The removal of trade sanctions' impact on South African wine export

- a gravity model that estimates what happened with South Africa's wine export when apartheid ended.

Julia Linderson

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Avskaffandet av handelssanktioners påverkan på sydafrikansk vinexport
- en gravitationsmodell som estimerar vad som hände med Sydafrikas vinexport när apartheid avskaffades.

Julia Linderson

Abstract

This paper investigates how the removal of the South Africa trade embargo in 1994 affected its wine exports. The goal is to determine the significance of the sanctions and trade agreements for this export. Specifically, sanctions and certain trade agreements are examined between the years 1990 to 2010. During this time, sanctions were imposed on South Africa because of apartheid. In 1994, apartheid ended, and then all sanctions had ended as well. To assess this, a gravity model is used. In this case, the model specifically estimates the parameters for South Africa's wine exports, South Africa's GDP, and the GDP for South Africa's trading partners. An additional parameter that estimates the sanctions is included in this model. The results are compared to the change of wine exports for the world's largest wine exporting countries. This is done to exclude that the changes in wine exports are due to other parameters. South Africa's economic growth effect is also illustrated. The data for the gravity model and for the complementary analyses are collected from the FAO State and the World Bank. The estimated results show that wine exports increased by 244 percent after the embargo was removed. This is a large increase that is economically significant. This may be due to the general globalization in the world at the same time. Although, as no other large wine exporting countries have such a high increase in their export (maximum 128 percent) this would suggest that the ending of all sanctions indeed had an effect. The results also show that the world's GDP had an impact on South Africa's exports. The changes in South Africa's wine exports increased after 1994 and after 2000. These changes appear to be specific to South Africa. South Africa's GDP increased mainly after 2002. The conclusion of these findings is that the removal of trade sanctions had a large impact on South Africa's wine exports. This is especially evident in the results of the gravity model. The results also indicate that trade policy appears to have an impact on South Africa's economic growth. This can open for speculation about how trade policy can be used to control other countries.

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1. Introduction

Overall development and economic national growth depend on trade (Rahman, 2003). Trade policy can rule, control, and direct. The morality that is considered important can be enforced through cooperation and political arrangements such as sanctions. Felbermayr, et al. (2019) writes that sanctions have been widely used and will continue to be used. But how much do these sanctions affect trade? How important are trade agreements?

In this study, the impact of sanctions on trade will be explored with a focus on South African wine exports. For many years until 1994, there were sanctions against South Africa because they were considered to oppose general morality. South Africa had a system based on racism and separation called apartheid which was condemned by many countries. The exports of wine are used as a type of measurement in this paper to measure how South Africa was affected by these trade barriers. South Africa seems to have a comparative advantage in this export since they are around 10 to 12 largest wine exports in the world (FAO 2006). Therefore, wine exports are the chosen good to measure the trade flow.

The wine exports between the years 1990 and 2010 are used to investigate if there was any contrast before and after 1994. This large number of years, after the removal of trade sanctions, is needed as it takes a long time to grow new wineries and create new businesses. There might thus be a lagged effect of this political change. Other factors may also affect trade e.g. trade agreements which is investigated for this reason. There are several papers that have made conclusions on these issues before. Some of them are presented and discussed in chapter 4. One point out that sanctions due to apartheid seem to influence South Africa's exports. Another study shows that a specific case and a specific good can be studied successfully to reveal these issues, especially goods where there is a comparative advantage. For this reason, this study's contribution is to investigate the sanctions impact on a specific good which South Africa has a comparative advantage. Because South Africa's high export of wine, this is considered their comparative advantage. In this paper, this is estimated by using the gravity model. There are alternative models that can be used, but the gravity model is an adequate way to measure trade. There is also a clear way to include the variable for the change in trade policy due to the end of the embargo with this model. The gravity model is further described in chapter three.

The economic growth of a country is affected by trade and is therefore also investigated. It is relevant since the impact of sanctions can determine how much South Africa was financially forced to end apartheid. For this reason, this study is an example of how trade policy, in general, can affect a country. Felbermayr, et al. (2019) writes that it is important to understand sanctions, create models to improve the valuation of sanctions, and use quantitative methods to be able to estimate sanctions impact. The reason for this is that sanctions will continue to be used in the future.

This study shows, like many others, that these sanctions and trade agreements have an impact on exports. Wine exports increased by about 244 percent from 1994 to 2010. This is a large increase that is economically meaningful but can be due to the general globalization in the world at this time. As other large wine exporters do not have a higher increase in their export then 128 percent it seems that the removal of trade sanctions had a large effect. The export is also affected by the world's GDP. An increase in GDP by one percent leads to an increase of 3,23 percent of the South African wine exports. A comparison of the largest wine exporting countries shows that these results indicate specific changes in South Africa. The results also opened for discussions on larger societal issues such as how both sanctions and trade agreements affect a country. Therefore, the study of specific good works to study large structures and societal issues.

In this paper, the background is presented first. This section includes more information about South Africa's wine production, its politics, and trade with the rest of the world. The next part introduces the problem, aim, and delimitations. Chapter two describes the theory used for this study, which is the gravity model. The method and data are described in Chapter three. Chapter four introduces the literature revue of earlier papers on trade agreements and sanctions. Analysis, results, and discussion are in chapter five. In chapter six the conclusion is presented.

1.1 Background

In the *Food and Agriculture Organization of the United Nations* (FAO) agribusiness handbook (2006) it is expressed that South Africa was around the tenth to twelfth largest wine exporter in the world at that time. It is an indicator that South Africa has a comparative advantage in this production. The fluctuations in the number of wine exports may be due to several things. These causes may be due to environmental fluctuation but also political ones.

