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The European Union & Southern African Development Community Economic Partnership Agreement's Impact on the Namibian Exports

The amount of research that has been done on the effects of free trade is extensive to say the least. Even though free trade creates winners and losers, there has almost been a unanimity among economists that free trade leads to a large net gain for the society which is in the best interest of all countries in the world. This thesis investigates the effects of free trade agreements on exports by a case study on Namibia's exports to the EU market. We use the duty-free and quota-free access that Namibia obtained to the EU market in 2008 to study if the absence of trade barriers leads to increased trade. This is done by examining the quantity exported from Namibia to the EU during 1999-2015 with an OLS fixed-effects model and a Difference in Differences approach. The results obtained from our two different models indicates that the duty- and quota-free access led to increased exports. However, our empirical methods did not produce enough significant estimates to make a reliable or convincing assessment of the duty-free and quota-free market access.

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Abbreviations

ACP - African, Caribbean and Pacific group of states.

DD - Difference in Differences

DFQF - Duty Free Quota Free

EPA - Economic Partnership Agreement

EU - European Union

FTA - Free Trade Agreement

GDP - Gross Domestic Product

GSP - Generalised System of Preferences

IMF - International Monetary Fund

MFN - Most Favoured Nation

MFS - Minor Field Study

NAFTA - Northern American Free Trade Agreement

NSA - Namibia Statistics Agency

ODI - Overseas Development Institute

OLS - Ordinary Least Squares

PSM - Propensity Score Matching

SADC - Southern African Development Community

SIDA - Swedish International Development Cooperation Agency

WTO - World Trade Organisation

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1. Introduction

The EU has for a long time advocated the idea of "European cooperation" and has since the early 1960s been part of numerous trade agreements with developing countries in the African, Caribbean and Pacific group of states. These agreements have changed a lot over time but they all have one thing in common, they intend to promote economic growth and to help countries in the ACP region develop by boosting their economies through trade, at the same time as the EU itself benefits from this trade. The belief that free trade will lead to development is in line with the ideas of the advocates of free trade, who argue that by removing tariffs, quotas and regulations, trade will increase and lead to economic growth for all countries involved.

In this thesis we will examine the statement that free trade agreements lead to increased trade and thereby development, through a case study on Namibia's exports to the EU market. More specifically this will be examined by looking at whether the duty- and quota-free access to the EU, obtained in 2008, has led to an increase in the exports from Namibia. The impact of this trade barrier removal will be estimated empirically using mainly a Difference in Differences model. For this impact assessment, a panel data set on Namibia's exports to the EU from 1999-2015 is used. The aim of the study is to answer the following question: How has the duty- and quota-free access to the EU market obtained in 2008 affected Namibia's exports?

The paper is structured in the following way. Section 1-4 intends to give the reader a background of the context in which this thesis is written and to present previous research and theories upon which this thesis is founded. Section 5-7 introduces our data, empirical methods and our results. In Section 8-9 we briefly discuss the results, the validity of the models used and present our conclusion.

2. Contextual framework

Namibia is a large country with a small population. Its approximately 2.5 million inhabitants makes it a relatively small economy and therefore it is highly dependent on trade and foreign direct investments in order to grow. The EU has been, and remains, a key market for Namibia's exports of meat, fish and grape products (Overseas Development Institute, 2007). Namibia is rich in diamonds and other minerals, fish and livestock, and this resource abundance is the cornerstone in Namibia's economy and the incomes generated through exporting these resources are substantial. On the other hand, the processing industry in Namibia is not very developed, thus the exports consist mainly of raw materials (Höglund, 2016).

The history of trade collaborations between the EU and Namibia dates back to 1975 and the signing of the Lomé I agreement. Since then several agreements have followed: Lomé II, Lomé III, Cotonou and last in line, as a part of Cotonou, are the Economic Partnership Agreements (EPA) (European Commission, 2016). On July 15th 2014, the EU concluded negotiations with the Southern African Development Community (SADC) EPA Group comprising Botswana, Lesotho, Mozambique, Namibia, South Africa and Swaziland (European Comission, 2015). The goal of the Economic Partnership Agreements is to promote trade between the ACP countries and the EU in order to contribute to poverty reduction and sustainable development. The EPA:s differ from its preceding agreements mainly in its reciprocity. The EPA is an agreement where both parts over time obtain free access to the other part's market whilst the agreements before the EPA had been unilateral. The lack of reciprocity was not in line with WTO rules, since it discriminated other developing countries by not offering them the same preferential access to the EU market. Hence, a new treaty, where reciprocity and non-discrimination played an important role was needed (European Commission, 2016).

The negotiations before reaching an agreement were long and Namibia initialled negotiations on an interim EPA with the EU in 2008, which gave them duty-free and quota-free (DFQF) access to the EU market. This DFQF access was granted under the so-called "market access EPA regulation" to all EPA-negotiating countries temporarily. Therefore, even though Namibia did not sign the EPA until 2014 they benefitted from this removal of trade barriers that the DFQF access meant already from 2008 (SADC EPA GROUP, 2011). In a scenario where an agreement had not been reached, Namibia would have lost its DFQF access to the EU market. Namibia's exports would have been subject to the tariffs applicable under the Most Favoured

Nation (MFN) or the Generalised System of Preferences (GSP) tariffs, which one is applicable depends on what type of product is exported (Overseas Development Institute, 2007). Under the MFN and the GSP tariffs, Namibia's exports would experience higher taxation and tougher competition. For the meat industry, which would be affected the most, it is even likely to have resulted in the complete cessation of exports to the EU. Products related to the meat industry accounts for 3-4% of the total value of Namibia's exports, thus it is not Namibia's main source of foreign currency (Namibia statistics agency, 2012). However, given the fact that the meat sector employs almost 30% of the population, its importance cannot be neglected. Put into this perspective, a complete cessation of the meat industry's exports to the EU would have led to negative economic and social effects for the country (Overseas Development Institute, 2007).

3. Literature review

Milton Friedman states in his paper "The case for free trade" (1997) that most of the time economists tend to disagree, but this has not been true in the case of international trade. Even though free trade creates winners and losers, there has almost been a unanimity among economists that free trade leads to a large net gain for the society which is in the best interest of all countries in the world.

