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SCHOOL OF INTERNATIONAL STUDIES

ANALYSIS OF THE COMMERCIAL FLOWS OF ECUADOR WITH GERMANY WITH APPLICATION OF THE GRAVITY MODEL.

GRADUATION THESIS PRIOR TO OBTAINING A BACHELOR DEGREE IN INTERNATIONAL STUDIES WITH A BILINGUAL MINOR IN FOREIGN TRADE

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DEDICATION

To my parents, my brother and all my family, for always believing in me and for their constant support in every stage of my life.

To my friends, former colleagues and all the people who, with their stories, helped me to build mine.

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ABSTRACT

This document analyzes the bilateral trade flows between Ecuador and Germany through the application of a gravity model. The study covers the period 2002 - 2017. It tries to identify the main factors that affect trade flows between both countries and analyze the influence of those factors. For this, an analysis of exports and imports is carried out, together with an analysis of the main products that constitute them, to then apply the gravity model that, in turn, takes into account the GDP of both countries and the trade costs to determine their influence in the trade flows.

RESUMEN

Este documento realiza un análisis de los flujos comerciales bilaterales entre Ecuador y Alemania mediante la aplicación de un modelo de gravedad. El estudio comprende el periodo 2002 – 2017. Permite identificar los principales factores que afectan los flujos comerciales entre ambos países y analizar su influencia en los mismos. Para esto se realiza un análisis de las exportaciones e importaciones, junto con los principales productos que las conforman, para luego aplicar el modelo de gravedad que, a su vez, toma en cuenta el PIB de ambos países y los costos de comercio para determinar su influencia.

INTRODUCTION

The present work is a study that analyzes the bilateral trade flows between Ecuador and Germany. This is important because Germany was, in the period between 2002 and 2017, the main trading partner of Ecuador in the European Union. At first glance, that may seem strange, because within the European Union there are countries that have more proximity in terms of language, culture and physical distance, such as Spain. Although those countries have come close, they have not become as relevant for Ecuador as Germany has been. However, its characteristics, such as being the largest and most populated economy in the European Union, seem to show that it is natural to have higher trade flows with Germany than with other countries. Thus, this paper studies the influence of the main factors in bilateral trade between Ecuador and Germany through a gravity model and the main products that are part of these flows.

The gravity model has been chosen for this analysis due to its great acceptance at international level for analyzing trade flows and its ability to provide information on the influence of the Gross Domestic Product (GDP) and trade costs. The gravity model applied to foreign trade is based on the same logic as Isaac Newton's Law of Gravity, which indicates that the attraction generated by one body with respect to another varies according to the size and distance of the bodies. This, applied to countries and their trade, means that the size of an economy, measured by its Gross Domestic Product (GDP), directly affects the trade flows, increasing with larger economies; while the effect of trade costs is the opposite, indicating that when these are greater, the size of trade flows should decrease. With this being said, the model allows calculating information related to the influence of these factors on bilateral trade flows.

The trade flows are composed of all products imported and exported between the two countries. This also explains the importance of the analysis carried out on the main import and export products. It is not only important to know precisely what is traded between the countries analyzed in the model in large quantities and the participation of those products with respect to the total of imports or exports, but it is also important to understand the possible influence of those products on the trade between the countries. If there is a very important product within the commercial flows, it can be affected by external factors and subsequently it could noticeably disturb the trade flows and make the calculations imprecise. In addition, it is important to see the type of

products sent by each country, since these may differ according to the orientation of each State's economy. The Ecuadorian government itself accepts that the country's economy is primary-exporting oriented, something very different from a more industrialized economy like the German one. This creates appreciable differences in trade between countries since raw materials tend to have lower values in the international market than processed products. Therefore, the analysis of the main products that are part of the trade flows helps to understand the nature of trade between the two countries and the effects they can generate.

For the reasons stated in the previous paragraphs, this document will have the following structure. First, exports from Ecuador to Germany and the main products that constitute them are analyzed. Second, Ecuador's imports from Germany are analyzed, as well as the main products that constitute them. The products considered as the most important are those that throughout the period of study become the ten most exported or imported, as the case may be, in US dollars according to the "Free On Board" Incoterm (FOB). Third, the bases of the gravity model are explained and the gravity model is applied to the bilateral trade flows between Ecuador and Germany. Finally, this document closes with the presentation of the conclusions of the study.

By first studying the imported and exported products and then moving on to obtain numerical data, the intention is to provide useful and accurate information that can help both importers and exporters or even public policy makers to take better decisions. This occurs before the beginning of a trade openness period for Ecuador and the improvement of its commercial relations with all the members of the European Union following the recent signing of a Multiparty Trade Agreement. Thus, Ecuador could afford to take better advantage of future opportunities and analyze the approaches it must take regarding trade with its main trading partner in the European Union.

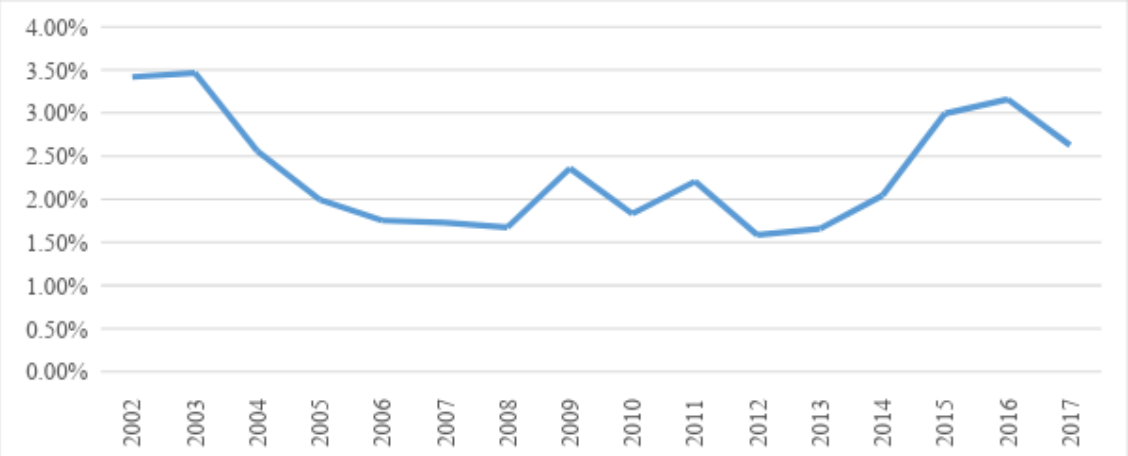
CHAPTER 1: ANALYSIS OF EXPORTS

In this chapter, the exports from Ecuador to Germany are analyzed from 2002 to 2017. First, the importance of Germany in relation to the total of exports of Ecuador is examined, analyzing its growth in terms of FOB and MT. Second, a profile of the German market, the target of these products, is provided. Third, there is a review of the ten most important products and their behavior. Finally, fourth, the conclusions of the chapter are established.

1.1 Percentage importance of Ecuadorian exports to Germany

During the period of analysis, Ecuador exported on average 2.32% of its total exports to Germany, the year with most participation was 2003 with 3.47% of total exports and the lowest point was 2012 with 1.59%.

Figure 1.1 Percentage share of Germany in exports from Ecuador in the period 2002 - 2017



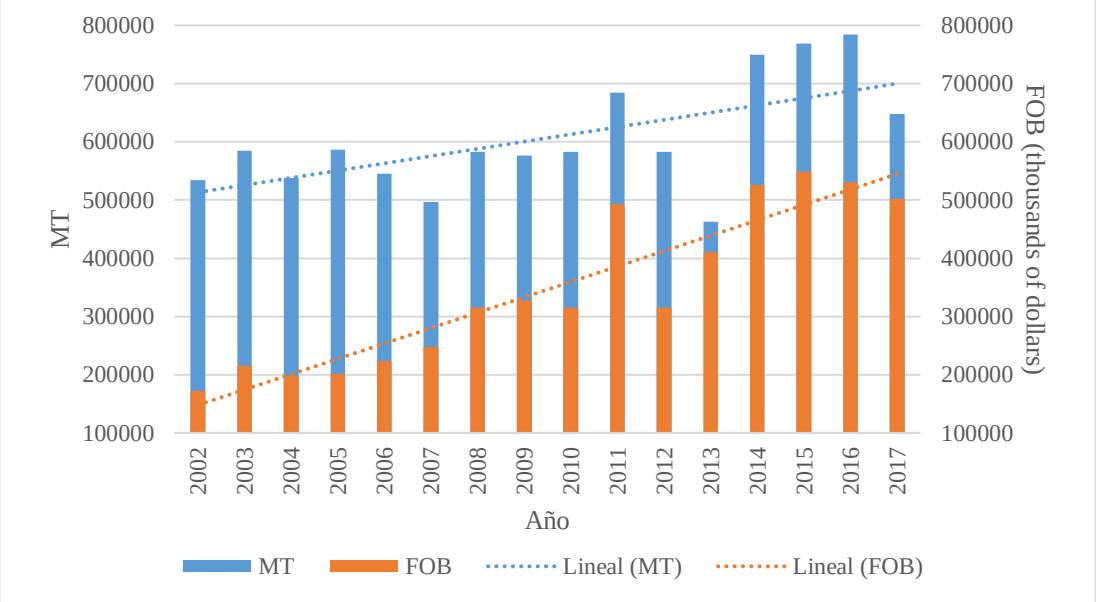
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding the trend, FOB clearly sees an increase in the amount of transactions during the period of analysis. In FOB values, the year with the biggest quantity of exports was 2015 with $ 548,916 million and the year with the lowest quantity of exports was 2002 with $ 172,165 million. Similarly, in terms of tons it is possible to see an upward trend, although in the latter case the trend is less pronounced. Thus, for more than 10 years, from 2002 to 2013, exports in MT remain in the same range of 40 thousand to 60 thousand tons, except for the year 2011. Even, during these years, within the range 50 thousand to 60 thousand tons only three years are the exception: 2006 and 2013 with

less and 2011 with more than the range. Since 2014, after two consecutive years of decline, there is evidence of a recovery in MT that stops in 2017. In any case, an increase is present in a visible way in both values during the analyzed period.

Figure 1.2 Exports in metric tons (MT) and in FOB values in thousands of dollars from Ecuador to Germany



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The aforementioned growth, more pronounced for exports in FOB than in MT, implies that over the years the country is not exporting many more products in tons, but that the products that are being exported have a higher value throughout the years.

1.2 Profile of the German market

Germany has one of the largest economies in the world. It is the largest economy in the European Union, representing about one fifth of its total GDP, and the fourth largest in the world, only behind the United States, China and Japan, according to the International Monetary Fund (2018). As for the composition of its GDP, it has a high participation of the tertiary sector, services, and a very low participation of the primary sector, agriculture. In short, it is the typical structure of a country with a high level of economic development.

Table 1.1 Composition of Germany's GDP by sector of the economy by 2017

Sector	Description	Participation
Primary	Agriculture, forestry and fishing	**0.70%**
Secondary	Construction	4.95%
	Industry, except for construction	25.67%
	Total of the secondary sector	**30.62%**
Tertiary	Services	**68.68%**

Source: www.destatis.de.

Elaboration: García, Paulo.

The German economy is mainly focused on exports. Here, large internationally recognized industries are based in the country and approximately one in five jobs depend on foreign trade (ProChile, 2018). Thanks to this export orientation, Germany registered a surplus during the whole period of this study in its commercial flows, becoming the third exporter of goods in the world, only after China and the United States. It is notable, however, that, with Ecuador, Germany actually has a deficit in its commercial flow in almost all the years of the period of analysis, with the exception being the year 2010.

Regarding the imports that Germany makes, according to the (Federal Statistical Office, 2018), its main partners in the year 2017 were, in order: China, the Netherlands, France, the United States and Italy, while Ecuador reaches the 77th position. Countries such as Colombia and Peru, regional competitors, are respectively in the 60th and 61st positions, although for Germany there is only a deficit with respect to Peru.

Germany is an outstanding market where it is very easy to do business. It attracts products and investment in its market with the large number of buyers, its good economic level, its excellent infrastructure and a very important training, research and its high level of development (ProChile, 2018). This makes it very easy to do business within the country, which has enabled it to reach 20th position of the ranking *Doing*

Business (World Bank, 2018), out of 190 countries analyzed. However, it is necessary to take into account other factors that influence when doing business with Germany or its citizens.

Different business guides describe the German market as one that cares about the type of products it acquires. Although, regarding the products of daily consumption, the most relevant factor is the price (SIICEX, 2017), there is also an important tendency for these products to be certified indicating that they are organic, its production is based on fair trade (ProChile, 2018) or that their manufacturers take into account the protection of the environment. These types of products also face tough negotiations with supermarket chains, which can force the reduction of product prices if they want to be competitive with other suppliers.

In terms of durable consumer goods and services, Germans tend to have very strict selection criteria. These are usually related to the quality and safety of the products they buy, their comfort, and their price. In addition, they tend to pay attention to details and payment deadlines.

The citizens of Germany are serious and direct people. They tend to be very punctual and plan well in advance (Argentina Trade Net, 2011). Based on Hofstede's model, Germans are described as competitive individuals who do not like uncertainty, which is also reflected in a long-term thinking with a good capacity to adapt to changes (Hofstede Insights, 2018). In addition, Germany is considered as a society of "low context", which explains how direct they are, since the objective for the Germans is the subject to be dealt with in a negotiation, more than the negotiators and their personal situations (Hofstede Insights, 2018). This forms a society that is very different from the Ecuadorian society.

For this point of the analysis, the year 2017 was primarily taken into account. This is because it is the last year available and the most current reflection of the situation in Germany and its commercial partners. Even so, with respect to the other years, there are no great variations and the commercial partners remain in their majority.

1.3 Main export products

The main products during the analysis period are:

Table 1.2 Most exported products in FOB values from Ecuador to Germany in the period 2002 - 2017

Position	Product	NANDINA	Period	Description of the NANDINA	Participation
1	Cavendish Valery Banana	0803901190	2016-Present	Others	
		0803901110	2016-Present	Certified organic	
		0803901100	2013-July 2016	Type «cavendish valery»	
		0803001200	1998-2012	Type «cavendish valery»	
		Total			53.35%
2	Tuna	1604141012	2016-Present	In water and salt	
		1604141013	2016-Present	In oil	
		1604141023	2016-Present	In oil	
		1604141022	2016-Present	In water and salt	
		1604141000	2002-2016	Tuna	
		Total			10.48%
3	Coffee Extracts	2101110000	1998-Present	Extracts, essences and concentrates	8.33%
4	Cacao	1801001990	2016-Present	Others	
		1801001910	2016-Present	Certified organic	
		1801001900	2005-2016	Others	
		1801001000	1998-2005	Raw	
		Total			8.07%
5	Roses	0603110000	2007-Present	Roses	
		0603104000	1998-2007	Roses	
		Total			2.33%
6	Broccoli	0704100000	1998-Present	Cauliflowers and broccoli («broccoli»)	1.58%
7	Palm oil	1511100000	1998-Present	Raw oil	1.18%
8	Wood	4407220000	2007-2017	Virola, Imbuia and Balsa	
		4407240000	1998-2007	Virola, Mahogany (Swietenia spp.), Imbuia and Balsa	
		Total			1.39%
9	Pineapples	0804300000	1998-Present	Pineapples	1.07%
10	Vegetables, cooked in water or steam, frozen	0710809000	2002-Present	Others	0.70%
	Others				11.54%

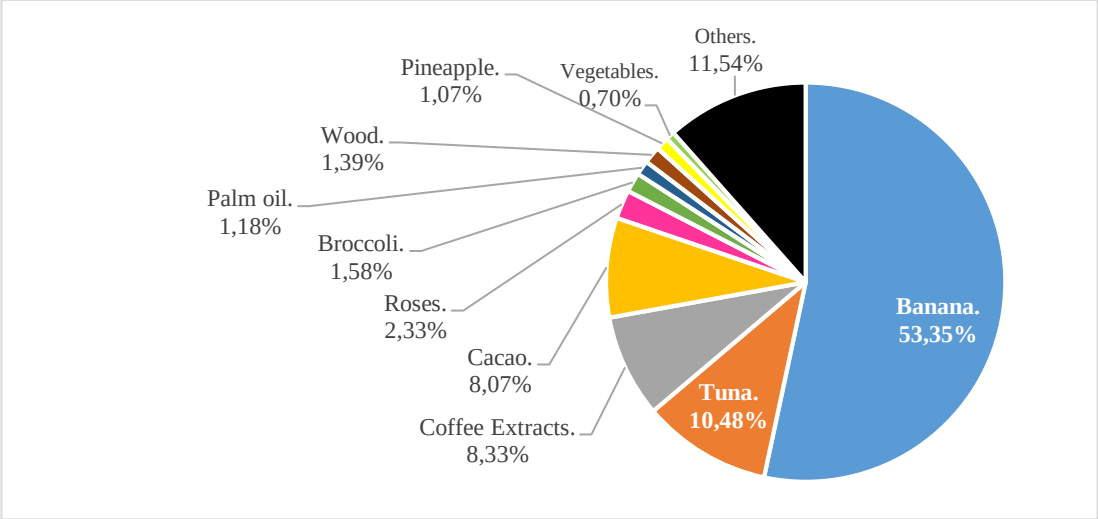
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Some products have more than one NANDINA, the code that identifies each category of imported products, due to the different changes in the nomenclature, both nationally and internationally, that occur during the period of analysis. However, they still refer to the main product.

In general, three aspects of this group of products most exported to Germany can be noticed. First, it is necessary to bear in mind that most are raw materials or products that have a low level of manufacturing. Second, most of these products are of agricultural origin. Third, Ecuador's main export product to the world is oil, but it is practically not exported to Germany. However, banana is exported, which is Ecuador's main non-oil export product to the world. These three points are present throughout the analysis period.

Figure 1.3 Percentage share of the ten most exported products in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values



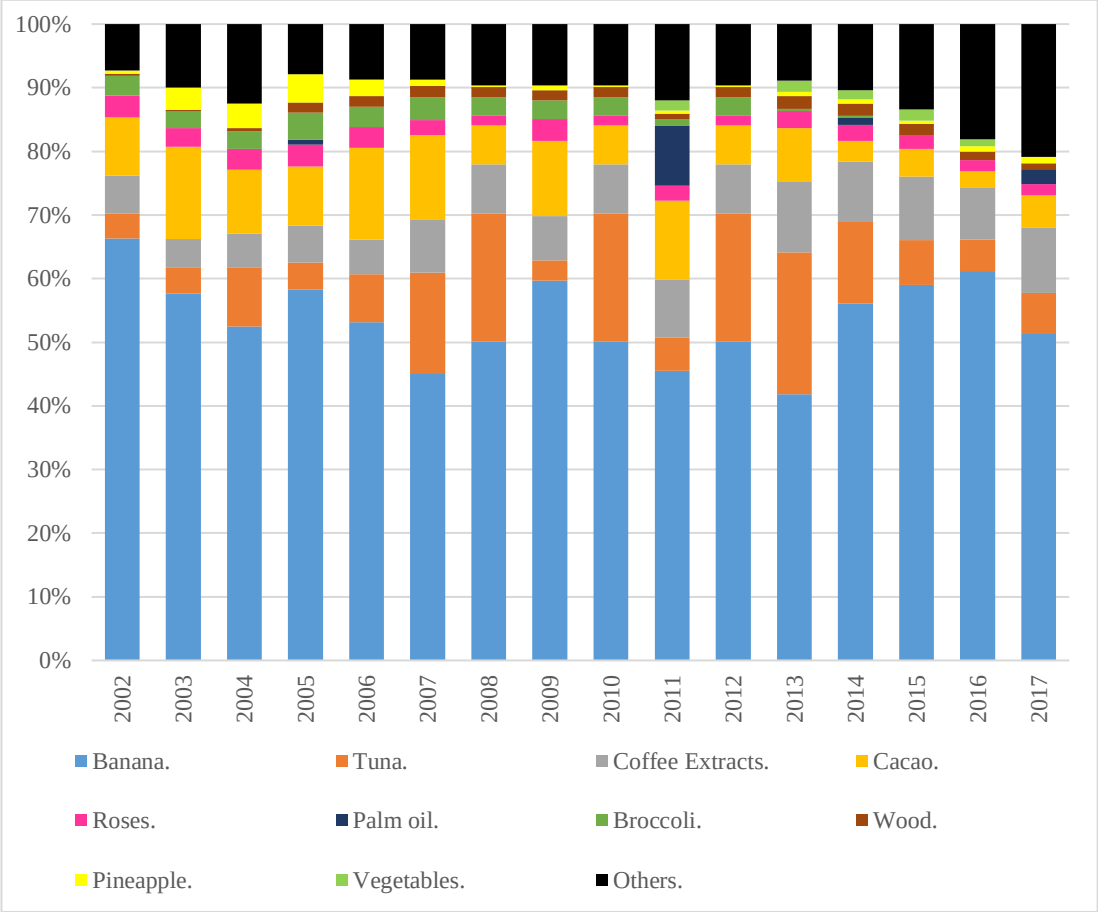
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

When an analysis of the entire period of analysis is made, a clear predominance of bananas can be seen. It occupies more than a half of the exports of the period. The next product, tuna, occupies about a fifth of the first, with a little more than a tenth of the total. Cacao and coffee extracts represent approximately 8% each and after these, the following six products individually have a share of less than 3% and combined close to that of cacao or coffee extracts. The category of other products comes to represent one percentage point more than tuna, putting others as the second item in the chart, but the fundamental difference is that this group between approximately 170 to 430 products depending on the year.

This makes it possible to differentiate that there are certain scales in which the Ecuadorian export products could be grouped. First, the dominant product: banana. Second, the products with a high participation, which individually have between 8 and 11% of the total exports, which are: tuna, coffee extracts and cacao. Third, the products with a smaller share: roses, broccoli, palm oil, wood, pineapples and vegetables. Fourth, the other products, where each one has a share of less than 0.7%, with the majority of products having a share of less than 0.1% of total exports.

Figure 1.4 Annual composition of exports from Ecuador to Germany in FOB values



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Likewise, in general terms because this point is explained in more detail below, the increase or decrease in the participation of certain products within the total of exports is noted. On the one hand, it is observed that the importance of banana is not sporadic, always representing a large part of total exports. Tuna, on the other hand, is highly variable with years in which sudden changes occur, especially during the period 2009 - 2012. Coffee extracts have an inverse behavior to cacao since the former have a continuous increase while the latter slowly decreases its participation. On the other hand, broccoli slowly disappears from the graphic in recent years. Palm oil and vegetables, on the other hand, have an irregular presence in exports.

