

# Trade creation and trade diversion resulting from bilateral trade agreements: An empirical analysis of European Association Agreements

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## Abstract

This research paper aims to examine the potential harm of bilateral trade agreements imposed on external nations which do not take part in the agreement. In order to shed light onto this matter, an empirical assessment of the trade relations after the implementation of three European Association Agreements will be made. More specifically, the analysis will study this by looking at the origin of imports for Israel, Macedonia and Chile, countries which all signed a trade agreement with the EU, during the period 1995-2013. The analysis will be conducted by using an application of Tinbergen's Gravity Model. It will be preceded by an extensive overview of the theoretical as well as empirical literature on the subject of trade diversion. Despite the fact that no significant decrease in the imports of the three countries mentioned above from nations outside the European Union was found in this research, this constitutes insufficient evidence to unequivocally rule out trade diversion. In the final discussion, it will be explained as to why it remains a challenging task to provide a conclusive verdict in this matter, which is mainly due to all the potentially distorting time-varying variables.

## 1.1 Introduction

This research paper aims to contribute to the ongoing discussion concerning the potentially distorting effect of preferential trade agreements on the allocation of factors of production. One of the most prominent economists criticising the discriminatory nature of preferential trade agreements was Jacob Viner. In the *Customs Union Issue* (1950) he introduced a microeconomic model to illustrate the distortion inflicted to the global trade dynamics by bilaterally rather than unilaterally reducing trade tariffs. This distortion follows from the fact that a discriminatory reduction of trade tariffs may lead to an unnatural competitive advantage for an industry that is not the most efficient one, resulting in a suboptimal allocation of factors of production. Following the introduction of the Viner's framework on trade diversion and the responses of some of his contemporaries, a short overview of the empirical research that has been conducted in an effort to crystallise this matter will be provided. However, since these have not been completely conclusive, the remainder of this research paper will be dedicated to the attempt to identify potentially undesirable side effects of the European Association Agreements. For this purpose, the imports of Israel, Chile and Macedonia over the period 1995-2013 have been examined by using an application of Tinbergen's Gravity Model. Despite the absence of any major indications of trade diversion, in the subsequent discussion a number of remarks will explain why the inferences of many empirical studies on trade diversion have to be treated with caution. This research paper will conclude with a summary of the main findings and a few suggestions for further research on this subject.

## 1.2 History of trade and trade tariffs

Whereas trade tariffs were once regarded as a necessary measure to protect a country's industries as well as its interests, since the emergence of classical economists such as Sir Dudley North and Adam Smith they have been subject to increasing criticism (Brue & Grant, 2013).

*'To give the monopoly of the home market to the produce of domestic industry, in any particular art or manufacture, is in some measure to direct people in what manner they ought to employ their capitals, and must, in almost all cases, be either a useless or a harmful regulation. If the produce of domestic industry can be brought here as cheap as that of foreign industry, the regulation is evidently useless. If it cannot, it must be generally harmful.'*

(Adam Smith, 1776)

Such sentiment was reinforced by the comparative advantage theory proposed by David Ricardo, who stressed the potential efficiency gains that could arise by virtue of specialisation and trade liberalisation. Since the publication of the works of the first proponents of free trade, many steps have been taken to alleviate the constraints on the international exchange of goods and services. This trend has not been a straight line, as depressions, such as the economic downturn in the early 1870s, the Great Depression and even the recent Great Recession usually fed calls for more protectionist economic policies (WTO, 2011). However, remarkable progress was not only achieved during the more prosperous periods but also in response to seismic shocks that resulted in the collapse of the established system. One of the most prominent examples is the creation of the General Agreement on Tariffs and Trade, which was signed by 23 nations in 1947, shortly after the Second World War.

Besides multilateral agreements, such as the GATT, many bilateral agreements have seen the light since the beginning of the nineteenth century. The first wave of bilateral deals aimed at the reduction of trade tariffs was prompted by Great Britain, and driven by the ideas of Smith and Ricardo. One of the most well-known agreements formalised during this period is the Cobden-Chavalier Treaty between Great Britain and France, which is said to have sparked many more bilateral negotiations between the other main economic powers in Europe at the time (Bairock, 1989). It has been estimated that in these agreements signed in the nineteenth century between the most prominent nations in Europe cut the tariffs level by half (Shafaeddin, 1998).

However, this newly formed system was dealt a massive blow by the increased tensions in the beginning of the twentieth century, as well as the economic uncertainty brought about by the Great Depression. Many of the trade initiatives instituted in this period were largely protectionist in nature, such as the Dutch-Scandinavian Economic Pact and the Imperial Preferences system established between Britain and its colonies.

Despite the GATT agreement of 1947, and the substantial growth in membership of the organisation later renamed as the World Trade Organisation, preferential reductions of trade tariffs remained common practice after the end of the Second World War. The principal example was the emergence of regionalism in Europe, embodied by the birth of the European Coal and Steel Community in 1951, which ultimately became the broader European Economic Community. In the ensuing decades, the Community continued to expand and its endeavour to further economic integration culminated in the establishment of a single market in 1992. During this period, The Community also concluded numerous trade deals with many

non-member countries in Eastern Europe, the Middle East and North Africa in an attempt to create a free trade area similar to the one that resulted from the North American Free Trade Agreement (WTO, 2011).

Since the ratification of the first Association Agreement in 1964 (with the Republic of Turkey), the European Union has closed twenty-four more agreements with different entities. The ultimate goal of these agreements is to stimulate cooperation between the members of the European Union and the second signatory not only with regard to trade but also concerning political issues, social problems, cultural exchange and security risks. However, this research paper will concentrate on the impact of the elimination of trade tariffs as a result of the Association Agreements. The first relevant question to ask is whether or not these agreement have indeed led to the desired increase in trade between the EU and the external signatories, in which the external signatories are Israel, Macedonia and Chile.

*Hypothesis 1: Association Agreements have resulted in an increase in trade between the European Union and the external trade partner.*

However, the principal aim of this research is to investigate the effect of European Association Agreements on the trade relations of the external signatories with the rest of the world. Although various economists have attempted to detect trade diversion in the wake of the signing of preferential trade agreements, the existing literature on the question whether or not Association Agreements instigate trade diversion is very limited. In order to assess the impact these agreements on trade flows, three separate treaties will be closely examined by analysing the origin of the goods imported by Israel, Macedonia and Chile by means of the Gravity Model of Trade. These entirely different economies have been chosen to see whether the patterns derived from the dataset are a common or merely a country-specific phenomenon.

*Hypothesis 2: External signatories of Association Agreements do not import fewer goods from the rest of the world following the ratification of the agreement with the EU*

*Hypothesis 3: European Association Agreements do not result in trade diversion*

## *2.1 Trade Diversion: A Theoretical Framework*

Yet the main focus of this research paper is to investigate whether the concerns over the undesirable side-effects of preferential trade agreements are justified. One of the academics who raised the issue was Jacob Viner, a Canadian trade economist. Viner was known as a

fervent advocate of free trade, as he strongly believed import duties diverted trade flows from the channels which they would follow under free trade (Oslington, 2013). Moreover, he heartily supported the Most Favoured Nation (MFN) principle, which stipulates that all countries should grant each other the same treatment with regard to tariffs, quotas and other trade barriers. This principle has become a key concept in the process towards universal trade liberalisation, and as such, the World Trade Organisation underlined its importance by including it in its Charter as Article 1. However, additional provisions allow exceptions in the form of Preferential Trade Agreements (under certain conditions), Free Trade Agreements and Customs Unions: all agreements of discriminatory nature which Viner firmly condemned due to their distorting effect on the global allocation of resources of production.

Partially because of his support for restriction-free universal trade, Viner shocked the world with his publication *the Customs Union Issue* (Viner, 1950) in which he asserted that customs unions do not necessarily increase global efficiency, and may even decrease the level of welfare within the counties involved in the preferential trade agreement. The general belief, hitherto, had been that despite its flaws and imperfections, customs unions constituted a significant step towards trade liberalisation. Despite the shockwaves caused by the publication of the *Customs Union Issue*, Viner's scepticism regarding customs unions became could already have been deduced based on an article from 1924, in which he wrote that "reciprocity treaties, even on free-trade grounds, are ordinarily not an amelioration, but on the contrary are an intensification of the evils of customs tariffs (Viner, 1924)." He believed that these treaties divert trade flows even further from their natural channels than under a universal yet non-discriminatory tariff scenario.

Viner described his concerns more extensively in 1931, by utilising a basic model depicting a world consisting of three countries: A, B and C (Viner, 1931). In this world, country B has a comparative advantage in the production of a specific good, which inherently makes it the cheapest producer. Country A, on the other hand, has to deploy substantially more resources to produce the good considered, making it the most expensive producer. Initially, all the countries in this model levy high tariffs on imported goods, and if the comparative advantage of country B is strong enough to compensate for the import costs, country A would import this product from country B. Although the volume of trade may be lowered as a result of the import tariff, the good is at least manufactured in the cheapest producing country. However, this may change if country A repeals or reduces the tariff levied on imports from the third country, C. If this enables country C to sell the product at a lower cost in Country A than

Country B, this will allow them to capture this foreign market at the expense of Country B's industry. "The reduction in duty, because it is discriminatory and not uniformly extended to all, operates as a deterrent instead of a stimulus to the optimum allocation of the world's resources in production". Later, it was noted that this model implicitly assumes that the supply is infinitely elastic, whereas demand is deemed to be perfectly inelastic (Meade, 1955). Because Country A loses the revenue generated from the import tariffs, a loss which is not compensated by a gain in efficiency as a result of the shift of trade flows, Viner claimed that it was likely to suffer a loss in overall welfare, along with the rest of the world.