One of the most prominent economists within the area of international economics and trade was David Ricardo, who with his work on comparative advantages demonstrated that two economies can engage in trade with each other with mutual benefits, even if one of them is more efficient at producing everything (Krugman & Obstfeld, 2003). The Heckscher-Ohlin theorem is another example of a model that shows that trade can be beneficial for both economies engaging in it. In the Heckscher-Ohlin model this is done by allowing both countries to export goods whose production depends heavily on resources that are locally abundant, while importing goods whose production depends heavily on resources that are locally scarce (Krugman & Obstfeld, 2003)

Amongst the vast amount of papers discussing free trade, the majority presents a rather positive view of the impact free trade has on a country's economy. A sample of such papers and also one paper that does not present a solely positive view will now be presented and reviewed. James Feyrer wrote in his working paper from (2009) "Distance, trade and income - the 1967 to 1975 closing of the Suez canal as a natural experiment" that an increase in trade volume was found to increase economic growth. Similar findings were presented by Frankel & Romer in their paper from (1999) "Does Trade Cause Growth" where they find that trade has a positive effect on income. Rudiger Dornbusch, wrote an article in the Journal of Economic Perspectives (1992) where he described the shift from protectionism to free trade promotion in many developing countries. He talks about the trade liberalisations in South Korea and Turkey as two examples of when increased openness is proved to be followed by higher economic growth. He also talks about the successful trade liberalisation in many countries in Latin America, with Mexico as one of the pioneers. Further examples of the positive effects of trade liberalisation is presented by Wacziarg and Welch (2016) in their article "Trade Liberalization and Growth: New Evidence" where they found that countries experienced a higher growth rate after liberalising their trade. Another positive effect of the move to free trade is presented by Milner and Kubota in their paper from (2005) "Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries". They argue that movements towards free trade and movements towards democracy are related. A paper that does not present a solely positive view on the effects of free trade is Luigi Pascali's (2014) paper "The Wind of Change: Maritime Technology, Trade and Economic Development" where trade is found to be positive for economic growth under the condition that good institutions exists in the country. On the contrary, trade in combination with lack of institutions proves to reduce per-capita GDP. So, Luigi argues that trade only is beneficial for a country given that it has good institutions.

The Asian development bank published a report (2010) on the importance of assessing the impact of a free trade agreement. They state that an impact assessment is of great importance, particularly for developing countries in order to be able to adjust and maximise the gains from the FTA. An impact assessment of the EPA:s in the six different ACP regions was published in the Journal of African Economics in 2010 (Fontagné, Laborde, & Mitaritonna). The results from their study shows an expected increase in exports to the EU due to the EPA. The International Monetary Fund (IMF) discusses in a working paper from (2004) the effect of the North American Free Trade Agreement (NAFTA) on Mexico's economy. One of their main conclusions, reached through looking at recent empirical analysis and through a casual inspection of the data used, is that the trade among countries in the NAFTA increased significantly because of the agreement. Similar results are found in a report made for the European commission by DG trade in (2010) on the economic impact of the FTA between the EU and Korea. The report shows positive and significant effects on the bilateral exports for both Korea and the EU.

4. Theoretical framework

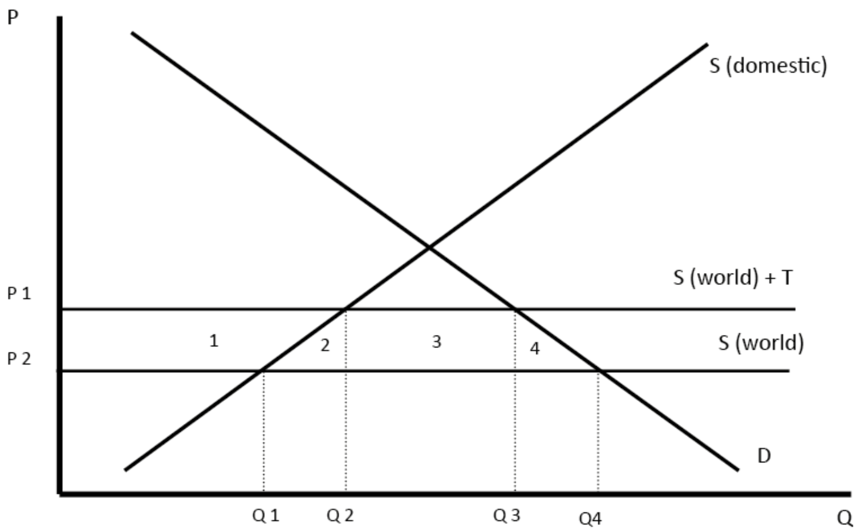
As mentioned in the literature review, the work of David Ricardo in the early 19th century has had a strong impact on the continued research on trade and the potential benefits of it. This is also the model that will serve as the theoretical framework for this thesis. The Ricardian model of comparative advantages between two economies consists of an approach where trade is only determined by differences in the productivity of labour (Krugman & Obstfeld, 2003). Ricardo assumes two countries and two goods, with labour as the sole factor of production and that the productivity of labour is the only difference between these two countries. He argued that if each country specializes in producing the good in which they hold a comparative advantage, the world output would increase with international trade enabling this specialization.

Put into the context of this thesis, the Ricardian model implies that Namibia is supposed to produce and export the goods where it has a comparative advantage. Namibia has a comparative advantage in the production of meat (Gawande, Chiriboga, Fan, & Kilmer, 2008) which in a model with two countries and two goods means that Namibia would produce and export meat whilst importing another good that they do not have a comparative advantage in (which we call X). As explained in the Ricardian model, the comparative advantages is derived from the differences in opportunity costs of producing one good over another. The opportunity cost of meat for Namibia is defined as the number of goods X that could have been produced with resources used to produce the amount of meat currently being produced. So, when Namibia has a lower opportunity cost than their trading partner of producing meat in terms of the good X it has a comparative advantage in producing meat. Following this argument, Ricardo showed that even if Namibia is less efficient in producing both meat and X, gains can still be made if the opportunity costs of specializing in producing only one of the goods are different between the two countries (Krugman & Obstfeld, 2003).