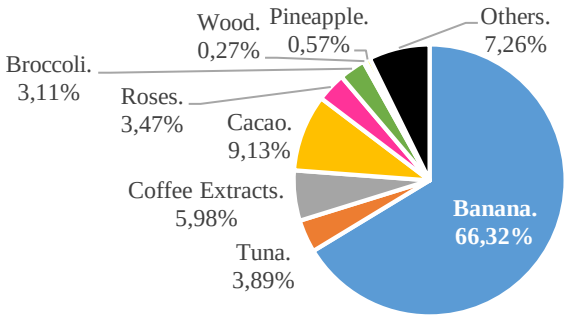
1.3.1 Analysis per year

Below, annual data expressed in FOB in US dollars and in metric tons are presented within the period of study.

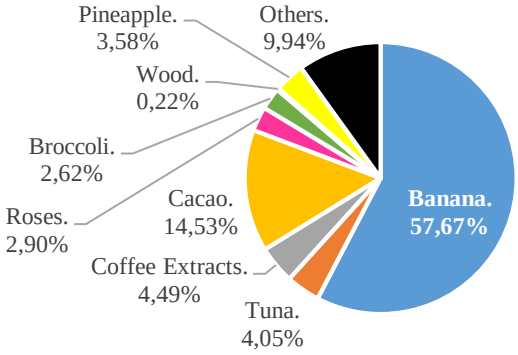
FOB Values

Figure 1.5 Exports from Ecuador to Germany per year in FOB values

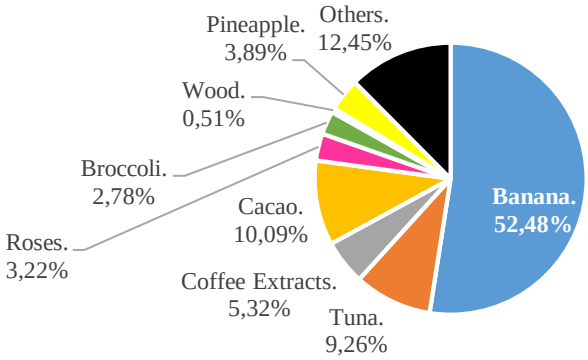
2002



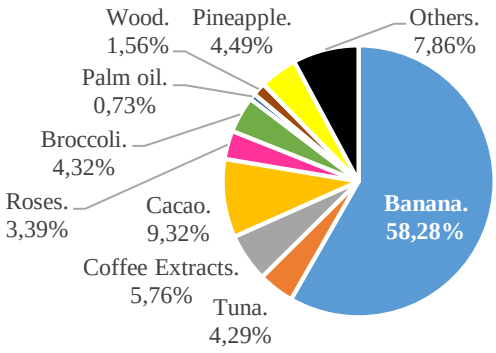
2003



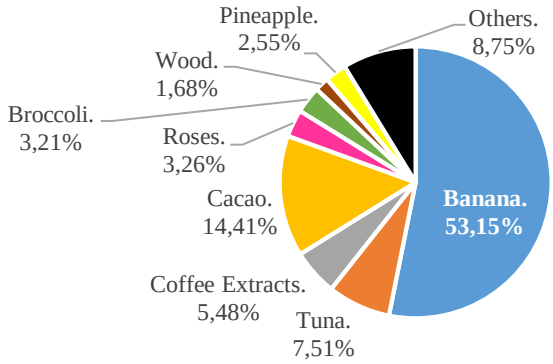
2004



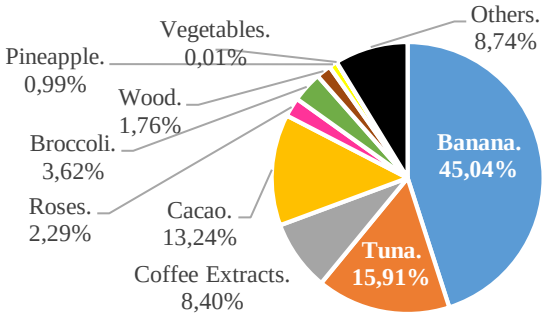
2005



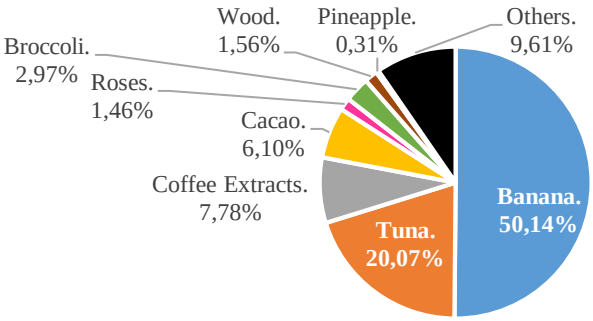
2006



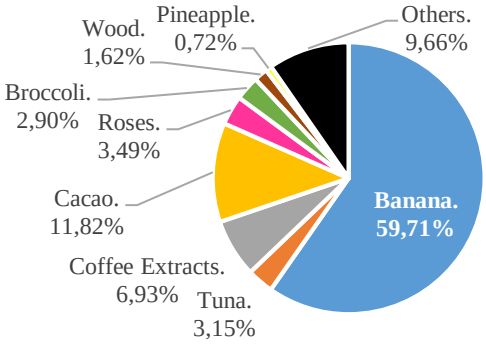
2007



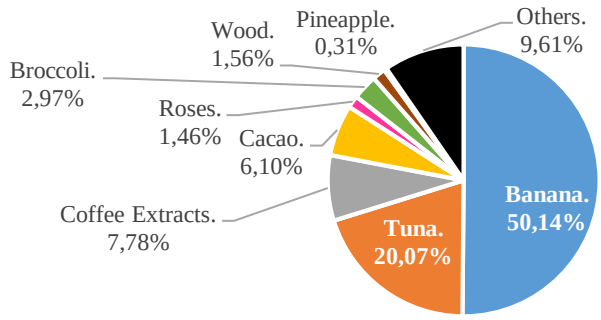
2008



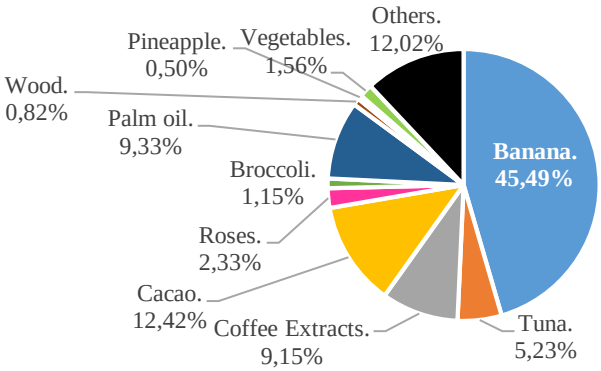
2009



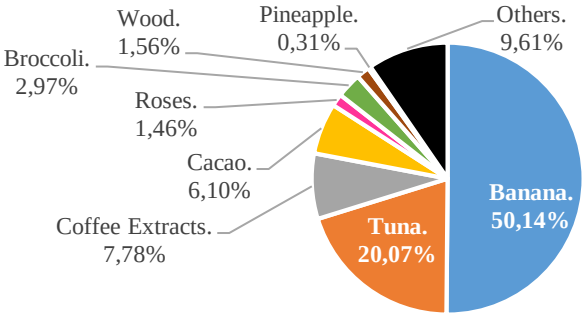
2010



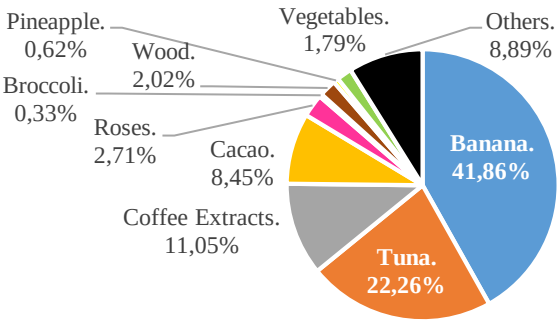
2011



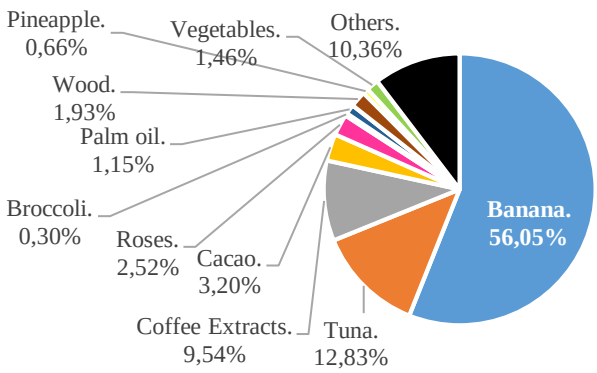
2012



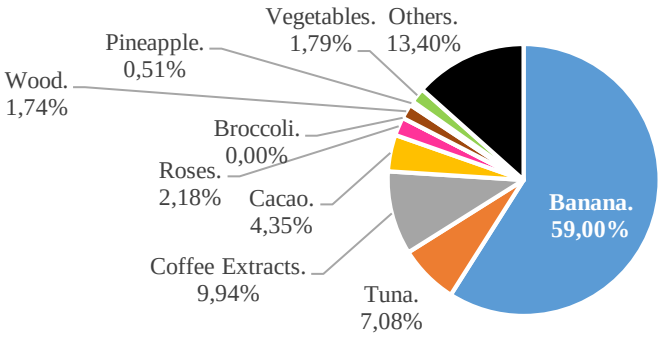
2013



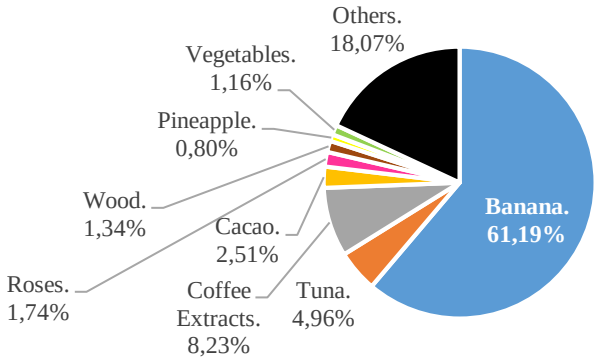
2014



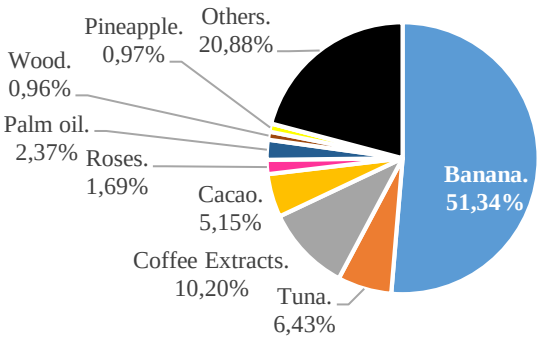
2015



2016



2017



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The predominance of bananas in FOB exports can be easily observed. It is only challenged in the first years by cacao and later by tuna and then coffee extracts, with

the year 2011 being the one with the lowest participation of bananas. Tuna is the only product that exceeds 20% in the period and remains an important product throughout the series, although its years of greatest participation are in the period from 2010 to 2015.

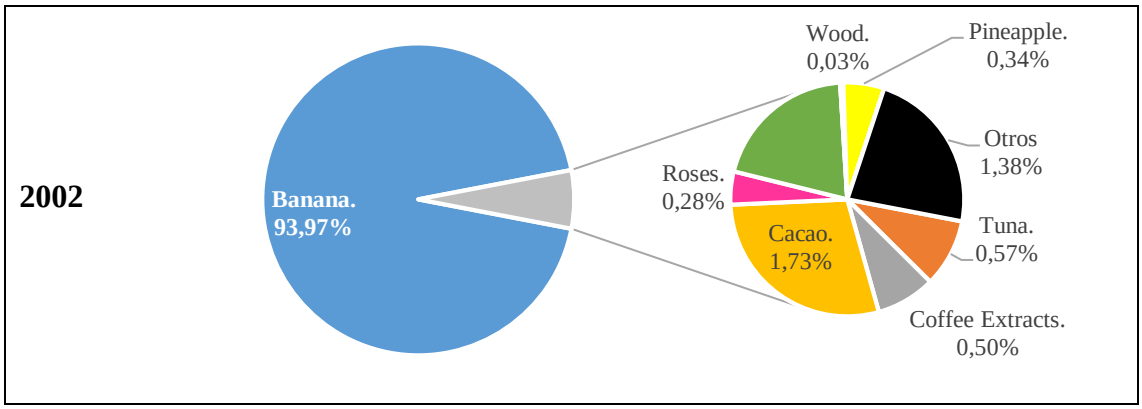
Products such as broccoli decrease in participation progressively until disappearing. Palm oil and vegetables, when they arise sporadically, also have a strong participation in some years, but disappear completely in others without a regular pattern.

The other products in the list of the top 10 have a relatively low percentage of participation that remains close to the same proportion throughout the period of analysis. The products within the other category increase according to the passage of time, not necessarily due to a decrease in the importance of the banana but rather to that of other products in the list of the top 10.

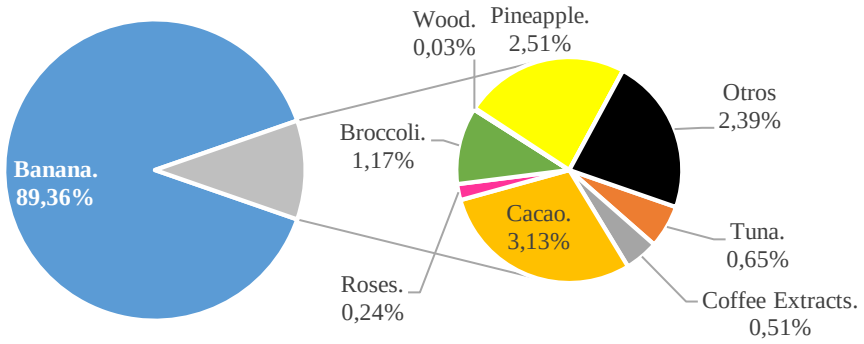
Metric tons

The data about exports in MT is presented annually thereafter. In the main part, which is displayed on the left side of the graph, only the banana is included. This is because most of the products have a very small participation in comparison to bananas and they cannot be easily appreciated if they are not shown in that way. The products that do not reach this percentage are represented within the "Other" category, which is expanded to the right of the graph.

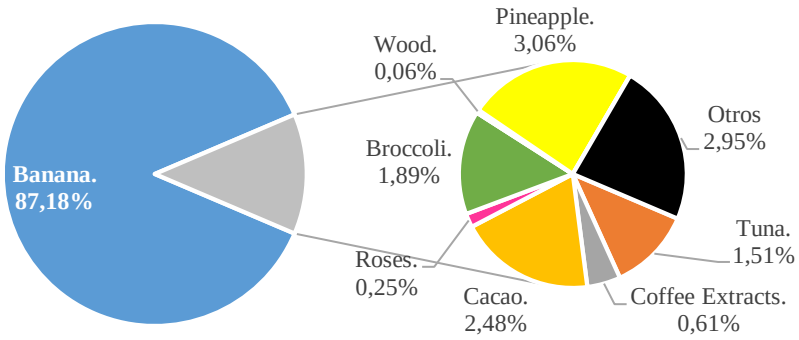
Figure 1.6 Exports from Ecuador to Germany per year (MT)