The extent to which the newly formed customs union is harmful to the efficient allocation of resources depends on various factors, which are also discussed by Viner in *the Customs Union Issue*. Some, yet not all of them, are also relevant to preferential trade agreements such as the Association Agreements ratified by the European Union. These include the size of the customs union (or Preferential Trade Agreement signatory), which matters since a more sizable market increases the potential scope for internal division of labour.

Following the publication of *The Customs Union Issue*, many economists have attempted to make their contribution to the debate on the desirability of customs unions and preferential trade agreements. Richard G. Lipsey identified a second effect, on top of the production effect thoroughly described by Viner, which he labelled the consumption effect (Lipsey, 1957). This effect only arose in the model because Lipsey decided to omit the perfectly inelastic demand assumption, which he considered to be highly unrealistic. The resulting consumption effect denotes the change in consumption behaviour of individuals living in the newly formed customs union as a result of the change in relative prices. Lipsey criticises Viner's assertion that trade diversion, the reallocation of production, is always undesirable because it fails to acknowledge the welfare considerations related to the consumption side of the economy. Even though he agrees that the distinction Viner identified between trade creation and trade diversion is an interesting avenue to explore for economists, he declares that these concepts are inadequate to draw any conclusions pertaining the general level of welfare.

From Lipsey's argument it can be concluded that, in order to ensure trade diversion to be welfare-reducing, one has to construct a model which includes the assumption that the consumers do not alter their behaviour despite the change of trajectory of the trade flows. Besides the fact that this assumption is probably unrealistic, as noted by Lipsey, even the absence of a consumption effect this would not inherently result in a preferential trade agreement being welfare-reducing. Albeit eliminating the possibility of gains in welfare due

to alterations on the consumption side of the economy, a transformation on the production side may also yield a gain in welfare overlooked by both Viner and Lipsey (Bhagwati, 1970). Bhagwati demonstrated that for a trade-diverting trade agreement or customs union to be welfare-reducing, imports, rather than consumption, have to be held fixed. This assumption is not only slightly less strong, it also makes the model more robust, as trade diversion continues to be welfare-reducing even if the production within the home country is allowed to be variable. If reallocation of domestic production resources is possible a terms-of-trade loss induced by the shift of the flow of imports from the low-cost to the high-cost producer may be mitigated by a production- as well as consumption gain. These gains result from the fact that the “international” price-ratio now approaches the price-ratio for domestic producers and consumers, respectively. However, the only way to realise a constant level of imports after the introduction of the trade agreement is to reduce the level of domestic consumption artificially. Notwithstanding the prerequisite introduced by Bhagwati being weaker than Lipsey’s condition, the fact that the model still relies on a controversial element weakens the notion that a loss in welfare unequivocally emanates from trade diversion.

A model with both elastic demand and finite supply elasticity for the exporting industry in country B was first presented by Panagariya (Panagariya, 2000), which also allowed for import from both countries, the customs union partner as well as the most efficient producer. The supply from the world’s most efficient producer (country C) continued to be perfectly elastic. As a result of the specific construction of this model, products manufactured in country C continue to supplement the imports from the new customs union partner. However, trade diversion continues to exist in the sense that relatively more goods are now imported from the other member of the customs union and fewer from the most efficient producer. The price consumers have to pay for the imported good remains constant, so this ultimately implies that the surplus for exporting producers in country B increases substantially.

## *2.2 Empirical Research on Trade Diversion*

Various trade agreements have been analysed empirically in order to research whether the features of the static theoretical framework presented by the economists mentioned above are indeed visible in the real world. One such case, in which the effect of the free trade agreement between the United States and Canada is examined by analysing the trade flows per commodity rather than just aggregate trade flows (Clausing, 2001). This study reveals no disturbing cases of trade diversion. A similar conclusion was reached when trade flows

between Mexico and the rest of the world were considered after the signing of the North Atlantic Free Trade Agreement, or NAFTA (Krueger, 1999). A slightly more sophisticated analysis of this agreement, based on a multi-country, multi-sector Ricardian model which included the indirect effects on intermediate goods and non-tradeable sectors which have been affected following the increase in interregional trade, indicated more mixed results for the members (Caliendo & Parro, 2015). According to this analysis trade among the members of NAFTA had increased substantially. The ultimate conclusion of this study was that Mexico's welfare had increased by 1.21%, the U.S.'s welfare by 0.08% and Canada's welfare had declined by 0.06%. Other economists, who used the revealed comparative advantage (RCA) measure in their analysis, have predicted that some trade diversion would occur as a consequence of further economic integration in South East Asia (Huang & Tu, 1994) and South Eastern Europe (after further integration of the Turkish market) (Karakaya & Ozgen, 2002). These different conclusions show that effects may vary per commodity and country, and explain why economists still have not reached a final verdict concerning the potentially damaging side-effects of customs unions and preferential trade agreements.

### *2.3 Dynamic Models on Trade Diversion*

The models covering the effects of preferential trade agreements that have been discussed so far were all static, yet some have opted for a different path by introducing a dynamic model (Bhagwati & Panagariya, 1996). Whereas previous economists assessed trade deals based on whether they induced trade creation or trade diversion, in *Preferential Trading Areas and Multilateralism: Strangers, Friends or Foes?* the authors expressed their conviction that trade deals should primarily be judged based on their contribution to the final objective: a multilateral freeing of trade. Those deals that instigate a shift towards free trade are described as “building blocks”, those that are based on more protectionism are labelled as “stumbling blocks”. Whether or not trade agreements may be perceived as building blocks depends on the question whether the emergence of trade deals harms the universal process of reducing trade barriers. Preferential Trade Agreements may result in more fragmentation in the world economy and hinder the process to the universal liberalisation of trade under the MFN principle, but the resulting free trade areas may also grow slowly by accepting more countries over time. Although the literature on this topic is limited, the few economists that have considered the implications of discriminatory reductions of import tariffs seem to concur that such agreements have a malign effect on the universal reduction of tariffs (Krishna, 1996) (Levy, 1997) (Saggi, 2006).



Although numerous economists have altered the original model, and some have even proposed completely alternative approaches, Viner's contribution was not only subject to criticism. Many economists agreed with Viner that a total abolition of trade tariffs would be far more efficient than to initiate customs unions or preferential trade agreements. Moreover, he was frequently hailed as a pioneer because of the establishment of a theoretical framework covering the implications of newly formed customs unions. Yet this praise inherently emphasises that Viner's argument may not be regarded as conclusive, requiring economists to conduct more empirical research in order to find convincing evidence to support or reject the line of reasoning presented in *The Customs Union Issue*. This is why this research aims to investigate the effect of European Association Agreements, which have thus far been mostly ignored in this discussion, on the trade relations of the external signatories.

### 3.1 Data

As mentioned above, three entirely different countries will be considered in the remainder of this paper. These nations do not only differ in terms of the state of their economy, but also in their relation with the EU. Israel has historically been a close partner and had already signed a trade agreement with the Union in 1973. Chile, on the other hand, also maintains strong economic ties with its regional neighbours, as well as China (in the form of a trade agreement that was signed in 2006). For Macedonia, the EU constitutes the most important trading partner, and it aspires to join the Union in the future. An overview of the main trading partners of Israel, Macedonia and Chile, in terms of the countries of origin of their imports, can be found in the appendix. This paper focuses on the imports of the three countries because such an analysis would reflect the description of Viner's original account most accurately. In his proposed model country A imported from country B (which may be a larger entity) rather than country C as a result of the reduction in trade tariffs.

However, the consideration of aggregate trade flows of three countries is probably insufficient to formulate a general conclusion pertaining the potential existence of trade diversion, since the effects of the signing of a trade agreement may affect some industrial sectors stronger than others. Therefore, 33 different products manufactured in 23 different sectors have been included in the dataset in order to attempt to account for these differences. The classification of the products and respective sectors is in line with the Harmonized Commodity Description and Coding System as presented by the World Customs Organization. The products and sectors have been selected with the greatest care, in order to make sure that the data was

appropriate for this analysis. In this process, various factors have been taken into consideration, such as the magnitude of the trade flows as well as the fact that all goods are imported from both EU-members as well as non-EU trade partners. If the latter criterion had not been met for particular products, it would have been impossible to establish the relative effect of the bilateral Association Agreements for these items. However, this inherently implies that the research will only investigate the effect of the trade agreements on the intensive margins of trade. Thus, it disregards the possibility that certain products, which were not imported from the EU before the implementation of the agreement may now be flowing from European countries. The products have been taken from a wide range of sectors in an attempt to include all the most important production sectors in the main analysis.

The data set has been retrieved from the UN Comtrade website and allows for the analysis of the trade flows over an extensive period of time, from 1995 to 2013. Since the Association Agreements were signed in 2000 (Israel), 2002 (Chile) and 2004 (Macedonia), this dataset should contain all its effects, even if these (partially) materialised some time before or after the signatory date. The data set included countries as well as supranational entities such as the EU and MERCOSUR; the variables related to such organisations have been deleted. Finally, all products have been categorised by the timeline that was used for the elimination of the trade tariffs. For Israel, this would imply the categorisation into groups for agricultural products and non-agricultural products, yet none of the agricultural products on which additional tariffs are levied were included in the selection used for this analysis. For the other two countries, the reduction of tariffs on imports was sometimes implemented gradually. In the agreement with Macedonia, some products were assigned to the category for sensitive and less sensitive industries. This meant for the products assigned to the less sensitive categories that the tariffs were eliminated in a ten-year period by reducing the tariff by ten percent of the original level each year. For the sensitive category, it was also decided to reduce the tariffs in a ten-year period; however, for these products the tariff was lowered by 20% every two years. In the agreement with Chile, there were three different categories besides the instant elimination of the tariff for non-agricultural products. A few of the import tariffs were gradually reduced over five, seven or ten years' time. An overview of the products and the categories to which they were assigned can be found below.