In order to decide which country produces which good, the Ricardian model describes the relationship between the relative price and the opportunity cost of the goods. Since this simplified model with two countries and two goods does not contain any profits the wage and the price will be determined by the production. In the case of Namibia, the value of one worker's meat production will determine the worker's hourly wage and in turn the price of meat. If the relative price of meat in terms of the other good (X) is higher than the opportunity cost of producing meat in terms of X, the wages in the meat sector will be higher. Obviously, the industry offering the highest wages is also where everybody will want to work. So if the meat industry offers higher wages than the X industry Namibia will specialise its production to the meat industry. To conclude, Namibia will specialise in the production of meat if the relative price of meat is higher than its opportunity cost, and vice versa (Krugman & Obstfeld, 2003).

As mentioned earlier, free trade allows countries to specialize in the goods they have a comparative advantage in. The diagram below shows what happens to the price level, as well as the quantity imported/exported for a country, when tariffs are removed.

Figure 1: Tariff removal



What happens when the tariffs are removed is that the prices fall from P1 to P2, there will be a larger consumer surplus (area 1+2+3+4) and the imports increase from Q2-Q3 to Q1-Q4. Alongside with the increase in imports there is also an increase in exports in the goods where the country has a comparative advantage. (Economicshelp, 2016)

The most important lessons from Ricardo's work can be summarized as, 1. Trade can be viewed as an indirect, more efficient method of production. Instead of producing all goods for itself, a country can produce one good and trade it for another desired good, at a lower cost than the cost of producing it itself. 2. Trade provides countries with larger consumption possibilities and this implies gains from trade 3. Trade does not depend on having an absolute advantage in the production of a certain good but rather on having a comparative advantage (Krugman & Obstfeld, 2003). The Ricardian model discusses the advantages of trade under the assumptions that there are no costs associated to it i.e. in a scenario where two countries freely can trade with each other. The EPA between the EU and Namibia allows the two parties to trade freely. Gawande *et al*. (2008) argue in their paper that Namibia traditionally has a comparative advantage in beef, which, in line with Ricardo's thoughts of comparative advantages, implies that with the new DFQF access to the EU market the beef exports should rise. This study aims to find out if this proves to be the case.

5. Data

Our sample includes trade statistics between Namibia and the EU nine years before and eight years after the new duty-free and quota-free market access in 2008. Eurostat, the database from which we collect the statistics, declares the trade of a good with two different indicators - its quantity in hundreds of kilos and its value in euros. The reported trade of a good will appear as a zero if its quantity is below a hundred kilos even if trade has occurred, and this can be a problem when looking at the reported trade of certain minerals, such as diamonds, which account for a substantial amount of the total exports' income. This potential problem could be overcome by using the indicator of euros, but then one must adjust each reported value for inflation. We will solely use the reported quantity as our indicator of trade since the dataset does not include any minerals or other goods that might be misleadingly reported in this statistics. The dataset contains the quantity exported of 12 different goods from Namibia to the EU during the period 1999-2015. The different goods consist of both individual and aggregated trade statistics at the Common Nomenclature (CN8) level.

Table 1: Catalogue of Exports

Good	Description
1	Fresh or chilled bovine meat, boneless (CN8: 02013000)
2	Frozen bovine boneless crop, chuck and blade and brisket cuts (CN8: 02023050)
3	Frozen bovine boneless meat (CN8: 02023090)
4	Frozen meat of lambs, boneless (CN8: 02044310)
5	Fresh or chilled flap mushrooms (CN8: 07095930)
6	Fresh table grapes (CN8: 08061010)
7	Fresh cherries (CN8: 08092095)
8	Quality white wines (CN8: 22042138)
9	Wine of fresh grapes (CN8: 22042180)
10	Wine of fresh grapes (CN8: 22042185)
11	Frozen hake (aggregated export of all CN8 codes for frozen hake)
12	Frozen monkfish (aggregated export of all CN8 codes for frozen monkfish)

[1] CN8: Product code from the harmonized system "Combined Nomenclature" (CN8) for product classification

The main focus of this thesis is to study if the new market access to the EU in 2008 has had an impact on Namibia's exports to the EU. To be able to distinguish such an effect we must control for other variables that might influence Namibia's exports. For this reason, a panel data set is created. We include variables commonly known to affect an economy's resources, efficiency and output, and thus its capability to export goods. A list of variables included in our panel data is found below, followed by a brief discussion of each variable.

Table 2: List of Variables

Variable	Description
Q	Yearly quantity exported in tons
Good	Exported good categorized numerically
EURNAD	Average yearly currency exchange rate EUR/NAD
GDPg	Annual GDP growth in percent
CPI	Corruption Perceptions Index
ME	Military expenditure as a percentage of GDP
ODA	Net official development assistance in USD millions
FDI	Net inflow of foreign direct investments in USD millions
qt	Good-specifc time trends
t	A time series that is 1 if year=1999, 2 if year=2000 ...
Post	A dummy variable that is 1 if year = or > 2008
Treatment	A dummy variable that is 1 if the observation is from the treatment group and 0 for the control group
Post*Treatment	An interaction term of the dummy variables Post and Treatment
Year	A vector of dummies indicating year
Year*Treatment	An interaction term of the dummy variables Year and Treatment

The average yearly currency exchange between the euro and the Namibian dollar is included to account for any variation in exports that follows from an appreciated or depreciated currency exchange rate. A time variable is included simply to control for any time trend affecting the exports. Measures of financial inflow, ODA and FDI, are included to control for the contributing effect increased financial resources can have on exports if they lead to increased investments in the economy, including the exporting sector. The Corruptions Perceptions Index is constructed by Transparency International and it scores a country's perceived level of corruption based on the informed views of analysts, business people and experts (Transparency International). Corruption has been shown to lead to inefficiencies and lower economic growth (Krugman & Obstfeld, 2003). If the exporting sector's business activities are subject to any form of corruption, for example by extensive regulations – which only serve to generate fines because they are impossible to comply with fully – the exports might decrease since money and time must be wasted on dealing with unproductive measures of corruption. Military expenditure can have adverse effects on exports since an economy's financial resources are limited, thus it diverts resources from being invested in the public and private sector. Annual GDP growth is included to control for how a growing economy can lead to increased exports if the growth also touch the exporting sectors. By including these variables we aim to control for how the economy's condition and its governance might impact the exporting sector, and from this try to distinguish the duty-free and quota-free access' impact on the exports. The dummy variables are specific to the Difference in Differences model analysis. They serve to estimate the policy change's impact on the exports by controlling for year specific shocks and by indicating how the treatment group differs from the control group in the periods before and after DFQF-access.