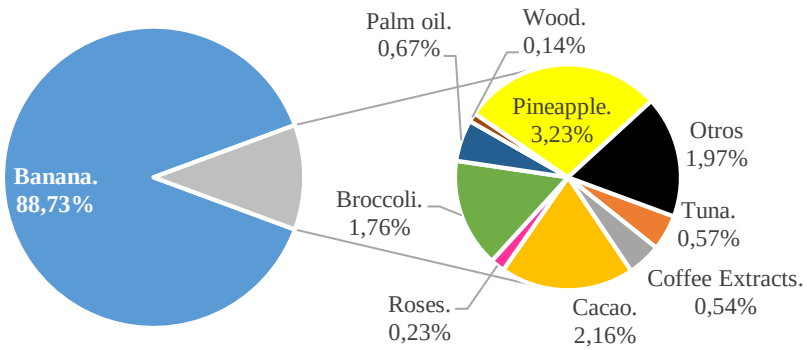
2003



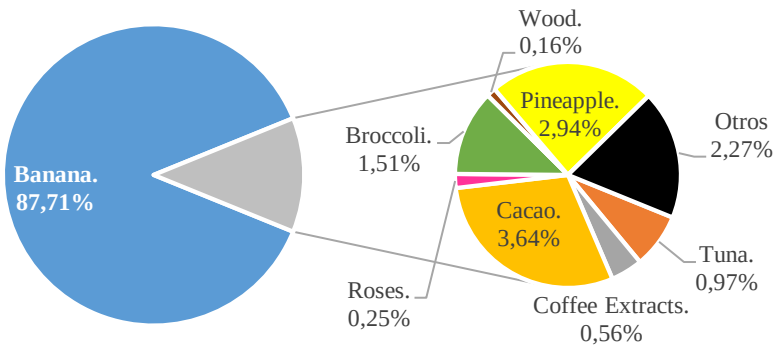
2004



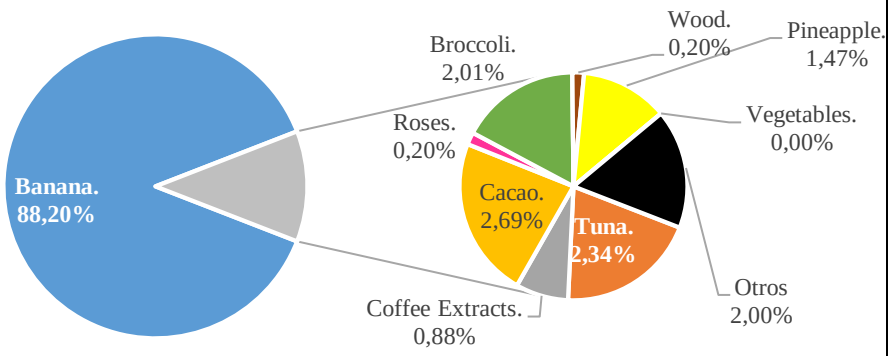
2005



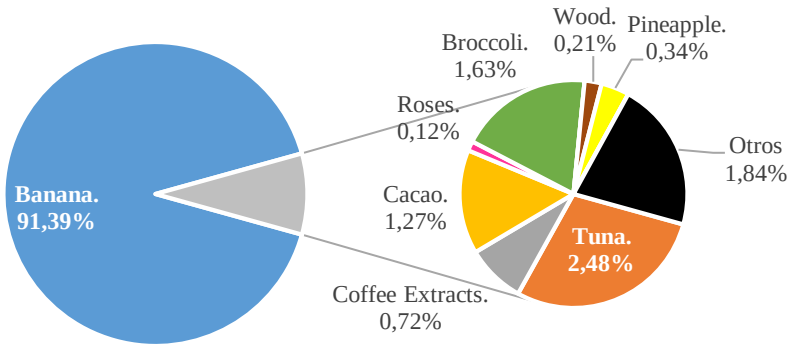
2006



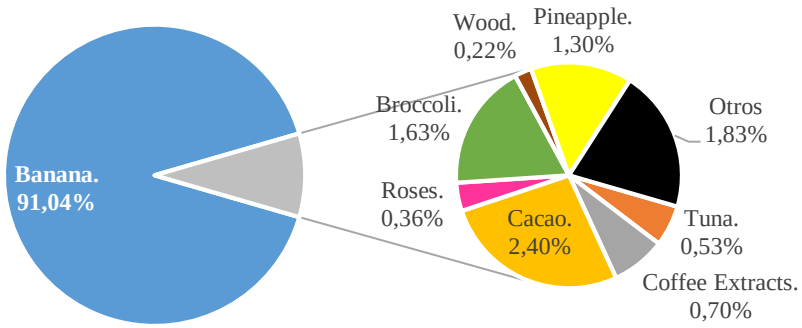
2007



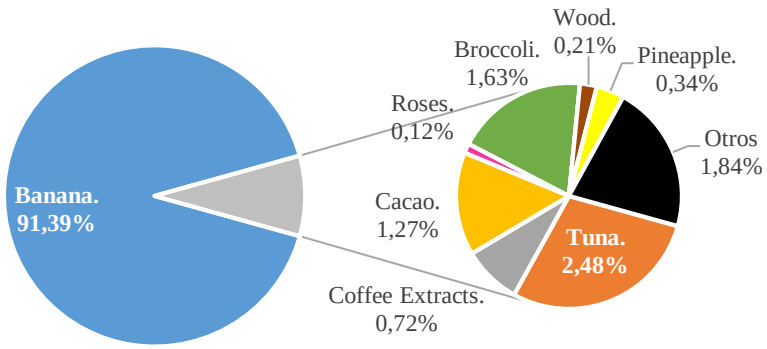
2008



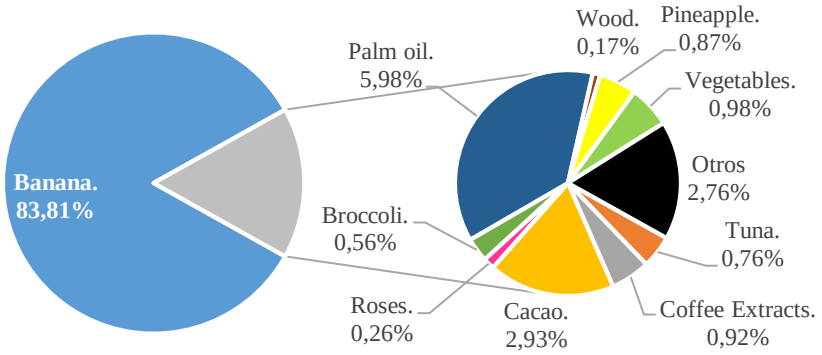
2009



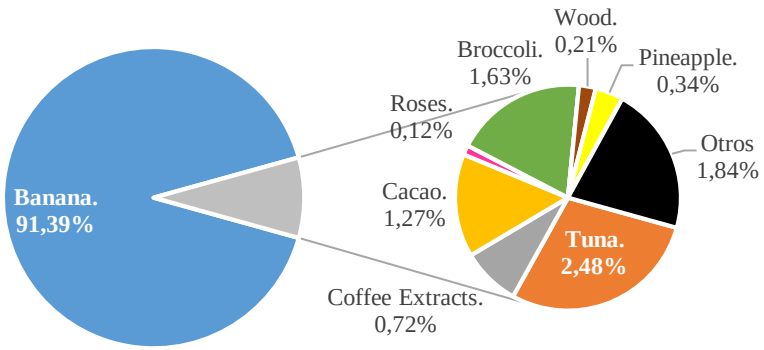
2010



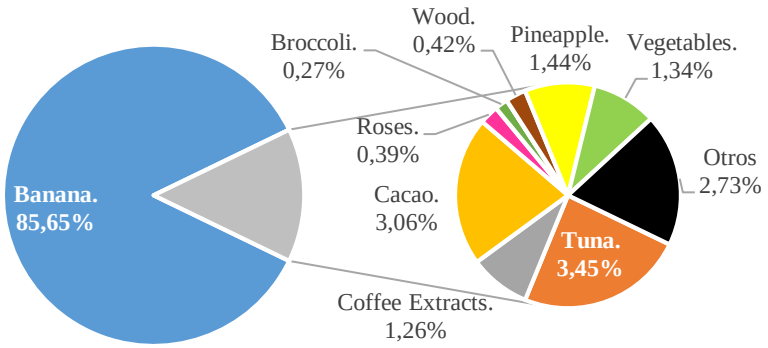
2011



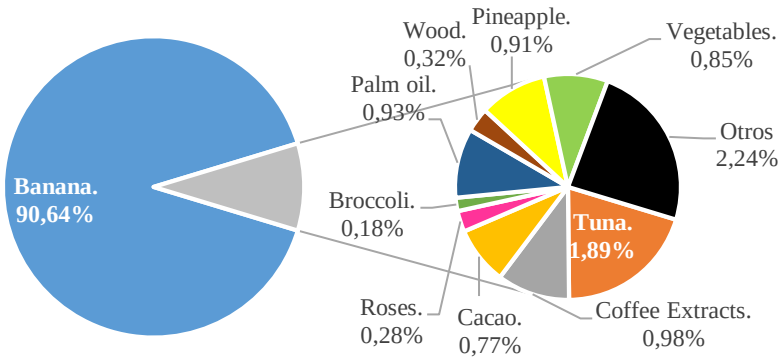
2012

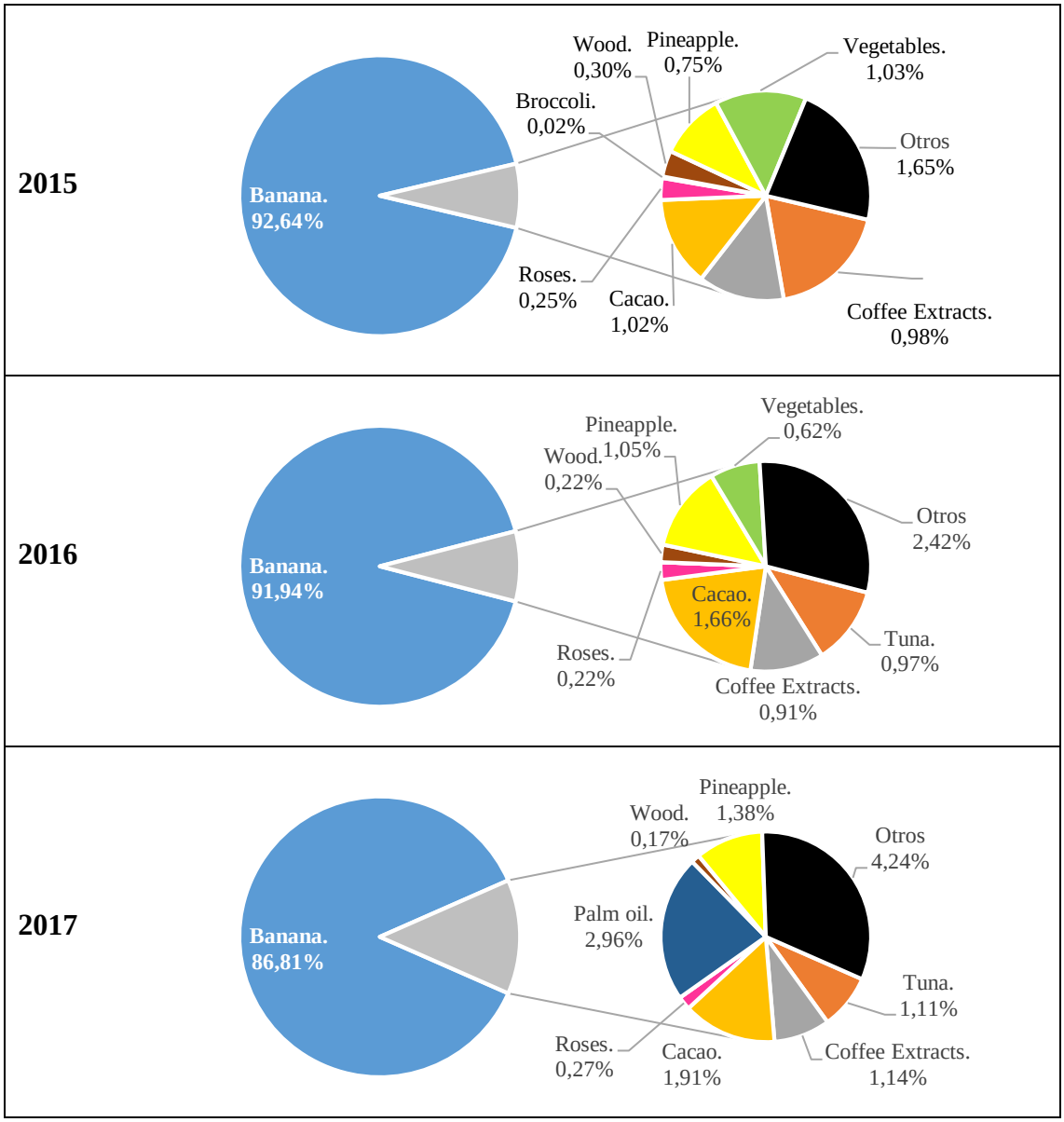


2013



2014





Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding exports in metric tons, it is obvious that bananas have an important predominance over all other products, always representing more than 80% and even, in some years, more than 90% of total exports from Ecuador to Germany. The other products mostly do not exceed 3% of the share with minor exceptions such as the presence of palm oil in 2011. Bananas have a sharp drop in FOB values and in metric tons (MT), which allows a growth of the other exports. Likewise, a high participation in MT does not imply a similar participation in FOB values. This is seen not only in the case of bananas but also in other products such as palm oil, which in 2017 becomes the second most important product in MT, but in FOB values it is still far behind, a

situation different from that of 2011 where it achieved a greater participation in FOB values than in metric tons.

1.3.2 Analysis by product

The following point analyzes each product, mainly taking into account the following factors:

- Participation in exports, mainly in FOB values due to the predominance of bananas in metric tons;
- Price per metric ton, to have a point of reference of what is the price of a product with respect to others in the same unit and its historical evolution;
- Position with respect to other suppliers of the German market, to see the importance of our exports in Germany.

However, it must be borne in mind that part of this information is not available for all products due to its very nature, as is the case of palm oil, where a proper historical tracking of the price by MT cannot be made due to its trade being so sporadic.

It should also be noted that the variation in the participation of the products is important throughout the period of analysis. Several of the products have notable increases in their price and then lose much of that increase the following year only to recover the following year. This shows that there is some instability in the prices of the products that Ecuador sends to Germany.

In general, the moment of greatest instability occurs from 2009 to 2013. It coincides with the global economic crisis and with the moment when the price per metric ton of products fluctuates more. This time coincides with the end of the cycle favorable to *commodities* worldwide.

Banana

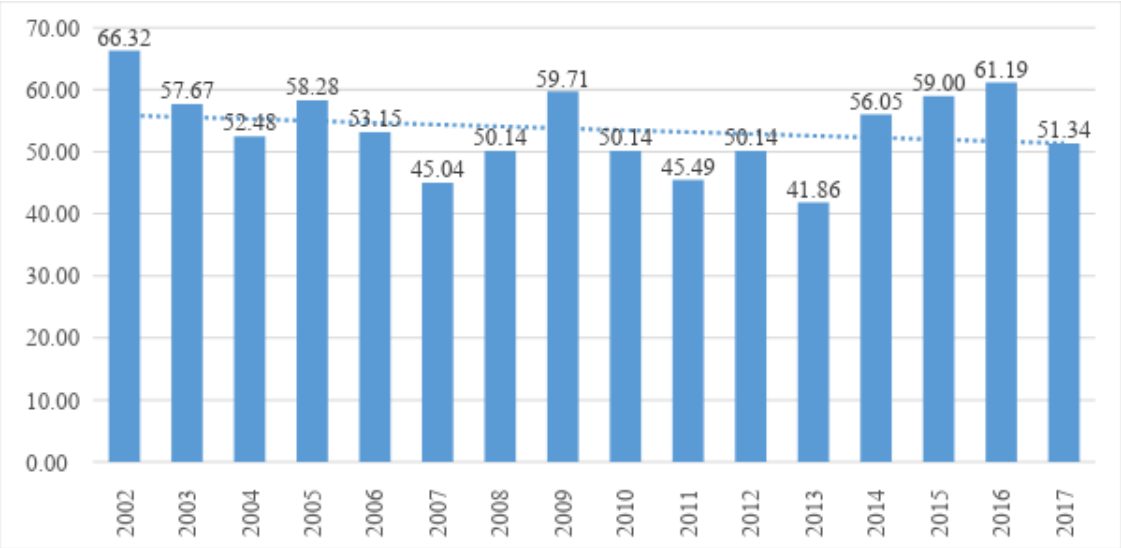
Within this study the NANDINAS 0803901190, 0803901110, 0803901100 and 0803001200 are considered as the same product. The first two apply from 2016, the next from 2013 to 2016 and the last from the beginning of the period of analysis until 2012. They refer to the "Cavendish Valery" variety of Ecuadorian bananas.

The product is under the following classification according to the (Committee on Foreign Trade, 2017):

- "08 Fruits and edible fruits; crusts of citrus fruits.

- 03 Bananas, including plantain bananas, fresh or dried.
  - 90 The others. "

Figure 1.8 Percentage share of bananas in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

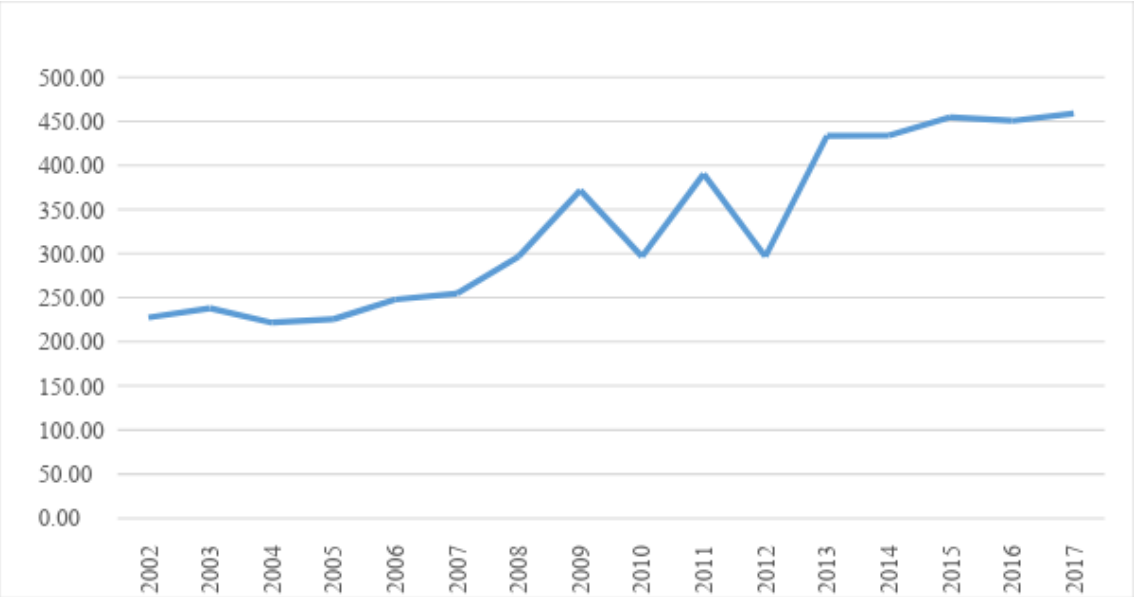


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The participation of banana is noteworthy, which during the whole period is the predominant product and accounts for almost half of all exports from Ecuador to Germany. This product has its highest point in 2002 and the lowest in 2013, although it never drops its share of 40% of the total.

Figure 1.7 Price per metric ton of bananas



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

However, it must be taken into account that the price of the metric ton of bananas, although it has increased progressively, is lower than that of most of other products. The price per metric ton has periods of relative stability from 2002 to 2007 and from 2013 to 2017 but it also has an intermediate period of instability.

Even so, despite the increase in the price per metric ton of bananas, the trend in FOB values is a slight decrease in participation.

Table 1.3 Position per year of Ecuadorian bananas in Germany

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	1	1	1	1	2	1	2	2	1	1	2	1	2	2	2

Source: www.trademap.org

Elaboration: García, Paulo.

Regarding the positioning in the German market, the banana has lost space to Costa Rica in recent years. However, Ecuadorian bananas are still very important for the German market, without ever falling below the second place.

In addition, bananas are the only product that has a warning in the data sheet on Germany issued by (Pro Ecuador, 2018). There it is detailed that the campaign

generated by OXFAM, an international non-governmental organization, result of the study "Sweet Fruit, Bitter Truth" that talks about the ruthless working conditions in the plantations of banana in Ecuador; has caused a negative impact on the image of the fruit in German consumers.

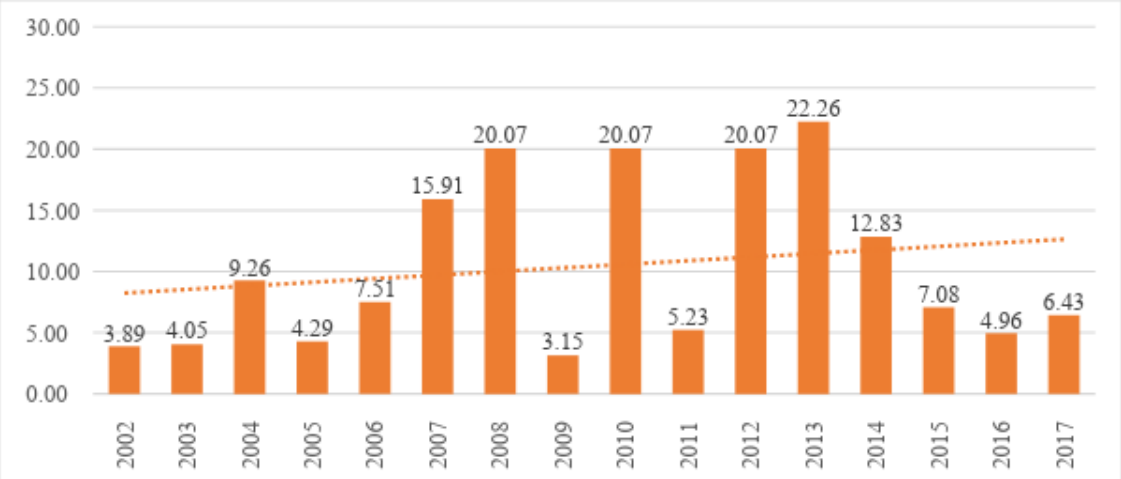
Tuna

NANDINAS are considered 1604141012, 1604141013, 1604141023, 1604141022, and 1604141000. Since 2016 there are new NANDINAS also related to canned tuna from NANDINA 1604141000, however, they are not exported to Germany.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "16 Preparations of meat, fish or crustaceans.
    - 04 Preparations and preserves of fish; caviar and its substitutes prepared with fish eggs
        - 14 Prepared and preserved tuna, skipjack tuna and bonito (Sarda spp.) "

Figure 1.8 Percentage share of tuna in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values



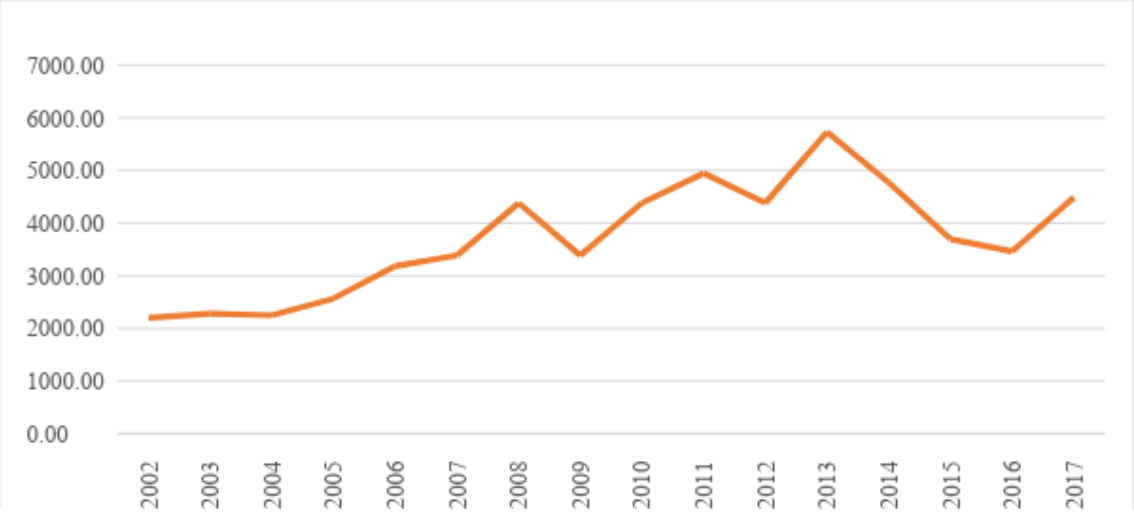
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

After the banana, the tuna follows, which is seen as a product of high variability, passing twice, 2008 - 2009 and 2010 - 2011, from having about 20% of the annual share to about 5% the following year. In any case, tuna is the second most important

product, being the only one that has more than 20% of participation aside from bananas.

Figure 1.9 Price per metric ton of tuna



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding the price per metric ton of the product, an upward trend is seen until 2013 and then return to values similar to those of the years 2009 and 2010. It is also seen that the price of the MT does not have an important influence on the FOB share of the product since in 2009 it has a share similar to that of 2011 when the values are 3,384 and 4,942 dollars per MT respectively. Similarly, there is similar behavior between 2012 and 2013.

Table 1.4 Position per year of Ecuadorian tuna in Germany

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
6	7	1	1	1	1	1	2	3	1	3	1	1	4	3	1

Source: www.trademap.org

Elaboration: García, Paulo.

In Germany, the Ecuadorian tuna has grown in importance since the early years and, although it has important variations, it is the most imported tuna from Germany. The declines in the export of tuna may be due more to factors related to the international tuna market than to domestic production. Also, in the data sheet of (Pro Ecuador, 2018), fishery products are one of the two goods marked within the opportunity

category, in this case due to Vietnam's failure to protect its natural resources against illegal fishing and the possible sanctions that this entails.

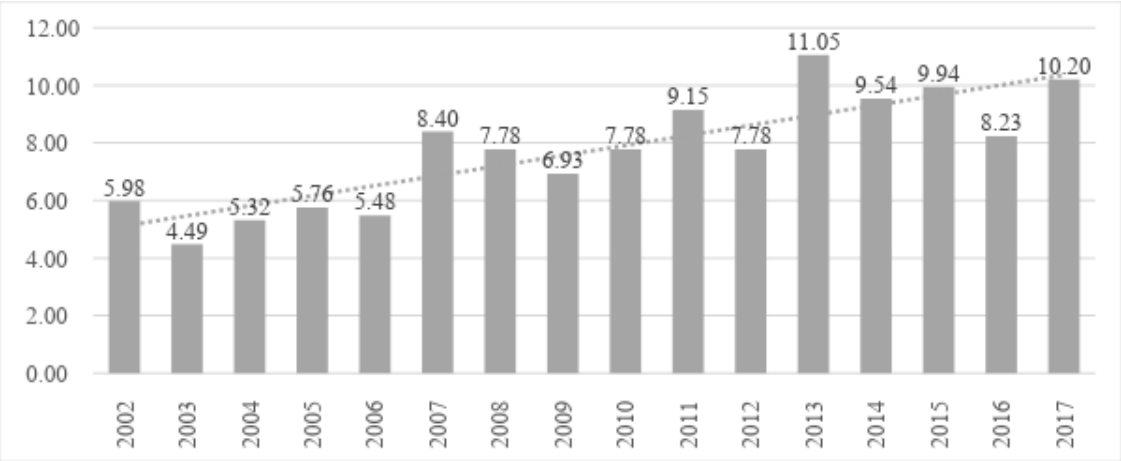
Coffee Extracts

Only NANDINA 2101110000 is used, as it is valid throughout the period of analysis. It is described as "Extracts, essences and concentrates of coffee and preparations based on these extracts, essences or concentrates or based on coffee: Extracts, essences and concentrates" (Committee of Foreign Trade, 2017) excluding in this case the preparations that correspond to the NANDINA 2101120000.

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "21 Various food preparations.
    - 01 Extracts, essences and concentrates of coffee, tea or mate and preparations based on these products or on the basis of coffee, tea or yerba mate; roasted chicory and other roasted coffee substitutes and their extracts, essences and concentrates.
        - 11 Extracts, essences and concentrates of coffee. "

Figure 1.10 Percentage share of coffee extracts in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

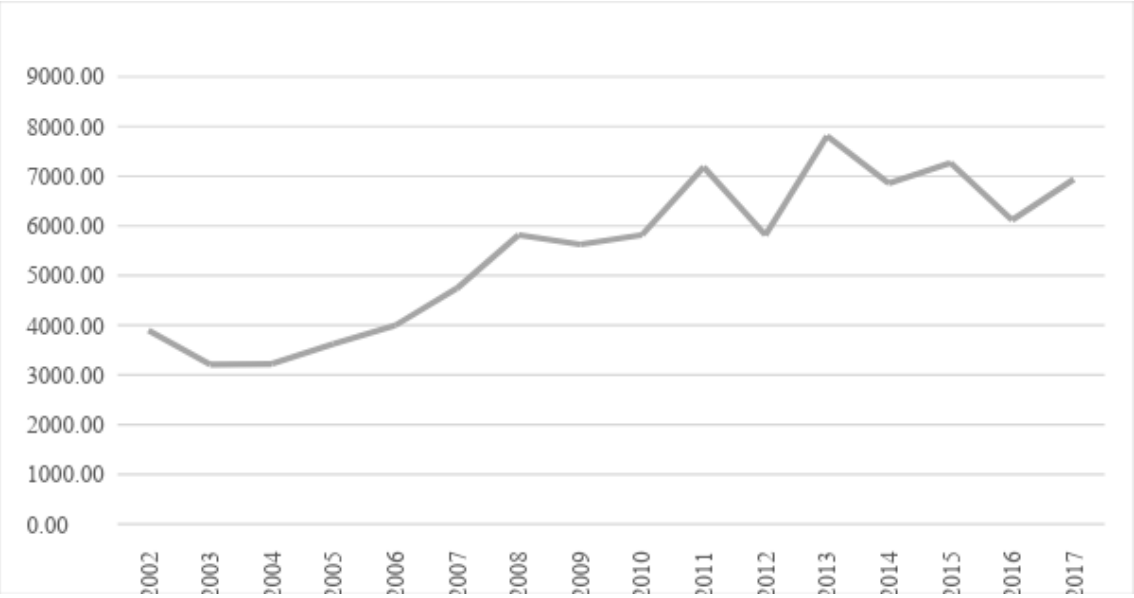


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Coffee extracts are a product that has increased its share in exports over time, although its growth has not been important or completely continuous.

