



Master Thesis – International Economics

## **The impact of foreign direct investments on the Dutch international trade**

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### **ABSTRACT**

Foreign direct investment and international trade, two important features in the economy that are nearly inseparable in the literature of international economics. This paper attempts to find the kind of relationship FDI and international trade share with a specific focus on the Dutch economy and its trading partners. It also investigates a mechanism involving export risk in order to find a potential driver of this correlation. The research employs Dutch data over the period 2000-2017 covering almost 190 trading partners. Evidence shows that increasing foreign investments induces the growth in international trade indicating a complementary effect where there is also proof of export risk forming an essential driver in this mechanism.

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## 1. INTRODUCTION

Foreign direct investment (FDI) and international trade have been growing at a rapid pace in the past decades. The Netherlands is one of the countries participating massively on this field. Over one-third of the Dutch economic activity relies on foreign markets (OECD, 2017). Their FDI surpasses their GDP by almost double the size, Even the Dutch gross exports and imports amounts almost for their GDP which puts the Netherlands in the top most exporting and most foreign investing countries. These features have become so vital in the economy that have resulted in receiving extensive attention in numerous research studies. We contribute to this growing literature by testing whether FDI's facilitate international trade. Our empirical model is based on gravity model framework described in Feenstra (2004). This model offers the opportunity to observe patterns that certain countries share over a long time period which in this case we observe patterns between the Netherlands and its trading partners. We extended the model by including an export risk factor, which we interact with our measure of foreign direct investments. We predict the model by employing country-level data using bilateral trade flows from the World Integrated Trade Solution database developed by the World Bank, for 190 countries during the years 2000-2017. The annual FDI flows are extracted from the OECD Statistics database for 190 countries during the period 2000-2017 and forms the independent variable combined with several gravity variables. The FDI flows contains an amount of missing values for data that are non-publishable due to confidential reasons. However, we expect this not to significantly influence our analysis. Our gravity model framework further consists the variables GDP per capita, population, distance, European Union, common language and colonial past. Our model predicts that Dutch foreign direct investments are positively associated with international trade which indicates that FDI and trade are complements. This effect is boosted by a mechanism consisting export risk as a driver.

After finding evidence that a positive change in the mass of new foreign direct investments is related to a positive change in trade, we analyze the plausibility of export risk being a mechanism driving this result. We explore whether the investments are a bigger concern for exports to riskier countries. We approach this by inserting proxies for export risk in our model. In an ideal case, we would conduct our research using data on cross-border country-to-country trading relationships, with the emphasis on instruments directly reducing export-risk. However, there is no variable directly indicating the export risk of a country. In this case we use two indexes: the political stability index and the economic globalisation index. The political stability index gives us a hint of how stable one's government is on regional and international field and for this reason it serves excellent as a proxy for export

risk. The economic globalisation index shows the relationships between countries created by foreign trade and investments and this can operate as a proper proxy. Our dataset is completely log-transformed because of the different values which prevents a skewed distribution. To control for effects that may not be caught by the employed variables such as time-invariant variable, country characteristics and globalisation trends, we control for time-fixed effects and country-fixed effects. Furthermore, we conduct various robustness checks to see whether the results hold under different circumstances like a different time-period or a different sample of countries. We find that the correlation remains positive and that the correlation between the model and dependent variable is statistically significant. This research adds its contribution to the existing literature mainly through the unique dataset constructed and the peculiar empirical methodology used. Our paper contributes to the large body of literature in three ways. First of all, we shed some light on the ambiguous link between FDI and trade where many researchers seem to collide. This paper tries to add its own contribution by using Dutch data with 190 trading partners covering a momentous time period that experienced several economic expansions and contractions. Secondly, we prove that investing in foreign economies are important for international trade. The more countries invest abroad, the more they gain through export and import. Moreover, we investigate a yet unexplored mechanism in the FDI and trade literature and provide evidence for the assumption that export risk serves as a proxy for this effect indicating that the effect is affected by the export risk of a country.

In the following chapter we present the literature and previous studies that help formulate our hypothesis and create our empirical approach. The third chapter addresses the empirical model and explains our hypothesis. Chapter 4 describes our data where the main results follow in chapter 5 together with robustness checks. Finally, we close with conclusions and some policy implications.

## **2. LITERATURE**

To conduct this empirical research where we investigate the impact of foreign direct investments on international trade, it is crucial to first begin with creating a framework that explains the main terms and the aim of the study. This chapter provides definitions of relevant concepts followed by previous studies that were carried out with a similar research focus. We will look into two main variables of this study, which are foreign direct investment and international trade, and try to find a link using control variables.

### *2.1. Foreign Direct Investment*

With the enormous rise of world trade, leading to an advanced economic integration, it is impossible not to think of trade and investment when evaluating one's economy. FDI and international trade are essential in a country's economic growth. There has been much debates on the effect of FDI on international trade followed by many studies in the literature given that it can shed some light on how globalisation affects international specialisation of countries and therefore help explain the welfare effects (Fontagne, 1999). FDI places the foundation of stable and long-lasting bonds between countries by stimulating international economic integration and ultimately enhancing economic development (OECD, 2019). These investments are accompanied by so many benefits for the home countries as well for the host countries. The interlinkages between FDI and international trade are a major component of globalisation which partly provides answer to the question on how globalisation affects the economy and its citizens (Fontagne, 1999). FDI is defined as a category of cross-border investment associated with a resident in one economy, the home country, having control or a significant degree of influence on the management of an enterprise that is resident in another economy, the host country (The World Bank, 2019). A criterion for such a direct investment relationship is having an ownership of 10 percent or more of the voting power in the invested enterprise. FDI flows can be divided into two directions. One direction is the outwards flows which refers to transactions which increases the investments in foreign enterprises like acquiring equity and reinvesting earnings, minus transactions which decreases the investments in foreign enterprises like selling equity and borrowing from the foreign enterprises. The other direction is the inwards flows which refers to transactions that increases the investment of foreign investors minus the transactions that reduce the investments of foreign investors. A lot of countries strive to attract FDI given the beliefs that international companies will facilitate economic growth. A huge amount of empirical studies shows evidence that FDI lead to net gains for both home and host countries (Desbordes et al., 2017). While developed countries continue to be the leading source of FDI, developing and transition economies have substantially risen in the past decades as a source of FDI. A question that concerns many researchers is how these flows affect the economic activity in home countries. FDI inflows seem to stimulate domestic investment while outward FDI reduces domestic investment. This could reduce domestic exports due to shifting production abroad as a consequence of investing abroad (Al-Sadig et al., 2013). Researchers came to the consensus that FDI does not have a negative influence on a country, but this was not always the case which led to a large body of empirical studies on FDI and international trade. At the end of the 60s concerns started to arise over the impact of FDI on trade flows. Reddaway (1967) and Hufbauer (1968) studied this impact

using different methodologies for respectively the United States and the United Kingdom and both came to the conclusion that FDI seem to stimulate exports. The studies also show that outward FDI do not stimulate imports. Researchers have found positive as well as negative effects of FDI on trade but most of them who study this relationship suggest that increasing FDI is associated with increasing exports (Liu & Graham, 1998). Graham (1998) explores this relationship for the home countries Taiwan and Korea including 54 host countries and finds evidence consistent with evidence of previous studies. He uses a multiplicative gravity specification

$$y = \log (\alpha x_1^{\beta_1} x_2^{\beta_2} x_3^{\beta_3} \varepsilon_3)$$

where the dependent variable ( $y$ ) is FDI or exports and the independent variables ( $x_i$ ) are GDP per capita, total population and distance from host to the home country. The outward FDI's of Taiwan and South Korea are positively related to exports but does not seem to be the case for imports.

## *2.2. Complementary and substitution effect*

Trade has grown remarkably in the past two centuries up to a point where now almost one fourth of the total global production is being exported (Ospina et al., 2014). This creates the curiosity on the link between the two pillars of the economy which led to an ongoing research on the link between FDI and trade. Until the mid-1980s empirical studies showed that international trade created direct investment but after this period the correlation appeared to be the other way around with international trade strongly being influenced by direct investments.