Product	Commodity Code	Sector	Status Israel Agreement	Status Macedonia Agreement	Status Chile Agreement
Butter and other fats and oils derived from milk	0405	Dairy Products	0	Agriculture	Agriculture
Cheese and curd	0406	Dairy Products	0	Agriculture	Agriculture
Margarine, edible animal or veg oil preparations	1517	Dairy Products	0	Agriculture	Agriculture
Chocolate and other foods containing cocoa	1806	Cocoa	0	0	0
Waters, non-alcoholic sweetened or flavoured beverage	2202	Beverages, spirits and vinegar	0	0	0
Liqueur, spirits and undenatured ethyl alcohol <80%	2208	Beverages, spirits and vinegar	0	0	10
Oils petroleum, bituminous, distillates, except crude	2710	Mineral fuels, oils	0	Sensitive	5
Medicaments, therapeutic, prophylactic use, in dosage	3004	Pharmaceutical products	0	Sensitive	0
Organic surface active agent, preparation, except soap	3402	Soaps, lubricants	0	Sensitive	7
Chemical industry products	3823	Miscellaneous chemical products	0	0	0
Polymers of ethylene, in primary forms	3901	Plastics	0	0	5
New pneumatic tyres, of rubber	4011	Rubber	0	0	0
Fibreboard of wood or other ligneous materials	4411	Wood	0	0	0
Builders joinery and carpentry, of wood	4418	Wood	0	Sensitive	0
Uncoated paper for writing, printing, office machines	4802	Paper	0	Less sensitive	0
Toilet paper and similar paper	4818	Paper	0	Sensitive	0
Woven fabrics of synthetic staple fibres	5512	Manmade staple fibres	0	0	0
Women's or girls' suits	6204	Articles of apparel, not knitted	0	0	0
Footwear with uppers of leather	6403	Footwear	0	Sensitive	0

Glazed ceramic flags and paving, hearth or wall tiles	6908	Ceramic Products	0	Less sensitive	0
Glassware of a kind used for table, kitchen, toilet, office	7013	Glassware	0	Less sensitive	5
Bars and rods	7213	Iron and Steel	0	0	0
bars and rods of iron or non-alloy steel	7214	Iron and Steel	0	0	0
Base metal mountings	8302	Miscellaneous articles of base metal	0	Less sensitive	0
Automatic data processing machines and units thereof	8471	Machinery	0	0	0
Electric generating sets and rotary converters	8502	Electronic equipment	0	0	0
Electric apparatus for line telephony	8517	Electronic equipment	0	Less sensitive	0
Motor vehicles for transport of persons (except buses)	8703	Vehicles	0	Sensitive	0
Motor vehicles for the transport of goods	8704	Vehicles	0	Sensitive	0
Spectacles, goggles etc	9004	Optical, Medical	0	0	0
Instruments etc for medical, surgical, dental, etc use	9018	Optical, Medical	0	0	0
Seats	9401	Furniture and Lighting	0	Sensitive	0
Lamps and lighting fittings	9405	Furniture and Lighting	0	Sensitive	0

The implementation of the Association Agreements is in the data set reflected by means of a set of dummy variables. For trade flows originating from EU members, this dummy AA takes the value "1" the year after the deal has been signed, as the agreements were not signed at the beginning of the year. Please note that not all current EU members were a member state at the time at which those agreements were signed. Therefore, the dummy does not take the value "1" before 2005 for countries such as Poland, Lithuania and the Czech Republic, and not before 2007 for Romania and Hungary. Furthermore, as mentioned earlier, for the agreements with Macedonia and Chile it was decided that the tariffs would not instantly be repealed for all products. Therefore a dummy variable associated with one of the other tariff reduction schemes, rather than the AA dummy variable, will take the value 1 after the implementation of the agreement for some categories of imports considered.

### *3.2 Methodology*

The dataset will be analysed by using an approach based on the gravity model. The gravity model, introduced by Jan Tinbergen (1962), is a model frequently applied in order to assess the impact of trade agreements on trade flows. It has been labelled the Gravity Model because it derives its origin from Newton's Law of Gravity, according to which the force of gravity is determined by the mass of two objects, as well as the distance between the two. Tinbergen, who had a profound interest in physics, discovered that such dynamics could also be observed in trade data, since his analysis indicated that the magnitude of trade flows between nations depends on the gross domestic product (GDP) of the two trade partners as well as the distance (or trade barriers) separating them. Since its introduction, the gravity model has not only been used to examine trade flows, but also foreign direct investments (FDI), migration and tourism.

For a long time, economists struggled to provide a theoretical explanation for the relationship revealed by the gravity model. However, in a sense, the trade model may be regarded as a reflection of supply and demand forces (Head, 2003). If the proportion of national income spent on products originating abroad is held fixed, a larger economy will import more in absolute terms than a relatively small economy. In addition, because the distance may be regarded as a reflection of trade barriers and transportation costs, this variable is negatively correlated with the intensity of the trade relations. Although the considerable impact of distance on bilateral trade flows may come as a surprise to some, extensive econometric research has indicated that it is actually one of the clearest and most robust empirical findings in economics (Leamer & Levinsohn, 1995).

Even though the three basic variables mentioned above are almost always statistically significant in regression analysis considering trade flows, there are multiple other factors that play a role as well. Throughout the years, researchers have added control variables in order to account for the influence of the level of development of an economy (for which income per capita is often deployed as a proxy), as well as geographical location (e.g. adjacency and access to the sea) and historical ties.

As mentioned before, this model has been frequently used to measure the impact of trade agreements. In order to demonstrate the application of the traditional approach to trade

datasets in an attempt to identify trade diversion, I will give a brief overview of the methodology as applied by Krueger in her examination of another free trade agreement, NAFTA. As mentioned previously, the early assessment provided by Krueger suggested that there were no significant indicators of trade diversion visible (Krueger, 1999). In her analysis, she took the logarithm of non-oil imports as the dependent variable and regressed it on distance, the GDP of the relevant countries and a set of additional control variables. The analysis was based on the values of variables in the years 1987, 1989, 1991, 1993, 1995 and 1997. Two additional dummy variables were included, one for the case if both countries, importer and exporter, were a member of NAFTA and one if only one was a member. These variables were also interacted with the number of years since 1987. In the end, Krueger found a positive, yet insignificant (t-statistic of 0.55) coefficient for the dummy variable related to the case of both importer and exporter being a member. Although the dummy variable denoting the situation if only the importer is a member of NAFTA is negative and highly significant, the interaction variable with the variable denoting the years it has been since 1987 was not significant (and its estimated coefficient equal to zero). This suggests that the trade relationships between the newly formed trade zone were already remarkably strong and that the agreement did not result in any additional harm to the external trade partners.

Throughout the years, various elements of the gravity model have been adjusted and improved, and some elements remain controversial. For example, academics realised that failing to include country-pair specific effects not captured by the conventional indicators such as distance and a common language may lead to erroneous conclusions (Anderson & van Wincoop, 2003) (Carrere, 2006). Instead, the inclusion of dummy variables for both the exporting as well as the importing variable should account for all time-invariant bilateral effects. This approach has been applied by, amongst others, Magee to search for patterns indicative of trade creation and trade diversion in data sets denoting import and export flows after the implementation of various trade agreements (Magee, 2008).

Moreover, in the most recent years, a multiplicative Poisson Pseudo Maximum Likelihood (PPML) approach emerged. The ascend of this method was the result of the fact that some economists felt that the original version, in which the natural logarithm of the value of trade flows is taken as the dependent variable, was inappropriate since this approach may lead to misleading conclusions in the presence of heteroskedasticity. Their argument is based on Jensen's inequality, and indicates that the expected value of the logarithm of a random

variable is different from the logarithm of its expected value. Additionally, this newly proposed approach also constitutes a more natural way to deal with zero value of the dependent variable (Santos Silva & Tenreyro, 2006).

The dataset of trade flows of Association Agreement signatories described earlier will be analysed by conducting Ordinary-Least-Squares regressions. Despite the legitimate criticism raised by Santos Silva and Tenreyro, I will use the traditional approach by taking the natural logarithm of the value of goods imported (in US\$) by Israel, Macedonia and Chile as the dependent variable. This is because the UN Comtrade website automatically removes countries for which the values of trade flows to or from the country considered is equal to zero from the data set, and due to relevant constraints I was unable to add all excluded values manually. Yet, I understand that using this method inherently means that I have to be cautious since there may be some bias. The imports of the countries considered will be examined separately.

The complete dataset for each country will be analysed in order to see if clear patterns are visible over the entire economy. In order to account for the distorting effect of time-invariant factors, dummies capturing all the country-pair specific factors will be included. As a result, these dummies will contain all the effects emanating from factors such as distance, a common language and infrastructure. Moreover, dummy variables are also used to correct for the different sectors, reflecting the difference in magnitude of trade flows of specific products. Ultimately the interaction effect between the sector dummy variables and the country dummy variables was included to account for the fact that countries may overall export relative more or less products from specific industries. This may be largely due to the fact that a country enjoys a relative comparative advantage in the manufacture of products from these sectors. By including all these different elements, I hope to ensure that the remaining variation in the value of trade flows will be solely due to time-varying factors, such as the ratification of a major trade agreement.

However, it would be ignorant to assume that the ratification of EU association agreements are the only factors that cause variation in the trade flows over time. Although it is impossible to account for all developments, various measures will be taken to reduce the distorting impact of such factors. The first is the inclusion of a set of dummy variables reflecting the different years in the dataset. These variables do not only capture the impact of global trends

on the imports of Israel, Macedonia and Chile, but also aim to address variance caused by variance in domestic demand. In this sense, these dummy variables capture one of the core elements of the original Gravity equation: the size (or GDP) of the importing country. In order to include the effect of the variance in the magnitude of the exporting economy over time, the logarithm of the total GDP of the trade partners will be incorporated as a control variable. Although it would have been more accurate to include a variable which reflects the economic magnitude of an exporting industry, rather than the GDP of the entire country, these statistics are much harder to obtain. Hence, the overall GDP, combined with the interaction effect between the sector dummies and the country dummies will serve as a viable alternative. The GDP statistics have been obtained from the website of the World Bank. The countries for which these figures were not available, such as North Korea, have been dropped from the dataset.