FAO (2006) also states that it can take between five and ten years for the vines to produce grapes of optimum quality. Which, together with the creation of firms, is a long process to get to high export values. This means that changes in policy can have a lagged effect on this export.

Trade policy might be the reason for the fluctuations in exports. The major political incidents to be studied are apartheid which influenced other countries' trade policies towards South Africa. Apartheid was introduced in 1948 and is a system based on racism and separation between people. With this system, people of colour did not have the same standards regarding housing and education. The Nationalist Party started apartheid which included three laws. These laws were prohibited by the mixed marriage act which became a law in 1949, group aria act which became a law in 1950, and the population registration act which also became a law in 1950. The purpose of this system was to preserve the power of the white population in the country. These laws received much criticism from many other countries already in the 60s (Evenett, 2002).

The United Nations condemned apartheid and adopted a mandatory arms embargo in the early 1960s towards South Africa. The first restrictions came from Sweden in 1979. Denmark was the first country to completely ban all trade in 1986. In 1985 and 1986, the largest sanctions were established. One of these was the United States ban on imports in 1985. Another was European community prohibition on imports of several goods in 1986 and that the United Kingdom stopped its investments in South Africa the same year. The first fully democratic elections were made in 1994. This led to an official end to the apartheid system. Then the boycott and the sanctions against the country had also ended (Evenett, 2002).

South Africa has been members of GATT since 1948. They became members of the World Trade Organization in January 1995. The World Trade Organization is a global international organization that manages the rules of trade between countries. The basis for this trade lies in the World Trade Organization agreements and negotiations. The agreements are signed by most of the world's trading nations and ratified in their parliaments. The fact that South Africa could join the World Trade Organization in 1995 opened many opportunities for trade with countries all over the world. This is the case as the goal of this organization is to ensure that trade flows as smoothly, predictably, and freely as possible (World Trade Organization,

2020). Today the countries that South Africa trade most with are China, Germany, United States, United Kingdom, and India (WIRS 2020).

In 1994, South Africa applied to join the trade agreement "Lomé Convention". It is an agreement on trade between the EU and developing countries. This request was rejected by the European Union. Two years later, the European Union began a discussion on creating a new agreement. They did this because they considered that trade with South Africa would benefit both parties. The agreement was not implemented until January 1, 2000. This agreement led to a duty-free industry and agricultural market. South Africa's exports to the EU increased by 75 percent between 1999 and 2004 (Assarson, 2005).

South Africa has its own Customs Union (SACU) with Botswana, Lesotho, Namibia, South Africa, and Swaziland, which was founded in 1889 but was remade in 1910. SACU started a free trade agreement with the European Free Trade Association (EFTA) in 2006, which includes Iceland, Liechtenstein, Norway, and Switzerland (SACU, 2020).

1.2 Problem, aim and delimitations

The specific research question is _Has the removal of trade sanctions increased South Africa's wine exports?_ By examining previous literature, the credible answer to this question will be yes. Therefore, this question is also developed into a second question which is _How much have the removal of trade sanctions increased South Africa's wine exports?_ This question includes a quantification of the wine export increase and must, therefore, be compared with other wine exporting countries. How other countries' wine exports are changing is also investigated in order to rule out that there is a specific change in South Africa. Although this study may seem limited, it can contribute to the discussion on the impact of sanctions and trade agreements. The general perspective is international trade. The value of wine exports is specifically investigated between the years 1990 and 2010.

2. Theory

Chapter two provides the theory of the gravity model, which is the base analysis tool in this study. The background of the model and how it works are described and the choice of the model for this study is motivated. The formatting of the equation and the parameters that introduce sanctions are presented.

2.1 Foundation of the Gravity Model

The gravity model is described in Chapter Three of the book "Handbook of International Economics". This chapter is written by Head and Mayer (2014) and the text below is a summary of their description. The gravity model measures the trade flow depending on size and distance. Size is measured primarily with the gross domestic product (GDP) and distance is measured in geographical distance between the countries. The model derives from Newton's physical concepts. Newton's law of gravity is based on the attraction between two masses that attract each other in proportion to the size of the body divided by the distance between them. The gravity model was therefore initially used more for physical analogy than economic analysis. The model was transformed into the social sciences to be applied to social interactions. It reflects the physical gravity equation as trade increase in proportion to the economic size of the trading partners and decreases in proportion to the distance between them. The model was introduced properly by Tinbergen in 1962 and Krugman in 1997. After this, the model becomes integrated and seen as an important part of international trade.

Head and Mayer (2014) also write that the gravity model has a positive relationship between GDP and trade. An increased GDP can increase the possibility of greater production and consumption, thus increasing exports and imports. The gravity model shows a negative relationship between physical distance and trade. The distance also includes trade policy, language, religion, and currency. These factors simplify trade and often arise in connection with shorter geographical distances. The opposite effect can occur due to colonial history. With colonial history, negotiation increases, even if there is a greater distance.