Many papers discuss whether there is a complementary or substitution effect between FDI's and trade flows. In case of a substitution effect, where FDI substitutes for trade, exports are replaced by domestic sales in the host countries. This could be harmful to the domestic industry of the home country by hurting production and employment. In case of a complementary effect, where FDI and trade are complements, investing in the host countries is beneficial to exports in the home country. The reason for this is that FDI decreases information costs between countries and increases trade in intermediate goods resulting in an increase in imports and exports (Hejazi and Safarian, 2001). Defining the relationship of FDI and trade solely on theoretic framework is inadequate without empirical evidence, therefore an empirical analysis is required.

Do FDI's and trade serve as complements or do they behave as substitutes? According to Amiti (2000) this question depends on the nature of FDI. It is challenging to carry out

empirical tests on this topic due to the difficulty separating FDI in the data which leads to an insufficient unified theory. There is research based on either horizontal FDI like in Markusen (1984) where one good is produced in numerous countries or vertical FDI like in Helpman (1984) where the stages of the production are done in different countries. Amiti points out that horizontal FDI's are substitutes while vertical FDI's indicate a complementary relation. His empirical work is based on a theoretical framework consisting of both vertical and horizontal FDI's depending it on various country characteristics. His data is based on trade and FDI of the United States with 25 partner countries over a period of eleven years. The results confirm previous studies and show that horizontal FDI and trade are substitutes whereas vertical FDI and trade are complements. Pontes (2005) investigates this further by relating FDI and trade to trade costs. He finds a positive relationship for high values of trade costs showing a complementary behavior. On the other hand, he finds a negative relationship for low values of trades costs displaying a substitution behavior. Kojima (1975) divides FDI into two types: trade-creating and trade-substituting. He explains that the first type generates more trade opportunities between countries and hence complements trade whereas the second type of FDI replaces foreign trade. Sun (1999) assessed the trade impact of FDI on China from both macro and micro perspectives where he eventually finds empirical evidence pointing towards a trade-creating relation which shows that FDI strongly stimulated the export growth in China. Lionel Fontagne (1999) examined the relationship between FDI and trade on three levels for 23 developed countries: the microeconomic level, macroeconomic level and the industry level. His empirical work found a complementarity effect between FDI and international trade at all the three levels. It appears that FDI stimulates the growth of export which points towards a complementarity effect. Additionally, it reveals that it's not a constant relationship. The impact of FDI on trade is influenced by many variables and keeps developing. Hejazi and Safarian (2001) investigate the complementarity between FDI and trade of the US and 51 other countries during the period 1982-1994 by using a gravity model for exports and imports:

$$\log (X_{Uit}) = \alpha + \log (T_{Uit}) \beta + D_{Ui} \delta_1 + \varepsilon_{Uit},$$

$$\log (M_{Uit}) = \alpha + \log (T_{Uit}) \beta + D_{Ui} \delta_1 + \varepsilon_{Uit}.$$

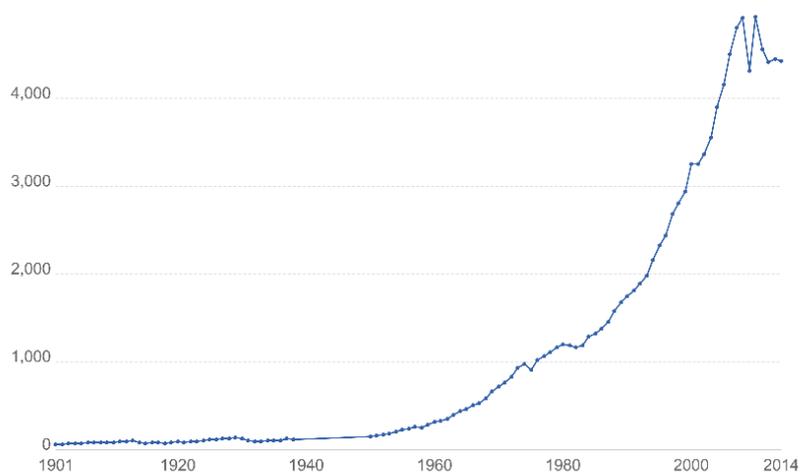
$X_{Uit}$  denote bilateral exports from the U.S. to country  $i$  in year  $t$  whereas  $M_{Uit}$  denotes the bilateral imports from country  $i$  into the U.S.  $T_{Uit}$  are transactions costs and  $D_{Ui}$  stands for regional dummy variables. Their results confirm a complementary relation between FDI and trade. Both outward and inward FDI increase trade but the impact on exports is larger

than on imports. Martinez (2013) investigates this effect within the European countries over the period 1995-2006. She did this by using three gravity models based on FDI, trade openness rate, GDP's, bilateral distance and economic size but with different approaches. This research stated a positive correlation indicating a complementary relationship between trade and FDI. She observed this effect for the intra-EU FDI and for investment coming from outside the EU.

### 2.3. International trade

One of the biggest developments in the world is the integration of the national economies which is often called as globalisation. Countries have been experiencing extraordinary growth in international trade in the past centuries up to a point where exports now are 40 times the amount of the export it was in 1913 (Ortiz and Beltekian, 2014).

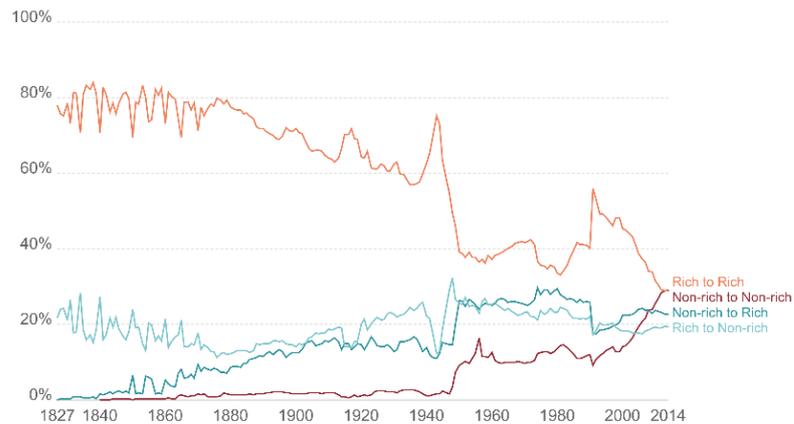
**Figure 1.** The value of global exports from 1900-2014 (values correspond to world export volumes indexed at 1913=100)



Source: Federico and Tena-Junguito (2016), OurWorldInData

Besides exporting final products, countries started to export intermediate inputs with a rapid speed. There are many factors that enhanced this growth such as competition, economies of scale, learning and innovation. Countries have been trading in goods since millennia while trade in services did not start too long ago. Trade in services now form a significant part of international trade. In some countries for example the Bahamas, nearly hundred percent of their trade consists of trade in services. Nevertheless, countries trade for the biggest part in goods. Decades ago, mainly rich countries use to participate in international trade but that has changed to where trade between non-rich countries now play a significant role.