The most challenging task, however, is to reduce the distorting effect of developments and changes in the relations between the three countries considered and non-EU countries on the direction and magnitude of the trade flows. One clear example is the initiation of other trade agreements, such as the agreement between Israel and the United States in 1995. An overview of the agreements other than the EU Association agreements signed by Israel, Macedonia and Chile during the period considered can be found in the table below.

<b>Israel</b>	<b>Chile</b>	<b>Macedonia</b>
<b>United States (1995)</b>	Brazil (1996)	Turkey (2000)
<b>Canada (1997)</b>	Uruguay (1996)	European Free Trade Area (2000)
<b>Turkey (1997)</b>	Canada (1997)	Central European Free Trade Area (2006)
<b>Czech Republic (1997)</b>	Mexico (1999)	
<b>Slovakia (1997)</b>	South Korea (2004)	
<b>Poland (1998)</b>	European Free Trade Area (2004)	
<b>Hungary (1998)</b>	China (2006)	
<b>Mexico (2000)</b>	Japan (2007)	
<b>Romania (2001)</b>	India (2007)	



<b>Bulgaria (2001)</b>	Panama (2008)	
	Peru (2009)	
	Colombia (2009)	
	Australia (2009)	
	Ecuador (2010)	
	Turkey (2011)	
	Malaysia (2012)	

In an attempt to be able to discuss the impact of the Association Agreements on the trade flows I will present three separate models. The first one will completely disregard the potentially distorting effect of other trade deals. For the second version, the countries that signed a trade agreement other than an Association Agreement with the importing nation have been dropped from the dataset. These two analyses will rely on the following regression equation (in which  $i$  reflects the importer,  $j$  the exporter,  $t$  the relevant year,  $p$  the relevant product,  $s$  the relevant sector and  $x$  the relevant tariff reduction scheme):

$$\ln(import_{ijtp}) = \beta_0 + \beta_1 AA_{ijx} + \beta_2 AA_{ijx} * Year_{it} + \beta_3 Year_{it} + \beta_4 Partner_{ij} + \beta_5 Sector_{is} + \beta_6 Partner_{ij} * Sector_{is} + \beta_7 Sector_{is} * Year_{it} + \beta_8 \ln(GDP_{ijt}) + \varepsilon_{ijtp}^1$$

The third and final analysis uses the original dataset, yet with additional control variables in order to account for the effect of any further agreements. These control variables consist of the interaction effect between the country dummy variables of the partners with which an agreement has been closed and the dummy variables of all the years since the implementation of the agreement. For example, in the analysis of the trade relations of Chile, the variables Turkey\*2011, Turkey\*2012 and Turkey\*2013 will be added. Formally, this implies that the following regression equation will be used for the final analysis (in which  $y$  reflects the partner which signed a trade agreement with the importer other than the Association Agreement):

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<sup>1</sup> Please note that Year, Partner and Sector comprise of a set of dummy variables rather than just one

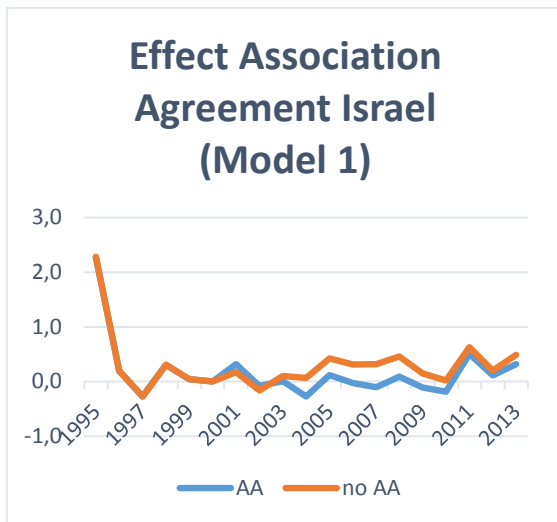
$$\ln(import_{ijt}) = \beta_0 + \beta_1 AA_{ijx} + \beta_2 AA_{ijx} * Year_{it} + \beta_3 Year_{it} + \beta_4 Partner_{ij} + \beta_5 Sector_{is} + \beta_6 Partner_{ij} * Sector_{is} + \beta_7 Sector_{is} * Year_{it} + \beta_8 (GDP_{ijt}) + \beta_9 Partner_{iy} * Year_t + \varepsilon_{ijt}$$

The analyses will compare the imported products belonging to a particular tariff reduction scheme to the same kind of products originating from countries that are not part of the European Union. For example, in the case of Chile, of the all the products considered in this research only the import tariffs levied on liquor were eliminated over a ten year period. For the analysis this implies that the inflow of liquor from the European Union will be compared to the inflow of liquor from the rest of the world, and not to aggregate of all products considered. This implies that for all the analyses depicted above, there will be one version of each for Israel, and four and five versions for Macedonia and Chile, respectively.

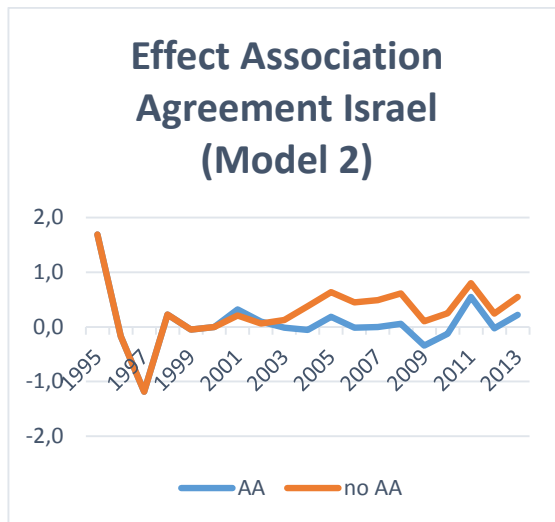
Although all models are possibly still subject to a certain degree of (omitted variable- or selection) bias, I believe to estimate them separately and compare their outcomes is a reasonable approach to reduce the impact of these external time varying forces. If the three patterns derived from the analyses are not conflicting, there would be sufficient reason to believe that the results indeed reflect the impact of EU association agreements on the imports of Israel, Macedonia and Chile.

#### 4.1 Results

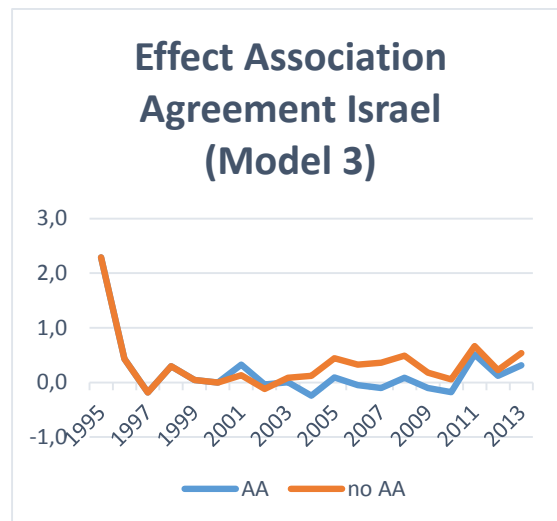
The regression conducted in order to answer the relevant hypotheses was based on a very extensive equation and the conventional presentation in tables may be challenging to interpret. Hence, I believe that for the purpose of this research, a visual graph showing the evolution of the effect of the Association Agreement will prove to be the most insightful. Therefore, in this section, all the relevant results will be presented in such a manner. The blue lines reveal the values of the time dummies (which reflect the imports from countries that did not sign the agreement) and serve as a benchmark. The orange lines reflect the values of the relevant Association Agreement dummy variable as well as the interaction effect between this dummy variable and the time dummies. Note that the year before the ratification of the Association Agreement serves as the reference category. An asterisk will be used to indicate the years for which the value of the goods imported from the EU was significantly higher than that of the inflow from the rest of the world (at the 10% level).



Observations: 22041



Observations: 17271

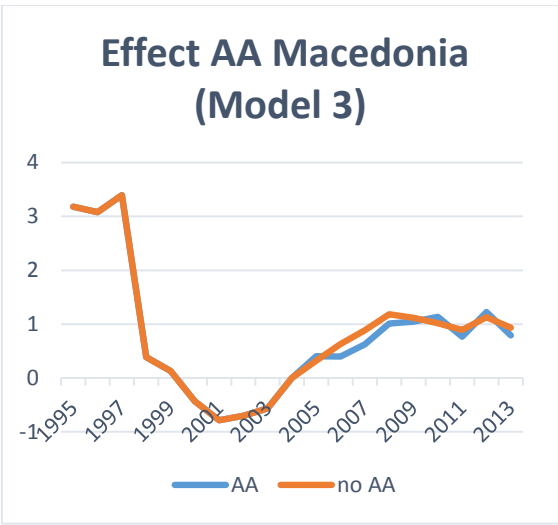


Observations: 22041

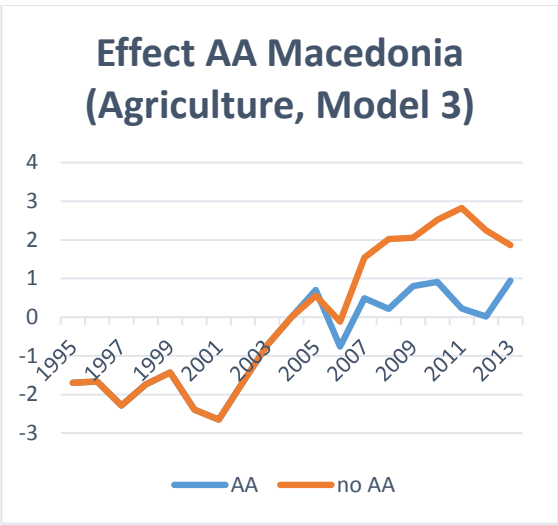
The three graphs exhibit a remarkably similar pattern. Initially, in 2001 (one year after the ratification of the agreement between Israel and the EU), Israel imported relatively more goods from the European Union than the year before, as all three models reveal. As mentioned before, the trade tariffs levied on imports were immediately after the implementation of the agreement eliminated. The positive effect this is supposed to have on the intensity of trade relations is only visible in the first three years, and after 2004 the value of the goods imported from non-EU members grew faster than the value of the goods originated in the EU. The relatively weak effect of the Association Agreement can partially be explained by pointing to the fact that there was already a trade agreement in place between the EU and Israel before 2000; however, this fails to explain why the boost faded after three years.