Head and Mayer (2014) use three definitions to specify the equations. The first definition is about general gravity effects. Definition two shows structural gravity that covers parts of the general gravity models. Definition three is the model used in this paper. This model is more pedagogically useful and has long been empirically successful. It contains the important insight that bilateral trade should be approximately proportional to the product of country

size. The definitions derived from theory. In this case, X_{in} is the trade flow between countries i and n. Y_i and Y_n are involved countries GDP and φ_{in} is the geographical distance between the countries. This is expressed as follows:

$$X_{in} = GY_i{}^{\alpha}Y_n{}^{\beta}\varphi_{in} \qquad\qquad\qquad\qquad\qquad\qquad\text{(Eq. 1)}$$

The advantages of the third definition are that it is straightforward and easy to collect data. The disadvantages of the definition are that Head and Mayer (2014) describe this model as naive as it is general and restrictive to the theory not specific. With this definition, there are some generalizations such as assumptions about α and β but also that φ_{in} is a constant.

However, this definition is very useful for estimating the effect on South Africa's wine exports due to changes in trade policy. The reason for this is that the data needed for the various variables is relatively easily accessible. The system becomes logical as X_{in} can be the value for wine exports and the Y variables can control for GDP in South Africa and the countries South Africa trades with. In order to adapt the model, the forms must be logarithm first to be able to get it in a linear form. Then it will look like this:

$$\text{Log } (X_{in}) = G + \alpha \log (Y_i) + \beta \log (Y_n) + \log (\varphi_{in}). \qquad\qquad\qquad\text{(Eq. 2)}$$

This model estimates relatively good results, but in this case, there are other factors that are relevant to estimate. Factors like this are not unusual to be included. The factors may be a certain number of dummy variables that test for specific effects. In Baier and Bergstrand's (2007) paper there is a description of these variables. Examples of specific effects could be sharing a common land border, being a member of a trade agreement, speaking the same language, etc. To test these factors, parameter G_s is included in this form

$$\text{Log } (X_{in}) = G + \alpha \log (Y_i) + \beta \log (Y_n) + \log (\varphi_{in}) + \gamma \log(G_s) \qquad\qquad\text{(Eq. 3)}$$

Baier and Bergstrand (2007) use a dummy veritable to measure FTA, which stands for a free trade agreement. They describe how the gravity model has been used for 40 years but was subject to some criticism when tariffs, quotas, and other trade barriers were not included. They include the large impact of trade policy with an additional variable. Trade policy is not an exogenous variable though. Endogeneity is also a problem when using trade policy variables in a gravity equation. The reason for this is that it can create simultaneous determination when trade policy is estimating as it can be affected by the trade flow. An instrumental variable and control function approach is not adapted for endogeneity as well as a panel approach. With endogeneity for the FTA variable, the empirical result is striking. A

dummy variable like this can measure countries' incomes, bilateral distances, common languages, common land borders, and for the presence or absence of FTA. In Baier and Bergstrand (2007), they ask the question of free trade agreements and if it increases members' international trade. The answer is "yes" considering the distribution of free trade agreements over the past 15 years and extensive expectations that such agreements should increase trade. The effects of free trade agreements on trade flows are that is quadruplets. They find that free trade agreement generally doubles two members' bilateral trade after ten years. These estimates, with the endogeneity panel approach, are five to six times greater than those using OLS.

3. Literature review

Different from other analyses, the gravity model is specifically estimating wine exports in this paper. However, there is much information on trade agreements and barriers such as sanctions, embargo, and boycotts from previous studies. Many conclusions have been drawn on these topics. These conclusions are about the effect trade policy's post-apartheid have on South Africa and their export. In summary, several studies indicate that the sanctions against South Africa have had an impact on South Africa's exports. It also indicates that South Africa's economy is affected. Conclusions on similar cases have also been made. This will be presented and explored further in this chapter as articles treat this area in different ways. Different questions have been asked, different methods have been used and different conclusions have been drawn. This chapter summarizes a couple of these studies.

Evenett (2002) writes about the sanctions against South Africa. He studied the sanctions of eight industrialized economies to see how their imports affected South Africa's exports. The gravity model is used to estimate the impact of the sanctions. To be able to estimate this with the gravity model sanctions are used as a parameter in the model. He does this by collecting data for the other variables and then having the sanctions as a dummy variable. The results showed that the sanctions from Europe had a great effect on South Africa, but US sanctions reduced South Africa's exports most. He also mentions that it can be problematic to measure this in a gravity model since there were also other factors depending on the sanctions that changed trade such as instability at the start of democracy. It is relevant to point out that it is an old analysis. After 18 years, there may have been large shipments that could be corrected effects that he does not include in his analysis. It is also important to point out what he emphasizes that the problems with the gravity model is when they only see the changes at the beginning of democracy. By including several more recent years, it is possible to reduce this error.

There may also be other models that are better and more relevant to investigate the trade and the causes. Bernhofen and Brown (2004) examine the trade in a different way. Their study is a similarity to this study in several ways. They have a clear example of a specific country. They also study the trade in which the country has a comparative advantage. The difference is that they study the case of Japan and above all that they use a completely different method. This method is relatively unusual today. They use the neoclassical trade theory, especially the Heckscher-Ohlin model. They do this by studying detailed product-specific autarky prices and

dealers. This is done during Japan's dramatic change from complete isolation to completely exposed to international competition. They test the theory of comparative advantages. This method is not limited by factor assets such as technology and taste or a combination of them. The law on comparative benefits means a comparison of autarchy and free trade. This method implicitly assumes that the production possibilities of the economy are the same under both regimes. It does not provide information on the composition of the commodity, such as what is exported or imported.

Bernhofen and Brown (2004) write that the case of Japan provides a natural experiment to explore the empirical validity of the theory. This experiment takes place in an environment that is transparent through all reasonable measures. Detail of Japan's trade statistics enabled a clear identification of the goods that are traded. In this case, prices are measured which is an adequate basis for a comparative benefit proposal. The focus is on a narrow range of raw materials and prices that are characterized as homogeneous goods. Autarchy prices include all relevant information about a country's domestic supply and demand. With this study, they find that the Japanese trade is negative for each year during the period 1868 to 1875. This matches the theory and is insightful with the theory, which can also be validated empirically.