**Figure 2.** The share of global exports by income level of trade partners of 1900-2014

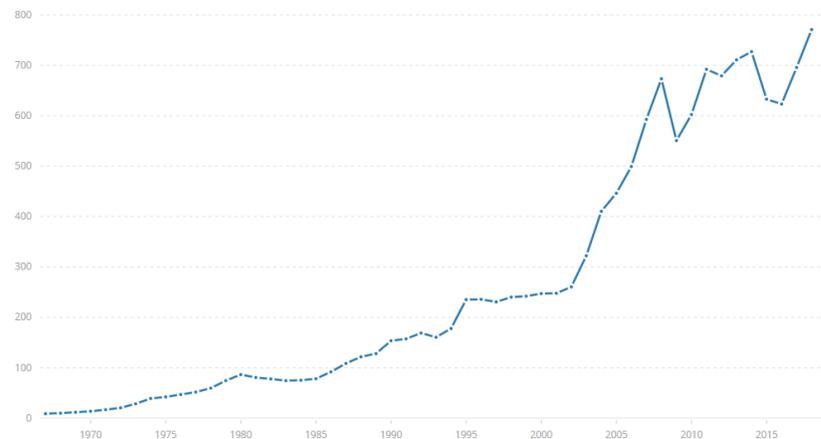


Source: Fouquin and Hugot (2016), CEPII

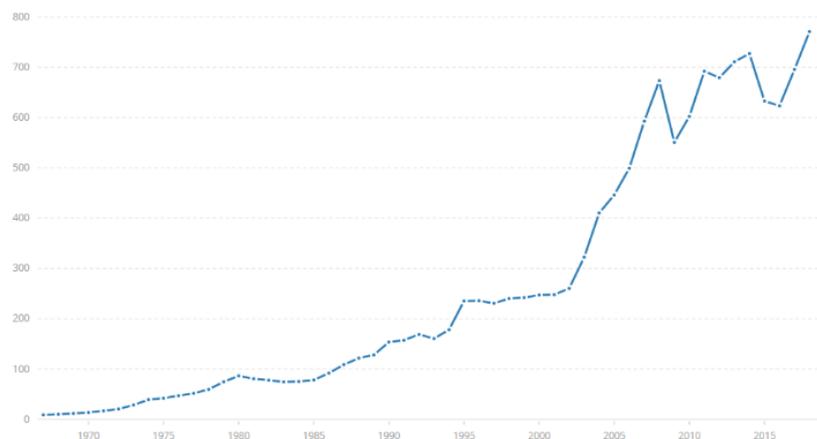
One of the most important reason why countries decide to trade is because of comparative advantage. A country has a comparative advantage when they can produce a certain good at a much lower opportunity costs compared to another country. Opportunity costs are the costs of the next best alternative you give up with the intention of producing one certain good. A country that is faster and better in producing multiple products have a high opportunity costs when they decide to invest their time in one product and start to specialize in what they do best to be more efficient. When a country opens up to trade, it impacts everyone in the economy from consumers to workers even in the non-traded sectors. Trade can have both negative and positive effects. And for that reason, exploring variables that influence international trade is of the utmost importance.

The Netherlands is one of the top ten biggest exporting and importing countries in the world. The Netherlands have always been very open to trade with foreign countries. Almost one third of the Dutch income is earned from export of goods and services (CBS, 2019). Nearly 80% of the Netherlands' GDP was generated by their exports which makes it clear that trade with foreign countries is very importance to the Dutch economy. The value of the exported goods in 2017 were around \$533 billion dollars (WITS, 2018). Besides massive exporting, the Netherlands also import great amount of goods. In 2017 they imported goods worth of \$499 billion dollars which makes the Netherlands one of the largest import country worldwide (WITS, 2019). These values have been rapidly increasing since the end of WWII and it's expected to continue increasing as we enter in a more globalized world.

**Figure 3.** The value of Dutch imports in billions of American dollars during the period 1970-2017.



**Figure 4.** The value of Dutch exports in billions of American dollars during the period 1970-2017.



**Source:** The World Bank database (2019).

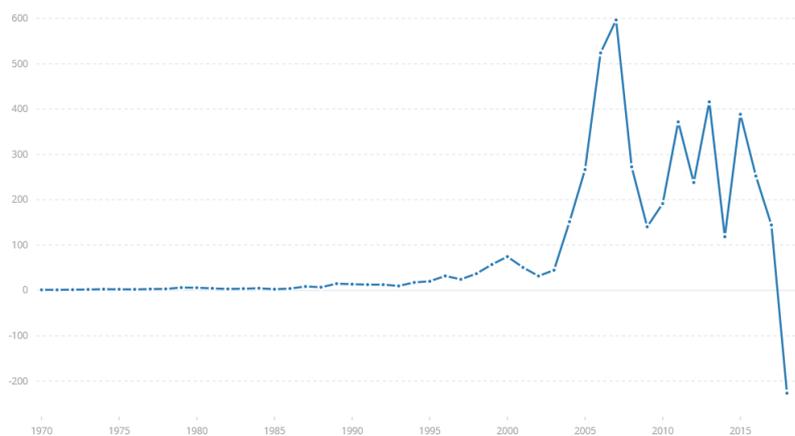
Besides being a huge export and import country, the Netherlands is also doing very well in investing abroad. This country belongs to one of the most receiving (inflow) but also investing (outflow) country in the world. They had an FDI inflow of \$96 billion dollar in 2017 and an outflow of \$144 billion dollars (The World Bank Data, 2019). It is also in the ten most receiving FDI countries with a FDI inflow of \$96 billion dollars in 2017. Doing business in the Netherlands is very attractive due to several reasons. The government invest regularly in innovation, research and growth (Netherlands Foreign Investment Agency, 2019). They have a liberal investment policy and are also very open to foreign investors. Furthermore, they have an excellent digital infrastructure and physical infrastructure.

Dutch people speak fluently English as well which makes it easier for investors to communicate.

**Figure 5.** The value of Dutch FDI inflows in billions of American dollars during the period 1970-2017.



**Figure 6.** The value of Dutch FDI outflows in billions of American dollars during the period 1970-2017.



**Source:** The World Bank database (2019).

It is very interesting to study such a tiny country with such massive financial transactions. Even with the small size of the internal market, the Netherlands is very competitive and perform exceptionally on the world market.

### 3. METHODOLOGY

This research is based on a gravity model which is a model used to predict trade patterns based on economic sizes (often the GDP) and distance. Jan Tinbergen (1962) came to the discovery that by using Newton's universal law of gravitation he could explain patterns of bilateral aggregate trade flows between two countries as positively correlated to the GDP of those countries and negatively correlated to the distance between them. The very first gravity equation looked as follow:

$$T_{A,B} \propto \frac{(GDP_A)^\alpha (GDP_B)^\beta}{(Dist_{AB})^\zeta}$$

with  $\alpha, \beta$  and  $\zeta \approx 1$ . It is empirically proven that trade decreases with distance and that this is not caused by other factors, but that distance strongly forms a barrier to trade (Eaton et al., 2002). Until recent times the gravity model was regarded as an equation lacking theoretical foundation (Martinez, 2012). Now the equation has been extensively used in empirical analysis's with successful results. It has been acknowledged as one of the most stable and robust empirical equation in the world of economics (Chaney, 2018).

This paper investigates the link between FDI and international trade by carrying out an OLS regression using a panel data from the period 2000-2017 containing bilateral trade flows and gravity variables in order to determine whether FDI has a significant impact on the relationship. We hereby use the Netherlands representing the home country while the 190 trading partners represent the host countries. We will be testing the following hypothesis:

*"An increase in the FDI flows has a positive impact on the international trade between the Netherlands and 190 trading partners during the period 2000-2017."*

This leads to our main specifications:

$$EX_{ijt} = \alpha + \beta FDI_{ijt-1} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt},$$

$$IM_{ijt} = \alpha + \beta FDI_{ijt-1} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt},$$

Where  $EX_{ijt}$  (dependent variable) stands for exports of country  $i$  from country  $j$  in year  $t$  and  $IM_{ijt}$  for imports.  $FDI_{ijt-1}$  represents the FDI invested by country  $i$  (home country) and received by country  $j$  (host country) in year  $t-1$ .  $GV'_{it}\delta_1$  measures the gravity variables GDP per capita and population of country  $i$  in year  $t$ .  $GV'_{jt}\delta_2$  measures the GDP per capita and population of country  $j$  in year  $t$ .  $GC'_{ij}\gamma$  stands for constant variables which do not change over time meaning they are time-invariant variables country-pair gravity variables. This estimation includes several time-invariant dummy variables such as the distance between home and host country, an indicator for being an EU country, sharing a common language and having a colonial past.  $E_{ijt}$  captures the error term. We assume that being in the EU together with the Netherlands, sharing a common spoken language and having a colonial past with the Netherlands generates increases in the trade flows between home and host country due to better communication and access to information. The results of the empirical analysis will reveal whether the variables are positively or negatively correlated with trade flows and whether their impact is significant. We implement the Poisson Pseudo-Maximum Likelihood model (PPML) revised by Santos Silva and Tenreyro (2011) which is an alternative gravity model that we carry out on top of the OLS model. They consider the PPML to be a successful workhorse in estimating gravity equations. The model performs overall good even in samples with many zeros which makes this estimation significant in this research as the dataset contains a considerably proportion of zeros. Zero values are normally dropped from an OLS model however a PPML model includes these observations which makes the Poisson estimator very desirable in gravity models (Shepherd, 2013). The estimator remains stable even accompanied by fixed effects which maximum likelihood estimators usually do not hold.