Since the constant in isolation is only relevant for one specific product, interpreting this value does not provide much valuable insight. Moreover, since the variation in the dependent variable is rather substantial, it would not be sensible to interpret the logarithm of the change in trade flows as percentage changes. As a final note, in line with the predictions of the original gravity model, the logarithm of the GDP of the trade partner is positively associated with the value of the dependent variable.

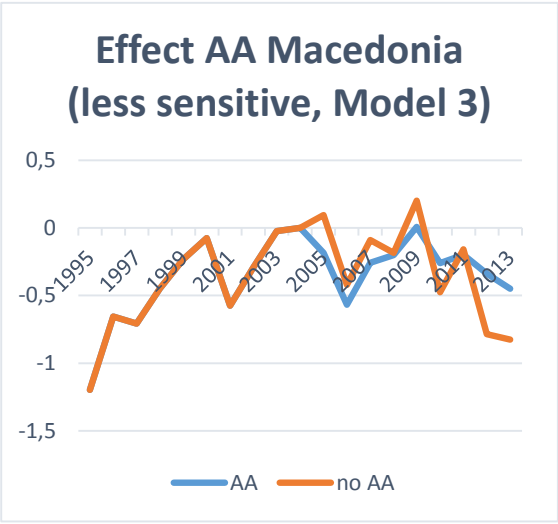
Since the three different models all largely exhibit similar trends, only the results derived from the third model for Macedonia and Chile will be shown in the remainder of this section. The graphs exhibiting the outcomes of the other analyses can be found in the appendix.



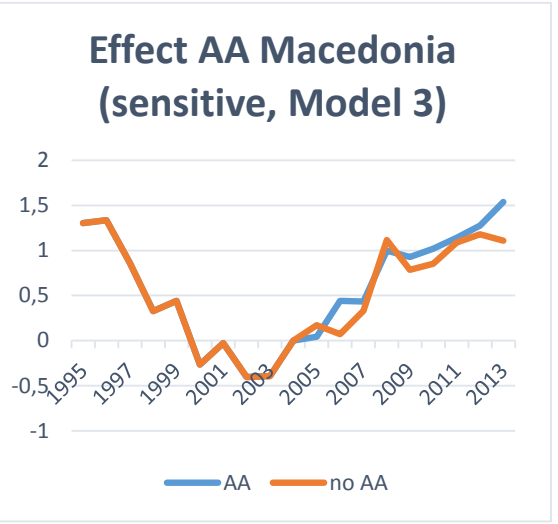
Observations: 7288



Observations: 744

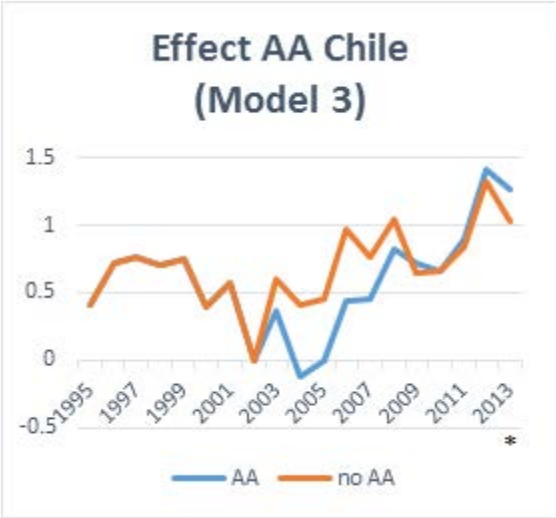


Observations: 2831

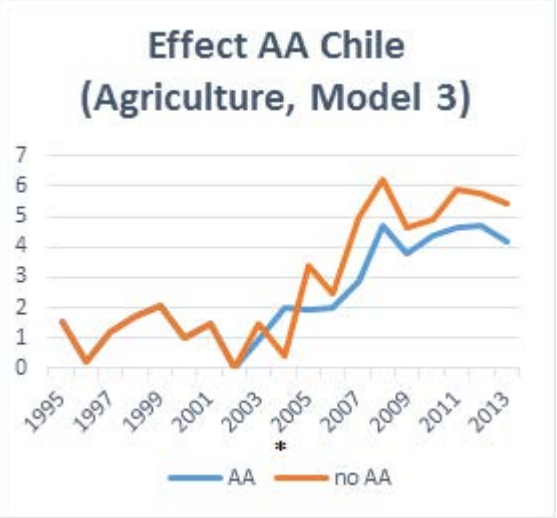


Observations: 6039

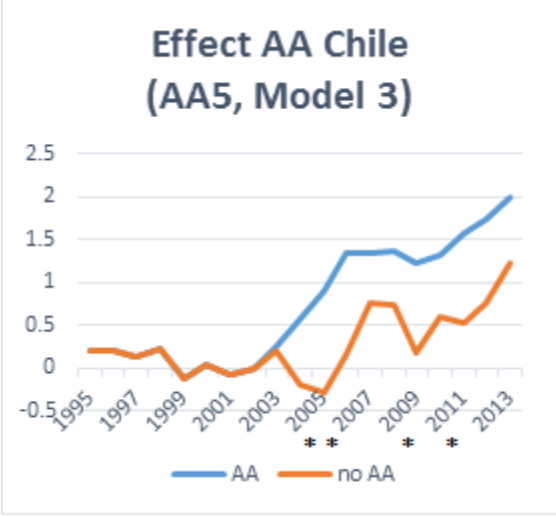
Looking at the analyses of the origins of the goods imported by Macedonia, one can conclude that there seems to have been a boost for European exporters with respect to the goods in the “sensitive” category. Whereas the third model indicates that the effect was hardly noticeable for the less sensitive category, the first model seems to suggest otherwise, as it reveals a significant positive effect for the years 2010, 2012 and 2013. While there seems to have been little effect on the products for which the tariffs were lowered to zero immediately after 2004, the position of the EU as a trade partner in agricultural products seems to have deteriorated since that date.



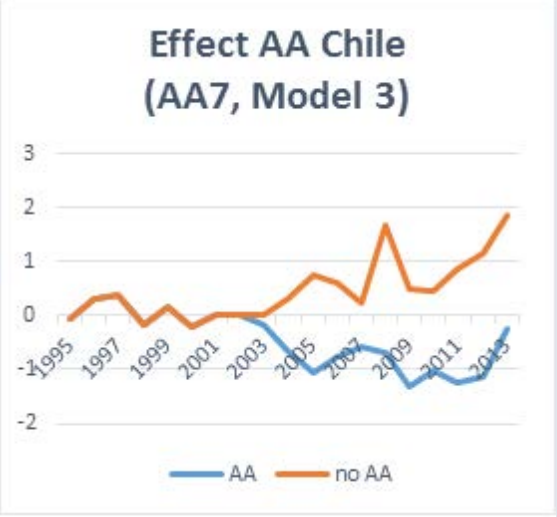
Observations: 16220



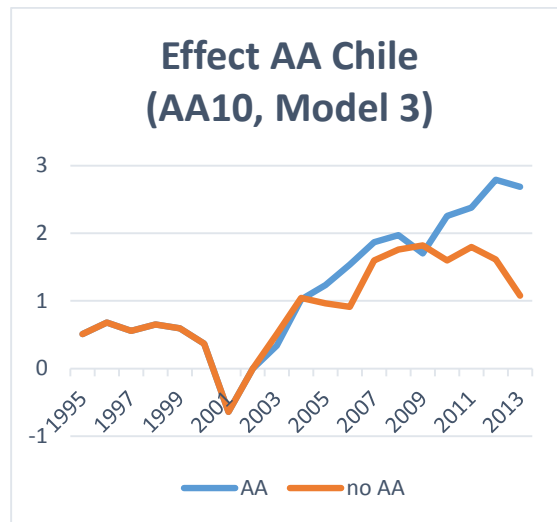
Observations: 768



Observations: 2225



Observations: 755



Observations: 432

The European manufacturers exporting products assigned to the categories AA5 and A10 seems to have benefitted the most from the Association Agreement. The effect of the agreement was statistically significant for the category AA5 in 2005, 2006, 2009 and 2011. The effect was positive for the products in the category AA10 as well, yet not statistically significant. The category of the products for which the tariffs were immediately eliminated does not exhibit an increase as compared to the imports originating from non-EU countries. The line representing the products in category AA7 is consistently below the line of the reference group, yet it should be noted that of the 33 different products considered only soap products were assigned to this category. Quite surprisingly, the output of the third model suggests that the value of the dependent variable for Chile is negatively associated with the logarithm of the level of GDP of the trade partner. However, it is worth mentioning that the estimated coefficients for this variable are not statistically significant for this variable.