Figure 1.11 Price per metric ton of coffee extracts



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

However, a more noticeable growth in the price of the metric ton of the product can be observed, which in this case does seem to be more related to the participation of the product in terms of FOB.

Table 1.5 Position per year of coffee extracts from Ecuador in Germany

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
5	4	6	8	6	6	3	2	2	2	2	2	2	1	2	2

Source: www.trademap.org

Elaboration: García, Paulo.

Ecuador has achieved that its coffee extracts have gained market in Germany. They have come to position themselves uninterrupted since 2008 within the three main suppliers. In this case, the main competitors are Colombia and the African countries.

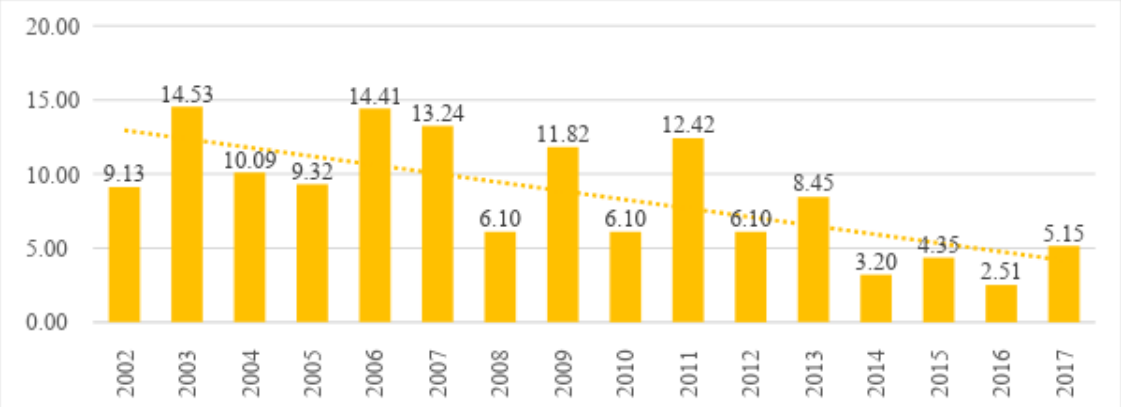
Cacao

The NANDINAS 1801001990, 1801001910, 1801001900, 1801001000 are the ones used with respect to this product, there are other related ones, but they are not exported to Germany. These NANDINAS also indicate that the product is exported raw and not roasted.

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "18 Cacao and its preparations.
    - 01 Cacao beans, whole or split, raw or roasted. "

Figure 1.12 Percentage share of cacao in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

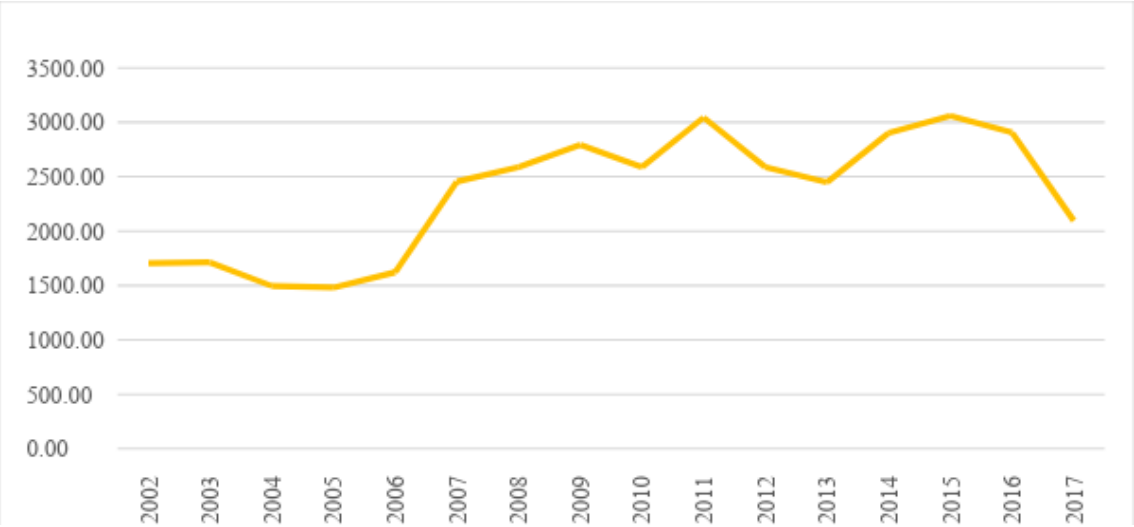


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The opposite of what happens with coffee extracts is true with cacao, which has decreased its participation, especially in recent years. It is also possible to observe that the participation varies greatly from year to year, being usual that from one year to the next export double the amount exported the previous year, so that later, half is exported next year, as see especially from the year 2007 onwards.

Figure 1.13 Price per metric ton of cacao



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price of the metric ton is lower in the years of higher trade, 2003 and 2006. However, the year 2011, where prices are the second highest, also coincides with a time when product trade increases. This implies that there is no objectively clear relationship between the price of the metric ton and its share in exports in the FOB values.

Table 1.6 Position per year of Ecuadorian cacao in Germany

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
5	4	4	4	5	5	5	5	5	5	4	4	3	5	6	6

Source: www.trademap.org

Elaboration: García, Paulo.

Regarding the participation in the German market of the product, the main competitors are the African producers. However, Ecuador has remained a stable supplier for Germany, without changing its position in the market much.

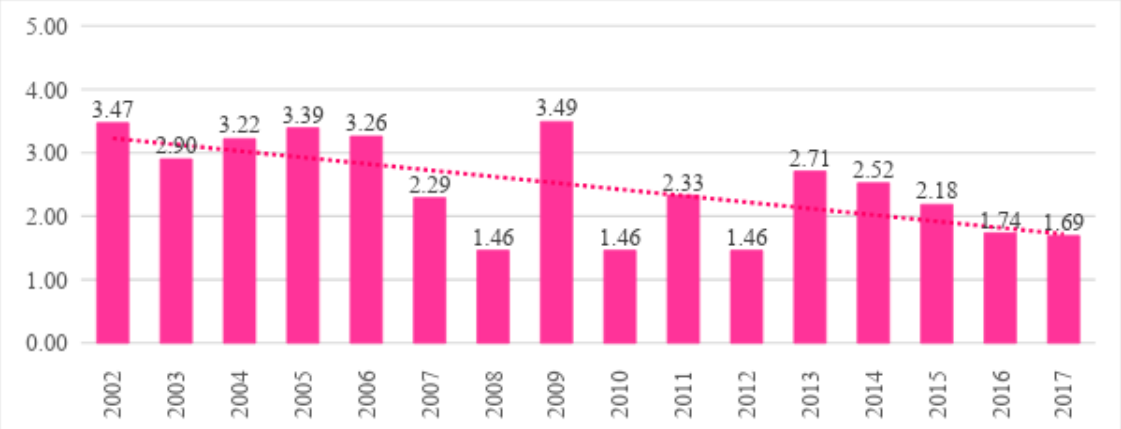
Roses

The NANDINAS 0603110000 and 0603104000 are used to refer to this product.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "06 Live plants and floriculture products.
    - 03 Flowers and buds, cut for bouquets or ornaments, fresh, dried, bleached, dyed, impregnated or otherwise prepared. "

Figure 1.14 Percentage share of roses in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

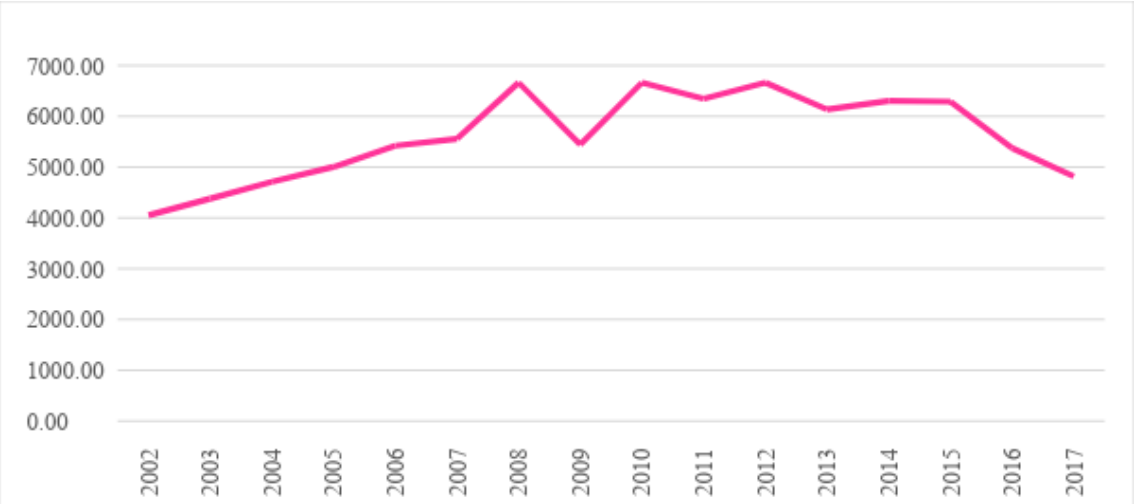


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

As for roses, their participation has also decreased. The first five years of the study are the most positive for this product and its participation is greater than that evidenced in the last five years. Thus, it is easy to distinguish different moments with important variations, especially the years 2008, 2010 and 2012, which coincide with the moments in which the metric ton had greater value. In addition, during the period of study there is a general downward trend meaning that this product is losing its importance.

Figure 1.15 Price per metric ton of roses



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

This can also be visualized in terms of the price per metric ton. This is one of the highest among the most exported products. This price has three visible stages: from 2002 to 2008, with a constant rise; from 2008 to 2015, where prices fluctuate, but are maintained with the exception of one year over six thousand dollars; and from 2015 onwards, when the price starts to fall again. Likewise, no direct relationship has been seen between the price per metric ton and the share with respect to the FOB values, despite the fact that in the years with the highest price of the metric ton, less was exported to Germany.

Table 1.7 Position per year of Ecuadorian roses in Germany

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
3	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3

Source: www.trademap.org

Elaboration: García, Paulo.

Ecuadorian roses are well positioned in the German market, remaining stable over time. As for what they represent in the German market, Ecuador is constantly in third place in recent years (4% of the total FOB that Germany imports from the world in the last decade), in the supply of this product after the Netherlands (82% in the last decade)

and Kenya (12% in the last decade). Other African producers along with Italy are the ones that also follow Ecuador in this market.

Broccoli

Only NANDINA 0704100000 is used to refer to this product.

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "07 Vegetables, plants, roots and tubers food.
    - 04 Coles, including cabbages, and cauliflowers, curly cabbages, rutabagas and similar edible products of the Brassica genus, fresh or chilled.
        - 10 Cauliflowers and broccoli. "

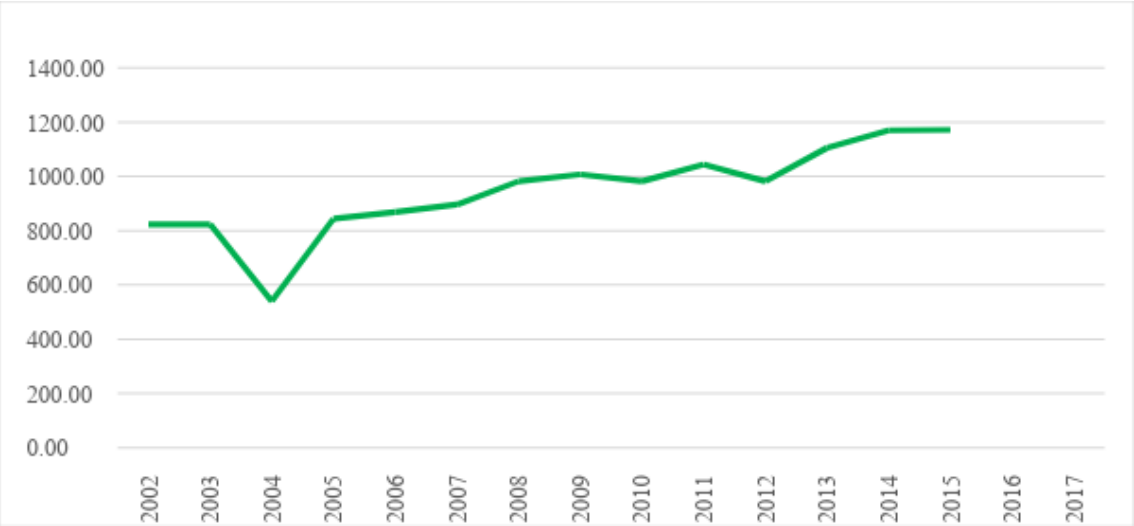
Figure 1.16 Percentage share of broccoli in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Broccoli went from being stable in the first years to decrease to disappear since 2016. This contrasts with the total of imports from Germany, which in that same time has remained stable and even with a slight upward trend, which indicates that other producers have already replaced Ecuador internationally.

Figure 1.17 Price per metric ton of broccoli



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price of broccoli shows a situation of greater stability than similar products with an increase in its value throughout the period. However, Ecuador has significantly reduced the export of this product to Germany since 2013 and has disappeared in recent years.

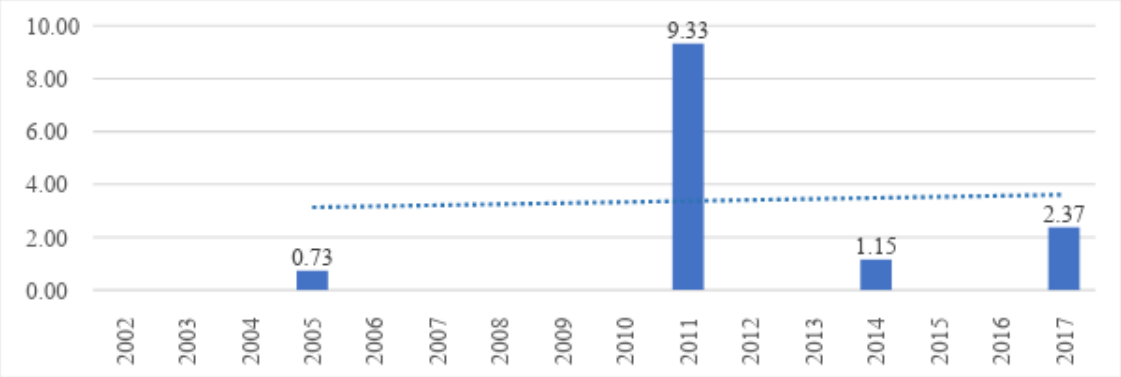
Palm oil

NANDINA 1511100000 is exclusively used to refer to this product.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "15 Animal or vegetable fats and oils; products of its unfolding; processed dietary fats; waxes of animal or vegetable origin.
    - 11 Palm oil and its fractions, whether or not refined, but not chemically modified.
        - 10 Crude oil. "

Figure 1.18 Percentage share of palm oil in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Palm oil has an unusual behavior. It is only present in the years 2005, 2011, 2014 and 2017. However, its strong presence in the years that appear, especially in 2011 with more than 9% of the total, makes it the seventh most exported product in the time studied.

The explanation for the sudden increase in exports of palm oil may be related to the decrease in the supply of this product by Indonesia, the main producer in the world, especially with respect to 2011. However, this does not imply that Ecuador is an important source of this product for Germany. In addition, this product is relatively new for Ecuador, yet it has experienced an important growth in recent years.

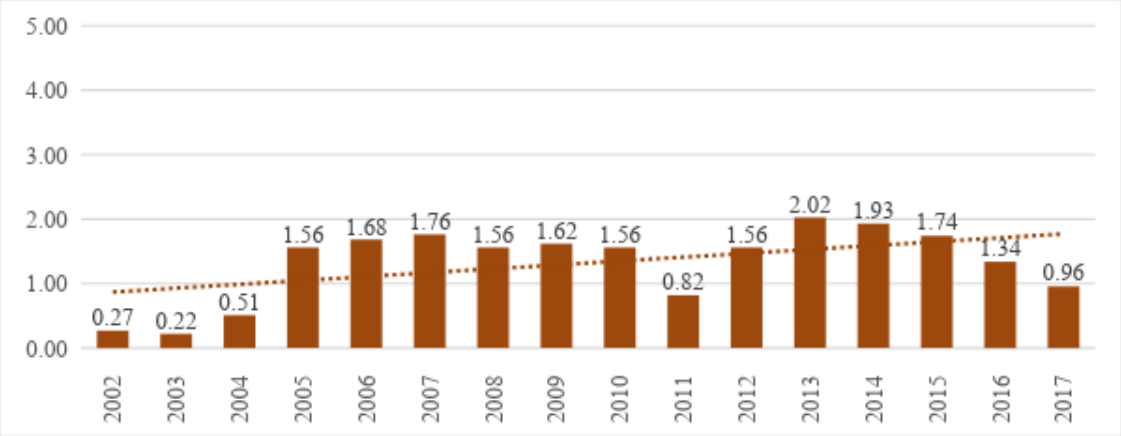
Wood

The NANDINAS 4407220000 and 4407240000 are used for this product, there are others related but they are not exported to Germany.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "44 Wood, charcoal and wood manufactures; cork and its manufactures; manufactures of plaiting or basketry.
    - 07 Wood sawn or chipped lengthwise, cut or unrolled, including planed, sanded or bonded at the ends, with a thickness greater than 6 mm. "

Figure 1.19 Percentage share of timber in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

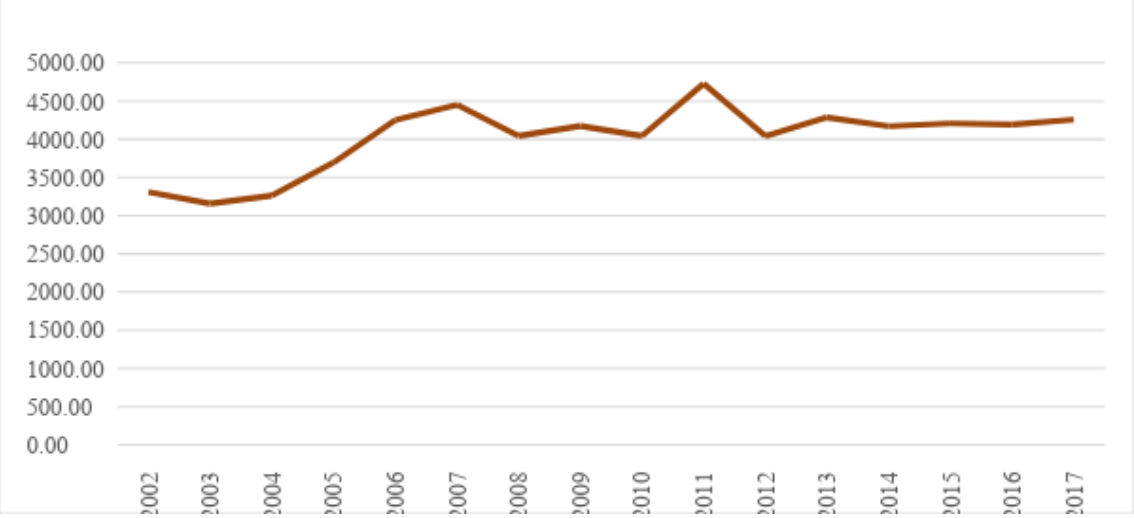


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Wood has an upward trend. However, it also has little presence in the first two years and it begins to decrease in the last two years. The period between these two stages, which runs from 2005 to 2010, is instead one of relative stability in terms of their participation with respect to FOB values.

Figure 1.20 Price per metric ton of wood



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton of wood is one of the least fluctuating among the most exported products. From 2002 to 2007, the first stage of price increase can be seen,

while from 2008 to 2012 there is a period of some instability followed by a final period, from 2012 onwards, in which prices are maintained.

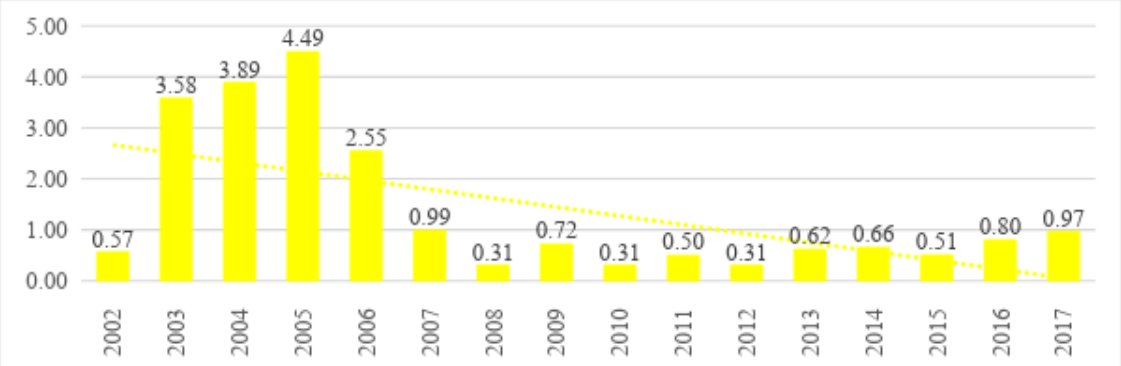
Pineapple

It refers to the NANDINA 0804300000 that is valid throughout the period.

The product is under the following classification according to the (Committee on Foreign Trade, 2017):

- "08 Fruits and edible fruits; crusts of citrus fruits.
    - 04 Dates, figs, pineapples, avocados, guavas, mangoes and mangosteens, fresh or dried.
        - 30 Pineapples ".

Figure 1.21 Percentage share of pineapple in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

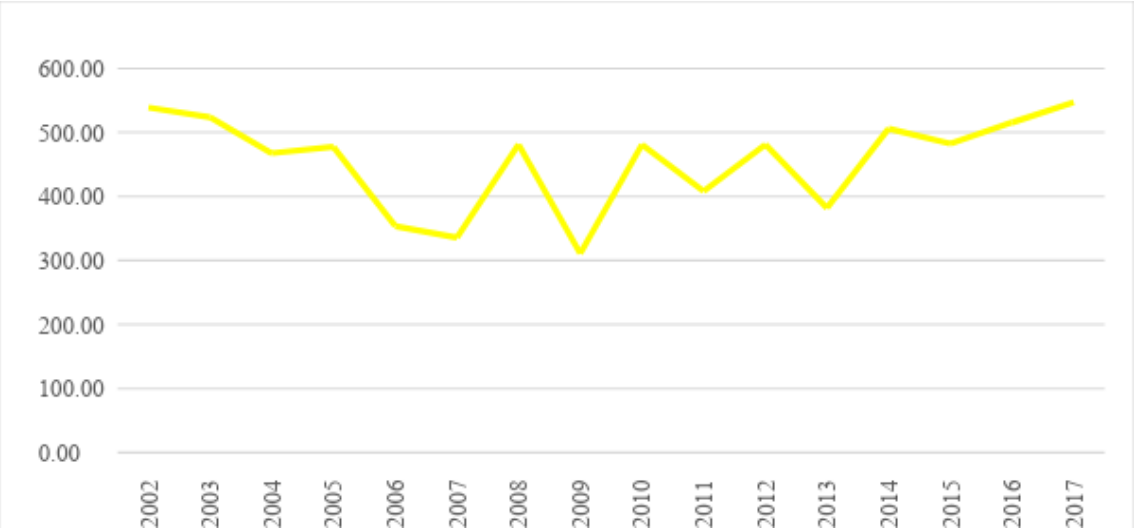


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

On the other hand, pineapples are a product that has lost market with respect to its share in total exports and regarding the exported amount of the product. The same is true with regard to its participation in the German market, losing space mainly to the Netherlands, which by 2017 was the second supplier of the product to Germany after Costa Rica, leaving Ecuador in third place. Also, 2005 was the best year for this product.

