague, July 16, 2018

Signature

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Bachelor Thesis Proposal

Author of the bachelor thesis: **Rubi Gjika**
Supervisor of the bachelor thesis: **Michal Paulus**

Proposed Topic **Does money laundering determine the direction of FDI outflows?**

Preliminary scope of work:

Money laundering, the concealment of the origins of illegally obtained money by various means of transfers, is considered a global threat to free market economies. Such highly complicated process with a substantial effect on the international financial system has shown to be challenging in estimation and effective in camouflage. Previous studies and academic papers from Walker (1999), Unger (2007) or Schneider (2015) focus on quantification and estimation of the volume of 'laundered money' through suspicious cash transactions, crime proceedings or number of prosecutions but their results appear with large margin of error.

This thesis aims to answer whether foreign direct investments remain an existing route for illicit flows and money laundering. It observes if the effect of particular countries officially known as money-laundering centers is significant to FDI outflows in specific OECD country members. Countries which are part of an international anti-bribery and anti-money laundering policy making organization, are chosen explicitly because past studies seem to treat this issue only for samples taken from economic or political regions.

For instance, Perez, Brada and Drabek (2012) do find a relationship between the distribution of FDI and money laundering but the analysis of countries is restricted to only Central and Eastern European economies. However, their research indicates strong evidence that investigating the distribution of FDI outflows may lead to an empirical result which shows that money laundering might be indeed a motive for large odd flows of investment.

Contribution:

If the proposed research is successful, my thesis's main contribution would be an empirical set of results for a specific sample of European OECD country members. In my opinion, it is of great importance to arrive at a conclusion regarding these countries, which are also part of FATF, a "policy-making body" that combats money laundering and other threats to the international financial system.

Methodology:

Using data regarding foreign direct investment, geographical distances, GDP, tax rates, EU membership etc., I will run the so-called Gravity model with a dependent variable (FDI outflows) which aims to explain the flow of investment between the countries I am analyzing and host countries. In order to estimate the effect of 'being a money-laundering center', an adjusted model will be constructed with a large set of independent variables and an empirical analysis will be conducted. I expect to build my research on panel data so econometric tests based on pooled OLS, Fixed Effects and Random Effects models will be likely used to accomplish the purpose of this study.

Outline:

1. Introduction
2. Literature Review
3. Methodology
4. Results and discussions
5. Conclusion

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Signature of the author

Abstract

The goal of this thesis is to investigate the relationship of FDI and money laundering through a Gravity model approach. Overall empirical results of the thesis suggest that FDI originating from highly developed European economies are insensitive to money laundering motives. However its findings diverge only for developed destination countries and they suggest that for this group, jurisdictions officially listed as money laundering centers attract significantly more FDI stocks than other countries.

Keywords

Money Laundering, Foreign Direct Investment, Gravity Model, Panel Data, Fixed Effects, Random Effects, OLS

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1 Introduction

Money laundering is commonly referred to as the act or process whereby the proceeds of crime are transformed into apparently legitimate money or other assets. More specifically, conversion or transfer of property, concealment or disguise of the nature of the earnings, the acquisition, possession or use of property, being aware that these are derived from criminal activity and participation or assistance in the movement of illicit funds to make them appear legitimate signify illegal activities considered laundering money (Duhaime, 2014).

Considered by many a global threat to free market economies and with a substantial effect on the international financial system, money laundering has shown to be challenging in estimation and effective in camouflage. Thus, the intergovernmental board of The Financial Action Task Force (FATF) established in 1989 to a certain extent with one objective : to set standards and implement policies which directly or indirectly combat money laundering by legal, regulatory and operational means.

Several studies have been conducted in pursuance of a thorough investigation regarding this phenomenon which has shown not to be a rare event in recent decades. An examination of major corruption cases over recent years shows that significant amounts of illicit financial flows from developing countries have found their way into OECD countries (OECD, 2014). According to an official report from the United Nations Office on Drugs and Crime (UNODC), in 2009 criminal proceeds amounted to 3.6 percent of global GDP, with 2.7 percent or USD 1.6 trillion being laundered.

This thesis' primary purpose is to investigate through empirical analysis whether the so-called money laundering might represent an important determinant for foreign direct investment outward position. Past investigations suggest that there exists evidence indicating significance of the money laundering factor driving outward foreign direct investment (Atems & Mullen, 2016; Perez et al., 2012).

To investigate this matter I utilize a sample of six European reporting

countries which also are members of The Organization for Economic Co-operation and Development (OECD). Germany, France, Italy, United Kingdom of Great Britain and Northern Ireland, Sweden and Netherlands are officially considered developed economies by the United Nations institutions and are mainly concentrated in the unofficial regional group of Western European countries.

The primary motive for bringing to the focus of my study these countries is to conduct a comprehensive analysis on sophisticated European economies of the Western region with high level of development, because similar existing studies are limited to results for Central European countries, ASEAN region, economies still in transition or for one specific country such as the United States (Perez et al., 2012; Nugraha, 2013; Atems & Mullen, 2016).

The study is based on the foreign direct investment outward positions of 6 cross-sections reporting outward FDI to more than 130 host economies, depending on data availability provided by the OECD statistics on bilateral FDI positions. It employs an unbalanced panel data for the time period between 2001 and 2012. The main contribution of the paper would be to use the gravity model approach which up to my knowledge has not been used yet to estimate the relationship between FDI and money laundering. Secondly the paper would add more evidence explicitly for highly developed European countries and from recent years regarding the investigation of money laundering.

Overall empirical results show that for this particular group of countries, money laundering may not be an important determinant for investments abroad. However, when estimations are performed to two smaller subsamples of developed and developing host countries, a clear difference is observed. Interestingly, for developed economies evidence suggests a positive relationship among FDI and money laundering. On the other hand, for developing economies money laundering does not seem to determine significantly FDI. These results could be explained by the fact that the volume of data and specifically of positive FDI values is higher for developed destina-

tions. Also, examining the list of major money laundering countries through the years, a great proportion consists of advanced economies.

Nevertheless, drawbacks of large FDI datasets should be taken into consideration firstly because it may be challenging to compare the information among different jurisdictions and secondly because a large number of countries are represented only as mediators in receiving or investing FDI which may invalidate the reported information. Lastly, missing data and non-positive values may also be of high influence to the outcome. So in general results should be seen with a certain level of skepticism.

2 Literature Review

An overview of previous literature regarding the topic starts with the origin and progress of the Gravity model of trade which remains crucial to understand patterns of international flows. Its limitations and drawbacks are also presented. This section is followed by an elaborate definition of foreign direct investment and briefly by their importance to the global economy. Furthermore, the gravity model of FDI is presented and explored through several studies that detect traditional gravity factors as main explanatory variables of FDI. Mentioned papers also analyze destination country characteristics and country pair similarities as potential determinants of foreign direct investment.

The assessment of traditional gravity determinants is succeeded by a short review of unconventional factors that determine FDI such as tax havens, corruption, transparency etc. Furthermore, the process of money laundering is introduced complemented with global statistics from past empirical works which focus on its quantification. Lastly and most importantly, papers studying the relationship of money laundering and FDI are examined. Their methodology, empirical results and some noted limitations are summarized.

2.1 The Gravity Model

In international economics, the gravity model is preferred by many researchers who attempt to examine and understand the patterns of trade between countries. This approach was initially presented by Tinbergen (1962). He introduced his study as an analogy with Newton's universal law of gravitation which states that the force of gravity between two objects is proportional to the product of the masses of the two objects divided by the square of the distance between them. In trade, Tinbergen replaced the force of gravity with the value of bilateral trade and the masses of two objects with Gross Domestic Products of two countries. He concluded that bilateral trade flows among two countries are positively correlated to both their gross domestic products and negatively affected by distance between them.

The relationship was commonly specified by the following equation:

$$PX_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} D_{ij}^{\beta_3} A_{ij}^{\beta_4} u_{ij}$$

where PX_{ij} is the US dollar nominal value of bilateral trade between country i and country j, Y_i and Y_j are respective values of Nominal GDP-s, D_{ij} is the distance from the economic center of i to the economic center of j and A_{ij} represents any other factors motivating or discouraging trade. u_{ij} is a log-normally distributed error term with expected value being zero (J. H. Bergstrand, 1985).