An interesting observation, which can only be derived from the graphs in the appendix, is the difference between the results of model one and two for Chile. Whereas the difference between the outcomes of the two was negligible for Israel and Macedonia, in the case of Chile the results of the second model seem much more favourable for the EU than the outcomes derived from the first one. This implies that the advantage enjoyed by European exporters was relatively greater when the benchmark solely consisted of exporting countries that have never signed a bilateral trade agreement with Chile. A decline experienced by these countries like the one visible for the categories Agriculture and AA5 may, in turn, indicate that some countries did suffer as a consequence of all the bilateral trade agreements that have been ratified. However, this phenomenon is only visible in the case of Chile, and not for Israel or

Macedonia. Furthermore, given that major economic powers such as China, South Korea and Japan also ratified a bilateral trade agreement with Chile during the same period, it is impossible to tie the disadvantageous position of some countries to the European Association Agreements specifically. Moreover, the fact that the third model does not reveal any discernible cases of trade diversion makes it harder to unequivocally prove that the European trade agreements harm exporting industries elsewhere.

Another remarkable outcome of the regression analyses conducted for this research is the fact that the increase of imports, if visible, is not always in line with what one might expect. For example, the effect for the categories AA10 and AA5 in the analysis of the Chilean imports is much clearer than for the category containing products for which the tariffs were instantly dropped. This may in part be due to the fact that the 33 products analysed are merely a small sample of all the products traded, yet it also shows that tariffs may not be the only factor determining the dynamics of trade flows.

### *5.1 Discussion*

Despite the fact that the implementation of the Association Agreement in some cases resulted in a boost to European exports, there is no convincing evidence of a discernible decline in the inflow of goods originating from non-EU nations. Kemp and Wan (1976) stated that if the rest of the world does not experience a decline in the intensity of the trade relations (for every single product) with a nation within a newly formed Custom Union (just like Jacob Viner, they initially focused on the economic implications of custom unions), this implies that the rest of the world has not suffered from the agreement (Krueger, 1999). Therefore, such an agreement would constitute a Pareto improvement. If one accepts this line of reasoning, the results presented in the previous section seem to suggest that the analysed agreements did not precipitate trade diversion. However, the value of the theorem proposed by Kemp and Wan has been for empirical research is ambiguous. As among others, Krueger points out, that whilst the theorem probably holds under *ceteris paribus* conditions, it is difficult to test this statement whilst accounting for all external developments taking place in the period before and after the implementation of a trade agreement.

Technically, it could have been possible that the imports from non-EU countries would have grown even faster if there had not been a reduction of the import tariffs levied on European products. If this is true, this would still have to be referred to as trade diversion, since the rest of the world is not as well off as it could have been without any agreement. The fear of

omitted variable bias due to additional time-variant forces is exacerbated by the observation that some for some products, Israel, Chile and Macedonia seem to import less from the EU after the reduction of trade barriers. Since this would be logically impossible under *ceteris paribus* conditions, this confirms that these omitted variables have a substantial effect on the origin of imports. Therefore, in order to identify trade creation and trade diversion with absolute certainty, all time-varying external factors should be included in the regression analysis.

Although the impact of the ratification of additional trade deals has been taken into consideration in the regression of two of the three models used, these are not the only political developments that shape the dynamics of trade flows. Major events besides the decisions to close trade deals are likely to have had an effect during the period considered as well. One example would be the accession of China to the WTO (Ianhovichina & Martin, 2004), which had a profound effect on the value of their exports. Another major landmark was the financial crisis of 2008-09. During this period the value of international trade fell much more dramatically than one would have expected based on the decrease of GDP. For example, the value of exports of the United States dropped by 18.9%, in a period in which the size of its economy only contracted by 3.8% (Levchenko, Lewis, & Tesar, 2010). Therefore, the variable of the GDP of the trade partners may not be sufficient to capture the implications of the global turmoil caused by the crisis on trade flows, certainly because some countries may have been more dramatically affected than others.

Another factor that can be used to explain the results of the regressions conducted for this research is the fact that the growth of productivity may differ per country; for this, it is interesting to consider the initial sources of a comparative advantage. According to the Heckscher-Ohlin model, the competitiveness of a nation in the production of certain goods depends on its relative endowments in terms of resources as well as the technology of production (Krugman, Obstfeld, & Melitz, 2015). If a country has a sizable labour force but relatively little capital, it is said to be labour abundant. Conditional on the fact that all countries are open to trade, such a country would increase its welfare by focusing on the production in sectors which are relatively labour intensive. However, unlike the model, the real world is not static and foreign investments and savings can lead to a change in the capital-labour ratio over the years, causing a transformation of nations' comparative advantages.

Such evolutions of comparative advantages lie at the heart of a famous model used to explain the dynamics of trade relations in East Asia during the second half of the twentieth century,



the flying Geese model. This model, based on a regional hierarchy, suggests that the production of goods will continuously shift from more advanced to less developed nations (Akamatsu, 1962). The main catalyst in this model is the need of more developed nations to relocate production process due to an increase in the cost of domestic labour. As a result, the development of a nation is inherently tied to the decrease of labour-intensive production processes and a rise of more capital-intensive industries.

The developments discussed in the previous paragraphs may partially clarify why the boost to European exports following the ratification of Association Agreements was not as strong as one may have expected. The analysis in this research was based on the import of 33 specific products. It is perfectly possible that other nations became relatively more competitive in the production of these goods, whereas the attention of European producers could have shifted to other items. This would, for example, explain why European exporters enjoyed an initial boost after the implementation of the Association Agreement with Israel, but that the positive effect of the variable AA diminished after only three years. Although the producers of the goods considered benefitted from the fact that there were no longer import tariffs levied on their produce, it was probably insufficient to offset the growth in competitiveness of producers from other nations.

## *6.1 Conclusion*

Like most empirical accounts aimed at disentangling trade creation and trade diversion effects after the implementation of trade agreements, the analysis described in this thesis did not detect any real symptoms directly associated with trade diversion. Despite the fact that the analysis conducted for this research paper does not give me any reason to reject the second hypothesis, I believe this is insufficient evidence to claim that trade diversion did absolutely not occur as a result of the Association Agreements. One has to remain extremely cautious as the regression results pertaining trade flows may be subject to bias resulting from the distorting effect of unknown factors. Although control variables have been included to mitigate the harm to the internal validity of the research, these might insufficient to capture all the different dynamics affecting the trade flows around the world.

Besides the threat to internal validity posed by the time varying forces described above, there are two further drawbacks to the analysis conducted in this research paper. The first note is that the regression relies on data for 33 different products. These are products that were intensively traded throughout the period 1995-2013. Therefore, this research may fail to

consider the impact of products that were newly introduced to the market. Furthermore, the fact that the regression of the models with modifications resulted in a negative estimated coefficient for the variable reflecting the logarithm of the GDP of the trade partners of Chile may indicate that these modifications were too extreme, distorting the mechanisms usually revealed by the Gravity Model. However, the negative estimated coefficient is likely to have been induced by the newly introduced set of control variables, which would imply that its effect is not distorted, but merely captured by another variable. Since the patterns revealed by the separate analyses are largely similar, I am confident that these modifications have not led me to draw completely fallacious conclusions.

Furthermore, the different models show that the ratifications of trade agreements elsewhere in the world did not have a noteworthy distorting effect on the analysis conducted based on the first model, especially not in the case of Israel and Macedonia. In addition, the similar outcomes resulting from the different models seem to suggest that the magnitude of the boost experienced by the European Union does not really depend on whether other nations maintaining trade agreements with Israel and Macedonia were included, excluded or accounted for. Despite the fact that the difference in the conclusions obtained from the first and the second model for Chile contradicts this observation, this is insufficient to serve as compelling evidence of trade diversion.

There are multiple possible extensions that could enhance the accuracy of the empirical analysis of trade creation and trade diversion in the future. One potential addition that could reduce the distorting effect of the changes in comparative advantages in the world would be to add the revealed comparative advantage (RCA) index as a control variable to the analysis. Including the variable, for each product and each year, would reflect the competitiveness of a nation's industries. In addition, one could also consider adding the height of the trade tariffs levied on imports as a control variable, rather than just the different categories as has been done in this research.

However, despite the absence of these control variables, the analysis seems to be sufficient to conclude that extremely harmful cases of trade diversion caused by the Association Agreements, occurring on a large scale, are improbable. In most cases, the imports of Israel, Macedonia and Chile from non- EU countries appear to follow an upward trend. Nonetheless, the claims that bilateral trade agreements are far from ideal, and that a multilateral reduction of trade barriers, possibly via the WTO, would be a far more efficient approach, continue to be plausible.