Figure 1.22 Price per metric ton of pineapple



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton of this product is close to that of bananas, although a little more expensive. It presents constant variations, especially between the years 2005 to 2014. After this period of instability, prices recover the initial values of the beginning of the period.

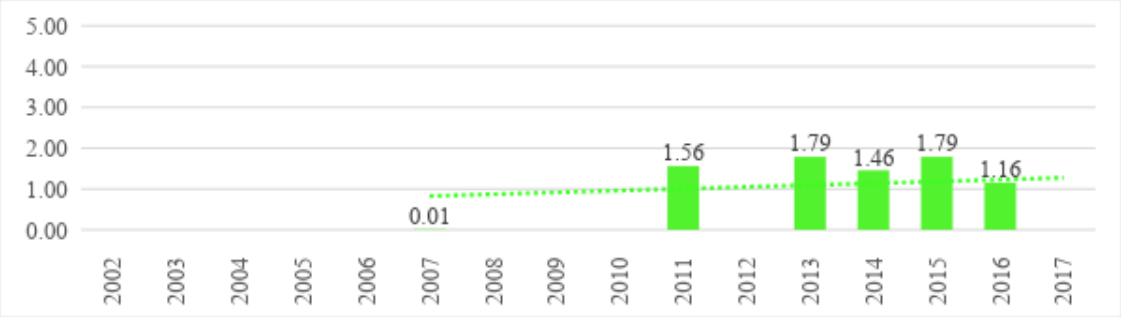
Vegetables, cooked in water or steam, frozen

The NANDINA 0710809000 is used, which is valid since 2002. Its description is "the others". Because it is an "Others" category, it is not possible to specify in more detail what types of vegetables are, with the exception of what other related items indicate since they are mutually exclusive, therefore, could not be asparagus, broccoli, sweet corn, spinach, potatoes or pod vegetables.

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "07 Vegetables, plants, roots and tubers food.
    - 10 Vegetables, even if they are cooked in water or steam, frozen."

Figure 1.23 Percentage share of vegetables in total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

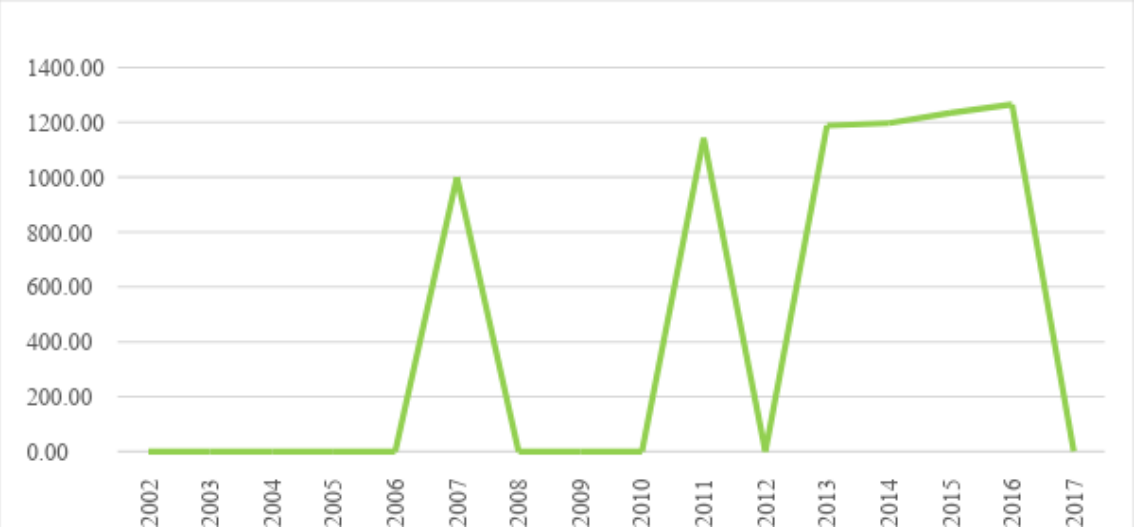


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

It is another product with an unusual behavior. Vegetables are only present in the years 2007, 2011, 2013, 2014, 2015, 2016 and 2017, of which both in 2007 and in 2017, their presence is almost non-existent. This means that the product, during the period of analysis, spent more years without being exported (10) than in those that were present (6).

Figure 1.24 Price per metric ton of vegetables



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

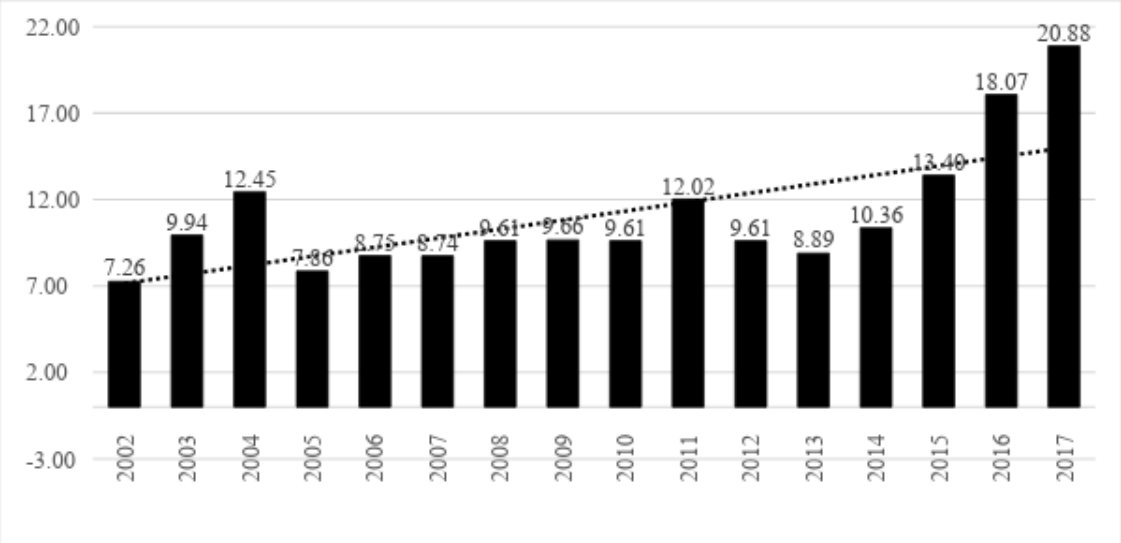
The price per metric ton of this product is always maintained above one thousand dollars. There is a slight upward trend, although there is less information available because it was not traded with this product during an important part of the period. In any case, it can be seen that in the years that the product is present, it always has an

increase in its price, something that apparently is not related to its share relative to the total FOB values.

Other

This category includes all other products that do not fall within the others mentioned before. Here there is a wide variety of products including seafood, such as shrimp; fruits and their pulps, canned food, among others.

Figure 1.25 Percentage share of the Other item in the total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

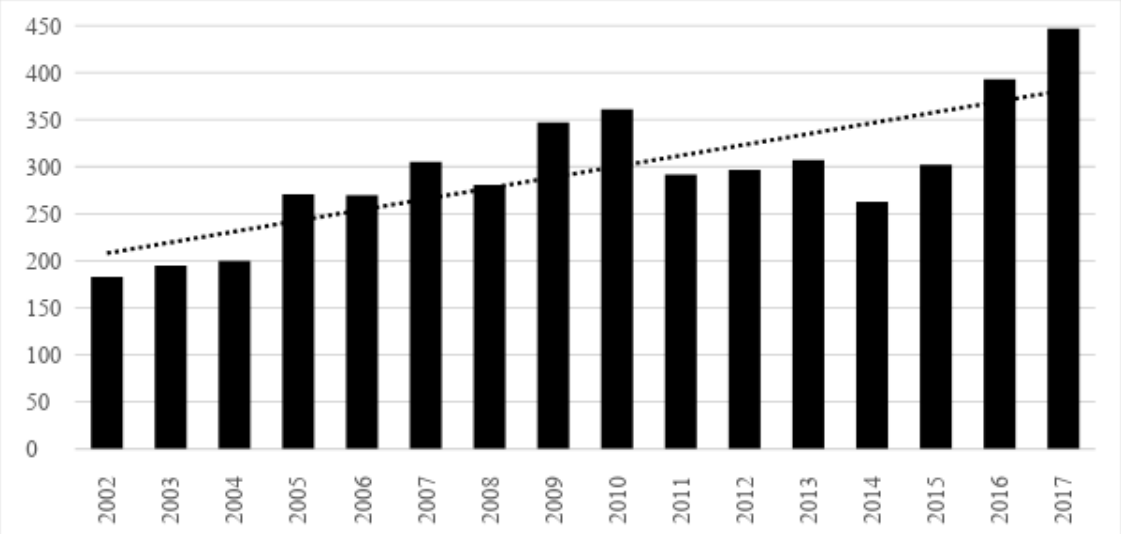


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

With regard to the other products, an increase is noted from the beginning of the period of analysis, especially in the last years of the study. This indicates a diversification of the country's export offer, taking into account that most of the time the top ten products represent about 90% of the offer.

Figure 1.26 Number of NANDINAS of the products exported from Ecuador to Germany in the period 2002 - 2017



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

This diversification in exports to Germany can be evidenced both in the growth of the "other" item, especially in terms of price and in the number of NANDINAS or products that are exported. However, the products of this diversification are still significantly lower compared to the first 10 products on the list, although over time some new products may enter the list of the most exported.

A clear example of this is the growth of shrimp exports in recent years, which in 2017 amounted to 2.5% of the total and in 2016, 2.8%. Thus, although it does not represent more than 0.01% in the whole analysis period (2002 - 2017), in the future its participation may become more relevant. A similar case as products such as palm oil or vegetables that, with a relatively minor appearance in recent years, have managed to enter into the list. However, it must be borne in mind that these new products do not exceed 3% of the annual total in terms of FOB exports, showing that they are still far from the main products that have traditionally been exported to Germany, such as Banana or Tuna, so there is no short-term change that can shift from those first positions to those products.

1.4 Chapter conclusions

Germany is an important market for Ecuadorian exports, especially non-oil exports. However, it is far behind the main markets, such as the United States, which indicates

that Germany is not an irreplaceable destination for Ecuador. Even so, exports have had a sustained growth during the period analyzed. In general, there is a greater increase in exports in terms of FOB than in MT, which also implies that the products that Ecuador sells to Germany have increased their value over time.

These products that Ecuador exports to Germany are mainly of agricultural origin and have a low level of manufacturing. In other words, they require a low level of industrialization for their production and their cost per metric ton is lower, as can be seen in cases such as banana, whose share in metric tons comes to represent much more than their participation in FOB. Exports are also concentrated in a low number of products, with the four most exported products accounting for 80% of the total. Likewise, the number of products, based on the number of exported NANDINAS, indicates that, although it has improved significantly in recent years (the number of different products sent compared to the beginning of the period has doubled); exports are still far behind compared to imports in terms of the variety of products. Thus, it can be seen that the most exported products are the same over time, with the four most exported products being the same throughout the period.

A separate paragraph deserves the banana, the most relevant product in terms of exports from Ecuador to Germany. The dominance that this product has over others makes exports vulnerable to what might happen to them. In the event that the Ecuadorian banana suffer any problem that prevents its entry into the European Union, exports to Germany could decrease very significantly. It is not surprising then that the banana has been one of the highlights of the Trade Agreement with the European Union. This product could influence in the accuracy of the gravity model, although there has not been sufficient evidence that the fluctuations suffered by this product or others of the most exported have done that.

CHAPTER 2: ANALYSIS OF IMPORTS

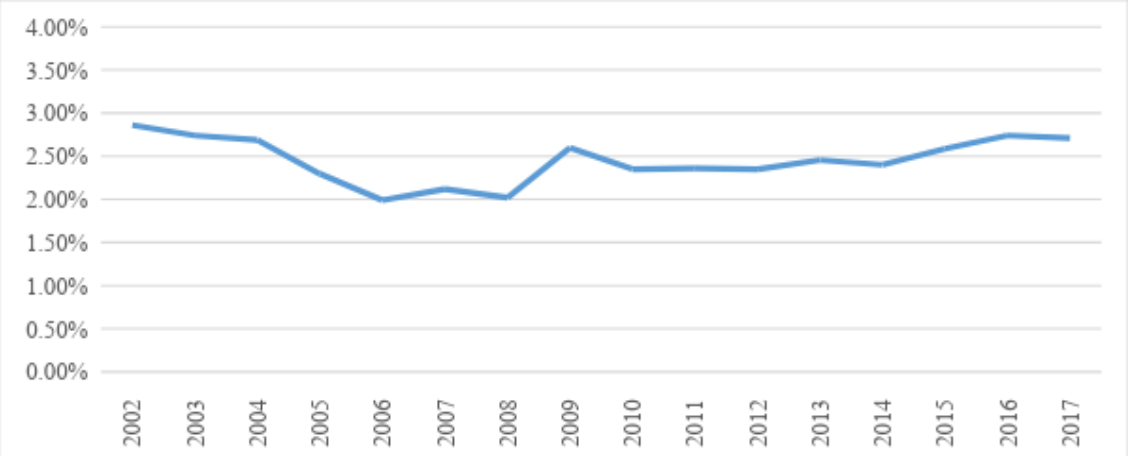
In this chapter, an analysis is made of the trade flows of imports between Ecuador and Germany for the period 2002 to 2017. First, the importance of Germany in the total imports of Ecuador is analyzed, analyzing its growth in terms of FOB and MT. Second, a profile of the Ecuadorian market to which these products are directed is provided. Third, a review is made of the ten main products and their behavior over time. And finally, fourth, the conclusions of the chapter are established.

Methodological note: In this chapter the FOB values are analyzed and not the CIF values. This is because it is necessary to keep the values used in this chapter without the influence of trade costs.

2.1 Percentage importance of Ecuadorian imports from Germany

During the period of analysis, Ecuador imported on average 2.45% of its total imports from Germany, being the year of greatest participation 2002 with 2.86% of total imports and the lowest year 2006 with 1.99%. This places Germany as one of the largest countries of origin of imports into the European Union, competing only with Spain in the period studied.

Figure 2.1 Percentage share of Germany in imports from Ecuador



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding FOB imports, Ecuador in 2017 brought products mainly, in order, from the United States, China and the neighboring countries of Colombia, Panama, Brazil and Peru. Imports in this case are very concentrated among a few countries, concentrating

in 2017 between the first two approximately 38% of total imports and between the first four about half of the total. Of all the countries, individually only the United States and China exceed 10% of the total, while among those that exceed 5% only the case of Colombia is added.

For this point of the analysis, as in the previous chapter, the year 2017 was taken into account. This is because it is the last available year and the most current reflection of the trade situation between the countries. Even so, with respect to the other years, there are no great variations and the trade partners mostly remain the same.

Table 2.1 Main origins of imports in FOB values from Ecuador to 2017

#	Country of origin	FOB	MT	Share FOB	Share MT
1	United States	3,727,842.07	4,709,654.90	19.75%	29.98%
2	China	3.476. 963.85	1,648,529.80	18.42%	10.49%
3	Colombia	1,550,039.70	827,630.67	8.21%	5.27%
4	Panama	858,841.55	1,577,176.84	4.55%	10.04%
5	Brazil	839,295.76	496,795.32	4.45%	3.16%
6	Peru	739,126.40	794,351.77	3.92%	5.06%
7	Mexico	712,420.79	418,309.72	3.77%	2.66%
8	South Korea	621,818.413.49	120,652.17	3.29%	0.77%
9	Spain	567,729.06	247,005.54	3.01%	1.57%
10	Germany	511,215.44	105,029.05	2.71%	0.67%
Other Countries		5,271,357.41	4,762,827.59	27.93%	30.32%
TOTAL		**18,876,650.50**	**15,707,963.40**	**100.00%**	**100.00%**

Source: www.bce.fin.ec.

Elaboration: García, Paulo.

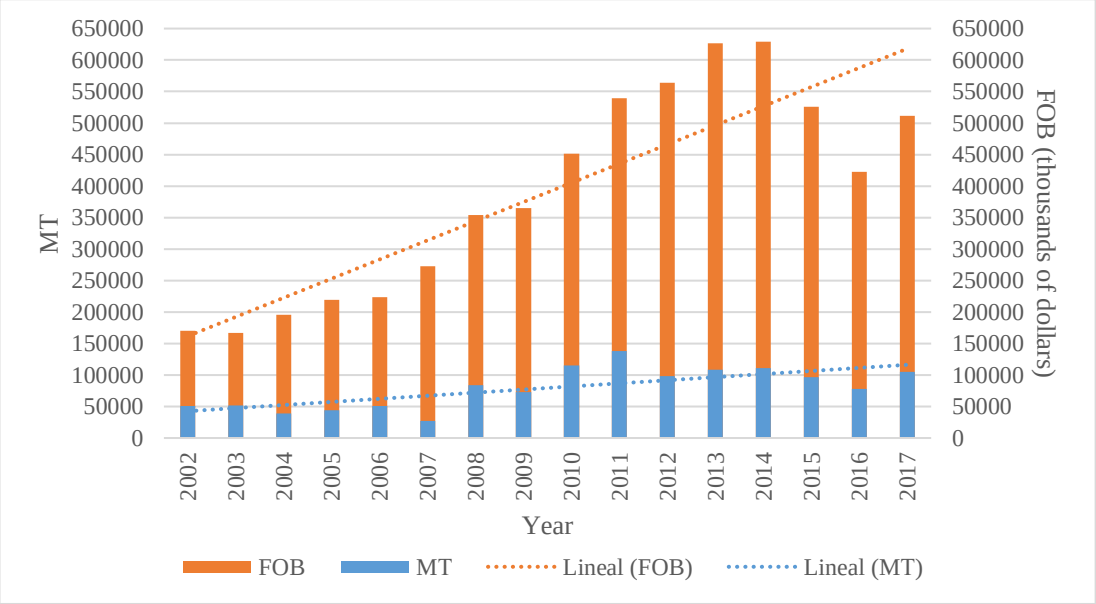
In terms of bilateral trade between the countries analyzed, Germany during the year 2017 was ranked tenth among the country's suppliers, behind Spain, which is the European competitor that most approached it, and ahead of from Japan. However, it is necessary to note that in metric tons Spain exports more than twice as much as Germany, while the difference in FOB values is not as noticeable, showing the different composition of the exchange of goods between countries, with Germany trading more valuable products. For Germans, on the other hand, Ecuador is the export

destination number 83, according to the division of its government, for the year 2017. This implies that Ecuador is not a destination of high relevance for German exports.

Compared to exports, imports have less variation over time than exports. While exports have higher peaks than imports, their lowest moments also become lower than those of imports, which means that, in the average of the whole period, Germany has more participation in imports than in exports.

A behavior indicates the growth of imports in both FOB and metric tons. On the total FOB values of imports, the year of most imports was 2014 with $ 629'361,200 dollars while the year of lowest importation in FOB was 2003 with $ 167,172,640 dollars. In contrast, in MT the year that this product was least imported was 2007 with 26,826.65 MT while the one that the product was the most imported was 2011 with 137,909.04 MT. All this is seen in the following graph.

Figure 2.2 Imports in MT and FOB (thousands of dollars) from Ecuador to Germany



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Upward trends are present both in the case of imports in FOB values and in metric tons. However, the trend is much more significant in the case of FOB imports. This means that there are years where in MT the trade decreases compared to the previous year, but in FOB, it increases, as for example the year 2007. Thus, the metric tons

imported in the year 2017 are 2.06 times more than those imported in the year 2002, while in FOB values the imports of the year 2017 are 3 times larger than those of the year 2002. This implies that the price of the imports is not directly related to their quantity in metric tons and that the FOB values increase faster than the number of metric tons.

2.2 Profile of the Ecuadorian market

Ecuador is a relatively small country in comparison to the other countries of Latin America or South America, both in relation to the size of its GDP and its population. Its location on the equatorial line added to the existence of the Andes and the Amazon create zones with different productive characteristics. The country has four natural regions: Insular, Coastal, Andean and Amazonia. Most of the production is concentrated in the cities of Guayaquil and Quito and their respective metropolitan regions, which accumulate most of the country's production (Banco Central del Ecuador, 2016).

As for the orientation of the Ecuadorian economy, it continues to depend more on the agricultural and oil sectors than on industrial production. As can be seen in terms of its sectors (table 2.2), the Central Bank of Ecuador (2018) indicates that the country continues to decrease the participation of its primary sector, linked to agriculture, livestock, fisheries and extraction of mineral resources in the economy. However, it is still very relevant to the country and about twenty times more relevant to the economy than it is in the case of Germany. The secondary sector, which mainly represents construction and manufacturing, is the second most relevant, but bearing in mind that it is still very dependent on the artisanal sector to the detriment of other industrial sectors with higher performance. The tertiary sector, which represents services, is the most relevant for Ecuador, as well as for Germany, making up more than half of GDP. This conformation has been characteristic of the country in the last decade: a primary-export oriented economy that in turn imports processed goods, in spite of the Ecuadorian government's attempts to change this situation towards a tertiary-export orientation economy (National Secretariat for Planning and Development, 2017).

Table 2.2 Composition of Ecuador's GDP by sectors of the economy by 2017

Sector	Description	Participation
Primary	Agriculture, forestry and fisheries	10.20%
	Petroleum and mines	4.69%
	Total of the primary sector	**14.89%**
Secondary	Construction	11.78%
	Manufacturing , petroleum refining and electricity and water supply	17.31%
	Total of the secondary sector	**29.09%**
Tertiary	Services	**56.02%**

Source: www.bce.fin.ec.

Elaboration: García, Paulo.

As for the ease of doing business in the country, the ranking *Doing Business* (World Bank, 2018) places Ecuador in the 118th position, out of 190 countries analyzed. This places it behind the regional average of Latin America and the Caribbean and far from its neighbors Peru and Colombia, which are ranked 58th and 59th respectively. The points where the country is currently best positioned are the ease of registering property (position 74), fulfilling contracts (position 75) and obtaining electricity (position 85). This is despite investments in infrastructure, education and others by the national government in the last decade that seem to have had no greater effect on the country's position in the index, even losing four positions in the 2018 report compared to the previous year (World Bank, 2017). Thus, with Ecuador being in this position, it is implied that this is not a country where it is easy to do business.