To dig a little bit deeper, we also look at a possible channel through which FDI impacts international trade. We follow Caballero et al. (2018) and examine whether export risk is one of the mechanisms that drives the results to our first hypothesis by using indexes to proxy for export risk. We assume export risk to be one the important channels that greatly encourages the positive correlation between the two variables. From this assumption we want to test the following hypothesis:

*“ Export risk serves an important driver in the mechanism between the Dutch FDI and the international trade to 190 trading partners in the period 2000-2017 .”*

After testing whether the first hypothesis is accepted or not, an interaction term will be added to the regression. The interaction term  $\beta_2 R_{it} FDI_{ijt-1}$  and  $\beta_3 R_{jt} FDI_{ijt-1}$  consists of FDI's and an export risk factor which will predict the link between FDI's, trade and export risk.

Additionally, we estimate the direct effect by adding the indexes separately representing  $\beta_4 R_{it}$  en  $\beta_5 R_{jt}$ . We use two indicators to proxy for export risk which are the political stability index and the economic globalisation index. The indexes show a higher value for countries with a lower export risk. We expect both coefficients to be positive as a riskier country is less attractive to investors and to traders. The following estimation will add the interaction term that will proxy for export risk and show if the positive correlation stimulated by a lower risk of exporting.

$$EX_{ijt} = \alpha_{ij} + \alpha_{it} + \alpha_{jt} + \beta_1 FDI_{ijt-1} + \beta_2 R_{it} FDI_{ijt-1} + \beta_3 R_{jt} FDI_{ijt-1} + \beta_4 R_{it} + \beta_5 R_{jt} + \varepsilon_{ijt},$$

$$IM_{ijt} = \alpha_{ij} + \alpha_{it} + \alpha_{jt} + \beta_1 FDI_{ijt-1} + \beta_2 R_{it} FDI_{ijt-1} + \beta_3 R_{jt} FDI_{ijt-1} + \beta_4 R_{it} + \beta_5 R_{jt} + \varepsilon_{ijt},$$

where the dependent variable remains unchanged.  $\alpha_{ij}$ ,  $\alpha_{it}$  and  $\alpha_{jt}$  are constant terms for respectively country i, country j and country-pairs in year t.  $FDI_{ijt-1}$  stands for the FDI invested by country i and received by country j on year t-1.  $R_{it}$  and  $R_{jt}$  represents a proxy for export risk of country i and country j in year t.  $\varepsilon_{ijt}$  is the error term. We expect the coefficients  $\beta_1$  and  $\beta_3$  to be positive, but we expect  $\beta_2$  to be zero as the risk of exporting to country i should have no impact on exports from country i to j. Including this measure serves as a placebo test as well. If  $\beta_2$  appears to be positive and significant, it could imply a spurious correlation between FDI's enlarged by risk measures and trade.

We further conduct several robustness tests to question the behaviour of regression coefficient estimates when modifying the regression specification. These tests are described and carried out later in the paper.

#### 4. DATA AND SAMPLE

In order to test the hypotheses, we gathered data on international trade flows, foreign direct investments and use proxies for export risk. We added data on GDP and population obtained from the World Bank database to our gravity model to control for country-level variables. We followed the gravity model of Head and Mayer (2013) and added standard used gravity variable like distance, common language and colonial past obtained from the CEPII Database. The total dataset contains 3420 observations and 12 variables collected over the period 2000-2017 across 190 countries. Using different reliable sources such as OECD Statistics, WITS TradeStats, the World Bank Data and the Worldwide Governance Indicators (WGI) project we were able to extract information creating a complete dataset.

#### 4.1. International trade flows

For the empirical analysis we collected yearly data on the Dutch international trade which includes exports and imports. We use reported exports flowing from the Netherlands (country i) to foreign countries (country j) and reported imports flowing from foreign countries into the Netherlands, as an estimate for the dependent variable. This data is obtained from UN-COMTRADE Database and spans over a period of 18 years with a sample of 190 countries covering almost every country in the world. The values are reported in U.S. dollars and contain missing values as well. Out of the 6840 observations there are 64 missing values which is 0.9% of all observations. We assume that the missing values will not significantly impact the results since it is a relatively small number. The trade flows detect no zero value which shows how big of a trader the Netherlands is in the world economy. Before running any regressions, we apply the log-transformation to avoid a skewed distribution of the data. Table 1 consists the 190 countries used for the data sample in this research.

**Table 1.** List of countries in research sample.

Afghanistan	Colombia	Indonesia	Montenegro	Singapore
Albania	Comoros	Iran	Morocco	Slovakia
Algeria	Costa Rica	Iraq	Mozambique	Slovenia
Andorra	Croatia	Ireland	Myanmar	Solomon Islands
Angola	Cuba	Israel	Namibia	Somalia
Antigua	Cyprus	Italy	Nepal	South Africa
Argentina	Czech Republic	Ivory Coast	New Zealand	South Korea
Armenia	Dem. Rep. Congo	Jamaica	Nicaragua	Spain
Aruba	Denmark	Japan	Niger	Sri Lanka
Australia	Djibouti	Jordan	Nigeria	Sudan
Austria	Dominica	Kazakhstan	North Korea	Suriname
Azerbaijan	Dominican Republic	Kenya	Norway	Swaziland
Bahamas	Ecuador	Kuwait	Oman	Sweden
Bahrein	Egypt	Kyrgyzstan	Pakistan	Switzerland
Bangladesh	El Salvador	Laos	Palestine	Syria
Barbados	Equatorial Guinea	Latvia	Panama	Taiwan
Belarus	Estonia	Lebanon	Papua New Guinea	Tajikistan
Belgium	Ethiopia	Lesotho	Paraguay	Tanzania
Belize	Fiji	Liberia	Peru	Thailand
Benin	Finland	Libya	Philippines	Togo
Bermuda	France	Liechtenstein	Poland	Trinidad& Tobago
Bhutan	Gabon	Lithuania	Portugal	Tunisia
Bolivia	Gambia	Luxembourg	Puerto Rico	Turkey
Bosnia& Herzegovina	Georgia	Macao	Qatar	Turkmenistan
Botswana	Germany	Macedonia	Republic of Congo	Tuvalu
Brazil	Ghana	Madagascar	Romania	Uganda
British Virgin Islands	Greece	Malawi	Russia	Ukraine
Brunei	Grenada	Malaysia	Rwanda	United Arab Emirates
Bulgaria	Guatemala	Maldives	Saint Lucia	United Kingdom
Burundi	Guinea	Mali	Saint Vincent& Grenadines	United States

Cambodia	Guinea-Bissou	Malta	Samoa	Uruguay
Cameroon	Guyana	Mauritania	San Marino	Uzbekistan
Canada	Haiti	Mauritius	Sao Tome& Principe	Vanuatu
Cape Verde	Honduras	Mexico	Saudi Arabia	Venezuela
Cayman Islands	Hong Kong	Micronesia	Senegal	Vietnam
Central African Republic	Hungary	Moldova	Serbia	Yemen
Chile	Iceland	Monaco	Seychelles	Zambia
China	India	Mongolia	Sierra Leone	Zimbabwe

#### 4.2. Foreign direct investment flows

We collected annual country-level data on foreign direct investments of the Netherlands from the database of OECD Statistics. This measurement is in U.S. dollars and contains many missing values which are non-publishable and non-confidential values according to the source. Around 30% of all FDI flows are missing values while 17% of the observations are zero values meaning that there was no investment between the countries. The FDI flows are split in two directions: inward FDI and outward FDI. Inward FDI are investments that foreign countries make in the Netherlands and outward FDI are investments that Dutch investors make in foreign countries. This data also covers 190 countries during the period 2000-2017 where the FDI statistics are divided according to Benchmark Definition 3<sup>rd</sup> Edition (BMD3) and Benchmark Definition 4<sup>th</sup> Edition (BMD4). The OECD's Revised Benchmark Definition of FDI aims to provide better data for better policy. It gives insight in more detailed and more meaningful FDI statistics. The third edition goes up to the year 2012 whereas the fourth edition start from the year 2013, hereby displaying two different datasets. We combined both to one dataset and applied a logarithm transformation to the data. We take the first lag of this variable to measure the effect of FDI made in the year  $t-1$  on exports in year  $t$ .