Bernhofen and Brown (2004) study show that it is relevant to study goods of comparative advantage in an actual example. This way of examining is compatible with the assumptions of the underlying theory. The model shows the figures for the change. It does not show a direct estimation of a variable like for example sanctions. It works well in this case as it goes directly from autarchy to fully open trade. In the case of South Africa, it is more complicated. The study can include countries that traded with South Africa before 1994 or stopped trading sometime after 1994. The paper is published by the Journal of Political Economy which is a serious journal that applying peer-reviewing and the method might work. Still, the gravity model is a more suited method for this study.

Understanding how sanctions can affect a country economically is very important as it shows the political impacts. In the theory of the gravity model, it is also described how to trade increase with an increase in size, expressed often by GDP. Neuenkirch and Neumeier (2015) make an analysis that is very relevant in this area. They analyse US financial sanctions and their effects on target countries' GDP. This analysis is done during the period 1982 to 2011 and studies 67 countries. This is during the same period as there were sanctions against South

Africa. Their model is a regression model that measures poverty. The dependent variable of the model is GDP per capita, which is compared with the different countries that have or have not been the target countries during this period. The results indicate that the sanctions have a negative impact on the target countries as it increases poverty. They show that the target countries have a 3.8 percentage point larger poverty than the control groups that have not been targeted by the sanctions. They also show that the target countries' GDP has fallen by about 25.5 percent. Furthermore, their result shows that poverty increases during the first 21 years from the first sanctions. These results show how sanctions have a significant impact and that this impact includes a lagged effect. This is relevant to the present study as it can be expected that GDP will increase after 1994 and include a lagged effect. It is also a regression model, but it does not measure trade at all instead the dependent variable measures economic growth. This method could be interesting to do for only South Africa. However, the result will be more general. Although the change in GDP is relevant, trade is the most relevant in this study.

These previous studies give an idea of the impact of trade policy. Sanctions due to apartheid seems to have a large effect on South Africa's exports. A specific case and a specific good can successfully be studied as in the case of Japan. This works as they studied a good where there is a comparative advantage. For this reason, it is reasonable to study the case of apartheid in South Africa's impact on the country's wine exports. There are alternatives to the gravity model, but as described in the theory part, the gravity model is an adequate way to measure trade. There is also a clear way to include the variable for the change in trade policy due to the end of apartheid with this model. Nevertheless, there are other ways to investigate the issue. For a wider perspective the method that Neuenkirch and Neumeier (2015) use is also relevant but it does not give the perspective of trade.

Finally, in the present paper, the gravity model will be used. With this model, the research question will be answered. As the question is as following *Has the removal of trade sanctions increased South Africa's wine exports?* a hypothesis will be created in the following way:
Null hypothesis h0: the post-apartheid dummy variable = 0. In other words, the removal of trade sanctions has not increased South Africa's wine exports.
Hypothesis h1: the post-Apartheid dummy variable > 0. In other words, the removal of trade sanctions has increased South Africa's wine exports.

The gravity model will test this hypothesis with this added parameter called "the post-Apartheid dummy variable" for the effect of the trade sanctions. For further analysis, this parameter will also be investigated more to answer the question: *How much have the removal of trade sanctions increased South Africa's wine exports?* This question is also impotent as a comparison with the general increase needs to be made to appreciate the effect of the removal of trade sanctions.

4. Method

Chapter three provides the method data and statics used. First, the method and motivation for choices of the model are presented. How this method is used is also described. There is a clear description of the data as well. A description of the general change in export is included in chapter 3.3.

4.1 Estimation Methodology

For a detailed description of the gravity model read chapter two. A comparison with other models is given in both chapter two and chapter four. The change in trade policy over the years has earlier been presented in Chapter 1.1.

The gravity model, in this case, has the following parameters:

$$\text{Log } (X_{in}) = G + \alpha \log (Y_i) + \beta \log (Y_n) + \log (\varphi_{in}) + \gamma \log (G_s). \qquad \text{(Eq. 3)}$$

This model follows the structure described in the theory. In this case, X_{in} is the value of the exported wine from South Africa. The parameters Y_i is the world's GDP and Y_n is South Africa's GDP. G_s stands for the trade policy change in the form of sanctions and trade agreements which is the variable "Post-Apartheid dummy". The reason for using the value of exported wine instead of the quantity is that it, even if it is more complicated to regulate, has benefits. These benefits are that it shows the quality which is more relevant for the country's economic growth. This did not only give this study an economic perspective but also opens for speculations of bigger questions about the country's GDP. The distance will not be measured in this model as it is not relevant since the distance is the same for all the years. The parameters that estimate size is South Africa's GDP and all countries trading with South Africa GDP. Although the second size parameter is shortened to GDP of the world. The reason for this is that in the UN Comtrade database it is presented that most countries trade with South Africa, it is over 100 countries. The dummy variable captures the effect of the sanctions, including the lagged effect, and the effects of trade agreements. This is converted into a dummy variable for the years between 1990 and 2010.

The gravity model is used again as a kind of robust check to roll out that the change in wine export is only due to the general globalization in the world at the same time. This is shown in table 3, were the gravity model is used as described above but for every of the six largest wine exporting countries in the world. It is the same data as before and regulation as in the earlier

analysis. The robust check, called "estimation perspective", is done to answer the second research question about how *much* the wine export is affected. It answers this question as it put the result of the first gravity model in perspective.