In the 1970-s and 1980-s, the relatively straightforward approach was partly seen as extensively empirical and without any significant foundation on previous theoretical models of trade (Deardorff, 1984; Aitken, 1973; Geraci & Prewo, 1977; Abrams, 1980). Theoretical heritage proposed different explanations of trade flows. For instance, the famous Ricardian and Heckscher-Ohlin models did not consider the size of the economy as a determining factor for trade. Instead, their ideas focused on factor endowment differences between countries, not being able to build a theoretical connection between bilateral trade and characteristic factors of production.

Despite contradicting opinions and academic papers from economists, it has been generally agreed that the gravity equation has demonstrated to be a robust empirical finding in economics with high statistical explanatory power (Evenett & Keller, 1994). Many researchers attempted to improve the model in order to eliminate various issues coming with employing only the intuitive first approach. The 'new gravity theory' suggested that the gravity model could be easily derived from very different models, including the Ricardian, Heckscher-Ohlin and Increasing Return to Scale (IRS) models (Anderson, 1979; Helpman & Krugman, 1985) contributing with the first theoretical foundation to the Tinbergen model.

Gravity with Gravitas model of Anderson & van Wincoop (2003) is considered a revolution in the gravity model theory because of its solid microeconomic foundations. The authors implement a demand function into the

gravity model specifically by adding a modified function of constant elasticity of substitution. According to their model, utility of consumers increases with consumption of either a wider variety of goods or from consuming more of a given good. Meanwhile, their production side follows the assumptions of Krugman (1979). In this respect, the progress of theoretical foundations for the gravity model of trade since 2003 is important in general for international flows but differs from the micro-founded gravity models of FDI which will be explained in the following subsection.

2.2 Foreign direct investment: Definition and Statistics

Foreign Direct Investment (FDI) flows are frequently defined as the value of cross-border transactions related to direct investment during a given period of time, usually a quarter or a year. Equity transactions, reinvestment of earnings, and inter-company debt transactions comprise the financial flows which by direction are distinguished into outward and inward investment flows. Outward flows represent transactions that increase the investment that investors in the reporting economy have in enterprises in a foreign economy, such as through purchases of equity or reinvestment of earnings, less any transactions that decrease the investment that investors in the reporting economy have in enterprises in a foreign economy, such as sales of equity or borrowing by the resident investor from the foreign enterprise. Inward flows represent transactions that increase the investment that foreign investors have in enterprises resident in the reporting economy less transactions that decrease the investment of foreign investors in resident enterprises. FDI flows are measured in USD and as a share of GDP (OECD, 2018).

According to the International Monetary Fund, a transfer or transaction of financial flows is considered a foreign direct investment when an individual or business is the owner of 10 percent or more of a foreign company. Otherwise, the International Monetary Fund defines it as part of his or her personal stock portfolio. It could be noted that a ten percent ownership does not give the investor the holding of a majority of the stock of a business, re-

stricting the holder from exercising control. However, it does allow influence over the corporate management, operations and policies and thus, governments usually ought to track every investment in their country's businesses (IMF, 2004).

In 2016, the United Nations reported a value of 1.75 trillion dollars global FDI declining roughly 2 percent from 2015's flows worth of 1.76 trillion dollars (UNCTAD, 2016). Key political and economic institutions emphasize the importance of FDI to the global economy and construct policies that may act as incentives for its overall rise. The European Commission views these investments as a main driver of competitiveness and economic development because it brings capital, diversification and rising living standards especially to the host economies (European Commission, 2015).

2.3 Gravity model of FDI and its main determinants

Several models have been used as a baseline for the investigation of foreign direct investments. Gravity model is a particular method commonly referred to for observing both foreign direct investment and trade patterns concerning direction and relevant determinants. The most current studies and economic papers have controlled for additional variables of interest in their econometric analysis through the gravity equation to assess their relative effect on foreign direct investment flows or stocks.

In contrast to the important recent improvements in the micro-foundation structure of the trade gravity model, there is limited progress for building a theoretical ground to explain through it the movement of FDI.

However, some attempts include an important study from J. Bergstrand & Egger (2007) who derive a gravity model for FDI from the knowledge capital theory of horizontal multi-national enterprises. Their objective is a full general equilibrium model that can explain foreign direct investment,besides trade and foreign affiliate sales. The theoretical model being simulated generates nonlinear relationships between exports, affiliate sales and their exogenous determinants. The approximate 'empirical' relationship is afterwards

fitted to the generated data which take the same relationship to actual data, with some success.

Over the last decade, the popularity of FDI flows gravity models has risen despite many obstacles in constructing the model itself and the data being vulnerable to important single events (Folfwas, 2011). Numerous authors have examined the effect of the core explanatory factors and additional micro and macro-founded variables (Brenton et al., 1999; Stone & Jeon, 1999; Kahouli & Maktouf, 2015).

Bevan & Estrin (2004) perform a comprehensive examination of FDI determinants by analyzing a panel dataset of foreign direct investment outflows from Western European countries to Central and Eastern European ones. The resulting significant factors appear to be market size and distance as the gravity model predicts. Additionally, their empirics suggest that unit labor costs and also announcements about EU Accession proposals have an important effect on FDI. Interestingly, host country risk statistically proves not to be a meaningful determinant. However, their dataset covers the period 1994-2000 with incomplete information on flows to transition countries. For instance, the data on Greece flows to Poland are restricted only for 1996 to 1998 and Ireland omits Estonia and Latvia. The authors also address many gaps which according to them indicate zero flows and several missing values e.g. Finnish flows to Poland in 1994.

Similar discrepancies occur to Blonigen & Davies (2002) exploring the impact of tax treaties on FDI for OECD members over a ten year period 1982-1992. However, the gravity model variables seem to have a considerable effect as the theoretical framework predicts. Eaton & Tamura (1996) imply that investment is closely related to the destination country characteristics including market size, cost of investment, level of development and transportation costs. Their dataset is restricted for Japanese and US flows to host countries, for a five year period 1985-1990. Their 'modified gravity model' controlling for various host country specifics such as population, income, the land-labor ratio, the average level of education and region,suggests that po-

tential gravity factors are consistent with the theory. Lastly, Frenkel et al. (2004) also strongly supports using the classic gravity explanatory variables as a baseline for investigating FDI flows.

Mıhcı et al. (2011) are particularly interested in outward FDI determinants for the EU-12 group of countries. Their results using the gravity approach put great importance to cost related factors and potential demand, but it should be noted that their study is particularly focused on industry differences. Thus, the dataset and the empirical specification are constructed mainly for industry levels.

2.4 Non-traditional determinants of investment decisions: tax havens, corruption, financial transparency, globalization

The rising level of globalization and technology in various spheres of the world's economy and development has brought many benefits to today's complex economic system but also several drawbacks. Modern mechanisms and institutions tend to facilitate today's business and financial transactions in order to create an incentive for openness, trade activity and generate more value which may translate into growing capital and prosperity for the countries and jurisdictions involved. On the other hand, various reports show a dramatic increase in paper entities or companies that don't demonstrate any type of business activity which add up to more than 2 million including banks, funds and insurance companies (The Economist, 2013).

One potential explanation, as argued by many authors, would be the rising number of investors that may rely on offshore finance for the expansion of wealth and capital. The term 'offshore financial centers' (OFC) is defined by the International Monetary Fund (IMF) as "jurisdictions that have relatively large numbers of financial institutions engaged primarily in business with non-residents", "financial systems with external assets and liabilities out of proportion to domestic financial intermediation designed to finance domestic economies" and more popularly as "centers which provide some or all of the following services: low or zero taxation; moderate or light fi-

nancial regulation; banking secrecy and anonymity" (IMF, 2000). In fact, over the past three decades, overall demand for information regarding these so-called secrecy jurisdictions kept increasing without any significant intervention from authorities and respective law-enforcement institutions up until the late 1990-s (The Economist, 2013).

Being able to explain completely the large flows of funds to these jurisdictions remains a challenge that requires access to information which unfortunately does not appear to be available neither to the general public or to concerning parties. Despite data limitations, there exists evidence showing that OFC-s represent an attractive destination for financial flows motivated predominantly because of tax deductions or total tax avoidance (Haberly & Wójcik, 2015), financial transparency (Drabek & Payne, 2002), money laundering (Walker, 1999; Perez et al., 2012). Thus, beyond studying the standard driving forces of FDI, recent research suggests some non-traditional factors influencing flows in disguise.