Table 3: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Q	21270.715	39472.172	0	204696	204
Good	6.5	3.461	1	12	204
EURNAD	0.107	0.026	0.07	0.156	204
GDPg	4.782	2.632	0.3	12.3	204
CPI	4.771	0.477	4.1	5.7	204
ME	2.963	0.494	2.4	4.2	192
ODA	201.024	60.870	112.13	325.53	192
FDI	229.733	320.127	-558.329	755.714	192
qt	203485.221	488053.719	0	3275136	204
t	9	4.911	1	17	204

6. Methodology

A fundamental difficulty with causal inference is that you never observe what would have happened if a treatment or an intervention had not taken place, i.e. counterfactual. The ideal experiment would be to observe the difference between the outcomes of a subject in a world in which treatment takes place and one in which it doesn't. Obviously, this is impossible since we can only observe one of these states. There are several ways of overcoming this problem. The most common is the conceptual framework of a randomized experiment, where a control group can be used to illustrate the treatment group's outcome had it not been subject to treatment. Randomized experiments are not always practical to achieve, or even ethical, depending on what the study wish to examine. Some methods deal with this issue by allowing the researcher to adopt the concept of a randomized experiment, even when randomization is not possible.

The consequences of a policy change are seldom random, but more often the result of observable and unobservable characteristics of the affected units. One could deal with this matter by estimating a fixed effects model, or one could take advantage of a Difference in Differences approach to exploit the experimental setting a policy change can unfold with, i.e. a natural experiment (Wooldridge, 2013). An important distinction between these two models is that the DD-model, contrary to the simple fixed effects OLS, follows the pattern of a randomized experiment by incorporating a control group to estimate a causal effect.

Propensity-Score Matching is another method suitable for observational studies that seek to evaluate the effect of a treatment, or policy change as in our case. Its concept was first introduced by Rosenbaum and Rubin in their paper published in 1983. They defined the propensity score as the conditional probability of being assigned to a particular treatment given a vector of observed covariates (Rosenbaum & Rubin, 1983). We considered using this model because it could have been an attractive complement to the results obtained from the DD-model. We were however not able to gather the data required for the matching procedure.

We will start analyzing our data with a simple fixed effects model to estimate if the duty- and quota-free access has had an impact on the exports. However, this approach can only indicate if the post-treatment period is associated with increased or decreased exports compared to the pre-treatment period. We cannot consider a potential difference between these periods as a causal effect of the duty- and quota-free access since we have no way of comparing this outcome to an outcome without duty- and quota-free access. Since we are interested in estimating the “true” causal effect we will focus on the Difference in Differences approach to analyze whether the DFQF access has had an effect on Namibia’s exports.

6.1. Fixed Effects OLS

An OLS regression using fixed effects allows to control for unobservable, time-constant factors that influence the outcome of interest. The fixed effects model assumes that the unobserved individual effects are correlated with the independent variables. If we consider a linear, unobserved effects model:

$$Y_{it} = X_{it}\beta + \alpha_i + v_t + \varepsilon_{it}$$

where Y_{it} is the dependent variable denoted by individual i at time t. X_{it} is a vector of independent variables that vary across individuals i and time t. α_i is the unobserved individual effects (which does not vary across time, thus there is no t subscript) and v_t is the unobserved effects common to all individuals that varies across time t. ε_{it} is the error term. The unobserved individual effects can be removed by demeaning the data with the fixed effects transformation, also called the within transformation (Wooldridge, 2013). The unobserved effects can also be removed by considering both α_i and v_t as parameters to be estimated for each i and t respectively – the dummy variable regression (Wooldridge, 2013).

In our case it means that the fixed effects model removes unobserved heterogeneity of each good included in the sample of exports. What remains is the time-series variation of exports since the cross-sectional variation is captured by the fixed effects. Since some of this time-series variation can be explained by v_t we also include yearly fixed effects. In other words, we control for permanent differences between the goods, and for impacts that are common to all goods. The common impacts might vary year to year, which is controlled for by including a full set of year dummies. We will however use a linear time trend to capture the impacts common to all goods and this will give us an average value of the yearly fixed effects across the entire period. Since we control for time fixed effects with a linear time trend, we can study if the period with duty- and quota-free access is different from its preceding period with a dummy variable separating these two periods (this would lead to problems with multicollinearity if we controlled for time fixed effects with year dummies). The regression will only include data on the treated goods and it will look as specified below:

$$Y_{it} = \beta_0 + \beta_1 t + \beta_2 D_i^{Good} + \beta_3 D_t^{Post} + \beta_4 X_{it} + \varepsilon_{it}$$

Y_{it} is the quantity exported where i denotes the goods at the Common Nomenclature (CN8) level and t denotes the year. β_0 is a constant quantity of exports for all years. t is a time trend. D^{Post} is a dummy variable that is 1 if the exports are made after the intervention and 0 otherwise. This dummy variable will indicate how the DFQF access has affected the exports. X_{it} is a vector of control variables comprising: GDPg, EURNAD, CPI, ME, ODA and FDI. ε_{it} is the error term. The constraint with this approach, as mentioned earlier, is that we cannot say that what we are measuring with D_t^{Post} is truly a causal effect of the duty- and quota-free access. We can only state that the two periods might be different from each other, but not why.

6.2. Difference in Differences

The Difference in Differences model is commonly used for evaluating the effect of a treatment or an intervention. A Difference in Differences model is especially appropriate when a policy change or an intervention unfolds with the characteristics of a natural experiment (Wooldridge, 2013). An exogenous event, such as a policy change, acts as a natural experiment if its essence is thought to only affect a certain group of individuals, companies or cities for example (Wooldridge, 2013). It is different from a true experiment in the way that the treatment and control groups are not randomly assigned, but automatically generated by the setting the policy change acts in. However, given the assumption that the treatment- and control groups do not behave differently for other reasons than the policy change, a natural experiment can still be used to estimate a treatment effect.

In our case the policy change in 2008 will be the treatment. The policy change applied to all exports, thus no pre-determined treatment- nor control group were defined in a random manner. However, the implications of the policy change were not equal for all exports. Only a few goods were identified to get *improved* market access from this change (Overseas Development Institute, 2008). From this we will derive a treatment group, which is composed of the goods identified to get improved access (see Table 4), while all other goods will serve as the control group. This is an arbitrary solution, however it follows the logic of a natural experiment where the treatment- and control groups are generated by their different characteristics.