The Ecuadorian market can be very different from the German one in its cultural characteristics. The official language of the country according to its 2008 Constitution is Spanish (Constituent National Assembly, 2008), which is also the most used. At the same time, there are other languages that emerge from the country's cultural diversity, such as the Kichwa and the Shuar, which are official languages of intercultural relations, and other ancestral languages of official use in the indigenous communities that use them (National Constituent Assembly, 2008). According to the cultural dimensions of Hofstede, Ecuador is a country in which it is believed that there are hierarchies and a certain inequality within society, normally giving decisions at a high level (Pro Ecuador, 2018). In addition, Ecuador is very opposed to Germany in terms of individualism because, although both societies are competitive and seek success, Ecuador has one of the most collective societies studied by Hofstede while Germany tends to individualism and what results in the Ecuadorian case in the search for a group social ascent rather than an individual one (Hofstede Insights, 2018). Additionally, Ecuadorians are a "high context" society, so it is normal for a meeting to talk about various topics before entering into the main objective of it. (Pro Ecuador, 2018) For Ecuadorians, like the Germans in this case, the uncertainty is not positive and they will seek to avoid it. It is also normal that it is necessary to establish a certain relationship between the negotiators, taking into account that many "decisions are usually made based on past experiences, on the application of general norms or logical principles," (Pro Ecuador, 2018) and that the negotiators do not usually change their minds. This makes the negotiations less direct and more delayed than in Germany.

2.3 Main import products

The main products during the analysis period are:

Table 2.3 Most imported products in Ecuador FOB values from Germany in the period 2002 - 2017

Position	Product	NANDINA	Period	Description of the NANDINA	Participation
1	Other medicaments	3004902900	1998-2017	Others	4.76%
2	Other diagnostic or laboratory reagents	3822009000	2005-Present	Others	
		3822001900	1998-2005		
		3822002900	1998-2005		
		Total			1.74%
3	Other fungicides	3808929900	2010-Present	Others	
		3808209000	1998-2007	Others	
		3808929990	2008-2009	Others	
		Total			1.58%
4	Reagents that are not used in the patient	3002103300	2005-Present	Laboratory or diagnostic reagents that are not used in the patient	1.37%
5	Road tractors	8701200090	2002-Present	Others	
		8701200000	1998-2002	Road tractors for semi-trailers	
		Total			1.34%
6	Fertilizer with potassium chloride	3104201000	2007-2017	With a potassium content exceeding 22% but not exceeding 62% by weight, expressed as potassium oxide (fertilising quality)	
		3104200000	1998-2007	Potassium chloride	
		Total			1.32%
7	Touring cars	8703239090	2007-Present	Others	
		8703230000	1998-2002	Of a cylinder capacity exceeding 1,500 cc but not exceeding 3,000 cc	
		8703230090	2002-2007	Others	
		Total			1.30%
8	Medical devices	9018909000	1998-Present	Others	1.08%
9	Apparatus for containers	8422309000	1998-2012	Others	
		8422309090	2013-Present	Others	
		8422309020	2013-Present	To pack liquids	
		8422309010	2013-Present	To label	
		Total			0.93%
10	Extruders	8477200000	1998-Present	Extruders	0.82%
	Others				80.70%

Source: www.bce.fin.ec.

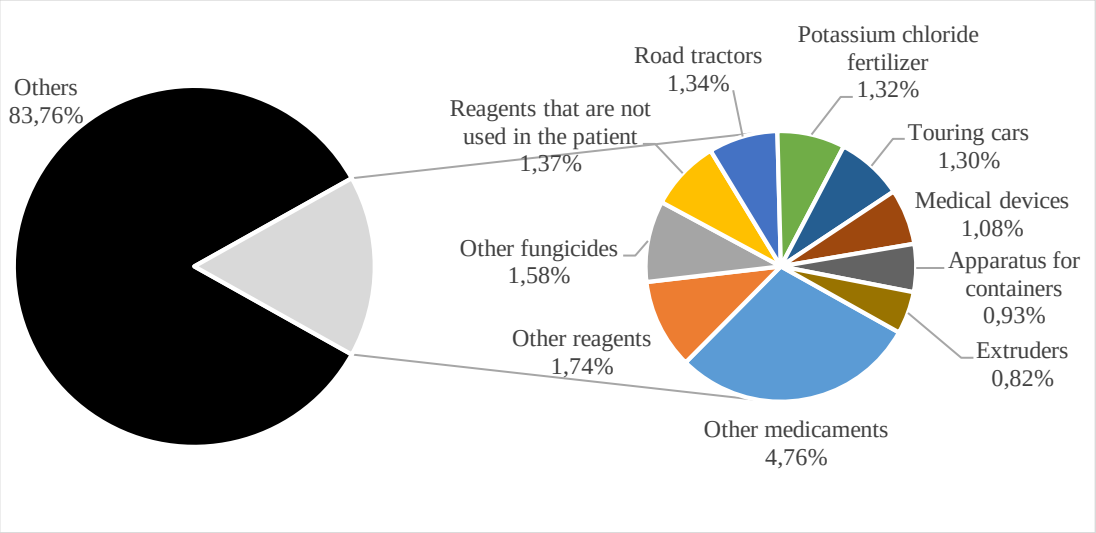
Elaboration: García, Paulo.

The products are analyzed based on the greater specificity allowed by the NANDINA, without using the complementary and supplementary codes which allows to see in greater detail the products that are imported. Some products have more than one NANDINA due to the different changes in the nomenclature, both nationally and internationally, that occur during the period of analysis, as can be seen in the table. However, they continue to refer to the main product as far as possible. In this case, there are products that do not have an exact equivalence because the NANDINAS to which they correspond have been merged or separated with the passage of time. This makes their follow-up inaccurate. In addition, many of the items belong to the groups "others", which indicate that there may be several products related to the main category

or subcategory but that they do not fit directly into other items. All this implies that tracking the NANDINAS is complicated and not completely accurate, although for the purpose of this chapter it is sufficient.

It is necessary to bear in mind that the majority of the products that Ecuador imports from Germany are products that have a high level of processing. In this, it differs with the exported products, which had a low level of manufacturing.

Figure 2.3 Percentage share of the ten most imported products in total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

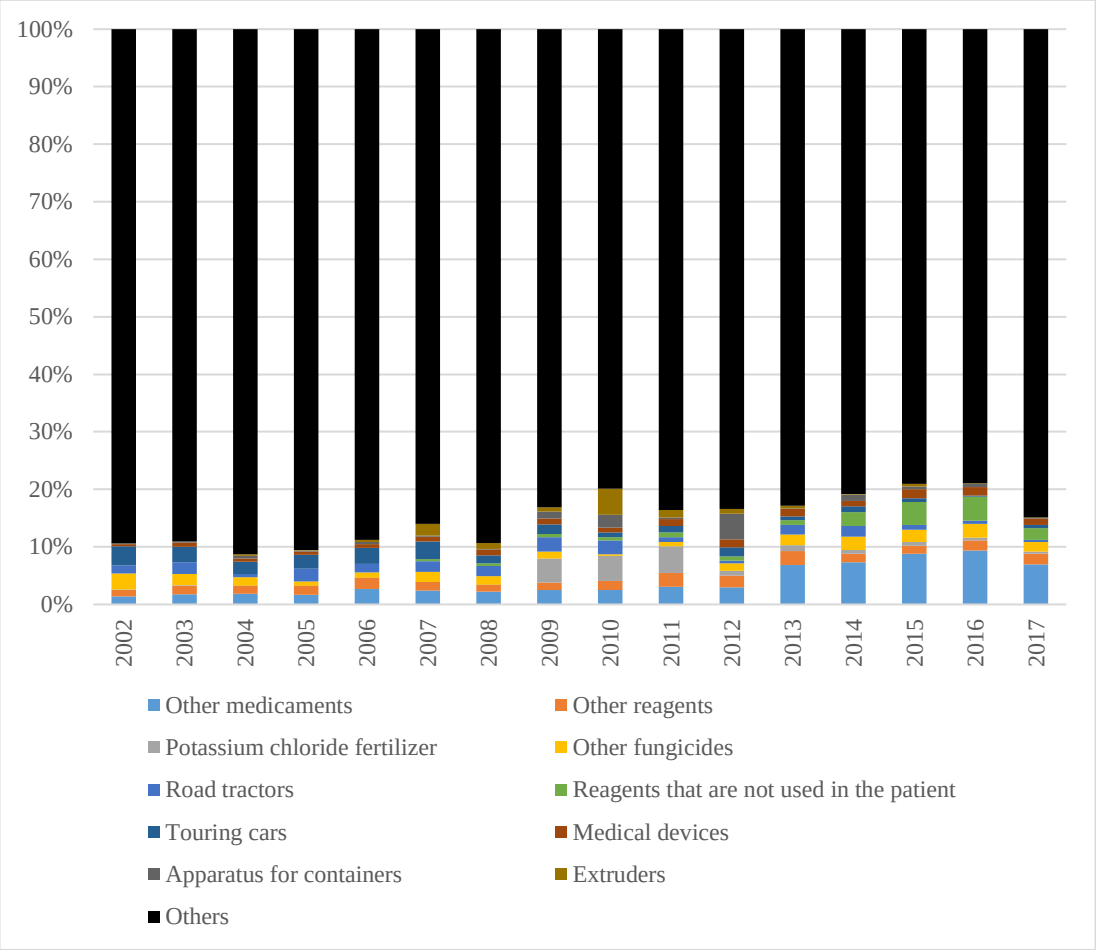


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Contrary to what happened with exports, imports do not have any product that dominates trade to a great extent. The medicaments, the most imported product, comes to be the 4.76% of the total. In the same way, the item "other" represents 83.76% of the total. This indicates that imports have a great variety and a unique product does not become truly dominant.

Figure 2.4 Annual composition of Ecuador's imports from Germany in FOB values



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

It can be seen that with the passage of time there is a slight reduction of the other item. This decrease is related to the increased importance of the top ten products.

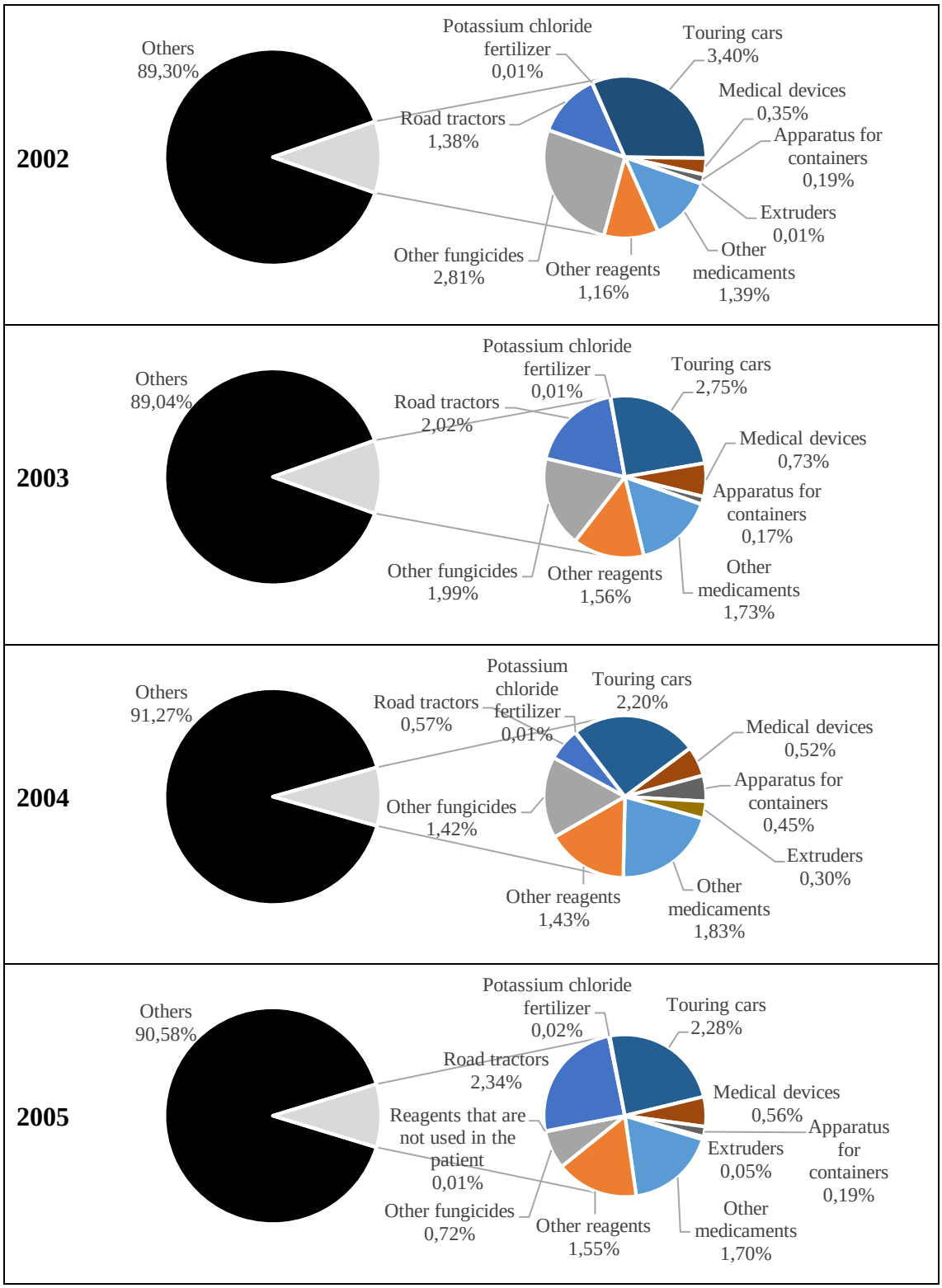
2.3.1 Analysis per year

Below, annual data, expressed in FOB (in US dollars) and in metric tons, is presented.

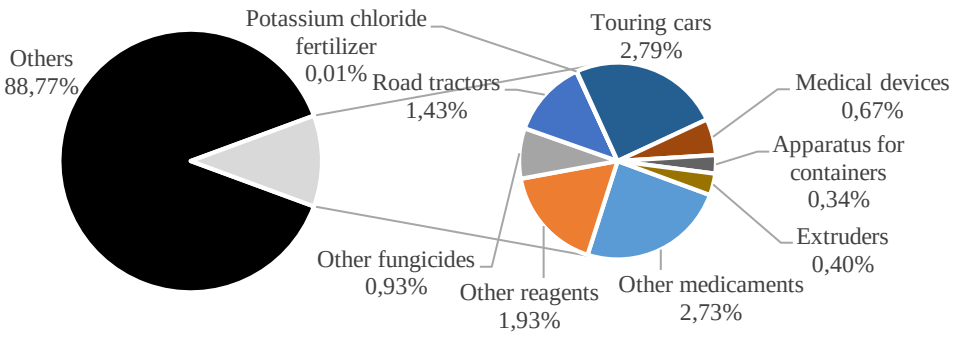
FOB values

The data presented on imports in FOB values is presented annually. In the main part, which is displayed in the center of the chart, only the "other" category is included. This is because there are products whose participation is very small compared to the main category and can not be appreciated correctly if they are not shown that way. The other products are represented to the right of the graph.

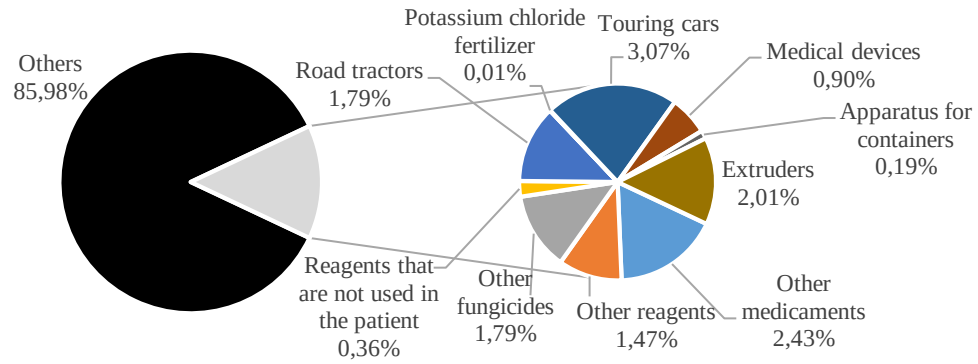
Figure 2.5 Imports from Ecuador to Germany per year in FOB values