#### 4.3. Export risk

The two proxies for export risk are general country risk measures. They are formed by using two indicators downloaded from the Worldwide Governance Indicators. The first indicator is the political stability index which captures different angles of the possibility that the government will be weakened or overpowered by illegal or vicious means, involving politically driven violence. This index ranges between -2.5 for weak political stability and 2.5 for strong political index so higher values indicate lower risk. We assume that if an economy has a weak political stability, it will become riskier to invest in that country so more likely to have less FDI flows and lower exports.

The second indicator is the economic globalization index ranging between 0 and 100. This indicator is divided by two sections: current economic flows and constraint to trade and

capital. The former index represents economic flows including data on trade, FDI and portfolio investment. The latter index takes import barriers, tariff rates, taxes on international trade and index of capital controls into account. Kaufmann et al. (2010) explains that perceptions data are valuable in the measurement of governance. Perceptions are of great importance to enterprises since it is the duty of the government to control the economy of a country, their choices are based on their perceptions and their image. They choose to invest or to trade according to their observed perspective of the investment climate and the government's performance. If enterprises observe a poor investment climate and a poor government's performance which causes a low ranking, this will eventually lead to lower FDI and international trade. We assume the indicators to be correlated with the FDI and international trade relation. By inserting the data in the baseline regression we hope to find clear results on whether political stability and economic globalization have an impact on the baseline results and in what direction they impact the results. Both indicators provided annual data from the period 2000-2017 over 190 countries extracted from the WGI.

## **5. RESULTS**

After setting up our theoretical framework, comparing previous studies, estimating our empirical model and gathering data we finally start running our regression. We begin with testing our first hypothesis through estimating our baseline regression where we end up with two table results one for export flows and one for import flows. Next, the export risk is implemented and tested for any correlation where the results are also presented in this section. Some robustness checks are performed afterwards to check if the results hold under different circumstances.

### *5.1. Baseline results*

Table 1 presents our baseline results, where we test whether increased FDI flows formed during year  $t-1$  affect exports in year  $t$ . In column 1 we regress exports on FDI where we find a positive correlation between FDI flows and international trade. In the second column we added the gravity variables GDP and population which represent the market size of both countries. The estimates diminish a bit but remain positive for all the variables. Next, the constant variables are added to the model presenting the estimates in the third column. Considering that we used logged variables in our regressions, it is easier to interpret the magnitudes of the coefficients. The results reveal that for every unit increase in FDI in the current year, there is a 0.0209 unit increase in exports in the following year which is in line

with our expectation. However, this estimate is not statistically significant. We can further see that distance has a negative correlation which means that the bigger the distance between country  $i$  and  $j$ , the less they trade. We can also observe a negative estimate for the colonial past which indicates that host countries with a colonial past lower the effect of FDI on trade. The variables GDP per capita, population, EU and language share a positive correlation with exports. In other words, a higher GDP, a larger population, being a part of the EU and having a common language are all factors which increases the trade between country  $i$  and country  $j$ . We also test for any specification problems in order to deal with zero values and heteroskedasticity by estimating an alternative gravity model: the Poisson pseudo-maximum-likelihood model. The results are in column 4 and includes all gravity regressors where we observe a smaller but still positive effect. The F-tests show that the results are statistically significant for all five models which indicates that the effect of FDI on trade is positive and significant. The F-test provides an indication whether the regression model gives a better fit to the data and hereby matches our first hypothesis.

In 2008 the Dutch economy was hit by a financial crisis which impacted the economy enormous. This could lead to a bias in the results; therefore, we included time fixed effects. To capture the influence of aggregate time series trends such as globalisation trends we also control for time fixed effects. Globalisation trends can cause a rise in the estimates while a crisis can cause a decline in the estimates. To account for time-invariant country characteristics that are not captured by the current measures such culture and history, we control for country fixed effects. Columns 1-4 include time fixed effects whereas column 5 does not. When controlling for the fixed effects the estimates get larger indicating a larger effect. By adding fixed effects in the model, we greatly reduce the threat of omitted variable bias. After including fixed effects with six independent variables the correlation of FDI and trade continue to be positive and statistically significant.

**Table 2.** Gravity model regressions for Dutch exports and FDI during the period 2000-2017

	(1)	(2)	(3)	(4)	(5)
Independent variables					
FDI <sub>ijt-1</sub>	0.0228 (0.0167)	0.0209 (0.0170)	0.0209 (0.0170)	0.00292 (0.00661)	0.00367 (0.0130)
GDP per capita		0.0411 (0.147)	0.0411 (0.147)	0.00605 (0.0574)	0.0458* (0.0247)
Population		0.585 (0.374)	0.585 (0.374)	0.0825 (0.146)	-0.0118 (0.0171)
Distance			-0.327 (0.432)	-0.0460 (0.165)	0.00299 (0.0225)
European Union			1.584 (1.643)	0.222 (0.622)	0.0122 (0.0940)
Language			4.028 (2.506)	0.569 (0.976)	-0.191 (0.226)
Colonial past			-2.256* (1.335)	-0.316 (0.520)	0.0567 (0.103)
Constant	7.684*** (0.699)	5.500*** (1.692)	6.482** (2.651)	1.867* (1.017)	6.715*** (0.224)
Fixed effect	Yes	Yes	Yes	Yes	No
Observations	1,263	1,259	1,259	1,259	1,259
R-squared	0.207	0.208	0.208		0.007

Dependent variable is the log of EX<sub>ijt</sub>. Column 3 includes all measures and fixed effects and used OLS regressions. Column 4 used Poisson pseudo-maximum-likelihood model including fixed effects. Column 5 excluded fixed effects in the OLS regression. Robust standard errors are in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 2 presents our baseline results, where we test whether increased FDI flows formed during year t-1 affect imports in year t. First, we regress Dutch imports on FDI flows where the results are shown in column 1 from which we can observe a negative correlation suggesting that increasing FDI is followed by decreasing imports. By adding the gravity variables to the model, the estimate slightly decreases but remains negative in the second column. Even with the dummy variables we observe a negative correlation between FDI and imports. For every unit increased of FDI, the imports decrease with 0.0289 points. However, this estimate is not statistically significant. Yet the F-test shows that the overall model is statistically significant and supports our hypothesis. Further there seems to be a negative influence of population, distance and common language on the correlation. With other words, bigger population, larger distance and speaking a common language seem to diminish the effect whereas GDP, EU and colonial past encourages the negative correlation. We can conclude from this that FDI does not have the same impact on exports to country j as it does on imports from country j (exports to country i). Dutch investments in foreign countries stimulates exports to foreign countries, but investments in the Netherlands do not increase the Dutch imports. The reason behind this could be the big difference between the Dutch outward FDI flows and inward FDI flows. The Netherlands invest way more making

them one of the world's largest source of FDI than foreign countries invest in the Netherlands (OECD, 2017). Another reason could lay in the sector the inward investments are being invested. A high share of its inward investment is going to the services sector which mainly contains Dutch exports. In this way the exports are being stimulated by the inward investments which again enhance the correlation between FDI and exports.