Descriptive statistics are presented in figures 1 and 2. The first figure is a graph that includes the value of the six largest wine exporting countries in the world. This figure is plotted in chapter 3.3 as it shows the statistics. In this figure, the value of their wine exports is plotted over the years 1990 to 2010 together with the value of South Africa's wine exports. This figure is made to see if the yearly changes are not only due to the general change in wine exports. The second figure shows how South Africa's GDP has changed over the years. This will also be plotted over the years 1990 to 2010. This is done because it is relevant to investigate how South Africa is economically affected by trade policy. It is also relevant to see how wine exports are affected by GDP.

4. 2 Data

The parameters in the gravity model are the value of exported wine in South Africa, a dummy variable for the years 1990 to 2010, South Africa's GDP, and the world's GDP. These years are used as the sanctions ended after 1994 and some trade agreements were made in these years. The data that is further needed for the "estimation perspective" and figure 1 is the value of the wine exports for the six largest wine exporters. These countries are Australia, Chile, France, Italy, Spain, and the United States according to FAO (2006).

The value of wine exports in the seven different countries comes from the FAO state database. This database has a great quality as it is reliable, coming from the united nations compartment means, with advances full figures. It shows exports in 1 000 USD for the years between 1990 and 2010. In figure 1 this value is divided with 1 000 and is therefore presented in million USD. In the gravity model, the value of South Africa's wine exports is the dependent variable. The first independent variable is the dummy variable for the years between 1990 to 2010. The year's show 0 until 1994 and 1 after 1994. This is the case since apartheid ended in 1994 and all sanctions were then gone. This variable will be called the Post-apartheid dummy variable. The second independent variable is South Africa's GDP and the third independent variable is the world's GDP. GDP for South Africa and the world comes from the World Bank *World Development Indicator database*.

In order to exclude inflation in the model, the consumer's price index from the World Bank *Consumer's prise index database* is used. This is included in the value of wine exports in all countries and in both South Africa's and the world's GDP. For the gravity models, it will be a logarithmic value of the parameters wine export, South Africa's GDP, and the world's GDP. This is the case as the gravity model is specified this way. The World Bank database is detached but cooperates within the United Nations with strong reliability.

4. 3 Statistics

Figure 1. The largest wine exporting countries value of exported wine
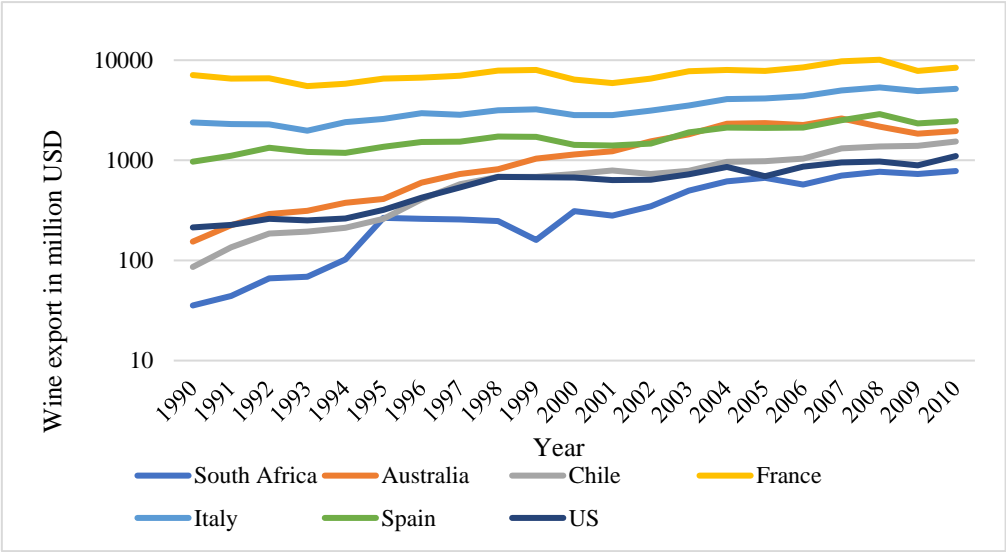
Figure 1. This graph shows the value of wine export for South Africa, Australia, Chile, France, Italy, Spain, and the United States. The value is divided with the consumer's price index. The figure is in a logarithmic scale. Years are on the x-axis and the wine export is on the y-axis.

The countries that are potted in figure 1 are the world's six largest wine exporting countries. The value of their wine exports is plotted together with the value of South Africa's wine exports. This figure is made to see if the yearly changes are due to the general change in wine exports. It shows that South Africa's wine export curve increases in 1994. It then drops slightly and increases again in the 2000s. overall, it is an increase. The other countries also have a general increase. The European countries have very similar and quite unchanging curves. The United States, Chile, and Australia have very similar curves as well, which is remarkable as there is a great distance between the countries. These countries are on different sides of the equator and on completely different continents. This suggests that there is something that sets the European countries apart from the rest of the world. The interesting thing for this paper is that South Africa seems to follow the same trends as the United States,

Chile, and Australia but with some notable differences. The difference is that the value is considerably lower until 1994 and quite lower in the early 2000s. These are specific deviations that are not visible in any of the other countries and therefore seem to be due to specific events in South Africa.