An empirical research on FDI conducted through the gravity model shows tax havens commonly defined as "jurisdictions that have a low rate of tax or do not levy a tax as well as offer some degree of secrecy (The Guardian, 2011)", with a statistical effect of around 30% on investment decisions. The results of Haberly & Wójcik (2015) for year 2010 are based on IMF FDI stock data and strongly support the significance of gravity variables, most importantly geographical distance. Furthermore, historical and political factors seem to play an important role in explaining FDI. However, the article's conclusions appear slightly over-generalized taking into account that the authors utilize only cross-sections for 2010. Lastly, the authors conclude that OECD countries internalize considerable offshore FDI affecting developed economies and also emerging markets, despite the organization's agenda and policy-making against tax evasion.

Another paper by Drabek & Payne (2002) shed light into a relatively new factor influencing foreign investors in the patterns and direction of their flows. They define their variable of interest as non-transparency which de-

scribes a set of government policies that increase the country's risk and level of uncertainty. According to their model, the high risk and uncertainty mainly emerge from the existence of corruption, instability in economic policy-making, the poor property rights enforcement and institutional inefficiencies. The rankings used to construct the variable consist of combining information regarding the level of corruption, law compliance, bureaucracy, contract viability and the risk of government expropriation of private assets. The transparency index is taken from publications of the International Country Risk Guide for 52 countries.

They suggest, in line with their empirical results that the country becomes to some extent, less attractive because of non-transparency and the effect of one point increase in the index would lead to 40 percent rise in FDI. The higher a country's rank the more transparent their policies and institutions. The dataset also includes interest rates, GDP, inflation, total investment, population, capital formation and employment levels. Nevertheless, taking into consideration that the sample covers only 4 years 1991-1995 and the authors' primary used econometric method is fixed effects estimation, short-term fluctuations might have biased the results in a certain degree.

Corruption is another particular phenomena which by representing a variable on its own has brought many interesting results and contributions into studying the determinants of foreign direct investment. For instance, Egger & Winner (2006) demonstrate evidence built on a dataset that refers to the knowledge-capital model of multinational activity. The sample contains observations of 21 home countries which are generally known as developed economies and 59 host countries in both developed and less developed categories for the time period 1983-1999. The outcome shows a negative association between FDI and corruption. However, its importance to FDI seems to be decreasing according to the paper's conclusions.

Alfaro et al. (2005) show that during 1970-2000 low institutional quality is the leading motive for the lack of flows of capital from rich to poor countries or the so-called 'Lucas Paradox'. They perform cross-country OLS

regressions on capital inflows which include the main categories of foreign direct investment (FDI), portfolio equity investment and debt inflows to obtain more comprehensive evidence.

Interestingly, globalization as an independent factor has shown to be impactful to the direction of FDI flows. The particular starting point of Bojnec & Ferto (2016) in investigating the effect of globalization is the knowledge-capital (KK) model. The methodology differs in many aspects from the gravity model and combines geographical variables, trade cost variables and factor endowment differences. Most importantly, the KK model requires relative measures for the country sizes, one being the sum of Origin and Host GDP-s (SUM_{ij}) and the other representing the following ratio:

$$1 - \frac{GDP_i}{SUM_{ij}} - \frac{GDP_j}{SUM_{ij}}$$

The research is focused on OECD country members and also Turkey, seen as a crucial trader with the organization but the data limitations only allow an analysis over the period 2004–2008.

2.5 Money Laundering

The question whether money laundering is considerably reflected into financial flows globally may have been answered already several times, but the issue of quantification remains problematic regarding the confidence of results. The latter occurs mainly due to the fact that 'money-launderers' usually operate in a 'shadow economy' and manage large amounts of cash which are difficult to be tracked but easy to be transferred by means of bribing and connections. The proceeds from money laundering not only are challenging to be studied but in the majority of jurisdictions, they remain unknown even to the authorities due to the high level of disguise by which illicit flows are moved worldwide.

For 2000 alone, International Monetary Fund (IMF) together with the World Bank estimate that 2 to 4 % of the global gross domestic product (GDP) is created from illicit sources (Schneider, 2010). Agarwal & Agarwal (2004, 2006) argue by several regressions that global money laundering

amounts to more than 2.0 to 2.5 trillion US dollars annually or about 5-6 % of World GDP in 2006.

A few empirical works for estimating the direction and volume of money laundering use the famous Walker model (1995). Its theoretical foundations seem to underly in the Input-Output (ten Raa, 2009) model - typically used for economic modeling and planning but in an adjusted version for explaining international trade flows. Shortly, the Leontief table is built on the logic that producer countries send their products and services to consumer countries whether they are "legal" products and services or illegal ones. The "Total" column must be equal to total production in each country, and the "Total" row must be equal to the total consumption in each country.

The 'prototype' Walker-Gravity model for money laundering is specified as following:

$$\frac{F_{ij}}{M_i} = \frac{Attractiveness_j}{Distance_{ij}^2}$$

where

$$\frac{F_{ij}}{M_i} = \frac{GNP}{capita} \frac{(3BS_j + GA_j + SWIFT_j - 3CF_j - CR_j + 15)}{Distance_{ij^2}}$$

where $\frac{F_{ij}}{M_i}$ represents the share of proceeds of crime that country i sends to country j, GNP/capita is Gross National Product per capita, BS is Banking Secrecy, GA is Government Attitude, SWIFT is a dummy for being a member of Society for Worldwide Interbank Financial Telecommunication , CF is a dummy for pair being in conflict, CR is Corruption. Bilateral distance is measured in kilometers between the countries.

As seen from the specification of the model, Walker (1995), Stamp & Walker (2007) and later on following studies specific to Australia, Walker & Unger (2009) use crime proceedings and distinguish them by different crime categories for estimating what fraction represents money laundering. This approach seems reasonable and consistent in many aspects of economics of crime and according to Walker & Unger (2009), it produces robust results. Nevertheless, the model has been criticized for its ambiguous findings. Reuter (2013) appears to suspect to the Walker methodology and claims that estimates based on his model remain vague and not valid for generalizations.

He argues that information extracted on crime income does not represent a reliable source and any attempt to estimate total earnings from each illegal crime fails mainly due to a lack of systematic data systems for capturing the scale of each crime.

Attempts to study the patterns and outcomes of this phenomenon remain crucial to the integrity and stability of the financial sector and also to the global economy. According to IMF, illegal activities related to money laundering may discourage foreign investment, cause distortion to international capital flows and result in significant welfare losses that would lead to destabilization of economic activities. Additionally, globalization and openness would facilitate the effects to be spread globally (IMF, 2018).

Moreover, Mcdowell et al. (2018) argue that one of many economic effects of money laundering is causing reputation risk. From a global economy viewpoint, a country whose financial institutions might be associated with money laundering activities is generally assigned high risk, uncertainty and low level of attractiveness.

Consequently, following this economic rationale the relationship of foreign direct investment to money laundering ought to be negative. This perspective is supported with empirical evidence by Nugraha (2013) focusing on the ASEAN region. A positive significant relationship has been observed between FDI and the existence of Financial Intelligence Units (FIU) in host countries for the time period 2000-2009. The presence of FIU-s is associated with a relatively higher control on money laundering activities and financial transactions related to it.

On contrast, another empirical effort to investigate money laundering specifically through foreign direct investment by Perez et al. (2012) presents contradicting evidence to Nugraha (2013) that illicit flows which facilitate money laundering move throughout the financial system by foreign investment. They use as econometric specifications the Location Choice Model and Outflows Model, both augmented versions of the Knowledge-Capital Model (KK) explained in section 2.3. for investigating the effect of the

variable representing centers of money laundering in FDI outward flows by adding additional independent variables such as host country tax rates, governance, corruption, and cultural differences between the home and host country. Their econometric approach follows the nonlinear models of Probit and Tobit.