Table 4: Goods belonging to the Treatment Group

Good	Description
1	Fresh or chilled bovine meat, boneless (CN8: 02013000)
2	Frozen bovine boneless crop, chuck and blade and brisket cuts (CN8: 02023050)
3	Frozen bovine boneless meat (CN8: 02023090)
4	Frozen meat of lambs, boneless (CN8: 02044310)
5	Fresh or chilled flap mushrooms (CN8: 07095930)
6	Fresh table grapes (CN8: 08061010)
7	Fresh cherries (CN8: 08092095)
8	Quality white wines (CN8: 22042138)
9	Wine of fresh grapes (CN8: 22042180)
10	Wine of fresh grapes (CN8: 22042185)

[1] CN8: Product code from the harmonized system "Combined Nomenclature" (CN8) for product classification

A key assumption in the Difference in Differences model is the parallel-trends assumption. This assumption states that the treatment- and control groups need to have the same pre-treatment trends to not threaten the validity of any conclusions made from the empirical study (Meyer, 1995). The idea is that a deviation from the pre-treatment trend could indicate a causal effect. Hence, we want to observe that the two groups have parallel trends before the intervention and that the treatment group deviates from this in the post-treatment period – while the control group maintains its pre-treatment trend. This ideal pairing of the two different groups is very hard to achieve. One way of verifying that this assumption holds is to observe and compare the pre-treatment trends graphically.

When we examined the reported trade of the goods in our treatment group, we found that several goods reported no or only sporadic quantities of export. Thus a pre-treatment trend could not be computed for these exports. Only a few goods turned out to report consistent quantities of exports both before and after the intervention, and therefore our focus was put on pairing these goods with any relevant goods from the control group, keeping the parallel-trend assumption in mind. We managed to identify four different goods, two from each group, with similar pre-treatment trends. The goods of interest and their pre- and post-treatment trends are shown below:

Figure 2: Trends over mean quantity exported at the group level.

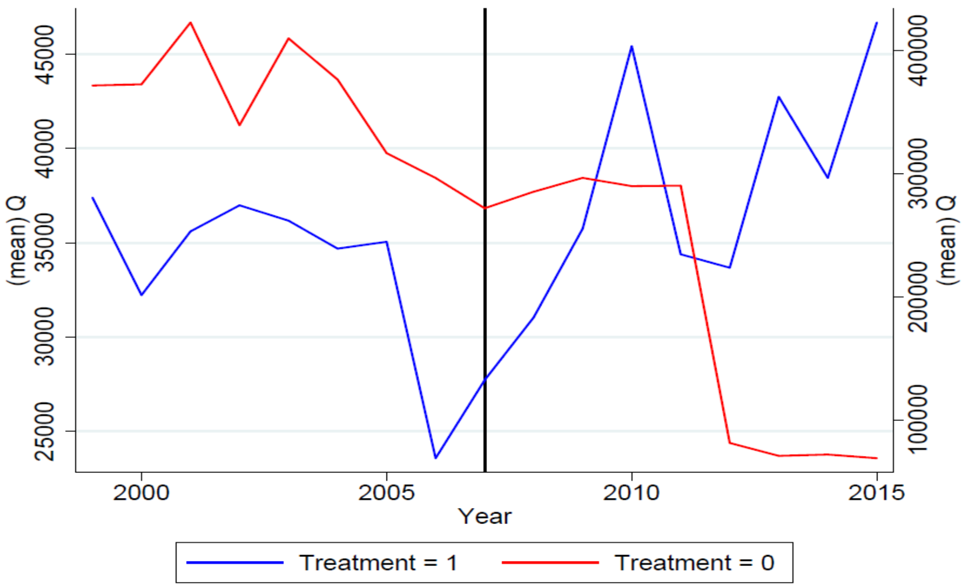
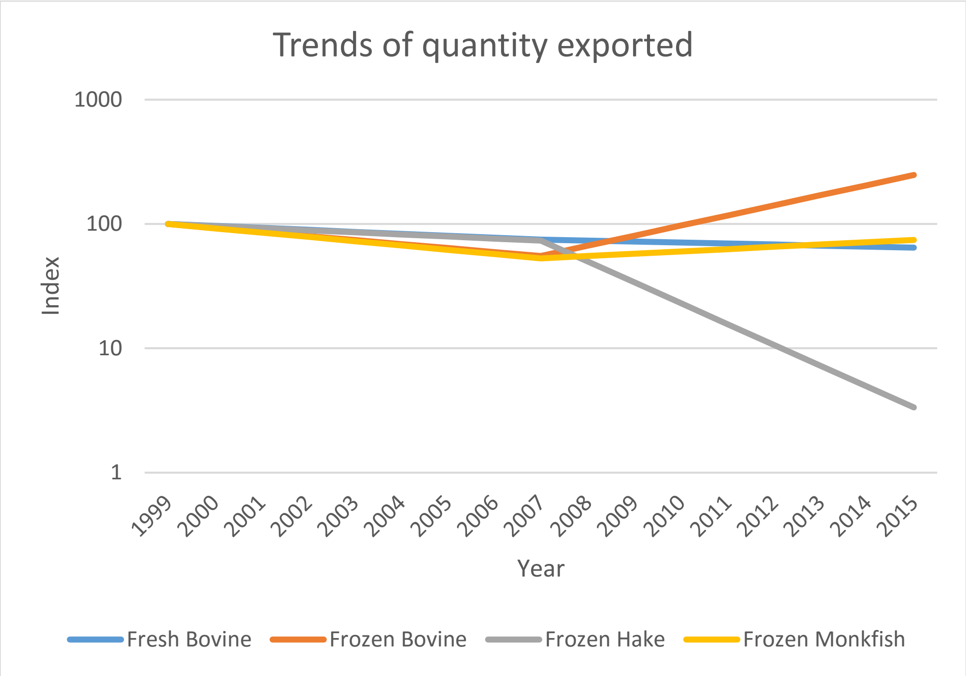


Figure 3: Pre-treatment trend: 1999-2007, Post-treatment trend: 2008-2015



The trends in Figure 3 are indexed for the purpose of presenting and comparing the goods to each other. As is shown in Figure 3, our treatment group is composed of fresh and frozen bovine (Good 1 & 3 in Table 1), and our control group is composed of frozen hake and frozen monkfish (Good 11 & 12 in Table 1).