5. Analysis, results, and discussion

This chapter describes the results of this paper. These results will also be analysed and discussed. The result is divided into the main result and the estimation perspective. The estimated result of the main gravity model is presented in Table 1 including general statistics. Table 2 shows the gravity model's Variance Inflation Factor. Figure 2 shows the temporal development of South Africa's GDP. The estimation perspective is included in table 3. In this table, the gravity model is used for every of the six largest wine exporting countries in the world.

5. 1 Main result

Table 1. The Gravity Model

Wine export Value	Coefficient	Standard error	t-value	P>|t|	95 % coefficient	interval
Post-Apartheid dummy variable	1.24	0.22	5.68	0.000	0.777	1.70
Log (World GDP)	3.23	1.02	3.17	0.006	1.08	5.37
Log (SA GDP)	-0.31	0.61	-0.51	0.617	-1,60	0.98
Constant	-81.88	18.31	-4.47	0.000	-120.51	-43.25

Number of observations = 21
F (3,16) = 82,74
Prob > F = 0.0000
R-squared = 0.9359
Adjusted R-squared = 0.9246
Root MSE =0.26822

Table 1. The estimation of the gravity model.
Notes: All variables are statistically significant at 99% except for the variable "Log (SA GDP)".

Table 1 indicates what happens to the export value if the independent variables increase by one percent. Log (World GDP) has a positive value, 3,23. As the variable for wine exports also is logarithmic it means that when the world's GDP increases by one percent, the value for South Africa's wine exports increases by 3,23 percent. There may be an error in this value because of the inclusion of all the countries in the world. It may be that some countries, that have not traded with South Africa, have a completely different political system and change in there GDP. Therefore, the estimation of the variable may be incorrect. It is also unusual to have just one variable like this in the gravity model. Evenett (2002), for example, uses the gravity model, but with another formulation of the equation. In his model, the European Union, the Nordic countries, the United States, and Japan are used. So, to only have GDP for the world makes the model more uncertain. The model gets less variation, less nuanced (such

as distance), and becomes simplified. However, this can be justified by the fact that for this study over 100 countries would have been needed to include all trading countries. Some of the countries that traded with South Africa for some years did not trade with them at other years. This would have made the study more confusing, complex, and would have drawn the attention from the main issue of the study, the sanctions.

Log (SA GDP) has a negative value, -0,31. The value shows that when South Africa's GDP increases by one percent the value for South Africa's wine exports decreases by 0,31 percent. However, this variable is not statistically significant. The post-apartheid dummy variable is 1,24 which is a positive relationship. Since this variable is a dummy variable and not logarithmic, it shows that when the variable goes from zero to one, the value of exports increases by $[\exp(\Theta) - 1]$ percent. To get it in percent form it needs to be multiplied by 100. So, in other words, exports increased by about 244,3 percent from 1994 to 2010. This is a large increase that is economically meaningful as it is more than double as large export as before the end of apartheid. For example, if the absolute value 1993 is multiplied by 244,3 percent (2,44) it will show how much the export has increased. 45 447k USD x 2,44 = 110890,68 k USD. This result thus indicates that the trade policies had a great impact on this situation.

This regression model has a significant relationship, as it has a good p-value from the t-test. The p-value for all variables except South Africas GDP is about 0.000. As the post-apartheid dummy variable shows an increase from 1994 to 2010 and that this value is significant means that the null hypothesis can be rejected. With other worlds *Null hypothesis h_0*: the post-Apartheid dummy variable ≤ 0 is rejected so the removal of trade sanctions has increased South Africa's wine exports.

Alongside the table, there is also the f-test and the p-value for this test. The coefficient of determination (R^2) is also presented in this table and the adjusted coefficient of determination. The F-test, unlike the T-test, tests all the variables simultaneously and should be significant in order to be able to assume significance in any variable. In this case, the f-test is significant as it has a p-value of 0.000. The coefficient of determination is about 94 percent and the adjusted coefficient of determination is about 92 percent. These values are very high and show that about 89 percent of all variation in the independent variable can be explained by the model.

Other parameters than the Post-Apartheid dummy variable, Log (World GDP), and Log (SA GDP) alone only explain 8 percent of the value of wine exports.

The main issue with these results is that the sample size is small. With a small sample size, the results have a large probability for errors and are, therefore, less reliable. A small sample size reduces the statistical effect, inflates false discovery rates, and can give incorrect estimations. These results might also be affected by simultaneous causality, Omitted Variable Errors, and Multicollinearity. According to the theory of the gravity model, GDP should have a positive effect on wine export. If then the trade flow has a positive effect on GDP as the theory also suggests there is a risk for simultaneous causalities in the model. It is likely that South Africa's GDP is affected by its export, although the gravity model did not show any significant result that cud indicates this. It is not likely that South Africa's wine export affects the whole world GDP so the changes for simultaneous causalities seem quite small. Omitted variable errors can be a problem as there may be other parameters that cause the change in wine export. The reason why there can be multicollinearity is that the independent variables can have collinearity between them such as South Africa's GDP and the world's GDP. These variables can increase at the same rate. VIF tests can check Multicollinearity. This test is presented in Table 2.

Table 2. Variance Inflation Factor

| Variable	VIF	1/VIF
GDP World	9.44	0.105971
GDP South Africa	6.80	0.147111
Year Dummy	2.51	0.398225
Mean VIF	6.25	

Table 2. This table includes the variance inflation factors for all independent variables and the mean for all these variables VIF.

The VIF value determines the presence of multicollinearity. If the VIF value exceeds 10 it is an indicator of multicollinearity but in weaker models' values over 2,5 can indicate multicollinearity. No value is above 10 but all exceed 2,5 so there is a risk for multicollinearity.