Their examination is focused only on Central and Eastern European countries which are recognized by them as transition economies. The authors compiled FDI outflows by country of destination for six countries : Bulgaria, the Czech Republic, Estonia,Hungary, Macedonia and Slovenia. Because of the infrequency of some of these FDI flows, the data on values of bilateral FDI flows are restricted for the period 2000–2003. They commonly show that there are no bilateral FDI outflows between numerous home and host country pairs. Specifically, 62 percent of the FDI flows in their sample are zero. On average, their estimates show that 6 % to 10 % of total FDI outflows and over 20 % of FDI to money-laundering countries were made to facilitate illicit money flows (Perez et al., 2012).

Atems & Mullen (2016) study by a dynamic panel model the relationship between outward FDI and money laundering only for the United States. Their variable of interest is constructed in a similar manner as by Perez et al. (2012) while they estimate the regression by the Generalized Method of Moments (GMM). Their empirical findings for the time period 2002-2010 indicate that money laundering opportunities attract FDI.

To summarize, from existing literature there are two main frames of references to found presumptions. As suggested by Perez et al. (2012) and Atems & Mullen (2016), being a major money laundering country is expected to significantly determine FDI with positive effect on it. On the other hand, Nugraha (2013) proposes that what considerably attracts FDI is the higher control on money laundering. His conclusion relatively contradicts the former authors because it suggests that countries combating money laundering and not the ones which facilitate this process actually encourage foreign direct investment.

However, these papers do not implement the Gravity Model approach to study the relationship of money laundering and FDI. Perez et al. (2012) and Atems & Mullen (2016) rather focus either on the Knowledge-Capital model which distinguishes between vertical and horizontal investment while Nugraha (2013) relies on a simple panel linear model. Lastly, their evidence involves regions such as Central Eastern Europe, United States or Southeast Asia (ASEAN).

Motivated by the above existing work on money laundering, this paper examines its relationship to FDI via the Gravity model and the focus are highly developed economies concentrated mainly in the well-known Western Europe.

The hypothesis to be tested based on past findings remains: money laundering reasons determine positively foreign direct investment.

3 Methodology and Data

Section 3 describes the model including variables used for estimation and its empirical specification to analyze accordingly the relationship of money laundering and FDI. Moreover, the dataset utilized for obtaining inference is presented and sourced. Lastly, the econometric tools used for panel data in this thesis are introduced which include pooled OLS, Fixed Effects and Random Effects methods. Statistical tests to compare between the three methods are described. Their main assumptions are stated and further advantages and drawbacks are explored. A few reasons for possible skepticism regarding obtained estimates are also presented and other solutions for treating zero FDI values are explored.

3.1 The Model

The main inspiration for constructing my econometric model remains the Gravity model of foreign direct investment used by authors such as Haberly & Wójcik (2015); Blonigen & Davies (2002). The micro-founded approach of the FDI gravity model such as J. Bergstrand & Egger (2007) is not followed

by this paper mainly due to its limitations and because it shows to be similar to the knowledge capital model which has already been used by previous authors who investigate money laundering. Adding several additional variables that are thought relevant for partly explaining the investment position has proven to be relatively successful and has given interesting estimates with statistically confident results (Bevan & Estrin, 2004; Blonigen & Davies, 2002).

However, studies on money laundering being an independent variable and explaining foreign direct investment positions by this approach are limited. As elaborated in Section 2.3 , the gravity model enriched with variables of high significant explanatory power has only been used to investigate the role of factors such as corruption, transparency, tax havens, globalization etc. Thus, this study adds money laundering as a potential factor in explaining FDI.

Employing the particular variable of interest, namely the binary categorical variable 'being a major money laundering jurisdiction' was inspired by Perez et al. (2012). Their study differs from my framework because they estimate a Probit and Tobit econometric model with a dependent variable defined as 'propensity of investors from country i to invest in country j'. Two specifications of the model include the location-choice model and the 'FDI outflow model'. Both combine relative country sizes, trade costs and factor endowment differences. Their panel dataset is limited to only a three year time period and the jurisdictions which are considered as reporting countries are transition economies, part of the Central and Eastern European region.

The model specified in my thesis uses foreign direct investment positions of the outward direction from the reporting countries or origins to destination countries as representatives for the dependent variable. This is normally done because FDI flows reported by the OECD statistical source, usually contain larger negative values which would be omitted or substituted in order to estimate the baseline gravity variables.

The first specification of the relationship to bilateral flows in a multi-

plicative form described in Section 2.1. of the gravity model ought to be adjusted to a regression equation to be appropriately estimated by linear econometric models. The log transformation is applied to the dependent variable (FDI) and main gravity variables: distance and GDP of country pairs which control for the size of the economies.

The specification to be estimated is presented in Equation 1. Besides the gravity variables, the basic model is usually enhanced by a set of dummy variables which represent destination country characteristics or country pair similarities. The most frequent dummy variables among others are Common Language, Common Border, Colonial Relations, EU membership. These dummies also control for cultural and geographical barriers to FDI. Their inclusion into the model provides an additional explanation of possible unusual amount of investment and an increase in the significance of the model. See for instance Oh et al. (2011)or NBERw16704.

$$\begin{aligned} log(fdi_{ijt}) = \beta_0 + \beta_1 log(distw_{ijt}) + \beta_2 log(gdp\_o_{jt}) + \beta_3 log(gdp\_d_{it}) \\ + \beta_4 ml_{it} + \beta_5 comlang\_off_{ij} + \beta_6 comrelig_{ij} + \beta_7 colony_{ij} + \\ \beta_8 contig_{ij} + \beta_9 eu\_d_{it} + \beta_{10} comcur_{ijt} + \beta_{11} ef_{it} + \theta_t + v_{ij} + u_{ijt} \end{aligned} \quad (1)$$

- fdi (dependent variable) represents foreign direct investment positions or FDI stocks of origin countries to host countries.
- distw is the weighted distance between the reporting or origin country which directly invests abroad and the partner or destination country which receives the investments.
- gdp_o is the Gross Domestic Product of the origin country.
- gdp_d is the Gross Domestic Product of the host country.
- comlang_off is a binary dummy which equals 1 if the pair of countries sharing bilateral investment have a common official language and 0 otherwise.
- comrelig is the religious proximity in form of an index calculated by

adding the products of the shares of Catholics, Protestants and Muslims in the origin and host country.

- colony is a dummy that equals 1 for pair ever in colonial relationship and 0 otherwise.

- contig is a dummy that equals 1 if the country pair shares a common border and 0 otherwise.

- eu_d is a binary dummy which equals 1 if the host country is a European Union member and 0 otherwise.

- comcur is a binary dummy which equals 1 if the pair of countries share a common currency.

- ef represents the Index of Economic Freedom for each host country. We use the overall indicator which is based on 12 quantitative and qualitative factors divided into 4 categories : rule of law composed of property rights, government integrity and judicial effectiveness ; government size which includes government spending, tax burden and fiscal health; regulatory efficiency which evaluates business freedom, labor freedom, monetary freedom and lastly open markets including trade freedom, investment freedom, financial freedom. Each of the twelve economic freedoms within these categories is graded on a scale of 0 to 100. A country's overall score is derived by averaging these twelve economic freedoms, with equal weight being given to each. The index is included in the model to control for any possible overestimation or incorrect sign of the parameter of money laundering. It represents crucial economic indicators in the investment environment framework and may be significant to explain FDI according to past studies (Fan et al., 2009; Wei, 2000).

- ml is a binary dummy which equals 1 if the partner country is considered a 'major money laundering center of primary concern'.

- θ_t represents the time specific effect. It is employed by dummy variables

for each year. This allows the model to attribute part of the variation of the data to unobserved events that occurred during each time period or characteristic features of particular years rather than specific events. For instance, Bortoluzzo et al. (2013) follows the same approach when investigating FDI stocks. Adding these dummy variables controls for any possible effect of the variation in exchange rate. Also, the time dummies deflate nominal values of GDP-s and control for possible global shocks. More generally, it addresses time specific effects and aims to eliminate time trends.

- v_{ij} controls for the country pairwise effect and is represented by a dummy which equals 1 for each pair of countries. This would reflect the potential variability of observations among the 6 reporting countries since estimations are done on a pooled dataset for 6 reporting economies.

The main focus when constructing this model is to examine the impact of being a major money laundering country on FDI outward stocks. All other factors are included to control for any other possible effect on FDI. In line with previous literature and findings (Perez et al., 2012; Atems & Mullen, 2016), the following hypothesis is formulated.

Hypothesis 1 : Money laundering motives affect positively foreign direct investment outward positions.