As mentioned before, the financial crisis of 2008 could have impacted the imports which is not observed in the model. To account for possible impacts on the results we include time fixed effects in columns 1-3. The Dutch imports can also be influenced by country characteristics like cultural and historical ties. For these possible impacts we include country fixed effects. Including fixed effects definitely had an impact on the outcome as the estimate is doubled after controlling for fixed effects.

**Table 3.** Gravity model regressions for Dutch imports and FDI during the period 2000-2017

	(1)	(2)	(3)	(4)	(5)
<b>Independent variables</b>					
FDI <sub>ijt-1</sub>	-0.0290 (0.0212)	-0.0289 (0.0212)	-0.0289 (0.0212)	-0.00402 (0.00926)	-0.0146 (0.0152)
GDP per capita		0.214 (0.149)	0.214 (0.149)	0.0309 (0.0648)	0.0301 (0.0334)
Population		-1.619*** (0.417)	-1.619*** (0.417)	-0.236 (0.185)	0.00965 (0.0190)
Distance			-0.226 (0.511)	-0.0382 (0.226)	-0.00383 (0.0238)
European Union			0.158 (1.943)	0.0115 (0.862)	0.0134 (0.0955)
Language			-9.944*** (2.743)	-1.447 (1.213)	0.263 (0.184)
Colonial past			3.587** (1.484)	0.525 (0.651)	-0.0372 (0.110)
Constant	6.664*** (0.885)	10.97*** (1.903)	11.65*** (3.127)	2.641* (1.383)	6.892*** (0.308)
Fixed effects	Yes	Yes	Yes	Yes	No
Observations	994	987	987	987	987
R-squared	0.273	0.292	0.292		0.003

Dependent variable is the log of IM<sub>ijt</sub>. Column 3 includes all measures and fixed effects and used OLS regressions. Column 4 used Poisson pseudo-maximum-likelihood model including fixed effects. Column 5 excluded fixed effects in the OLS regression. Robust standard errors are in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

We assumed that FDI flows formed between the Netherlands and 190 other countries in year t only impact trade in year t+1. However, there is a possibility that this effect could last longer. If this is the case, our baseline results might be suffering from omitted variable bias. We empirically test how long the effect on trade persists after an investment has been made. We approach this by adding a lag to the variable FDI<sub>ijt-1</sub>

$$EX_{ijt} = \alpha + \beta FDI_{ijt-1} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt}$$

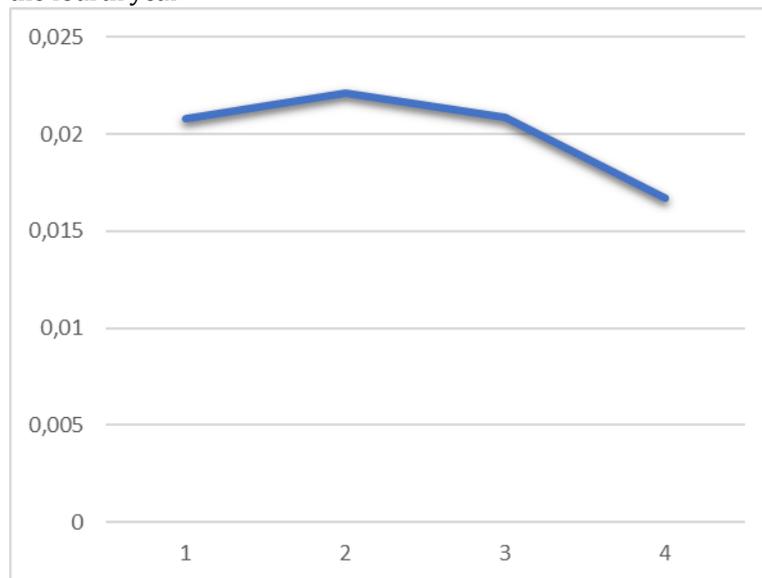
$$EX_{ijt} = \alpha + \beta FDI_{ijt-2} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt}$$

$$EX_{ijt} = \alpha + \beta FDI_{ijt-3} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt}$$

$$EX_{ijt} = \alpha + \beta FDI_{ijt-4} + GV'_{it}\delta_1 + GV'_{jt}\delta_2 + GC'_{ij}\gamma + \varepsilon_{ijt}$$

and observe the change in estimates. Figure 1 shows the fluctuations of the coefficient  $FDI_{ijt-1}$  up to 4 lags. The table of the estimates with the results of each lag are to find in the Appendix. We already observed a positive coefficient in the first lagged regression model but adding a lag to the model seem to boost the impact. We observe a larger effect for year  $t-2$  compared to  $t-1$  which indicates that FDI flows impacts the exports even more in the second year after the investment. While the effect increases from 0.0209 to 0.0221 and remains statistically in the F-test, it enlightens us on the duration of the effect. Computing the model for 3 lags results in a decrease and the coefficient continues to drop for  $FDI_{ijt-4}$  which tells us that the effect starts to wear off after the fourth year. These results slightly change the interpretation of the baseline results. We expected the effect of FDI on trade to only impact the following year without considering the years after which influences our interpretation of the magnitude of the effect. On the one hand, we create an upward bias in the coefficient  $FDI_{ijt-1}$  when lagging it multiple times and hereby overestimating the impact effect. On the other hand, we under-estimate the total impact by letting FDI only affect export in the year after the investment if we do not take persistent effects into account. Therefore, it is essential to explore the duration and the magnitude of the effect to be able to interpret our results more precisely.

**Figure 7.** The magnitude of the effect of FDI on trade with lags up to the fourth year



## 5.2. Export risk mechanism

In this paragraph, we test whether the mechanism through which FDI's affect trade is related to export risk and control the validation of our second hypothesis. We use two widely used country measures: the political stability index and the economic globalisation index. These measures do not directly represent export risk but they do reflect the stability and trustworthiness of a country so we can expect them to be positively correlated with export risk. We examine how the effect of FDI's on trade reacts to an improvement of export risk. If our hypothesis is true, the effect of FDI's will fluctuate with the export risk of country  $j$ . The results are reported in columns (1) and (2) of table 3 for political stability index and economic globalization index, respectively. For each one-point increase in FDI, exports increase by 0.014 points. The results indicate that a lower risk of country  $j$  is correlated with a higher trade in exports. F-tests show that these results are statistically significant which brings us to the conclusion that our results are in line with our hypothesis. This means that if FDI's help mitigate export risk, the impact on exports to higher risk countries will be larger. This is in accordance with the mechanism we presented: FDI's supports trade growth by representing lower export risk. In a country with a high FDI reported, is likely to have lower export risk resulting in higher exports. However, this is not evidence for the effect of FDI on trade being causal.

**Table 4.** Gravity model regressions for Dutch trade and FDI with risk measures

Risk measures (R)	(1) Political stability index	(2) Economic globalisation index
FDI <sub>ijt-1</sub>	0.0146 (0.0245)	0.0335 (0.3285)
R <sub>jt</sub> FDI <sub>ijt-1</sub>	0.00008 (0.0001)	0.00002 (0.00002)
R <sub>it</sub> FDI <sub>ijt-1</sub>	0.0904 (0.0886)	0.01017 (0.022)
Constant	7.802*** (0.699)	8.403*** (0.728)
Observations	1,263	1,257
R-squared	0.208	0.208

Dependent variable is the log of EX<sub>ijt</sub>. Column 1 displays the results with the political stability index as risk measure. Column 2 displays the results with the economic globalisation index as risk measure. Fixed effects included in all regressions. Robust standard errors are in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

### 5.3. Robustness test

To ensure the results hold under different assumptions we perform a few robustness checks. The robustness tests will analyze the model uncertainty by comparing our baseline model to rational alternative model specifications (Neumayer & Plumber, 2018). At the same time the tests will show how sensitive the estimated effects are to changes in the model specifications.