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## 8.1 Appendix (Origin of imports, 1995 & 2013)

### Israel

rank	Partner	Trade Value (US\$)	rank	Partner	Trade Value (US\$)
1	USA	\$ 5,263,608,832.00	1	USA	\$ 8,159,492,000.00
2	Belgium-Luxembourg	\$ 3,433,426,944.00	2	China	\$ 5,660,266,000.00
3	Germany	\$ 2,745,722,880.00	3	Germany	\$ 4,666,311,000.00
4	United Kingdom	\$ 2,324,751,104.00	4	Switzerland	\$ 4,397,265,000.00
5	Italy	\$ 2,193,860,096.00	5	Belgium	\$ 3,823,010,000.00
6	Switzerland	\$ 1,680,492,032.00	6	Netherlands	\$ 2,717,506,000.00
7	France	\$ 1,158,331,008.00	7	Italy	\$ 2,692,748,000.00
8	Netherlands	\$ 949,073,984.00	8	United Kingdom	\$ 2,421,850,000.00
9	Japan	\$ 931,387,008.00	9	Turkey	\$ 2,354,144,000.00
10	Spain	\$ 520,864,000.00	10	India	\$ 2,121,990,000.00

### Macedonia

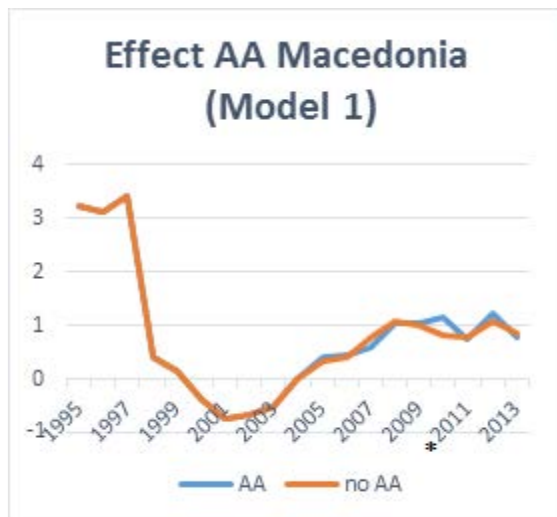
rank	Partner	Trade Value (US\$)	rank	Partner	Trade Value (US\$)
1	Germany	\$ 282,899,136.00	1	United Kingdom	\$ 726,809,338.00
2	Bulgaria	\$ 255,892,368.00	2	Greece	\$ 697,786,594.00
3	Italy	\$ 179,262,432.00	3	Germany	\$ 693,621,245.00
4	Serbia and Montenegro	\$ 161,055,360.00	4	Serbia	\$ 551,988,176.00
5	Slovenia	\$ 116,436,208.00	5	Italy	\$ 428,442,581.00
6	Russian Federation	\$ 60,429,816.00	6	China	\$ 379,563,199.00
7	USA	\$ 57,750,128.00	7	Bulgaria	\$ 365,678,519.00
8	Croatia	\$ 56,246,044.00	8	Turkey	\$ 314,494,115.00
9	Turkey	\$ 55,066,724.00	9	Slovenia	\$ 167,369,538.00
10	Austria	\$ 44,910,024.00	10	Russian Federation	\$ 163,623,733.00

## Chile

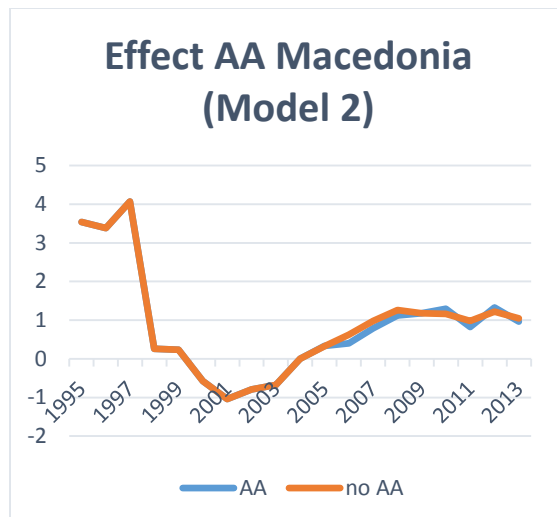
rank	Partner	Trade Value (US\$)	rank	Partner	Trade Value (US\$)
1	USA	\$ 3,792,839,680.00	1	USA	\$ 16,077,233,745.00
2	Argentina	\$ 1,384,488,960.00	2	China	\$ 15,631,618,818.00
3	Brazil	\$ 1,194,607,488.00	3	Brazil	\$ 5,109,117,210.00
4	Japan	\$ 1,012,887,232.00	4	Argentina	\$ 3,933,179,654.00
5	Germany	\$ 789,635,840.00	5	Germany	\$ 3,200,666,183.00
6	Mexico	\$ 600,620,032.00	6	Rep. of Korea	\$ 2,766,713,096.00
7	Rep. of Korea	\$ 527,364,864.00	7	Mexico	\$ 2,538,344,237.00
8	Italy	\$ 508,666,752.00	8	Ecuador	\$ 2,514,801,094.00
9	France	\$ 445,830,976.00	9	Japan	\$ 2,477,521,577.00
10	Spain	\$ 444,916,640.00	10	France	\$ 2,249,238,420.00

## 8.2 Appendix Results

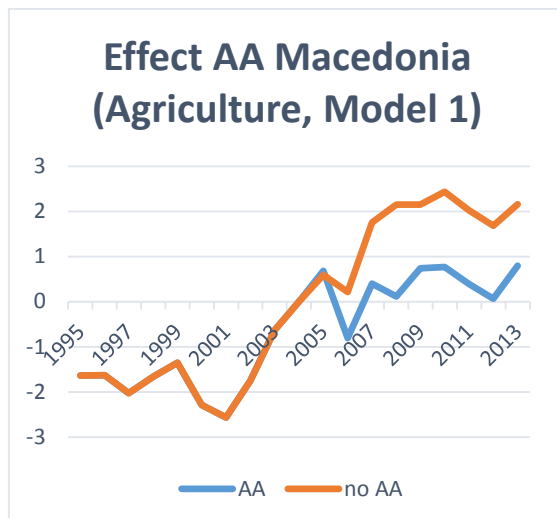
### Macedonia



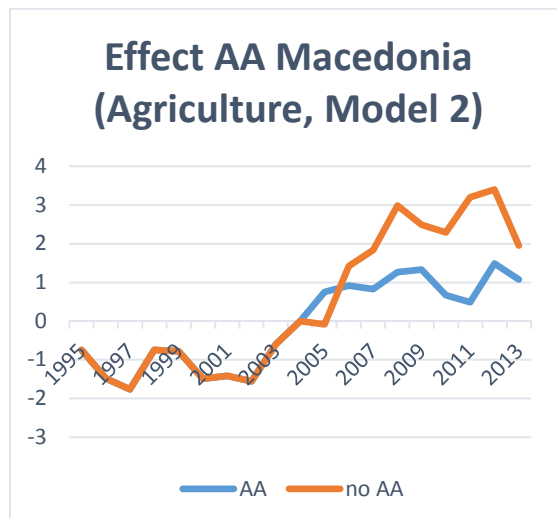
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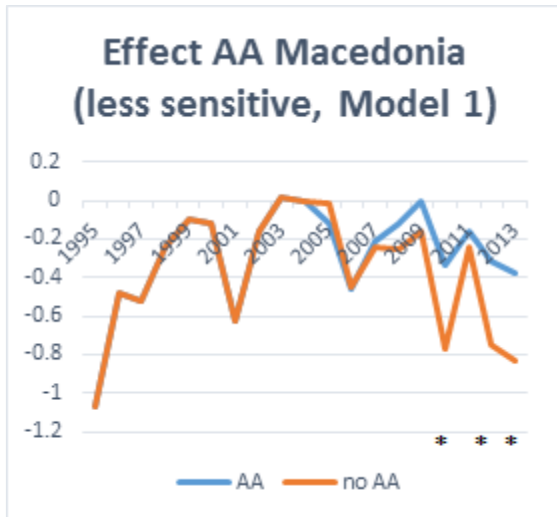
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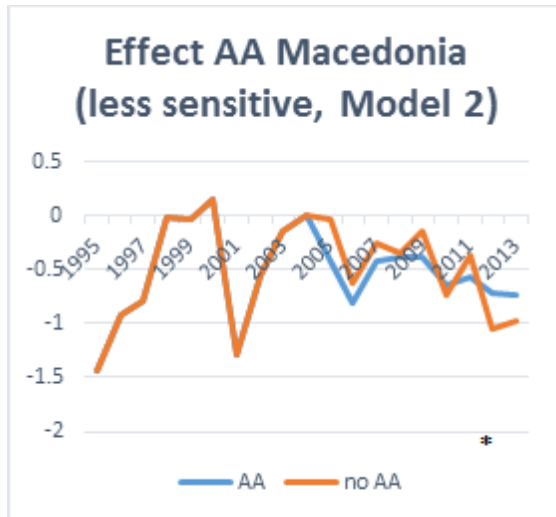
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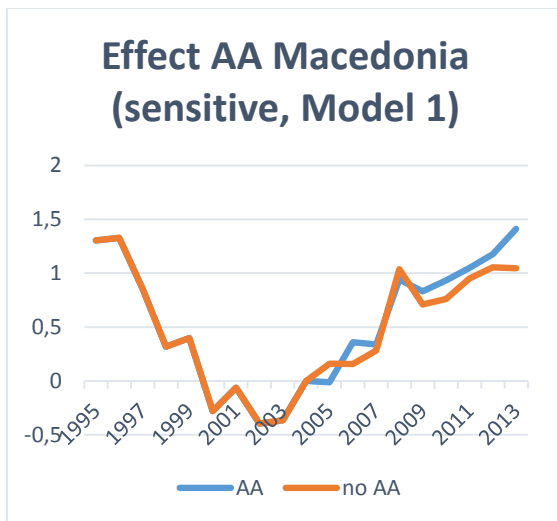
Observations: 555