6.2.1. Model designs

The first DD-model we will estimate is a basic two-period Difference in Differences model translated into the regression framework:

$$Y_{it} = \beta_0 + \beta_1 D_t^{Year} + \beta_2 D_i^{Tr} + \beta_3 (D_t^{Post} * D_i^{Tr}) + \beta_4 D_i^{Good} + + \beta_5 X_{it} + \varepsilon_{it}$$

Y_{it} is the quantity exported, where i denotes the good at the Common Nomenclature (CN8) level and t denotes the year (1999-2015). D^{Year} is a vector of year dummies. D^{Tr} is a dummy variable that is 1 if the observation belongs to the treatment group and 0 if it belongs to the control group. D^{Post} is a dummy variable that is 1 if the exports are made after the policy change and 0 otherwise. $D^{Post} * D^{Tr}$ is an interaction term. D^{Good} is a vector of dummy variables for each good included in the two different groups. By including dummy variables for each good we avoid losing information about their exports at the aggregated group level. X is a vector of additional control variables that are possible to include since we use the model in a regression framework. ε_{it} is the error term. We will estimate our models both with and without the control variables. Adding them can decrease the residual variance and it can also serve as a robustness check on the earlier estimates (Angrist & Pischke, 2009). By interpreting the coefficients in this equation it is possible to derive how much the quantity of goods exported changed after the policy change in the treatment- and control groups. Table 5 gives an overview of the DD-coefficients.

Table 5: Overview DD-coefficients

Y	$D^{Post} = 0$	$D^{Post} = 1$
$D^{Tr} = 0$	$\beta_0 + \beta_1 + \beta_4 + \beta_5$	$\beta_0 + \beta_1 + \beta_4 + \beta_5$
$D^{Tr} = 1$	$\beta_0+\beta_1+\beta_2+\beta_4+\beta_5$	$\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5$

From this we can interpret the coefficients as follows:

- Quantity exported by control group before policy change = $\beta_0 + \beta_1 + \beta_4 + \beta_5$
- Quantity exported by control group after policy change = $\beta_0 + \beta_1 + \beta_4 + \beta_5$
- Quantity exported by treatment group before policy change = $\beta_0 + \beta_1 + \beta_2 + \beta_4 + \beta_5$
- Quantity exported by treatment group after pol. change = $\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5$

The logic of a DD-model is that you estimate the causal effect by computing the difference between the groups' individual differences to obtain a "difference in differences". This translates into a difference in differences estimator which will be equal to β_3 in our specification of the model in the regression framework:

$$(Y_2^{Treated} - Y_1^{Treated}) - (Y_2^{Control} - Y_1^{Control}) = Difference\ in\ Differences$$

$$\big((\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5) - (\beta_0 + \beta_1 + \beta_2 + \beta_4 + \beta_5)\big) - \big((\beta_0 + \beta_1 + \beta_4 + \beta_5) - (\beta_0 + \beta_1 + \beta_4 + \beta_5)\big) = \beta_3$$

Since our sample includes many years of observations and four different goods, we want to control for how the exports might fluctuate due to good-specific time trends. We do this by adding qt, which is the quantity (q) exported of each specific good interacted with a time trend (t). This allows the treatment and control goods to follow different trends in a limited but potentially revealing way (Angrist & Pischke, 2009). That is to say that we can be more confident about our results if the estimated effect of the policy change does not change drastically. However if it does change, we need to consider whether the treatment effect has absorbed differences between the two groups' (potential) underlying time trends. The second regression looks as specified below:

$$Y_{it} = \beta_0 + \beta_1 D_t^{Year} + \beta_2 D_i^{Tr} + \beta_3 (D_t^{Post} * D_i^{Tr}) + \beta_4 D_i^{Good} + \beta_5 qt_i + \beta_6 X_{it} + \varepsilon_{it}$$

We will also estimate a more specific DD-model to analyze if the policy change in 2008 has an increasing or decreasing effect on the exports in the years following its implementation. This is to capture the idea that there could be a lag between the implementation of the new market access and the actual exploitation of it. We believe it is reasonable to think that the exporting sectors might need time to increase their supply, or to simply divert exports from less favorable markets, before they can take advantage of the new market access. To do this we design the DD-model to correspond to Granger's model (1969) used for testing causality (Angrist & Pischke, 2009)

$$Y_{it} = \beta_0 + \beta_1 D_t^{Year} + \beta_2 D_i^{Tr} + \beta_3 (D_t^{Year} * D_i^{Tr}) + \beta_4 D_i^{Good} + \beta_5 X_{it} + \varepsilon_{it}$$

The model allows us to distinguish if the effect of the policy change is different as time passes. Its design is similar to the first design, with the vector of year dummies now replacing D^{Post} in the interaction term. This way we will see what it means to belong to the treatment group each specific year during the period of improved market access. Since the interaction terms include not only the years following the intervention, but also all the years leading up to it, the model will also act as a placebo test at the same time. We expect the interaction terms before 2008 to be 0, otherwise the effect does not follow its cause, which it by definition should.

To summarize. We use two different designs of the DD-model. The first design assumes the treatment effect is constant each year. The second design assumes the treatment effect varies each year and will also serve as a placebo test. Good-specific time trends will be added to each design to control for underlying trends in the two different groups.

6.2.2. Problems with the standard errors

Bertrand et al. (2014) did a study where they examined 92 papers and the reliability of the results reported when a DD-model had been employed. They came to the conclusion that most of these studies underestimated their standard errors and they showed that this could have led to several Type I errors (false rejections of the null hypothesis) in the papers examined. The issue was that a substantial amount of the papers had neglected to adjust their standard errors for serial correlation. When a sample includes many years of data, serial correlation can make the standard errors inconsistent, thus adjustments needs to be made. Bertrand et al (2014) proposed several techniques for dealing with this, the easiest being to cluster the standard errors for each group included in the panel dataset. Unfortunately our dataset includes only four different goods, thus the cluster technique cannot be applied since it requires a much larger amount of clusters to be relevant.