The same hypothesis is tested for two subsamples : developed and developing countries to check for robustness of estimates and whether they differ depending on the level of development of host economies.

3.2 Data

The sample of destination countries analyzed is not uniform from one reporting country to another. An ID is assigned to each pair of countries to distinguish FDI coming from 6 origins for the period of time 2001-2012. The panel dataset is unbalanced due to data availability restrictions. Moreover, non-publishable, confidential values and non-positive observations in the dependent variable have been omitted due to its logarithmic form in the model. After applying these transformations, estimations are conducted on a sample of 7014 observations for the entire dataset.

Information on foreign direct investment positions has been retrieved from the OECD statistics official website in section "FDI statistics according to Benchmark Definition 3rd Edition (BMD3) - FDI positions by partner country". The values are reported in millions of US dollars for every pair to avoid inconsistencies. They essentially comprise every international investment within the balance of payment accounts where a direct investor owns a 10 % rate or more of the ordinary shares or voting rights of the enterprise.They differ from the accumulated flows because they are reevaluated taking into account inflation, exchange rates and other adjustments as for instance rescheduling or cancellation of loans or debt-equity swaps.

Bilateral distances, reported in kilometers and population weighted and also EU memberships are extracted from the CEPII distance dataset constructed by Mayer & Zignago (2011). Gross Domestic Products are reported in current US dollars and extracted from the World Development Indicators (The World Bank, 2018).

Information on colonial relationship, common official language and contiguity was taken from Head et al. (2010), while dummies for the common currency variable were constructed following De Sousa (2012).

The index of common religion was retrieved from Disdier & Mayer (2007) while the Index of Economic Freedom is reported by Heritage Foundation (n.d.) for the entire sample.

The independent variable representing money laundering includes obser-

vations collected from the United States Department of State website, for each year's International Narcotics Control Strategy Report (INCSR). The review assesses the importance of financial transactions in the country's financial institutions including proceeds of serious crime, steps taken or not taken to combat financial crime and money laundering, each jurisdiction's vulnerability to money laundering, the conformance of its laws and policies to international standards, the effectiveness and political actions taken from the government.

The yearly reports identify money laundering priority jurisdictions and countries using a classification system that consists of three categories: Jurisdictions of Primary Concern, Jurisdictions of Concern, and Other Jurisdictions Monitored. "Jurisdictions of Primary Concern" are those that are identified,conditional to INCSR reporting requirements, as major money laundering countries (US Department of State). Any destination jurisdiction of my sample which is identified among this list, is assigned a ML dummy with value 1 and 0 if part of any other category or not listed at all.

Table 1 summarizes the names of the variables, scales of values and the sources they were extracted from.

Table 1:

Variables			
Abbreviation	Name	Scale	Source
fdi	foreign direct investment	US $ millions	OECD
distw	distance	kilometers	Mayer & Zignago (2011)
gdp_o	GDP of origin	current US $	World Bank
gdp_d	GDP of destination	current US $	World Bank
comlang_off	common official language	Dummy 0 or 1	Head & Ries (2008)
comrelig	common religion	Index 0-100	Disdier & Mayer (2007)
colony	colonial relationship	Dummy 0 or 1	Head & Ries (2008)
contig	contiguity	Dummy 0 or 1	Head & Ries (2008)
eu_d	EU membership	Dummy 0 or 1	Mayer & Zignago (2011)
comcur	common currency	Dummy 0 or 1	De Sousa (2012)
ef	economic freedom	Index 0-100	Heritage Foundation
ml	money laundering	Dummy 0 or 1	US Department of State

3.3 Econometric approach

For estimating the effect of the money-laundering variable to foreign direct investment positions and for further investigations, 3 main econometric methods are employed: regular Pooled OLS, Fixed Effects and Random Effects.

Pooled OLS assumes that a random sample is drawn at each time period and the resulting data are independently pooled cross sections. Its regular OLS assumptions with estimators $\hat{\beta} = (X'X)^{-1}$X'Y involve:

- A random sample is drawn.
- Linear in parameters β-s.
- No perfect linear relationship among independent variables.
- There is no correlation between disturbances and independent variables: $\mathrm{E}(u_i/\mathrm{X}) = 0$
- Homoskedasticity of error terms: $\mathrm{Var}(u_i) = \sigma^2$
- Normality of error terms: u_i follows the distribution $\mathrm{N}(0,\sigma^2)$

Ideally under the first five assumptions, OLS estimators are BLUE (best linear unbiased estimators) where "best" stands for the ones with the smallest variance. The increased sample size of pooled OLS produces more precise estimators. Moreover, the effect of time could be controlled by adding year dummy variables in the model.

However, pooled OLS does not account for unobserved individual effects which if present in the model, produce biased and inconsistent results and estimates. Despite this disadvantage, this method is used for comparison to other panel data methods of estimation in terms of coefficients, goodness of fit and statistical tests.

The two other methods used, Fixed Effects and Random Effects are part of a panel dataset approach. The rise in popularity of panel data methods is mainly dedicated to their larger source of information that allows to examine more complex observations and behavioral patterns of economic agents.

According to Baltagi (2005), panel data give more informative data, more variability, less collinearity among the variables,more degrees of freedom and more efficiency. In general, larger and more informative datasets may produce more reliable estimates of coefficients. Moreover, panel data have proven to be better able to study the dynamics of adjustment and lastly they are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data.

One of the most important advantages of panel data include controlling for heterogeneity of individuals, firms and countries. Not controlling for the heterogeneity problem with time-series or cross-sectional datasets may run the risk of getting biased results.

In Equation 2, a panel data model is specified which takes the effects of explanatory variables as invariant both in time and at cross level, but the effects of omitted variables can be decomposed into individual, period or cross-section and period effects (Hsiao, 2007).

$$y_{it} = \beta_0 + \beta X_{it} + u_{it}$$

$$\text{for i= 1,...,N and t= 1, ...,T}$$

where y_{it} is the dependent variable, β_0 is the intercept, X_{it} is a vector of K dimensions representing explanatory variables. The i subscript denotes the cross-section dimension whereas t denotes the time-series dimension.

The second panel data technique, Fixed Effects employs a one-way error component model for the disturbances, with $u_{it} = \mu_i + \nu_{it}$ where μ_i denotes a time-invariant individual-specific unobserved effect and is referred to as unobserved or individual heterogeneity. ν_{it} denotes the idiosyncratic disturbance i.e. to be stochastic and independently identically distributed $(0, \sigma^2)$.

Fixed Effects (FE) and specifically the "Within" method estimates a demeaned model. It subtracts to each individual observation the average of the period, for each time-varying variable. As the fixed effect is constant, this method eliminates μ_i . Therefore, in this case the issue of correlation

between independent variables and the error term, which might cause severe bias in estimations is solved. Moreover, Fixed Effects is consistent in the case of correlation between the unobserved heterogeneity and a time-varying dependent variable. However, the level of this method's performance depends to an extent on the variation of regressors over time, as estimation uses demeaned data, i.e. the time differences. Time invariant variables included in the panel model are eliminated.

Main assumptions of the Fixed Effects method require :

1. A random sample in the cross sectional dimension.

2. Strict exogeneity i.e. for each time unit or period, the expected value of the idiosyncratic error given the explanatory variables in all time periods and the unobserved effect is zero: $E(\nu_{itj}/X_i;\mu_i\ ) = 0$

3. Each explanatory variable changes over time (for at least some i), and there are no perfect linear relationships among the explanatory variables.

   Ideally under 1-3 being fulfilled, β estimators are unbiased and as the number of observations gets larger, they become consistent.

Lastly, one drawback of the fixed effects could be that despite capturing entirely the time-constant omitted variables, the effect of any time-varying omitted variables would not be captured.

In Random Effects models, it is assumed that the time-invariant individual-specific effect μ_i is uncorrelated with each explanatory variable at all periods x_{itj} and Fixed Effects or First Differencing methods do not appear to be efficient because their transformations might eliminate significant information that μ_i may contain. Important assumptions of Random Effects that have these implications are:

1. The expected value of μ_i condition to all explanatory variables is zero: $E(\mu_i/X_i) = 0$. This rules out the correlation between the unobserved effect and explanatory variables.

2. There are no perfect linear relationships among the explanatory variables. This allows explanatory variables to be constant over time for all i i.e. individual cross-sections as opposed to FE.