**Table 5.** Gravity model regressions for Dutch exports and FDI during the period 2000-2017 testing for reverse causality.

Independent variables	(1)	(2)	(3)	(4)	(5)
EX <sub>ijt-1</sub>	0.00980 (0.0160)	0.0112 (0.0162)	0.0112 (0.0162)	0.00158 (0.00644)	-0.00912 (0.0125)
GDP per capita		0.104 (0.149)	0.104 (0.149)	0.0147 (0.0595)	0.0451* (0.0240)
Population		0.0494 (0.378)	0.0494 (0.378)	0.00668 (0.149)	-0.0135 (0.0167)
Distance			0.0856 (0.371)	0.0127 (0.151)	0.00533 (0.0222)
European Union			0.406 (1.424)	0.0596 (0.578)	0.0626 (0.0933)
Language			0.394 (2.519)	0.0523 (0.998)	0.321 (0.223)
Colonial past			-0.635 (1.319)	-0.0879 (0.524)	0.113 (0.103)
Constant	6.645*** (0.561)	5.912*** (1.649)	5.655** (2.431)	1.754* (0.975)	6.775*** (0.218)
Fixed effects	Yes	Yes	Yes	Yes	No
Observations	1,247	1,243	1,243	1,243	1,243
R-squared	0.224	0.226	0.226		0.011

Dependent variable is the log of FDI<sub>ijt</sub>. Column 3 includes all measures and fixed effects and used OLS regressions. Column 4 used Poisson pseudo-maximum-likelihood model including fixed effects. Column 5 excluded fixed effects in the OLS regression. Robust standard errors are in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Our baseline result could be threatened by unobserved determinants leading to reverse causality. This could lead to an incorrect causal interpretation of the results meaning that FDI does not affect exports but the other way around. Since earlier empirical work has shown that international trade generates direct investment, it is essential to investigate this concern (Fontagne, 1999). To evaluate the possibility for reverse causality, we estimated a regression of new FDI's on lagged exports. The regression assesses the theory that increasing exports establishes more FDI's. Table 5 presents the estimates in case we use lagged exports instead of lagged FDI's. We hereby exchange the role of the dependent and independent variable. This shows how exports in the previous year affects the investments in current year. We find that the effect is positive and the overall model is statistically

significant, but that the estimates are twice smaller than the effect of FDI on trade in our baseline regression. This indicates that it is unlikely for reverse causality to justify for all of the results even though it remains a valid concern.

We perform another test to further lessen concerns about the existence of endogeneity triggered by reverse causality. We investigate whether FDI's made by companies in country *i* investing in country *j* affect exports from country *j* to country *i*, with other words we examine the link between FDI outward flows and export and find a smaller effect which is also statistically significant as presented in table 6. This provides a placebo test for our research to verify if the effect is driven by spurious connection between investment and trade flows causing the effect to show up in the reverse direction. To make sure we are not dealing with a spurious relationship we perform an Augmented Dickey-Fuller test where we test for stationarity. The test revealed that the regression is stationary hereby concluding that the relationship is not spurious. We cannot completely rule out the endogeneity concern driven by reverse causality; however, we can provide evidence for the role that FDI's have on international trade.

**Table 6.** Gravity model regressions for Dutch imports and FDI outward flows during the period 2000-2017 testing for spurious relationship.

	(1)	(2)	(3)	(4)	(5)
<b>Independent variables</b>					
FDI <sub>ijt-1</sub>	-0.00895 (0.0155)	-0.00287 (0.0158)	-0.00287 (0.0158)	-0.000391 (0.00662)	0.00543 (0.0125)
GDP per capita		-0.0718 (0.136)	-0.0718 (0.136)	-0.00992 (0.0574)	0.0108 (0.0237)
Population		-0.673* (0.347)	-0.673* (0.347)	-0.0962 (0.148)	0.00147 (0.0165)
Distance			-0.142 (0.401)	-0.0213 (0.168)	-0.00622 (0.0216)
European Union			0.448 (1.524)	0.0604 (0.639)	0.0229 (0.0904)
Language			-4.292* (2.325)	-0.615 (0.987)	0.350 (0.217)
Colonial past			2.273* (1.239)	0.323 (0.523)	0.0142 (0.0988)
Constant	6.998*** (0.649)	9.627*** (1.570)	10.05*** (2.460)	2.384** (1.038)	7.009*** (0.215)
Fixed effects	Yes	Yes	Yes	Yes	No
Observations	1,263	1,259	1,259	1,259	1,259
R-squared	0.258	0.262	0.262		0.004

Dependent variable is the log of  $IM_{ijt-1}$ . Column 3 includes all measures and fixed effects and used OLS regressions. Column 4 used Poisson pseudo-maximum-likelihood model including fixed effects. Column 5 excluded fixed effects in the OLS regression. Robust standard errors are in parentheses: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

We continue by conducting a robustness test on our benchmark specification which approaches concerns about influential observations. Our sample period 2000 till 2017 has one very important influential time period which is the global financial crisis which began in the year 2007. This crisis hit many countries all over the world causing a severe worldwide economic crisis. Economists have not encountered such a serious financial crisis since the Great Depression of the 1930s. Amongst the many aspects that were impacted, the global stock market and international trade were tremendously affected. To ensure that this incident did not create a bias in our results, we run our empirical analysis for the years 2000 to 2007. The effect remains positive and statistically significant, but we find that the effect of FDI on trade is quite smaller than in the benchmark as we can see in table 7.

**Table 7.** Gravity model regressions for Dutch exports and FDI during the period 2000-2017 testing for influential observations.

Independent variables	(1) Year < 2008	(2) No China	(3) No USA	(4) No Islands
FDI <sub>ijt-1</sub>	0.0148 (0.0424)	0.0150 (0.0169)	0.0219 (0.0171)	0.0226 (0.0171)
GDP per capita	0.526* (0.317)	0.101 (0.149)	0.0576 (0.148)	0.0226 (0.149)
Population	-3.465** (1.483)	0.592 (0.370)	0.595 (0.375)	0.570 (0.374)
Distance	1.756*** (0.567)	-0.352 (0.428)	-0.331 (0.433)	-0.320 (0.430)
European Union	11.44** (4.771)	-1.890 (1.633)	-1.678 (1.647)	-1.066 (1.814)
Language	-20.84** (9.695)	4.168* (2.479)	-0.274 (0.746)	3.909 (2.503)
Colonial past	10.85* (5.654)	-2.506* (1.325)	2.048* (1.192)	-2.147 (1.341)
Constant	2.948 (3.101)	6.259** (2.624)	6.358** (2.657)	6.608** (2.647)
Fixed effects	Yes	Yes	Yes	Yes
Observations	580	1,246	1,247	1,230
R-squared	0.307	0.210	0.209	0.213

Dependent variable is the log of EX<sub>ijt-1</sub>. The four columns include all of the measures and fixed effects using OLS regressions. Column 1 has the sample period 2000-2007. Column 2 does not include the country China in the regression. Column 3 excludes the country USA from the sample. Column 4 excludes the Caymans Islands, British Virgin Islands and the Bermuda from the analysis. Robust standard errors are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Besides the crisis, we also have influential countries in our sample. China for example, had a colossal growth in their trade during our period sample which led to China becoming one of the most powerful countries in the international trade. The United States of America is the world's most dominant economic and military power and therefore called the world's largest economy with the highest GDP of all countries

(<https://worldpopulationreview.com/countries/most-powerful-countries/>). The Caymans Islands, British Virgin Islands and Bermuda are particular popular offshore financial centers holding more than thousand times the value of what their economy should hold enabling their position as a strong contributor to the global economy and facilitator of international trade and investment (Garcia et al., 2017). We drop these countries separately from our benchmark sample and explore the impact on our results to see whether our results are driven by one of these countries. However, we detect no significant change in our estimates bringing us to the conclusion that our results are not driven by one of the influential countries.