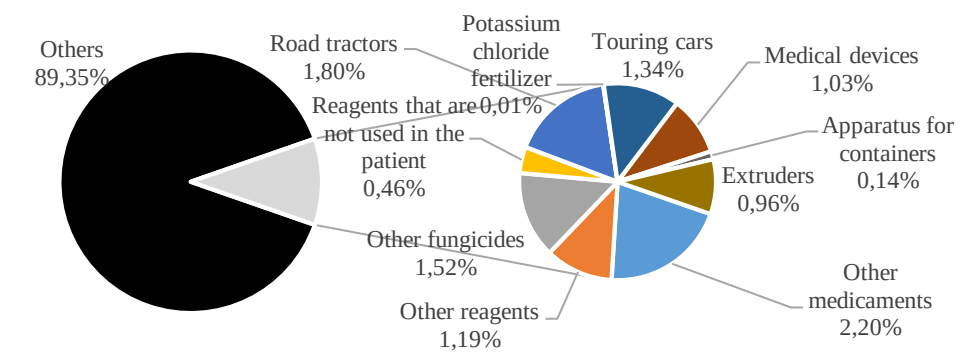
2006



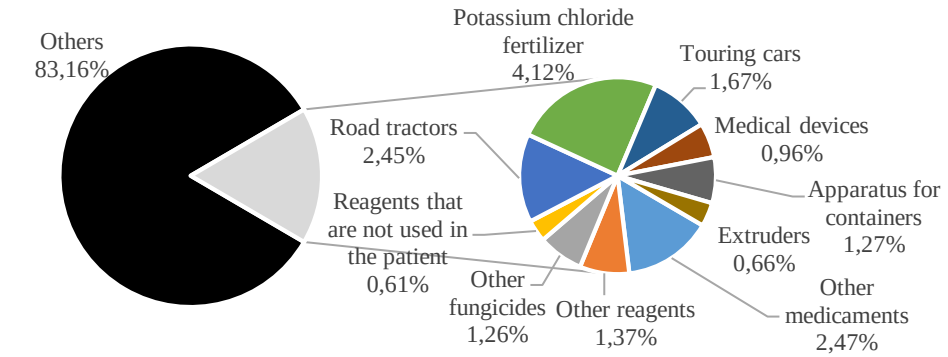
2007



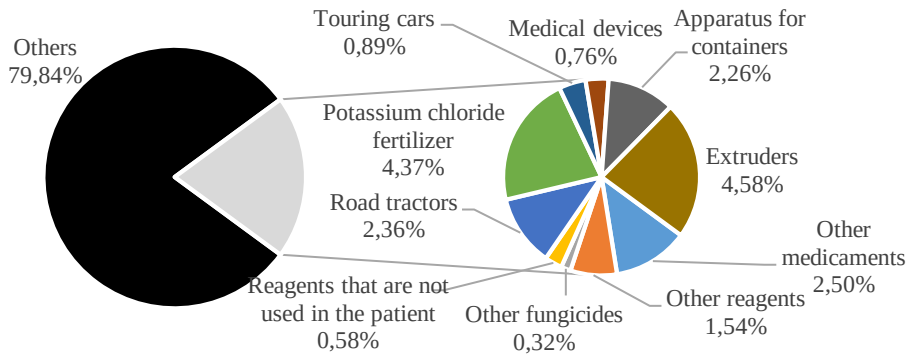
2008



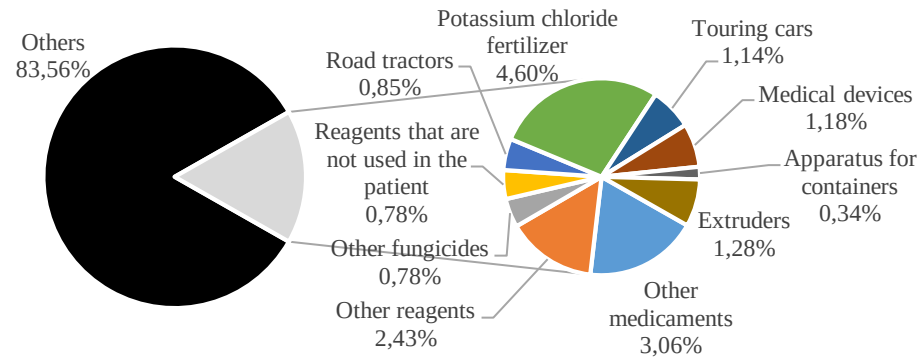
2009



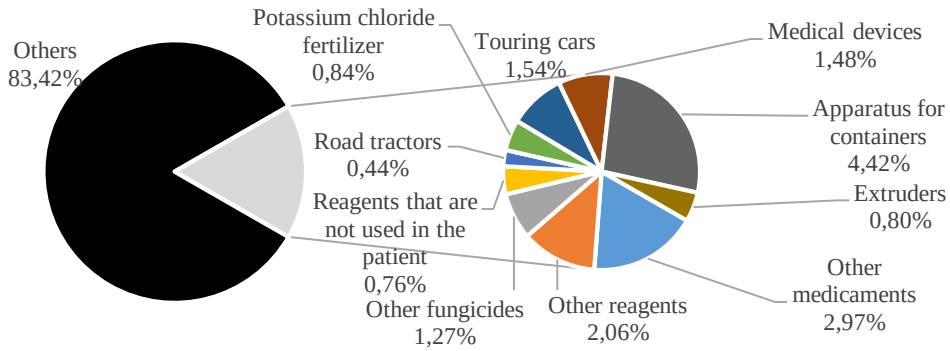
2010



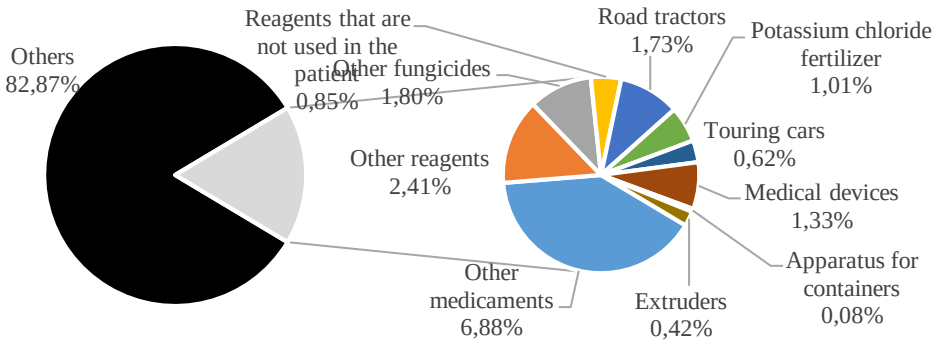
2011

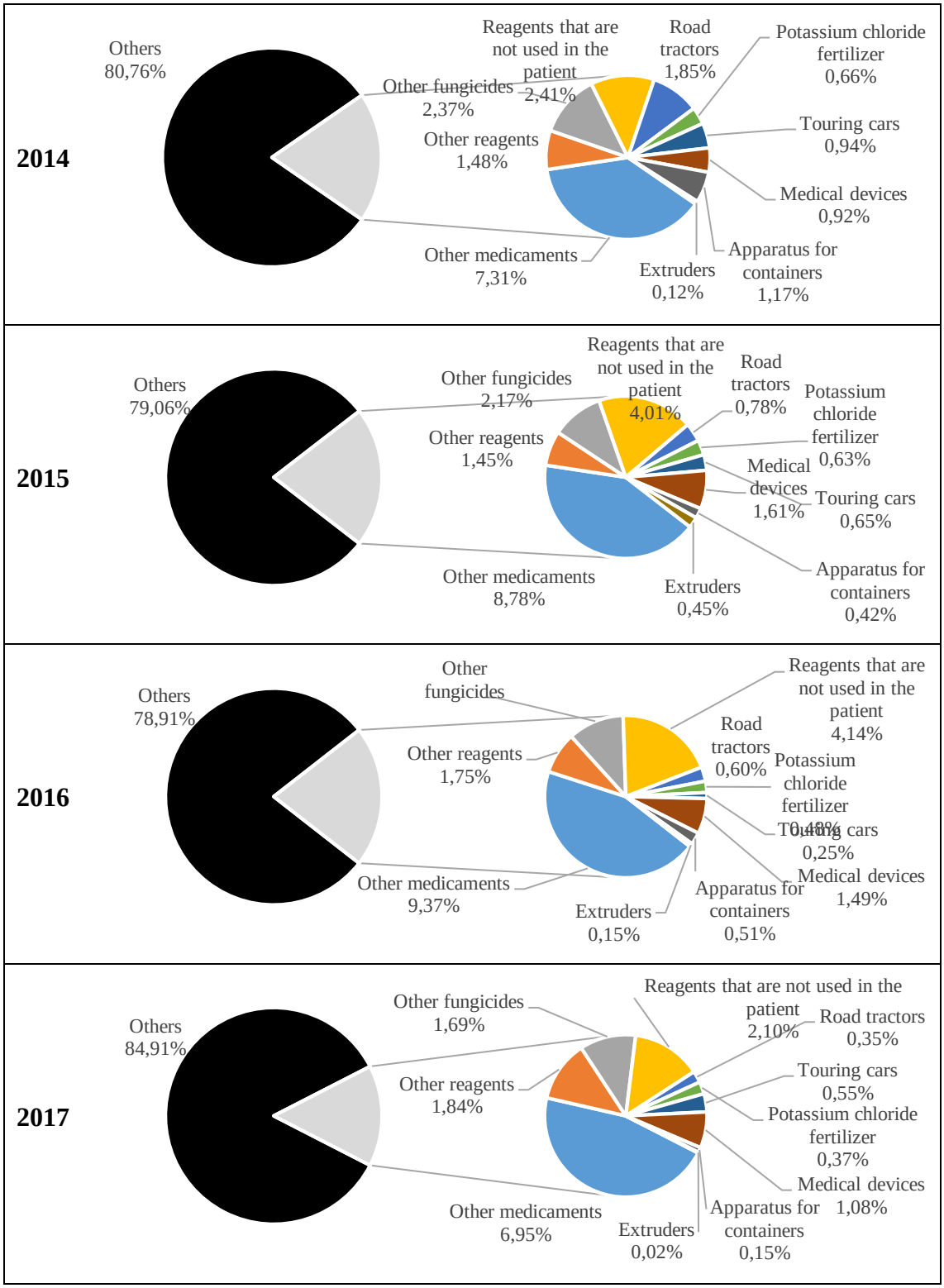


2012



2013





Source: www.bce.fin.ec.

Elaboration: García, Paulo.

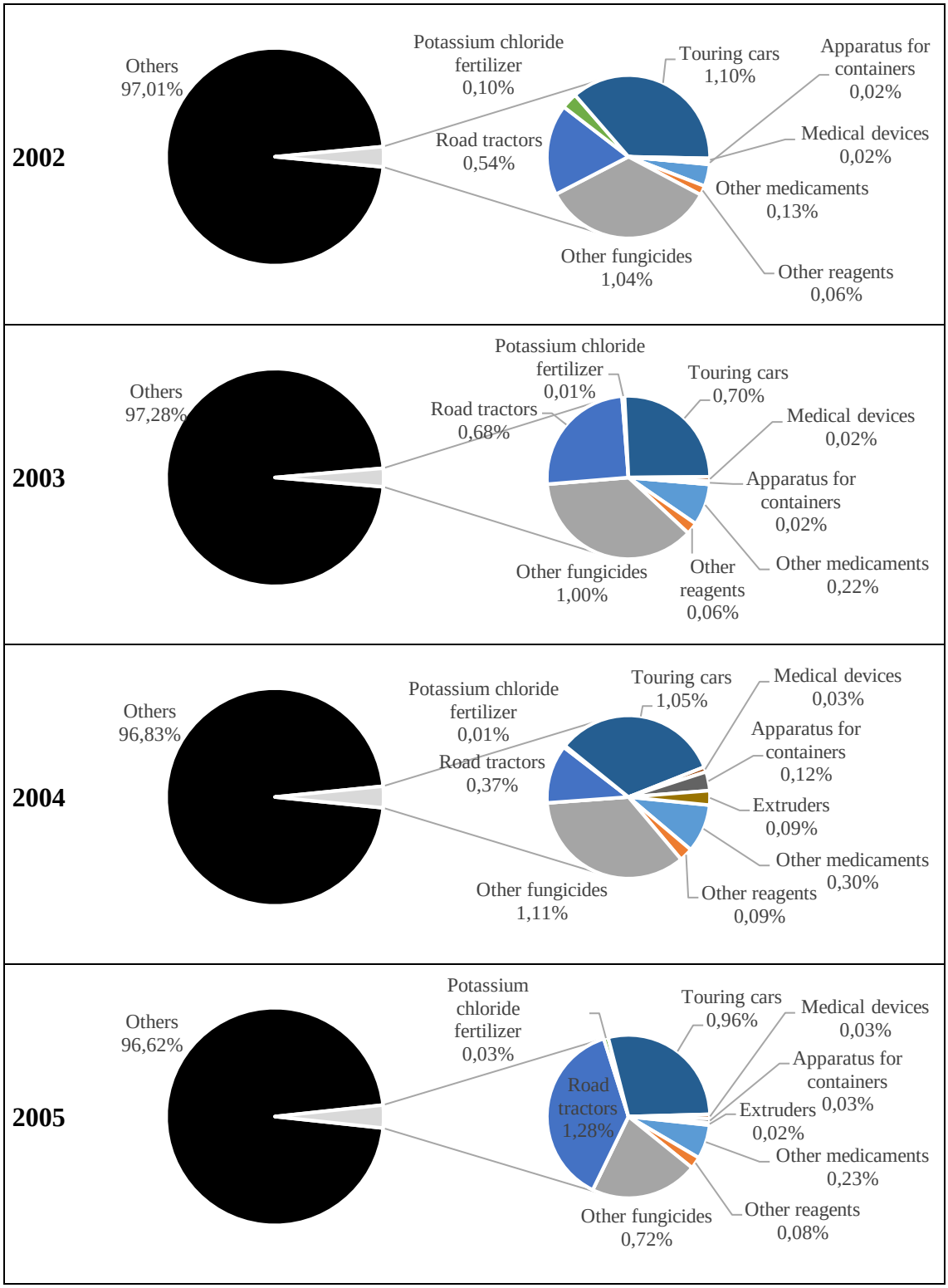
Regarding imports in FOB, changes can be seen mainly with respect to others, touring cars and medicaments items. In the first case, there is a continuous reduction of the other item, implying that the main products acquire more participation with respect to

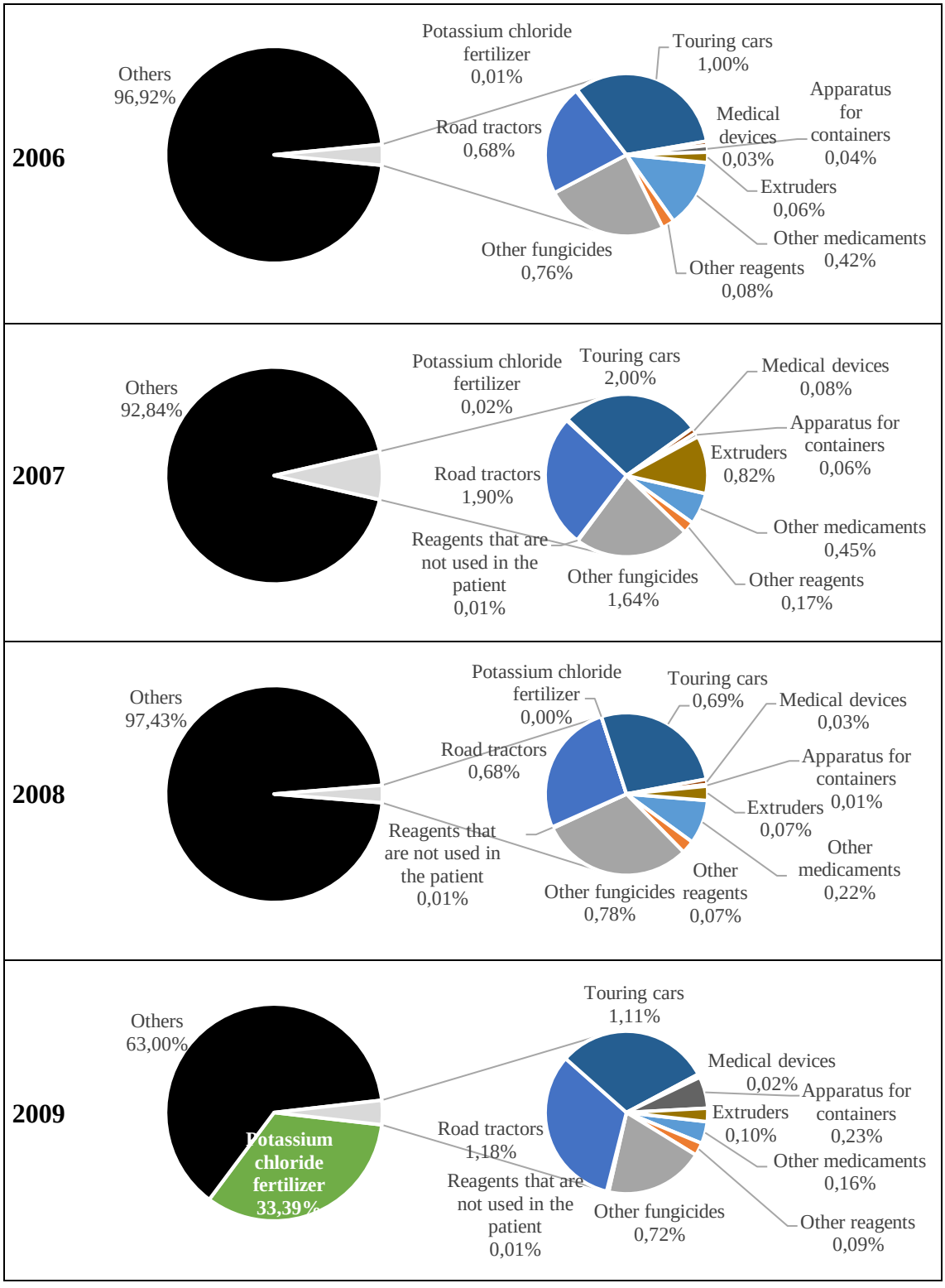
the total. On the other hand, at the beginning the most important NANDINA was that of automobiles. However, with the passage of time, its importance decreased significantly, while the category of other medicaments gradually increased until it became the most imported.

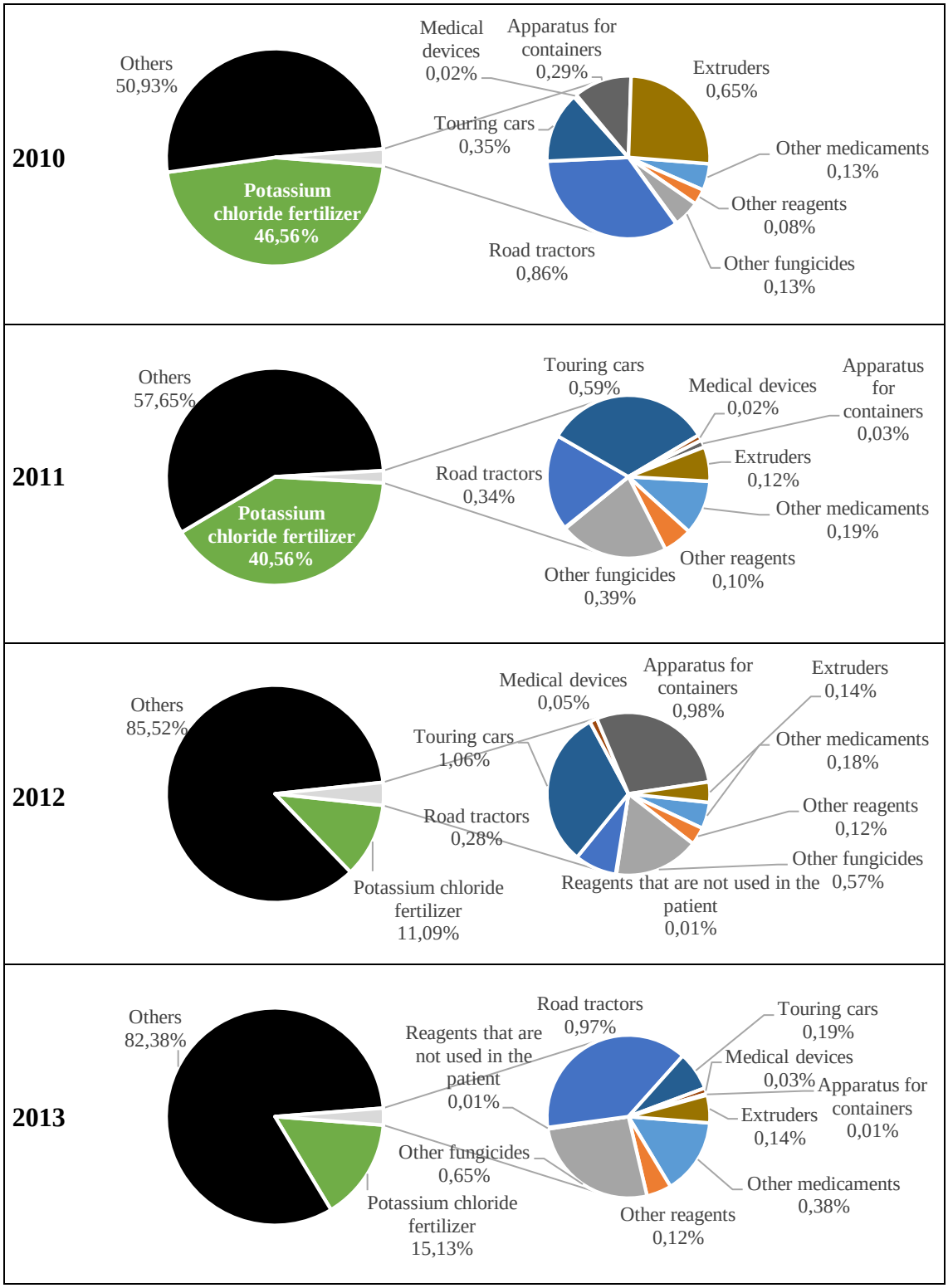
Metric tons

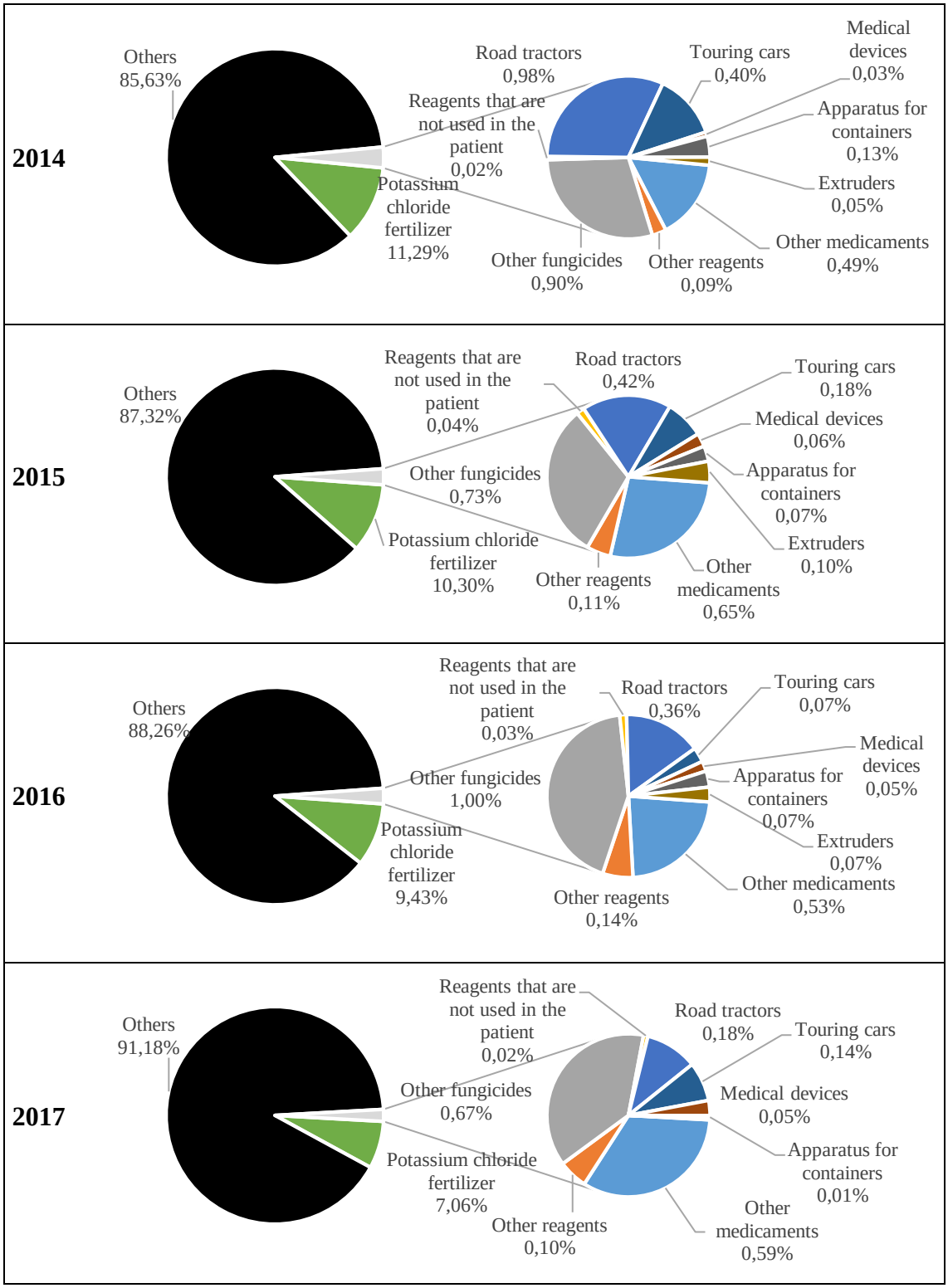
Data on imports in metric tons is presented annually. In the main part, which is displayed on the left of the graph, all products that involve more than 5% of the total are included, being in this case only two categories that pass this threshold. First, the category "other", which it is dominant throughout the period. Second, the fungicides, that appear after a significant increase in the quantity imported since 2009. This is due to the fact that there are products whose participation is very small compared to the main one and cannot be appreciated correctly if they are not shown that way. Products that do not reach this percentage are represented to the right of the graph. Products with less than 0.01% of that year's share are not shown in the chart.

Figure 2.6 Imports from Ecuador to Germany per year in metric tons




2006
Others 96,92%
Potassium chloride fertilizer 0,01%
Touring cars 1,00%
Apparatus for containers 0,04%
Medical devices 0,03%
Road tractors 0,68%
Extruders 0,06%
Other medicaments 0,42%
Other fungicides 0,76%
Other reagents 0,08%
2007
Others 92,84%
Potassium chloride fertilizer 0,02%
Touring cars 2,00%
Medical devices 0,08%
Apparatus for containers 0,06%
Extruders 0,82%
Road tractors 1,90%
Other medicaments 0,45%
Reagents that are not used in the patient 0,01%
Other fungicides 1,64%
Other reagents 0,17%
2008
Others 97,43%
Potassium chloride fertilizer 0,00%
Touring cars 0,69%
Medical devices 0,03%
Road tractors 0,68%
Apparatus for containers 0,01%
Extruders 0,07%
Reagents that are not used in the patient 0,01%
Other medicaments 0,22%
Other fungicides 0,78%
Other reagents 0,07%
2009
Others 63,00%
Touring cars 1,11%
Medical devices 0,02%
Apparatus for containers 0,23%
Extruders 0,10%
Potassium chloride fertilizer 33,39%
Road tractors 1,18%
Other medicaments 0,16%
Reagents that are not used in the patient 0,01%
Other fungicides 0,72%
Other reagents 0,09%


2010
Others
50,93%
Potassium
chloride fertilizer
46,56%
Medical
devices
0,02%
Apparatus for
containers
0,29%
Extruders
0,65%
Touring cars
0,35%
Other medicaments
0,13%
Other reagents
0,08%
Road tractors
0,86%
Other fungicides
0,13%
2011
Others
57,65%
Potassium
chloride fertilizer
40,56%
Touring cars
0,59%
Medical devices
0,02%
Apparatus
for
containers
0,03%
Extruders
0,12%
Road tractors
0,34%
Other medicaments
0,19%
Other reagents
0,10%
Other fungicides
0,39%
2012
Others
85,52%
Potassium chloride
fertilizer
11,09%
Medical devices
0,05%
Apparatus for
containers
0,98%
Extruders
0,14%
Touring cars
1,06%
Other medicaments
0,18%
Road tractors
0,28%
Other reagents
0,12%
Other fungicides
0,57%
Reagents that are not used in the
patient
0,01%
2013
Others
82,38%
Potassium chloride
fertilizer
15,13%
Road tractors
0,97%
Reagents that are
not used in the
patient
0,01%
Touring cars
0,19%
Medical devices
0,03%
Apparatus for
containers
0,01%
Extruders
0,14%
Other fungicides
0,65%
Other medicaments
0,38%
Other reagents
0,12%



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding imports in metric tons, the predominance of the "other" category can be seen. This is because most of the products within the ten most imported have a very small share of the total. On average, this item has 85.43% of the participation in the

analyzed period and during eight of the years, it exceeds 90% of the total. This indicates the participation of the most imported products.