3. The variance of μ_i given all explanatory variables is constant:
   $\text{Var}(\mu_i/X_i) = \sigma_a^2$

Statistical tests

Comparisons among each mentioned econometric approach involve particularly their efficiency and consistency in estimation. Statistical tests for panel models described further are based on the work of Wooldrige (2003) and Baltagi (2005). For one to be able to test between Pooled OLS and Fixed Effects, a null hypothesis of individual specific heterogeneity is given and an F test is performed calculating the Wald statistics. Rejecting the null hypothesis would imply that the individual heterogeneity exists in the model and pooling the data as a single regression with a single intercept is not appropriate while Fixed Effects deals with it accordingly and produces consistent estimates.

Additionally, Breusch Pagan Lagrange Multiplier test is used to decide whether pooled OLS or Random Effects performs better on this sample of observations. If the null hypothesis would not be rejected, statistical evidence indicates that the variance across individual entities is zero and therefore pooled OLS remains consistent without the need of Random Effects.

Lastly, to examine the consistency of Random Effects estimates, the Hausman test is conducted. The null hypothesis states that Random Effects estimates are consistent which implies that disturbances and regressors are independent of each other. If H_0 is not rejected, both Fixed Effects and Random Effects are consistent but only Random Effects is efficient because it produces the smallest variance of disturbances. Under the alternative hypothesis, endogeneity among independent variables exists and Fixed Effects is preferred.

3.4 Omission of zero FDI values

Initially, the set of FDI outward stocks collected from the OECD statistics website contained approximately 30% zero observations which officially represent no foreign direct investment. For this paper, it was seen more appropriate to omit these values in order to log-transform the dependent variable specified in the regression equation as log(fdi) as it remains one of the suggested solutions by Bacchetta et al. (2012).

There are several techniques treating zero observations in the dependent variable depending first and foremost on the assumption of randomness i.e. they are zero randomly and there is no other reason behind their value. Secondly, the econometric method employed in the empirical analysis should be considered when dealing with these observations.

Commonly for foreign direct investment, the occurrence of zero values is noticed to be non-random. For instance, very distant and smaller destination economies in terms of GDP may receive typically zero investment positions from abroad. There is no clear pattern of zero values among major money laundering countries and the rest of the destinations which receive FDI. However, their randomness cannot be definitely concluded.

In the presence of heteroskedasticity, data which contain a large volume of zeros usually cause the disturbance term to be substantial at very low values, violating the assumption of normal distribution. It is usually pointed out that OLS estimation of the logarithmic transformation of gravity model produces inconsistent results (Santos Silva & Tenreyro, 2006).

One simple and commonly used way of how to deal with zero values is adding a small constant to each observation and then perform the logarithmic transformation. Using log(y+constant) raises the issue of what constant should be added. One should be careful when choosing a significantly small but positive value for it because it might create substantial outliers in terms of the transformed response variable. For the mentioned reasons, this solution is not implemented in this paper.

Secondly, an advanced solution to this problem would be the Poisson

Pseudo-Maximum Likelihood method of estimation which models the error term following the Poisson distribution introduced by Santos Silva & Tenreyro (2006). They estimate the gravity equation in the multiplicative form. In this form, zero observations cause no problem. Apart from solving the zero values issue, this approach yields consistent estimates even though heteroskedastic disturbances are present. Other authors such as Head & Ries (2008) and Desbordes & Vicard (2009) also employ the Poisson model to estimate gravity models of FDI.

Lastly, another alternative would be the Tobit estimation model which is specifically designed to deal with corner solution dependent variables. It was first employed on FDI by Eaton & Tamura (1994) and is followed later by Wei (2000). However, the method relies heavily on the assumption of homoskedasticity for unbiased estimates (Santos Silva & Tenreyro, 2006).

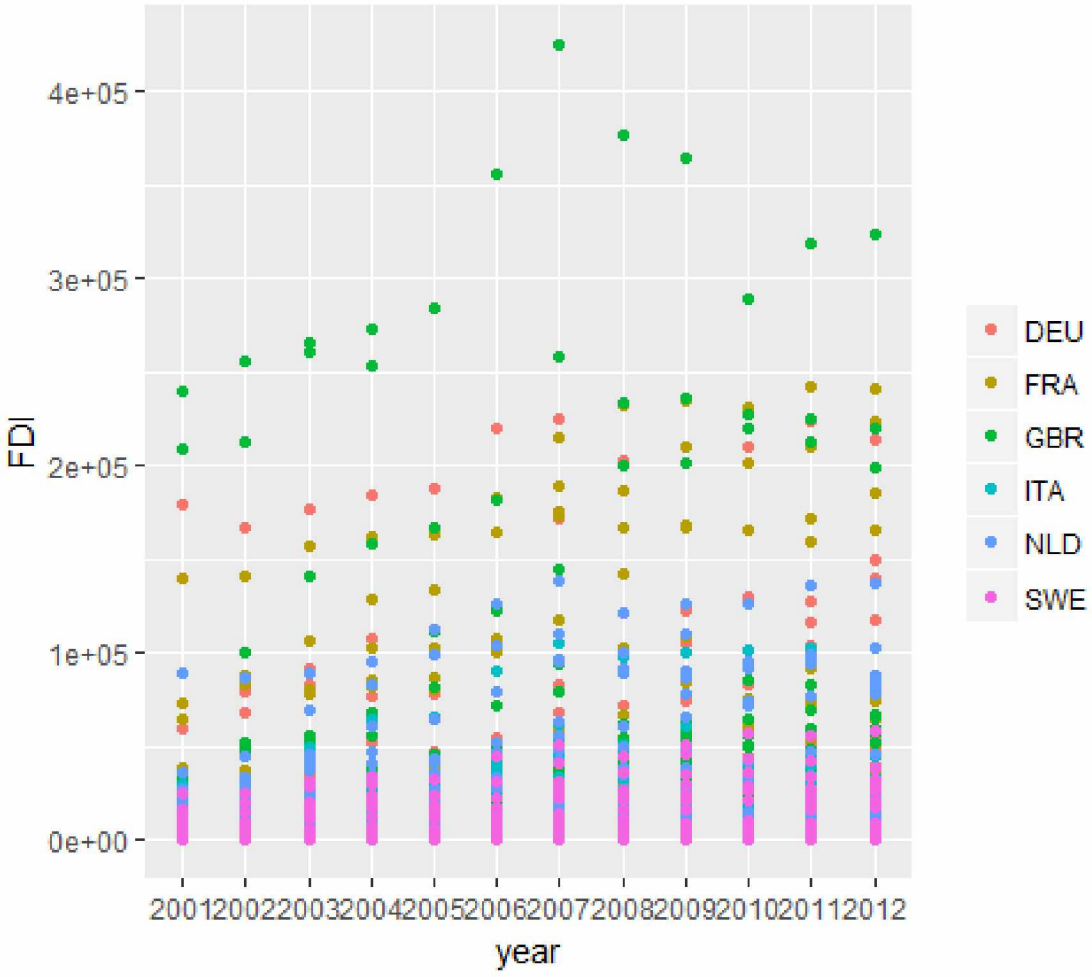

Figure 1: Overview of FDI outward positions.

4 Results

4.1 Inference on complete dataset

Figure 1 shows the distribution of FDI stocks originating from the 6 reporting countries between the years 2001-2012. The highest values of FDI stocks but also the majority of outliers in observations seem to originate from the United Kingdom which traditionally has shown similar patterns while Sweden's outward FDI has the smallest reported investment abroad.