## 6. CONCLUSION

Finally, we provide evidence for the assumption that when the investments between two countries intensify, the trade tends to increase in the next year by an economically and statistically significant amount. There is evidence for FDI in particular being significant in the increase of trade, but the overall model does show statistical significance when implementing the variables. This result is obtained after controlling for gravity variables as well as for fixed effects. Moreover, robustness tests show that the results hold after checking for reverse causality, spurious relationship and influential observations.

We theorize that the mechanism for this effect of FDI is linked to the role of investments in reducing export risk. We prove this by conducting a number of tests that support this theory. We cannot directly test for this using currently available data which leads us to using indexes. We utilize an interaction term in our regression with two indexes representing the export risk of a country. Because the political stability in a country can provide a good picture on how financially safe it is to invest in a country and therefore determine the level of export risk which can predict international trade flows, we inserted the political stability index. Similarly, the economic globalisation of a country can show how well regulations are in regard to foreign investment and tariff barriers to trade which in turn can inform us about the export risk. Cross-border FDI's then might induce more international trade through increasing the willingness and ability to engage in cross-border trade.

There are a few reasons for why this analysis is important: first, it investigates a yet unexplored time period for the linkage between FDI and trade; second, it explains a mechanism that facilitates a rise in the effect; third it supports the previous studies concluding a positive correlation for FDI and trade. This paper leads to economic as well as policy implications. FDI's have a complementary effect on trade which implicates that home countries investing in foreign host countries are beneficial for the home country's exports.

Meanwhile economies must try to attract FDI in order to lower the export risk and create a safe image for their trading partners. Understanding the link between the two vital features are essential in order to stimulate FDI followed by rising international trade which ultimately results in economic growth.

## 7. REFERENCES

- Al-Sadig, A. J. and International Monetary Fund. (2013). *Outward foreign direct investment and domestic investment: the case of developing countries*. Washington, D.C.: International Monetary Fund (IMF working paper, WP/13/52).
- Amiti, M., Greenaway, D. & Wakelin, K. (2000). *Foreign Direct Investment and Trade: Substitutes or Complements?*
- Anwar, S. & Nguyen, L. (2011). *Foreign direct investment and trade: The case of Vietnam*. Research in International Business and Finance, Elsevier, vol. 25, pages 39-52.
- Aizenman, J. & Noy, I. (2005). *FDI and Trade - Two Way Linkages?* Working Paper, No. 598, University of California, Economics Department.
- Berkum, S. V. (2002). *Trade and foreign direct investment patterns: the case of Dutch agribusiness*.
- Caballero, J., Candelaria, C. & Hale, G. (2018). *Bank linkages and international trade*. Journal of International Economics, Elsevier, vol. 115, pages 30-47.
- CBS. (2019). *Dutch Trade in Facts and Figures*. Statistics Netherlands.
- Chaney, T. (2018). *The gravity equation in international trade: An explanation*. Journal of Political Economy, vol. 216, no.1.
- Desbordes, R. & Wei, S. (2017). *The effects of financial development on foreign direct investment*, Journal of Development Economics, Elsevier, vol. 127(C), pages 153-168.
- Eaton, J. & Kortum, S. (2002). *Technology, Geography, and Trade*. Econometrica, 70: 1741-1779.
- Feenstra, R.C. (2004). *Advanced International Trade: Theory and Evidence*. Princeton University Press, Princeton, New Jersey.
- Fontagne, L. (1999). *Foreign Direct Investment and International Trade: Complements or Substitutes?* OECD Science, Technology and Industry Working Papers, No. 1999/03

- Garcia, J., Fichtner, J., Takes, F. & Heemskerk, E. (2017). *Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network*. Scientific Reports 7, 6246.
- Gradeva, A. J. (2013). *Inward FDI determinants: The case of the Netherlands*. Erasmus University
- Hailu, Z. (2010). *Impact of Foreign Direct Investment on Trade of African Countries*. International Journal of Economics and Finance, vol. 2, no. 3.
- Haishun, S. (1999). *Impact of FDI on the foreign trade of China*. Journal of the Asia Pacific Economy, 4:2, 317-339.
- Head, K. & Mayer, T. (2013). *Gravity equations: toolkit, cookbook, workhorse*. In: Gopinath, G., Helpman, E., Rogoff, K. (Eds.), Handbook of International Economics. vol. 4.
- Hejazi, W. & Safarian, A.E. (2001). *The complementarity between U.S. foreign direct investment stock and trade*. Atlantic Economic Journal 29, 420-437 (2001).
- Kaufmann, D., Kraay, A. & Mastruzzi, M. (2010). *The Worldwide Governance Indicators: Methodology and Analytical Issues*. World Bank Policy Research Working Paper No. 5430.
- Liu, X., Wang, C. & Wei, Y. (2001). *Causal Links between Foreign Direct Investment and Trade in China*. China Economic Review. 12. 190-202.
- Majeed, M. T. & Ahmad, E. (2007). *FDI and Exports in Developing Countries: Theory and Evidence*. The Pakistan Review Development Review, 46(4), 735-750.
- Martinez-S., Valeriano & Bengoa-Calvo, M. & Sánchez Robles, B. (2012). *Foreign Direct Investment and Trade: Complements or Substitutes? Empirical Evidence for the European Union*. Technology and Investment. 3. 105-112. 10.4236/ti.2012.32013.
- Martinez, I. (2003). *Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows*. Journal of Applied Economics. VI. 291-316.
- Netherlands Foreign Investment Agency. (2019). *Invest in Holland. Leading Location for Innovation and Growth*.
- OECD. (2017). *Netherlands: Trade and Investment Statistical Note*. International trade, foreign direct investment and global value chains.
- OECD. (2008). *OECD Benchmark Definition of Foreign Direct Investment 2008: Fourth Edition*. OECD Publishing.
- OECD. (2019). *OECD International Direct Investment Statistics*. OECD Publishing, <https://doi.org/10.1787/g2g9fb42-en>.

Ortiz, E. & Beltekian, D. (2014). *Trade and Globalization*. Our World in Data.

Pontes, J. (2006). *FDI and trade: Complements and substitutes*. Working Papers Department of Economics 2006/03, ISEG.

Santos Silva, J. & Tenreyro, S. (2011). *Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator*. *Economics Letters*, vol. 112, issue 2, pages 220-222.

Shepherd, B. (2013). *The Gravity Model of International Trade: A User Guide*. United Nations publication.

WITS. (2018). *Netherlands trade statistics*.

Xiao, J. (2008). *The Impact of Foreign Direct Investment on International Trade: An Empirical Study of China*.

## 8. APPENDIX

**Table 8.** Gravity model regressions for Dutch exports and multiple lagged FDI's during the period 2000-2017.

	(1)	(2)	(3)
<hr/>			
Independent variables			
FDI <sub>ijt</sub> -2	0.0221 (0.0154)		
FDI <sub>ijt</sub> -3		0.0210 (0.0165)	
FDI <sub>ijt</sub> -4			0.0168 (0.0163)
GDP per capita	-0.236* (0.139)	-0.0473 (0.148)	-0.0328 (0.156)
Population	0.338 (0.351)	0.165 (0.404)	0.353 (0.409)
Distance	-0.418 (0.519)	-0.221 (0.556)	-0.214 (0.574)
European Union	-0.262 (2.007)	-0.259 (2.132)	-0.639 (2.189)
Common language	2.238 (2.345)	1.553 (2.662)	3.029 (2.689)
Colonial past	-0.432 (1.285)	-0.486 (1.425)	-1.292 (1.466)
Constant	8.954*** (2.962)	7.469** (3.235)	7.105** (3.310)
Fixed effects	Yes	Yes	Yes
Observations	1,249	1,229	1,246
R-squared	0.224	0.224	0.259

Dependent variable is the log of EX<sub>ijt</sub>. Column 1, 2 and 3 show the estimates for respectively FDI<sub>ijt</sub>-2, FDI<sub>ijt</sub>-3 and FDI<sub>ijt</sub>-4. In all columns country-pairs and time fixed effects is included. Robust standard errors are in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.