7. Results

7.1. Fixed Effects OLS

Table 6: Regression results from OLS using fixed effects

VARIABLES	Q
t	207.139
	(1,083.738)
Post	782.056
	(9,306.234)
GDPg	-407.836
	(575.202)
EURNAD	-106,263.789
	(153,297.145)
CPI	-5,478.125
	(4,553.752)
ME	3,537.239
	(9,830.630)
ODA	-15.879
	(45.381)
FDI	-3.563
	(8.451)
Constant	89,217.767**
	(42,083.540)
Observations	160
R-squared	0.760

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 shows the results from our OLS regression using fixed effects. The good fixed effects are not included in the presentation as they are not the focus of our interest. None of the estimates are significant. The dummy variable Post represents what we want to measure as the effect of the policy change since it captures how the exports differ from the pre-treatment period in the post-treatment period with duty- and quota-free access. It suggests that the duty- and quota-free access led to an increase in the exports with around 780 tons each year after its implementation. Furthermore our time trend, t, suggests that the exports see yearly increases of around 200 tons over the entire period. The variable CPI indicates that an increase in the perceived level of corruption leads to a decrease in exports with almost 5 500 tons. The currency exchange rate, EURNAD, indicates that an increase in the currency exchange rate (1 euro more per Namibian dollar) decreases the exports with around 100 000 tons. GDPg reports a somewhat interesting estimate which suggests that an increase of 1 percentage unit in annual GDP growth leads to a 400 ton decrease in the quantities exported. We would expect to see the opposite in a growing economy, unless it is growing at the expense of the exporting sectors, which seems unlikely. Another interesting estimate we found in the results is ME, which reports that an increase in military expenditure leads to an increase in the quantities exported. This is also the opposite of what we would expect to see according to the theory. This is perhaps likely if the military industry accounts for a large share of the country's exports, but this is not the case for Namibia. The remaining variables report estimates that are opposite what we would expect as well, and we believe it is plausible that our model specification suffers from an omitted variable bias. As already mentioned the estimates are not significant and thus no statistical inference should be made from them.

7.2. Difference in Differences

Table 7: Regression results from DD

VARIABLES	(1) Q	(2) Q	(3) Q	(4) Q
Treatment	-6,287.160* (3,611.354)	-7,666.749** (3,716.963)	1,256.368 (3,186.643)	3,408.333 (2,899.222)
Post x Treatment	17,609.528*** (5,618.897)	18,655.342*** (4,862.679)		
qt		0.054*** (0.019)		0.051* (0.027)
Treatment x 2006			-2,868.200 (3,338.163)	-2,942.862 (2,094.891)
Treatment x 2008			-1,008.200 (2,495.490)	743.782 (3,591.111)
Treatment x 2009			-1,658.400 (3,108.550)	1,747.975 (4,737.135)
Treatment x 2010			-21.250 (2,523.953)	3,711.591 (6,228.579)
Treatment x 2011			-1,163.350 (3,189.735)	4,564.561 (7,754.073)
Treatment x 2012			19,618.900 (20,263.691)	11,869.766 (15,555.725)
Treatment x 2013			21,571.250 (20,985.245)	12,578.463 (16,106.972)
Treatment x 2014			21,033.600 (20,880.066)	12,622.148 (16,152.890)
Treatment x 2015			22,155.450 (21,279.288)	12,947.211 (16,498.789)
Frozen Bovine	-4,534.188** (1,753.441)	-2,757.002* (1,481.953)	-4,534.188*** (502.915)	-2,852.452*** (1,035.598)
Frozen Hake	46,810.047*** (5,158.696)	29,549.316*** (9,897.913)	46,810.047*** (5,901.166)	30,476.366** (13,188.795)
Frozen Monkfish, omitted	-	-	-	-
Constant	7,553.290** (3,667.290)	4,879.114 (4,061.413)	3,781.526 (3,157.417)	-477.752 (2,805.642)
Observations	68	68	68	68
R-squared	0.843	0.881	0.874	0.897

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 gives an overview of the results obtained from the different DD regressions. To make the presentation easier we have excluded the year dummies and some of the interaction terms. An overview of the results including all interaction terms can be found in the appendix. None of the models were able to include any of the control variables due to problems with multicollinearity, and we were only able to include two out of the four dummy variables capturing the good fixed effects. We did not find any strong correlations between the included variables to be the evident cause of this. We speculate that perhaps the large number of variables combined with a relatively small number of observations could be the reason to this problem (over fitting the data). Looking at the numbers for R-squared this seems very likely. Our dummy variables explain almost all the variation in the dataset, thus there is no variation left for our control variables to explain. Control variables are usually possible to include in a DD-model to complement the original models thanks to the regression framework. They are however not necessary in the core methodology of Difference in Differences and therefore not detrimental to our analysis.

Looking at the results, we can see that the DD-models also estimate a positive effect of the policy change (indicated by Post x Treatment and Year x Treatment). The DFQF access is estimated to have a positive impact on the treated goods' exports in all regressions, though this is only significant in (1) and (2). When we include the good-specific time trends, the exports are estimated to increase with around 18 600 tons per year. In regression (3) we can see that the DFQF access is estimated to increase the exports of the affected goods from 2012 and forward. This delayed effect is however removed when we include the good-specific time trends in regression (4). The DFQF access is now estimated to have a positive effect on the exports already in 2008, and the positive effect increases every following year. The interaction terms before 2008 are however not 0, as we would expect them to be, but they report large, negative effects. This suggests that the policy change had a negative effect on the exports before it actually happened. This is not consistent with the definition of a causal effect. It could indicate that the exporters had information about the policy change and its implications before it was finalized. However, looking at all the interaction terms preceding the policy change, we can see that they indicate a negative treatment effect already in 1999. We think it is more likely that our placebo test has captured an underlying difference between the two groups, than that the exporting businesses knew the outcome of the negotiations already in 1999. We note that the results contain very few significant estimates, which could indicate that we have overlooked important variables. The absence of significant estimates could also be due to the fact that our sample includes only four different goods and a relatively small number of observations.