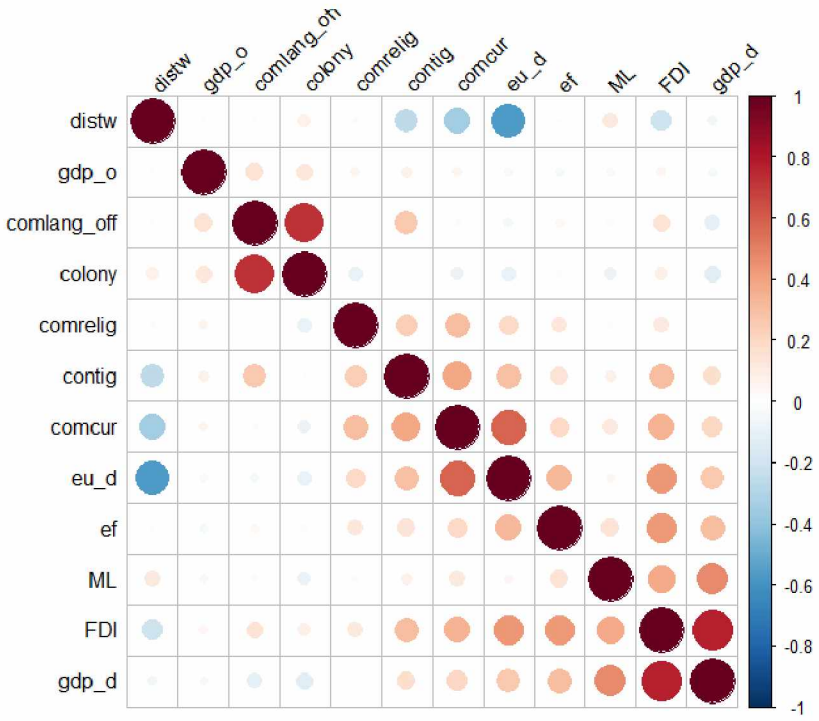

Figure 2: Cross-correlations graph

An illustration of correlations among the variables of the model is displayed in Figure 2. Negative dependencies are colored in blue and positive ones in light or dark red. It shows clear positive correlation between FDI and GDP-s, country pair similarities represented by dummies, economic freedom and money laundering. Also foreign direct investment seems negatively correlated with distance as gravity model predicts.

I begin my econometric analysis with an F test for individual specific heterogeneity in the model which indicates whether pooled OLS or Fixed Effects estimators should be used as elaborated in Section 3.3. Based on the p-value considerably lower than 5%, the null of no heterogeneity is rejected and it is concluded that pooled OLS is most likely biased and we prefer Fixed Effects.

Furthermore, the Breusch-Pagan Lagrange Multiplier test is helpful to decide between pooled OLS and Random Effects methods. The null hypothesis is rejected with a p-value significantly lower than 0.05 which shows that there exist differences across units and Random Effects performs better

than pooled OLS in this case.

To make a statistical comparison between Fixed Effects and Random Effects, one should consider their main assumptions and whether they are fulfilled or not. Random Effects assumes no endogeneity among independent variables, thus there is no correlation between the unobserved individual effect and explanatory variables. To test this assumption, Hausman test is performed. The null hypothesis H_0 states no endogeneity. Under H_0, bot Fixed Effects and Random Effects are consistent but only Random Effects is efficient. If H_0 is rejected, FE is preferred because under the alternative it is consistent while RE is not. The resulting p-value of Hausman test is considerably lower than 0.05. Therefore, H_0 is rejected and FE is preferred to RE due to its consistent estimates.

Furthermore, the fulfillment of important linear assumptions is checked. To test whether disturbances are homoskedastic, a Breusch-Pagan test is performed in R. The p-value is significantly lower than 0.05, thus the null hypothesis of homoskedasticity of error terms is rejected. This shows clear evidence of the assumption's violation. To test for autocorrelation of disturbances, Breusch-Godfrey test is employed in R for panel data. The null hypothesis is rejected again with a p-value lower than 5% indicating that there exists autocorrelation in error terms.

For large sample sizes such as the one in this paper, one common solution to this problem is using heteroskedasticity and auto-correlation robust statistics which make the standard errors and confidence intervals valid.

After fitting the model in R, the regression results for Fixed Effects are presented in Table 2. Since FE employed by the time demeaning transformation drops time-invariant variables, bilateral distance and all country-pair or individual factors that do not change over the years do not appear on the table. Specifically common language, contiguity, colony, common religion and the country pair dummies are omitted. GDP of both host and origin countries, EU membership and common currency all show statistical significance and appear with the expected positive sign.

The economic freedom index is also clearly significant. Its sign indicates that several factors representing the economic environment of host countries are also explaining positively incoming FDI from reporting countries. Its coefficient of 0.021 could be interpreted that a one unit increase of the economic freedom index for the destination country would raise investment by 2.1% . This variable indirectly controls for any expected effect especially from institutional indicators and tax related reasons which could have incorrectly overestimated the impact of money laundering on FDI if not included in the model.

Our variable of interest, money laundering shows no statistical significance and a coefficient of -0.043 contradicting Perez et al. (2012) and Atems & Mullen (2016). One issue to be discussed in this case is how well does the dummy variable capture the effect of money laundering. As stated in the INSCR report of the US Department of State, the list of concerning jurisdictions is compiled after assessing vulnerability to money laundering and the significance of the amount of crime proceeds which are laundered. Again, according to our source the latter should be seen with a degree of skepticism because of the the difficulty and complexity of distinguishing them from other crime proceeds.

Additionally, an important factor to be taken into account when interpreting the econometric results for the entire dataset is the omission of zero values, which is discussed in detail in section 3.4. This could potentially make the estimates inconsistent.

Table 4 displayed in Appendix compares coefficients and their significance for Pooled OLS to Fixed Effects and Random Effects. Time dummies and country-pair effects are included in all models. Results from pooled OLS indicate a positive and significant relationship between FDI and money laundering while the Random Effects model demonstrates an insignificant money Laundering variable with a coefficient of 0.08. The former estimate relatively corresponds with the conclusions from Perez et al. (2012) and Atems & Mullen (2016) while the latter suggest the opposite. However, re-

sults from both Pooled OLS and RE were argued to be inconsistent at the beginning of this section so they cannot be taken as reference.

Lastly, the majority of control variables which are constant over time seem significant and with the expected signs but are not of particular interest for this paper.

Table 2: Regression Results - Fixed Effects

	Dependent variable
	log(fdi)
log(gdp_o)	1.077^{***} (0.285)
log(gdp_d)	0.676^{***} (0.112)
eu_d	0.205^{*} (0.105)
comcur	0.539^{**} (0.242)
ef	0.021^{***} (0.007)
ml	-0.043 (0.128)
Observations	7,014
R^2	0.254
Adjusted R^2	0.159
F Statistic	124.612^{***} (df = 17; 6222)

Note: *p<0.1; **p<0.05; ***p<0.01

4.2 Robustness check

Final estimations are performed on two sub-samples of the dataset to analyze any notable differences in results. The first sample contains only destination countries which are listed as developed economies and the second sample includes those listed in the developing group of economies by CIA (2011). The list of developed countries is presented in the Appendix.

The same statistical tests are performed as for the bigger dataset. Comparing Pooled OLS to Fixed Effects with an F -test, a p-value lower than

0.05 showed Fixed Effects to be more adequate. Results from Pooled OLS and Random Effects are also shown in the Appendix for both subsamples. Similarly as before, the Hausman test that checks the assumption of no endogeneity among independent variables showed that it is violated. Therefore, we rely on Fixed Effects to Random Effects for consistent results in both subsamples. Heteroskedasticity and serial correlation - robust estimates and standard errors are obtained after observing heteroskedasticity and autocorrelation in both models.

Table 3 compares the Fixed Effects results of developed and developing destinations receiving FDI.

Table 3: Developed destinations VS Developing destinations

	Dependent variable: log(fdi)	
	(1)	(2)
log(gdp_o)	1.223*** (0.376)	0.961** (0.382)
log(gdp_d)	0.451** (0.178)	0.779*** (0.139)
eu_d	0.164 (0.143)	0.228 (0.141)
comcur	0.404* (0.244)	0.712 (0.503)
ef	-0.012 (0.011)	0.961** (0.382)
ml	0.289*** (0.079)	-0.053 (0.145)
Observations	1,996	5,018
R^2	0.437	0.221
Adjusted R^2	0.378	0.112
F Statistic	82.530*** (df = 17; 1805)	73.468*** (df = 17; 4400)

Note: *p<0.1; **p<0.05; ***p<0.01

The confidence intervals are computed and it is checked that they do not overlap. For the developed sample it is [0.285; 0.292] while for the developing subset is [-0.247; 0.141].