To summarize, this shows very reliable and clear results. For this reason, it could be concluded that the gravity model is a very good model or a very poor model as it shows such incredible results. However, the results go hand in hand with the theory. These results may not alone lead to decisive conclusions but along with other theories, many conclusions can be made. Evenett (2002) paper supports this theory when he writes that the EU and, above all,

the United States' sanctions have had a large impact on South Africa's exports. Assarson, J. (2015) also writes that the Lomé Convention trade agreement has increased South Africa's exports by 75 percent. Other literature can also support the importance of open trade policy. The results of this study are in many ways like the results of Bernhofen and Brown (2004) study. They are also studying trade with a specific good with comparative advantage. Although they use a different method and study another country, it also shows that open trade politics increases exports of specific goods.

Figure 2. South Africa GDP
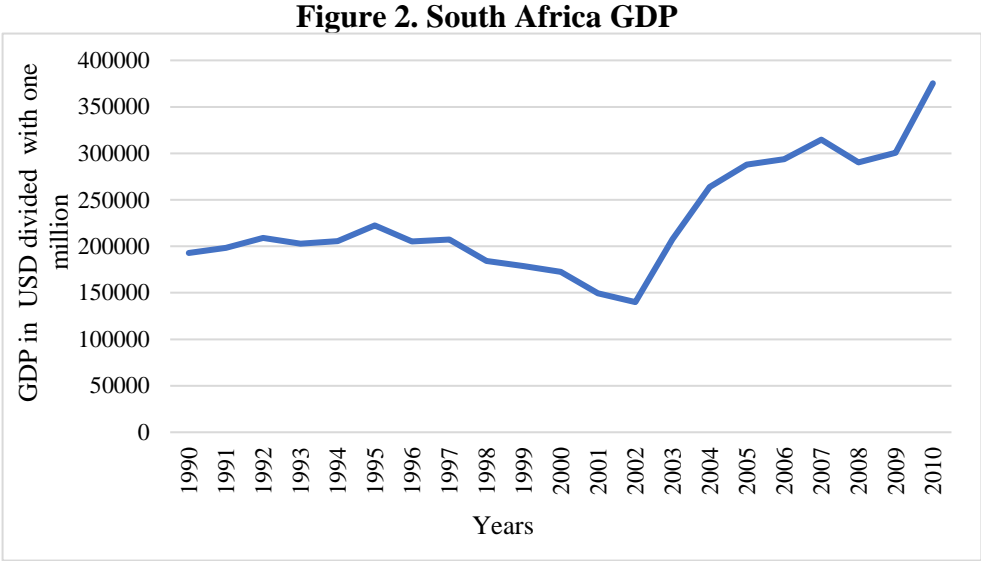
Figure 2. This graph shows the consumer's price index divided GDP for South Africa. This value is in USD and divided with one million on the y-axis. Years are on the x-axis.

Figure 2 shows how South Africa's GDP has changed over the years. The figure complements the gravity analysis as it shows the temporal evolution of the GDP. It is also relevant to see how wine exports are affected by GDP. This graph shows that the curve drops until 2002, then it starts to increase and almost doubles until 2010. Since there were no more sanctions against South Africa after 1994 and they could join the WTO in 1995, the expectations can be that it should have started to increase much earlier. However, as mentioned earlier, it may take some time to start-up companies and accumulate profits. This would mean a lagged effect. Evenett (2002) writes in his paper that South Africa was quite unstable after 1994 since it had just become a democracy and that it may take time before the result was visible. Neuenkirch and Neumeier (2015) write that the target countries of sanctions GDP fall by about 25 percent. It is therefore quite logical that South Africa had a decrease in GDP because of the sanctions. It is also logical that it then took time for the country to build up an increase in GDP as they wrote that poverty in the target country's increases during the first 21 years from the first sanctions.

However, it was not until 2000 that South Africa could join the "Lomé Convention" and EFTRA was first formed in 2006. Maybe this agreement would have been formed earlier if the political situation around apartheid did not exist. From figure 1 these trade policy differences can be seen very clearly. However, the differences are not as clear. It is difficult to say that exports have increased South Africa's GDP directly, but it can be argued that exports have this lagged effect on GDP. For such an analysis, exports from other goods and imports are also needed, as this trade is also important for analysing South Africa's GDP.

Another interpretation is that when GDP increases in South Africa, so do the exports of the country. The growth in GDP in 2002 could lead to the constant increase in wine exports after the 2000s. In the estimation of the gravity model, the variable for South Africa's GDP were insignificant so therefore no such a conclusion can be made.

5. 2 Estimation perspective

In chapter 3.3 the statistic of the six largest wine exporting countries wine export value is plotted together with South Africa's wine export value. The figure shows that South Africa's value increase after 1994 and 2000. These are specific deviations that are not visible in any of the other countries and therefore seem to be due to specific events in South Africa. However, it is relevant to study the general increase for all the countries to make a conclusion on South Africa's wine exports.

Using the gravity model, it is estimated that South Africa's wine exports will increase by 244 percent from 1994 to 2010. In order to make conclusions about this figure more than saying that it is economically meaningful, it must also be compared with other countries. As figure one indicates that there appears to be a general increase in exports for several countries, the reason for South Africa's increase becomes uncertain. As globalization took place during the 1990s and 2000s the world trade increased. According to Mariani et al (2012), wine exports have increased especially since 2000. Previously, a large part of wine exports came from Europe, but after a non-tariff policy, when WTO expanded, many other countries from other continents caught up. Probably a large part of the increase in South Africa is due to this. However, it is likely that the removal of trade sanctions also had an impact on South Africa's wine exports. As a robustness check, the gravity model is used with the same data as before except that the value for South Africa's wine export is changed for each country. For every

country, the gravity model instead includes that countries wine export value. As the percentage change after 1994 is the relevant variable, only the post-apartheid dummy variable is plotted for all countries together in table 3.