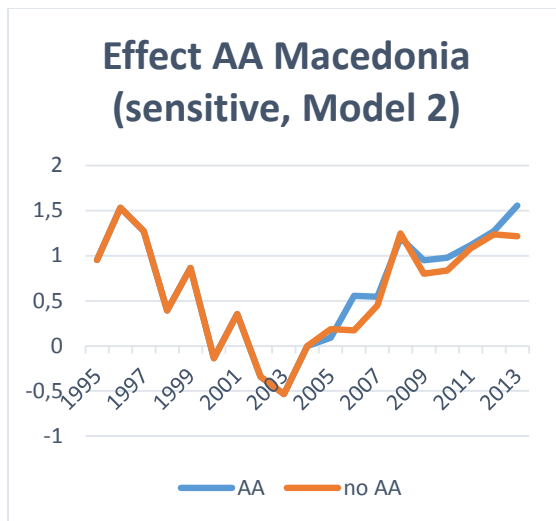
Observations: 2831



Observations: 2305

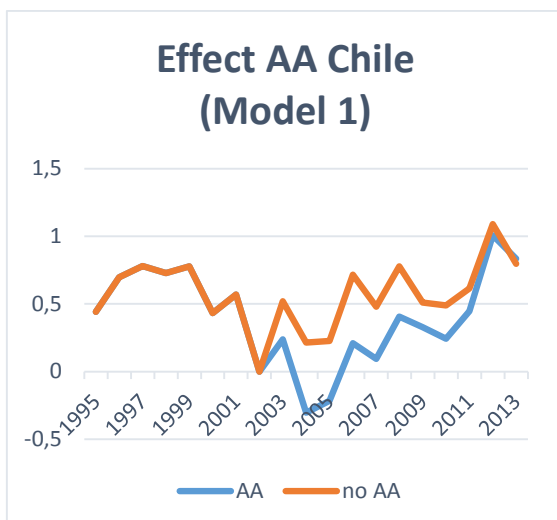


Observations: 6039

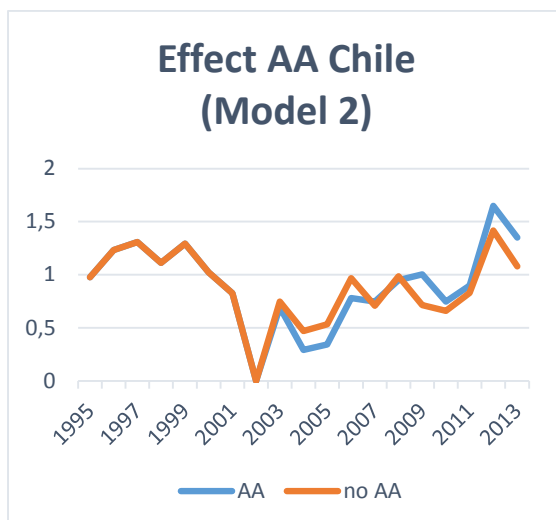


Observations: 4823

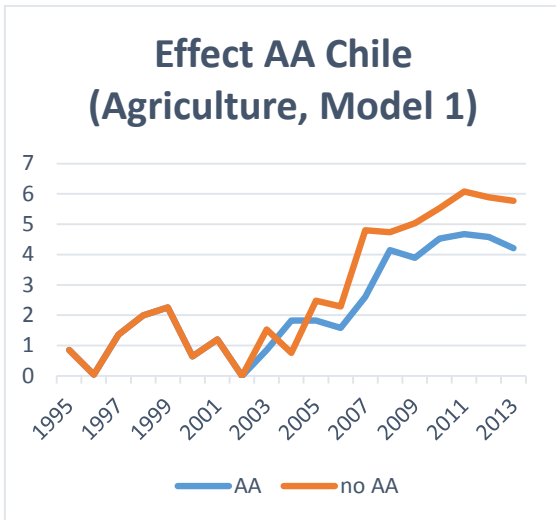
## Chile



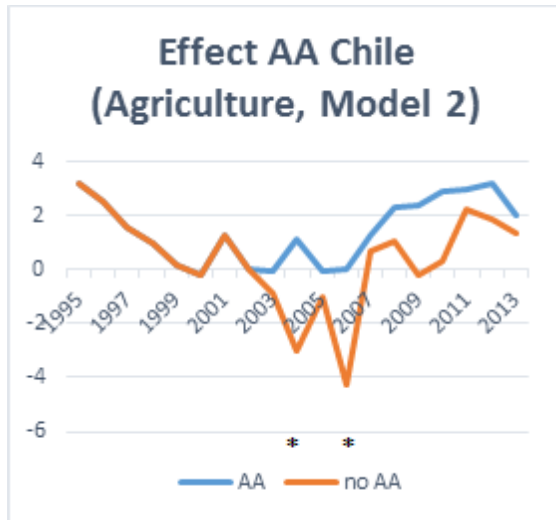
Observations: 16220



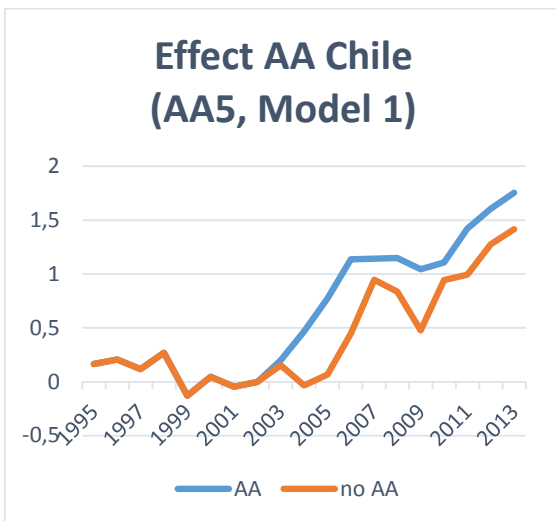
Observations: 9527



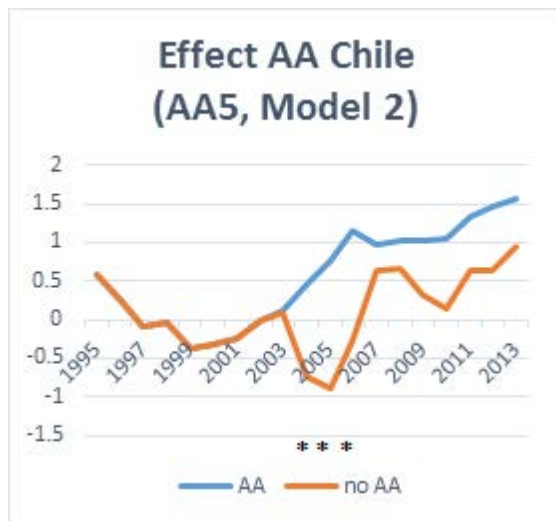
Observations: 768



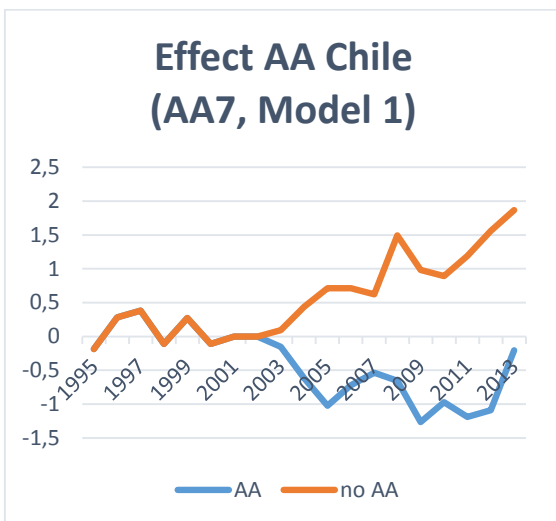
Observations: 371



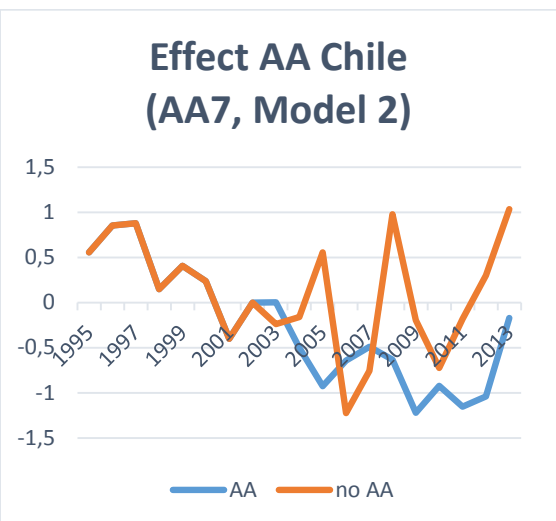
Observations: 2225



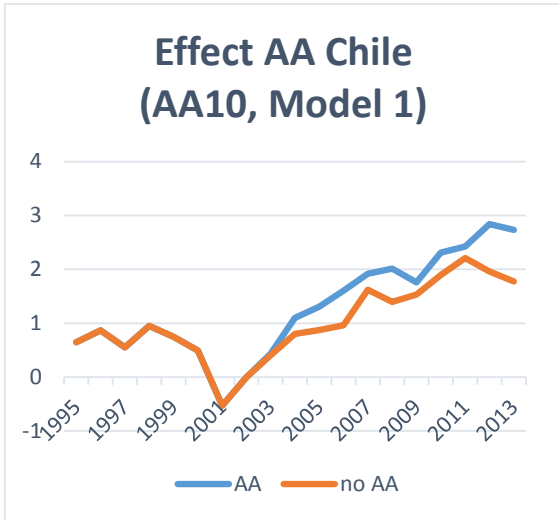
Observations: 1275



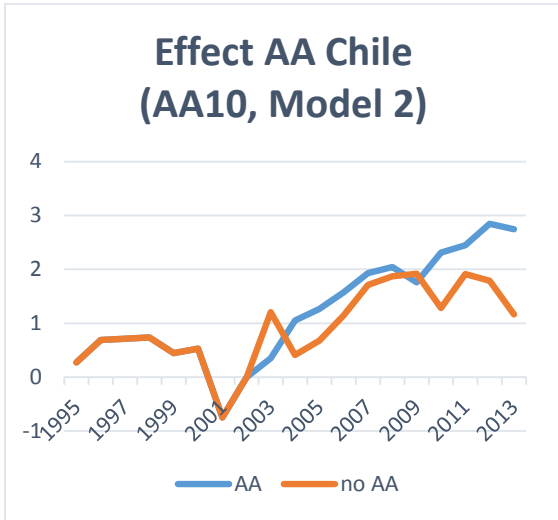
Observations: 755



Observations: 431



Observations: 1131



Observations: 687