8. Discussion

8.1. Validity of the models

8.1.1. Omitted variable bias

We believe the estimates from the fixed effects OLS regression are likely to be biased since our dataset include rather few control variables. We were not able to include any of our control variables in the DD regression due to constraints from over fitting the data, and it is also important to note that we probably lack variables that are more relevant when trying to explain how the exports behave over time. For example supply, demand and price formation on the beef and fish market would be very interesting variables to include in both methods, as these are crucial and highly influential factors in all business environments. Not including them in our models means that we try to explain the behavior of these exports which perhaps is due to supply, demand and price changes, with some of the other variables included that might be correlated to them. This will lead to an omitted-variable bias in our data, which makes our models inclined to over- or underestimate the effect of the variables included in the regression.

8.1.2. Selection bias

Our study has through the methodology of Difference in Differences tried to take advantage of how the duty- and quota-free access to the European market only improved the market access for a few goods to evaluate its impact on the Namibian exports. We differentiated between “treated” and “non-treated” goods with the Overseas Development Institute report (2008) as guidance. Since we cannot observe both potential outcomes for the treatment group (with and without treatment) we try to assess the effect of the policy change by comparing the “treated” goods’ outcome to a control group. Which group the goods ended up belonging to is the result of observable and unobservable characteristics of the goods themselves, and since there might be unobservable differences between these two groups which we cannot control for, our estimated treatment effect might suffer from a selection bias. Random assignment would eliminate the selection bias because randomization makes treatment independent of potential outcomes (Angrist & Pischke, 2009).

8.1.3. Sample size & composition

Our sample is quite small even when it includes the entire treatment group. When it comes to the Difference in Differences approach we include only four different goods. It is hard to draw any convincing conclusions regarding the exports in general since what we have been studying is how a limited number of specific goods have been affected, and these do not necessarily reflect the entire population (all exports) that we have sampled from.

8.2. Interpreting obtained results

As described in the literature review, most economists tend to agree that free trade is beneficial for a country's economic growth. Several papers were reviewed and the majority of them presented findings indicating that trade had a positive effect on economic growth. In this study we found that Namibia's exports from the meat sector increased with the duty-free and quota-free access to the EU market. An increase in the exports is one factor that could stimulate economic growth, if it is of a lasting nature. Thus, the findings in this study are similar to the findings presented by the majority of the papers in the literature review. The new market access that followed with the Economic Partnership Agreement is found to have a positive impact on the meat exports and this could in turn lead to economic growth.

9. Conclusion

The aim of this thesis was to investigate how Namibia's exports to the European Union have been affected by the duty-free and quota-free access obtained in 2008. The data used to analyse these questions was mainly collected from the European database of trade statistics, Eurostat, and from the World Bank database. With this data we made fixed-effects OLS- and Difference in Differences regressions to estimate the effect of the duty-free and quota-free access on Namibian exports, of which two DD regressions produced significant results regarding the impact of the policy change.

During the work of this thesis we learned that the duty- and quota-free access lead to improved market access only for a few goods exported by Namibia to the EU. Several of these goods come from the agricultural sector, which is one of the most important sectors in the Namibian economy. On a side note, we believe it would be very interesting to further study the importance the European market has played for this sector, as it employs around 30% of the Namibian workforce.

Our main finding is that the results from the OLS- and Difference in Differences models indicate that the duty- and quota-free access led to increased exports from Namibia to the European market. However, our empirical method did not produce enough significant estimates to make a reliable or convincing assessment of the duty- and quota-free market access. We believe the small sample size and the absence of control variables in the DD regressions to be an important factor to the unsatisfactory results. Furthermore, we believe that our assessment would benefit greatly from the inclusion of control variables that have a more specific and direct effect on the exports. For example supply, demand and price formation on the beef and fish market would have been interesting factors to account for, but finding statistics on these factors in such a specific setting is hard, and it is beyond the scope of this thesis to compute them on our own. We believe further studies in this area would benefit from including these, and other, factors that have a more specific and direct impact on the behaviour of exports.

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11. Appendix

11.1. Regression results from DD, excluding yearly fixed effects

VARIABLES	(1) Q	(2) Q	(3) Q	(4) Q
Treatment	-6,287.160* (3,611.354)	-7,666.749** (3,716.963)	1,256.368 (3,186.643)	3,408.333 (2,899.222)
Post x Treatment	17,609.528*** (5,618.897)	18,655.342*** (4,862.679)		
qt		0.054*** (0.019)		0.051* (0.027)
Treatment x 1999			-8,978.400 (9,032.126)	-18,442.138 (16,892.045)
Treatment x 2000			-9,591.650 (9,263.764)	-17,297.165 (15,195.881)
Treatment x 2001			-14,264.200 (14,901.106)	-19,530.743 (17,975.661)
Treatment x 2002			-5,799.600 (6,545.108)	-10,821.279 (9,432.537)
Treatment x 2003			-12,919.850 (13,683.601)	-14,599.006 (12,868.672)
Treatment x 2004			-9,737.350 (11,209.608)	-10,490.150 (9,203.454)
Treatment x 2005			-3,732.500 (5,151.456)	-4,885.532 (3,784.188)
Treatment x 2006			-2,868.200 (3,338.163)	-2,942.862 (2,094.891)
Treatment x 2008			-1,008.200 (2,495.490)	743.782 (3,591.111)
Treatment x 2009			-1,658.400 (3,108.550)	1,747.975 (4,737.135)
Treatment x 2010			-21.250 (2,523.953)	3,711.591 (6,228.579)
Treatment x 2011			-1,163.350 (3,189.735)	4,564.561 (7,754.073)
Treatment x 2012			19,618.900 (20,263.691)	11,869.766 (15,555.725)
Treatment x 2013			21,571.250	12,578.463

			(20,985.245)	(16,106.972)
Treatment x 2014			21,033.600	12,622.148
			(20,880.066)	(16,152.890)
Treatment x 2015			22,155.450	12,947.211
			(21,279.288)	(16,498.789)
Frozen Bovine	-4,534.188**	-2,757.002*	-4,534.188***	-2,852.452***
	(1,753.441)	(1,481.953)	(502.915)	(1,035.598)
Frozen Hake	46,810.047***	29,549.316***	46,810.047***	30,476.366**
	(5,158.696)	(9,897.913)	(5,901.166)	(13,188.795)
Frozen Monkfish, omitted	-	-	-	-
Constant	7,553.290**	4,879.114	3,781.526	-477.752
	(3,667.290)	(4,061.413)	(3,157.417)	(2,805.642)
Observations	68	68	68	68
R-squared	0.843	0.881	0.874	0.897

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1