Again, time-invariant control variables are omitted. Referring to Table

3, ml shows a significant estimate and a positive coefficient for developed economies corresponding to results of Perez et al. (2012) and Atems & Mullen (2016). The results are incompatible with the ones regarding the whole list of host countries. Interestingly, for destinations which are considered to be more economically advanced and developed, money laundering is evidently a reason to increase the investment position while economic freedoms become irrelevant as a factor. The coefficient of the dummy variable ml may be interpreted with the formula $100[\exp(\beta_j)-1]$. On average, major money laundering countries receive roughly 33.5% more FDI stocks than other countries not considered as such.

The coefficient seems rather large to explain the pure money laundering effect on FDI. Therefore it is suspected that the variable might act as a proxy for other factors. To control for tax avoidance reasons which might not be controlled by the economic freedom index, it is checked that all countries considered as tax havens published by Ethical Consumer and European Commission are included in the sample. The list is displayed in the Appendix.

One explanation for this reference might be that more data could be found for 2001-2012 regarding developed countries rather than for developing ones. It should be noted that it appears more probable for reporting economies to invest less or not at all in developing countries.

Lastly, it is not uncommon for many developed countries to be considered major money laundering centers by the US Department of State throughout the time interval 2001-2012. A great proportion of the thirty jurisdictions listed by CIA in the group of developed countries are of primary concern regarding money laundering activities. Also, if we refer to the correlations plot from Figure 2, there seems to be a positive association of destination GDP and money laundering.

On the other hand, for FDI being transfered to developing destinations, results demonstrate a different inference. The money laundering variable proves to be statistically insignificant. This shows that the reporting coun-

tries investing in host economies without a high level of development are not motivated by money laundering. One highly important factor explaining FDI to developing economies is the index of economic freedoms.

To briefly summarize, the importance of money laundering in determining FDI outward stocks is dubious and statistically not convincing. The results ought to be seen with hesitation due to major differences between the two subsamples, data availability for each of them and other possible factors not controlled for.

Conclusion

The goal of this thesis is to investigate the effect of money laundering on foreign direct investment positions and determine whether it has a significant impact on them. Its contribution lies in employing a gravity model approach of FDI and adding the money laundering dummy variable to estimate its effect. Moreover, evidence is obtained for a more recent period than past investigations and for advanced European reporting economies. Results are additionally inspected for two subsamples of destinations officially categorized by their level of economic progress in developed and developing economies.

Obtained results indicate that overall, investors from origin countries are not motivated by money laundering to increase their FDI positions. This conclusion differs only for the sample of developed destinations which represents approximately 30% of the available dataset. For this particular group of countries, money laundering is a significant determinant of FDI. On average, money laundering centers receive 33.5% more FDI than the rest of the countries. Traditional determinants such as geographical factors, cultural similarities and economic freedoms of destination economies also considerably explain investment decisions.

An important remark to be added regarding results is that they remain valid only for the 6 reporting countries which are considered highly developed European economies. As mentioned in this thesis several times, the effect of money laundering is highly challenging and complex to be quantified correctly. It should be pointed out that except the existing variables, other not captured factors could possibly contribute to the effect of money laundering on FDI or the money laundering dummy could be influenced by unobserved factors not included in the model.

Lastly, the omission of zero values as well unobserved time-variant factors might have a considerable effect on estimates and possible inconsistencies should be paid regard to. Unfortunately, these issues are not yet resolved due to limited econometric tools and are left to future research.

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Appendix

Table 4: Pooled OLS vs Fixed Effects vs Random Effects

	Dependent variable: log(fdi)		
	Pooled OLS	FE	RE
	(1)	(2)	(3)
log(distw)	-0.566^{***} (0.068)		-0.614^{***} (0.067)
log(gdp_o)	0.283^{***} (0.069)	1.077^{***} (0.285)	0.250^{***} (0.072)
log(gdp_d)	1.016^{***} (0.031)	0.676^{***} (0.112)	1.011^{***} (0.031)
comlang_off	1.153^{***} (0.191)		1.234^{***} (0.219)
comrelig	0.781^{***} (0.233)		0.863^{***} (0.241)
colony	1.152^{***} (0.173)		1.103^{***} (0.206)
contig	-0.052 (0.224)		0.067 (0.243)
eu_d	0.475^{***} (0.159)	0.205^{*} (0.105)	0.247^{**} (0.097)
comcur	0.354^{*} (0.183)	0.539^{**} (0.242)	0.604^{***} (0.208)
ef	0.041^{***} (0.005)	0.021^{***} (0.007)	0.031^{***} (0.005)
ml	0.228^{**} (0.112)	-0.043 (0.128)	0.080 (0.101)
Constant	-25.709^{***} (2.116)		-23.916^{***} (2.209)
Observations	7,014	7,014	7,014
R^2	0.753	0.254	0.353
Adjusted R^2	0.752	0.159	0.351
F Statistic	968.412^{***}	124.612^{***}	172.359^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

Table 5: Developed destinations

	Dependent variable: log(fdi)		
	Pooled OLS	FE	RE
	(1)	(2)	(3)
log(distw)	-0.796^{***} (0.111)		-0.692^{***} (0.123)
log(gdp_o)	0.335^{***} (0.110)	1.223^{***} (0.376)	0.445^{***} (0.123)
log(gdp_d)	0.930^{***} (0.058)	0.451^{**} (0.178)	0.874^{***} (0.064)
comlang_off	0.586^{*} (0.309)		0.826^{**} (0.343)
comrelig	1.080^{**} (0.447)		1.213^{**} (0.499)
colony	1.073^{***} (0.272)		1.271^{***} (0.345)
contig	-0.041 (0.270)		-0.047 (0.308)
eu_d	0.501^{**} (0.226)	0.164 (0.143)	0.129 (0.136)
comcur	0.240 (0.214)	0.404^{*} (0.244)	0.372^{*} (0.221)
ef	0.086^{***} (0.012)	-0.012 (0.011)	0.005 (0.010)
ml	0.455^{**} (0.201)	0.289^{***} (0.079)	0.368^{***} (0.116)
Constant	-26.846^{***} (3.356)		-23.319^{***} (3.433)
Observations	1,996	1,996	1,996
R^2	0.741	0.437	0.464
Adjusted R^2	0.738	0.378	0.458
F Statistic	256.599^{***}	82.530^{***}	77.413^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

Table 6: Developing destinations

	Dependent variable: log(fdi)		
	Pooled OLS	FE	RE
	(1)	(2)	(3)
log(distw)	-0.436^{***} (0.083)		-0.476^{***} (0.085)
log(gdp_o)	0.290^{***} (0.086)	0.961^{**} (0.382)	0.213^{**} (0.090)
log(gdp_d)	1.090^{***} (0.036)	0.779^{***} (0.139)	1.053^{***} (0.038)
comlang_off	1.469^{***} (0.244)		1.475^{***} (0.284)
comrelig	0.561^{**} (0.275)		0.775^{***} (0.281)
colony	0.988^{***} (0.210)		0.989^{***} (0.256)
contig	0.157 (0.312)		0.563^{*} (0.338)
eu_d	0.632^{***} (0.242)	0.228 (0.141)	0.285^{**} (0.133)
comcur	1.737^{**} (0.829)	0.712 (0.503)	0.831 (0.509)
ef	0.038^{***} (0.006)	0.025^{***} (0.008)	0.030^{***} (0.006)
ml	0.101 (0.129)	-0.053 (0.145)	0.045 (0.114)
Constant	-28.304^{***} (2.640)		-24.967^{***} (2.801)
Observations	5,018	5,018	5,018
R^2	0.646	0.221	0.283
Adjusted R^2	0.645	0.112	0.280
F Statistic	414.631^{***}	73.468^{***}	88.981^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

List of developed countries (DC) reported by CIA (2011):
Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Slovenia, South Korea, Spain, Sweden, Singapore, Switzerland, United Kingdom, United States

Tax havens list:
Anguilla, Aruba, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands,Cook Islands, Curaçao, Cyprus, Delaware (US), Dominica, Gibraltar,Guernsey, Guyana, Hong Kong, Ireland, Isle of Man, Jersey, Liberia,Lichtenstein, Luxembourg, Macao, Malta, Marshall Islands, Mauritius,Monaco, Montserrat, Nauru,Netherlands, Nevada (US), Samoa, San Marina, Seychelles Singapore, St. Kitts and Nevis St. Vincent & Grenadines, Switzerland, Taiwan, Turks and Caicos Islands, US Virgin Islands, Wyoming (US)