Table 3. Post-apartheid dummy variable for the six largest wine exporting countries

Wine export Value	Coefficient	Standard error	t-value	P>|t|	95 % coefficient interval	
Australia	0.80	0.31	2.62	0.018	0.16	1.45
Chile	0.82	0.23	3.65	0.002	0.35	1.30
France	0.06	0.08	0.68	0.505	-0.12	0.23
Italy	0.11	0.06	1.82	0.082	-0.28	0.24
Spain	0.16	0.08	2.13	0.049	0.00	0.32
US	0.55	0.15	3.63	0.002	0.23	1.87

Table 3: Estimation of the post-apartheid dummy variable for the six largest wine exporting countries in the world with the gravity model. Note that the post-apartheid dummy variable for Australia and Spain are significant by 95%. The post-apartheid dummy variable for Chile and the US are significant by 99%. All other variables are insignificant.

Since these independent variables are dummy variables and the dependent variable is their logarithmic value, it shows that after 1994 to 2010, exports increased by [exp (Ө) - 1]. This should be multiplied by 100 to be expressed is a percentage from. This means that in Europe, exports increased by about 6 to 18 percent. Although, some of these values are insignificant. Outside Europe, the increase is much higher. The country that have the highest increase in their wine export is Chile with an increase of about 128 percent. They are followed by Australia; which exports have increased by about 123 percent. US exports increase by 74 percent. South Africa's 244,3 percent increase is still very high in this context as well. The difference from Chile, the country with the highest increase in exports after South Africa, is more than double. This indicates that South Africa has an increased wine export which is not only due to the globalization that took place during this time. Although it is difficult to disentangle the impact of the embargo from overall economic growth.

6. Conclusions

The research question is: *Has the removal of trade sanctions increased South Africa's wine exports?* This is limited to the years between 1990 and 2010. The answer to this question is "yes". This is clearly shown as the null hypothesis, that the removal of trade sanctions has not increased South Africa's wine exports, cud be rejected. But what is the answer to the second question: *How <u>much</u> has the removal of trade sanctions increased South Africa's wine exports?*

In Chapter 1.1, the information on trade policy that can affect South Africa's wine exports is presented. Apartheid's unfair and racist systems are presented. How this system violates the general morality which leads to sanctions until 1994 when Apartheid ended is very relevant. These sanctions are the ground for this study. As mentioned before, these sanctions can have a lagged effect. It is also relevant that some trade agreements might have been delayed because of apartheid. In 1995, South Africa joins the WTO, 2000 they join the Lomé Convention and 2006 they join the EFTA. This trade politics is visible in the models. The gravity model estimates that after 1994, wine exports will increase by 244.29 percent. Figure one shows that exports increase after 1994 and then again after 2000. This curve also indicates that it is a specific change for South Africa as that change is not visible in other countries. By looking at other large win exporters the increase in South Africa seems to be due to more than the general globalization in the world at the same time. This is the case as the other country's do not have an increase higher than 127,74 percent. It thereby seems that the removal of trade sanctions had an effect.

The sanctions led to a change both directly but also as a lagged effect. There is a great difference between when South Africa are subject to sanctions and not, expectedly as they then have several new trade agreements. So, the answer to the question is that the removal of trade sanctions seems to influence South Africa's wine exports much. This is the case as South Africa's export increase with more twins as much as the other wine exporting countries. That it has a large effect is supported by the literature. The increase in wine exports may also be due to the trade agreements that were formed maybe later than it would if it weren't for the sanctions.

This issue also opens for larger questions as trade has a large impact on the country's economic growth. This conclusion implies that trade policy can control another country. It is a

useful fact to know that sanctions and exclusion from trade agreements have such a negative impact on a country that they must change their policies. But how big is the impact of trade on South Africa's economic growth?

As previously mentioned, information on other exports and imports is also needed to be able to reach that conclusion. Figure 2 shows that it may be a lagged effect that causes GDP for South Africa to decrease until 2002 and then increase drastically. This is also confirmed by the literature where there is an analysis of both how large the sanctions influence GDP but also that there is a lagged effect. Many big trade agreements were also created after 2000. According to the theory of the gravity model, GDP should have a positive effect on wine export. If then the trade flow has a positive effect on GDP as the theory also suggests there is a risk for simultaneous causalities in the model. As earlier mentioned, the risk for this happening, in this case, is quite small. Although it seems that the gravity model has a spiral effect. Economic growth is depending on trade and the gravity model shows that with greater GDP trade increases. So high GDP has a positive effect on trade. Increased GDP increases trade and increased trade generates higher GDP.

To sum up, in 1994 at apartheids end the wine export increased. After 1994 there were no sanctions and new trade agreements were made. However, it is difficult to say whether the agreements and the increased exports are only due to the removal of trade sanctions or the general globalization. It is probably due to both but as South Africa's export increase more than twice as much as the other wine exporting countries the sanctions seem to have a large effect. This is in line with theory, which is important as the results of this study have some uncertainties. These uncertainties are due the control variable being "world's GDP" and that there is a small sample size. Since trade affects economic growth, this can be a guideline on how countries can be controlled by trade. This paper also can show how a good works as a measurement for studying larger issues.

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