In addition, among the ten most imported products, the most important item is that of the fungicide. This item, which at the beginning has a minimal participation, significantly increases its share in metric tons in 2009, 2010 and 2011 and then decreases it again, but always remaining very far from the next product, maintaining a distance of close to seven points in recent years.

2.3.2 Analysis by product

The following point analyzes product by product, mainly taking into account the following factors:

- Participation in imports, mainly FOB due to the low participation of products in MT;
- Price per MT, to have a point of reference of what is the price of a product with respect to others in the same unit and its historical evolution. It is obtained from the division of the quantity imported in FOB for the MT number of each year;
- The position with respect to other suppliers in the Ecuadorian market is not evaluated in most cases since it is not possible to correctly monitor the product of all the products.

Something that is important to mention is that most of the items correspond to groups "others" that include all products that do not fall within similar categories. The structure of the NANDINA and the Harmonized System imply that to classify the products they will be divided into chapters and each chapter usually has a category that can be used if there are products that do not go clearly within one of the sub classifications. These products are grouped in the category "others". The problem with this is that this type of categories are usually divided to become more specific, so the monitoring of them is not as precise.

Other medicaments

Within this study only the NANDINA 3004902900 with the description "the others" is considered.

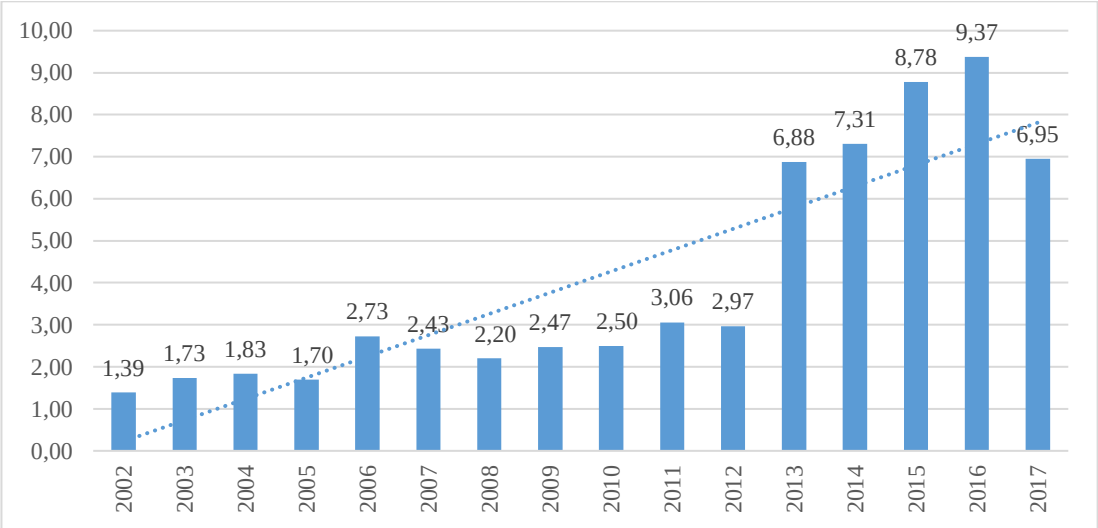
The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "30 Pharmaceutical products.
    - 04 Medicaments (other than products of heading 30.02, 30.05 or 30.06) consisting of mixed or unmixed products, prepared for therapeutic or prophylactic uses, dosed (including those intended to be administered transdermally) or put up for retail sale.
        - 90 The others. "

Here, drugs that contain antibiotics are excluded; medicaments that contain hormones or steroids used as hormones but without antibiotics; medicines containing alkaloids or their derivatives but without hormones or steroids used as hormones or antibiotics; medicines containing provitamins, vitamins or their derivatives used mainly as vitamins; medicines containing iodine or iodine compounds; medicines put up for retail sale.

This NANDINA is among those affected by the Trade Agreement with the EU, with a reduction in six stages that begin five years after the entry into force of the agreement.

Figure 2.7 Percentage share of other medicaments in the total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values



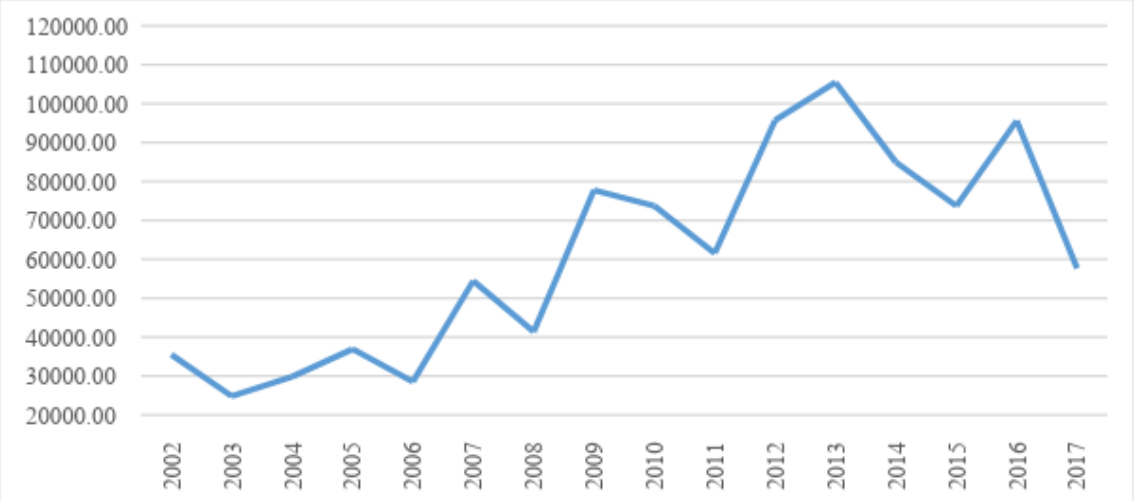
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

This product has a not so high share in the beginning, but its increase in recent years is what allows it to be the most imported product from Germany. In this NANDINA three periods can be identified: the first, from 2002 to 2005, where it approaches, but

does not reach 2%; the second, from 2006 to 2012, where it exceeds 2%; and the third, from 2013 onwards, where it has its largest participation, always with more than 6% and reaching its maximum point in the period of analysis in 2016.

Figure 2.8 Price per metric ton of other medicaments



Source: www.bce. fin.ec.

Elaboration: García, Paulo.

The value per metric ton of the product is very variable. It presents continuous increases and decreases with a maximum peak in 2013 and a minimum in 2003. In addition, it can be seen that the importation of this product does not necessarily coincide with the value of its metric ton in the market. In any case, it can be noticed that the price per metric ton is one of the highest among all the most traded products between the two countries.

Other diagnostic or laboratory reagents

NANDINAS 3822009000, 3822001900 and 3822002900 are considered. They are chemical compounds used mainly by chemical laboratories. The description of these NANDINAS is "the others".

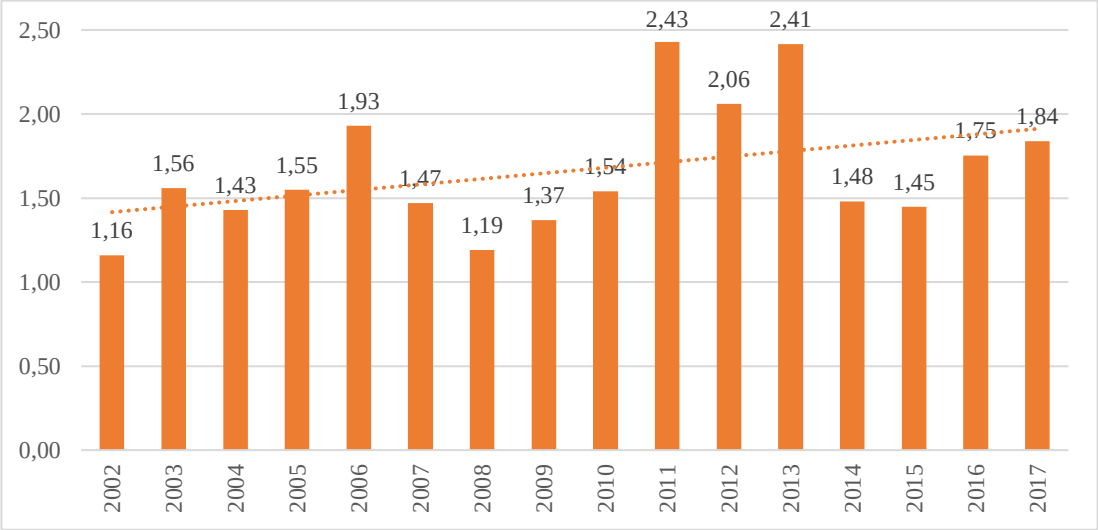
The current NANDINA is among those affected by the Trade Agreement with the EU, with an immediate reduction since the agreement is in force.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "38 miscellaneous products of the chemical industries.

- 22 Diagnostic or laboratory reagents on any support and prepared diagnostic or laboratory reagents, whether or not on a backing, other than those of heading 30.02 or 30.06; certified reference materials. "

Figure 2.9 Percentage share of other diagnostic or laboratory reagents in the total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

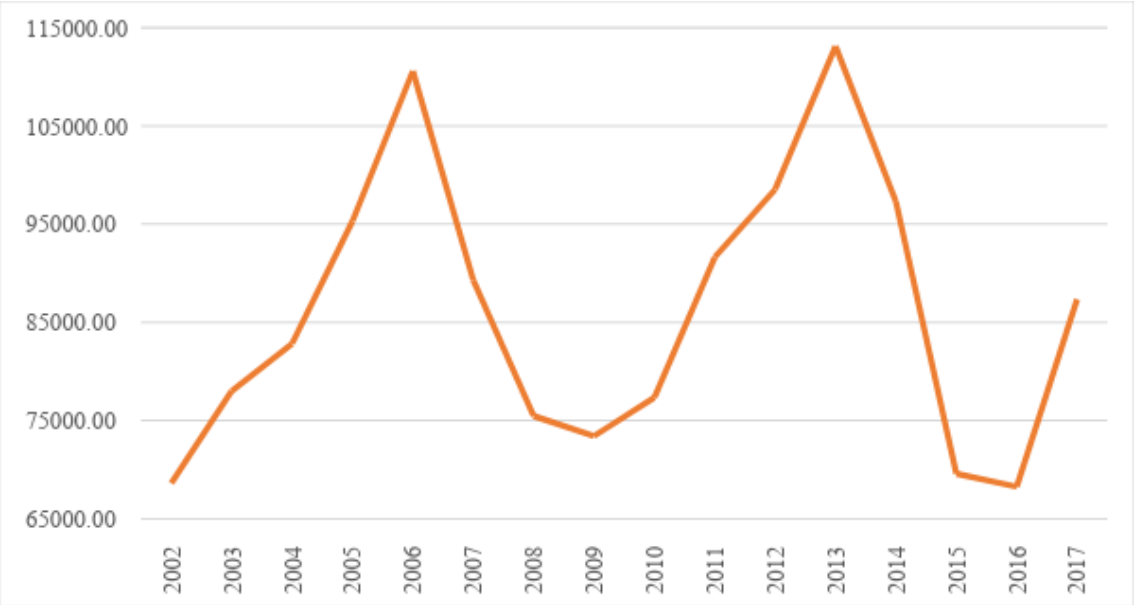


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

After seeing the results of other medicaments, this type of reagents have a more stable participation. Likewise, they have an upward trend, although not as pronounced as in the previous case. The time of most participation of this product is between 2011 and 2013.

Figure 2.10 Price per metric ton of other diagnostic or laboratory reagents



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price of this product has two points where it shows significant growth, in 2006 and in the year 2013. This also coincides with an increase in FOB imports, although there is no clear correlation between the two aspects because if other years like 2012 or 2016, there is no evidence that there is a relationship between the decrease or increase in prices and the increase in their share of FOB imports.

Other fungicides

The NANDINAS 3808929900, 3808929990 and 3808209000 are used. The description of these NANDINAS is "the others".

The current NANDINA is among those affected by the Trade Agreement with the EU, with an immediate reduction since the agreement is in force.

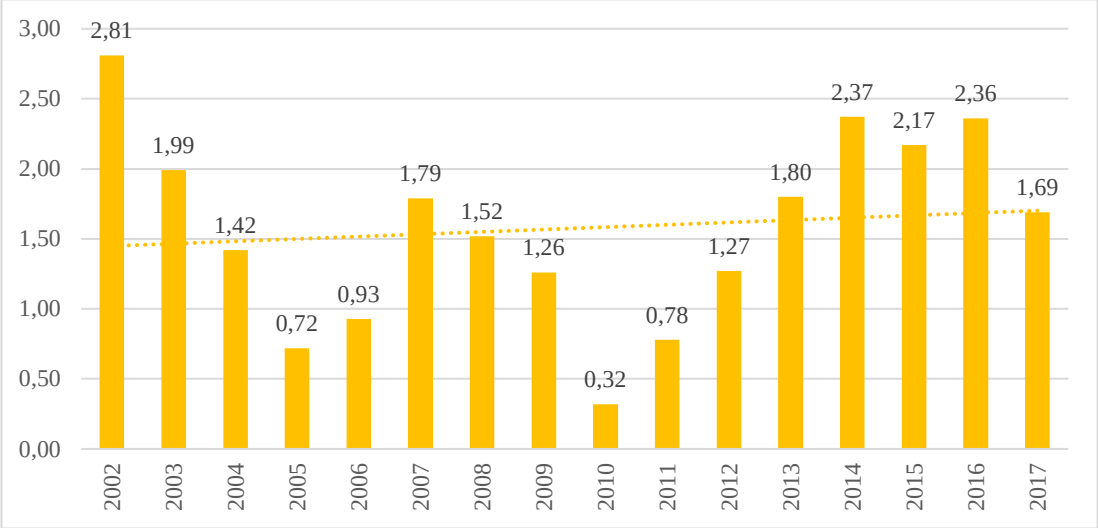
The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "38 Miscellaneous products of the chemical industries.
    - 08 Insecticides, rodenticides and other antirust agents, fungicides, herbicides, germination inhibitors and plant growth regulators, disinfectants and similar products, put up in forms or packings for retail

sale, or as preparations or articles such as ribbons, wicks and candles, sulfur, and flypaper.

- 92 Fungicides. "

Figure 2.11 Percentage share of other fungicides in total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

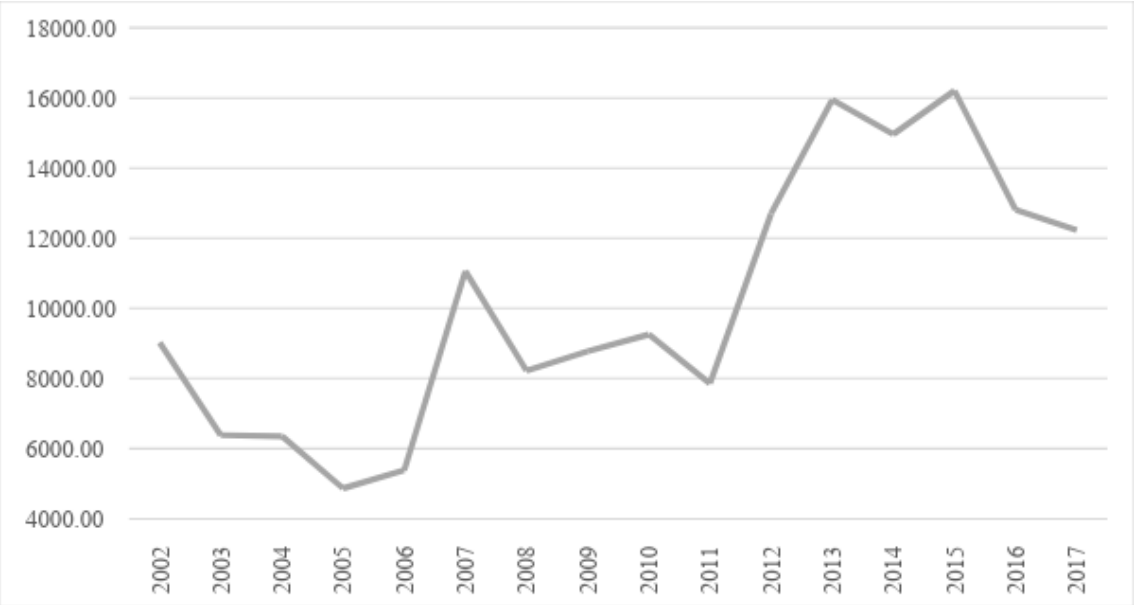


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The product in the period of analysis has a slight upward trend, which is not easily visible to the naked eye. However, the year of the whole period in which it has the most participation in FOB is 2002 at the beginning of the period, later it goes through a period of decrease of its participation until 2005. It reaches its lowest point in 2010 but subsequently recovers, although not reaching the levels of 2002.

Figure 2.12 Price per metric ton of other fungicides



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding the price per metric tons, it presents three important points. The first is that it tends to rise during the period studied. The second is its high variability of one year with respect to the other and throughout the period in general. The third is that, although it does not have a behavior exactly related to the quantity of the imported product and its FOB share, they do have similar behaviors, increasing the amount imported of the product when its price increases. However, this does not indicate a direct relationship between the share of the product and its price because the behavior is not exactly the same.

Laboratory or diagnostic reagents that are not used in the patient

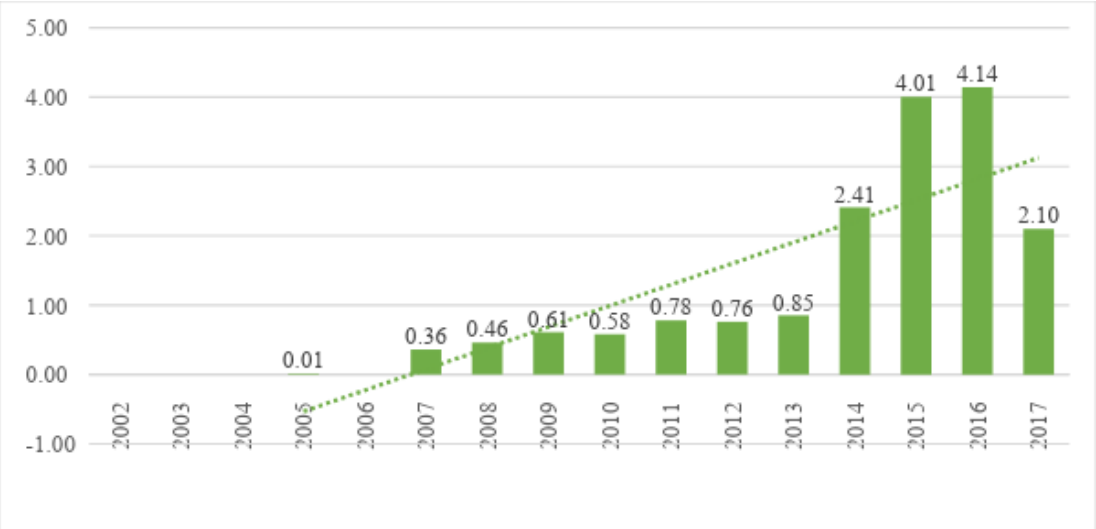
Only the NANDINA 3002103300 is used. It is valid since 2005, but due to the changes in the NANDINA it is not considered adequate to make a previous follow-up based on other NANDINAS. . Its description is "Antisera" sera with antibodies ", other blood fractions and modified immunological products, including those obtained by biotechnological process: other blood fractions and modified immunological products, even obtained by biotechnological process: diagnostic reagents that do not are used in the patient "(Committee on Foreign Trade, 2017).

This product is among those affected by the Trade Agreement with the EU, under category 5, which is deductible in six stages of a year from the agreement (Ministry of Foreign Trade and Investment, 2017).

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "30 Pharmaceutical products.
    - 02 Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera (sera with antibodies), other fractions of blood and immunological products including modified or obtained by biotechnological process; vaccines, toxins, cultures of microorganisms (except yeast) and similar products.
        - 10 Antisera (sera with antibodies), other fractions of blood and modified immunological products, including those obtained by biotechnological processes."

Figure 2.13 Percentage share of laboratory or diagnostic reagents in total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values



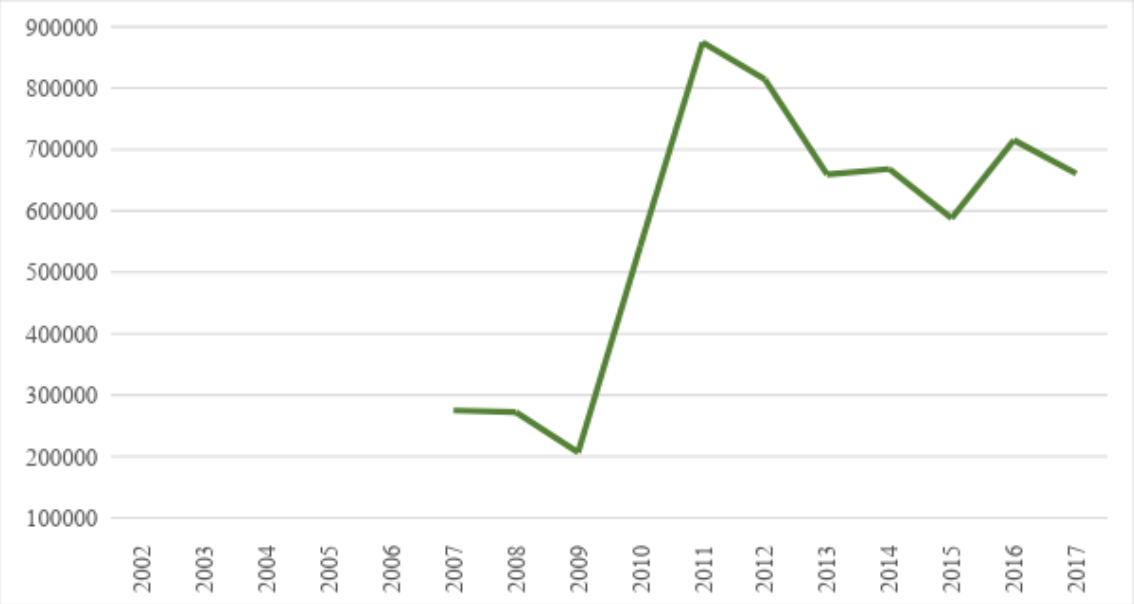
Source: www.bce.fin.ec.

Elaboration: García, Paulo.

This NANDINA has three stages marked. The first, in 2005 and 2006, where the product is almost not imported. The second, from 2007 to 2013, starts to become more important, but always staying below 1%. The third stage goes from 2014 onwards,

where NANDINA always exceeds 2% of the total and comes to represent up to 4.14% of imports from Germany.

Figure 2.14 Price per metric ton of laboratory or diagnostic reagents



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton has two stages. First, from 2007 to 2009, with a price per metric ton less than 300 thousand dollars. Second, from 2010 onwards, where it suffers a strong rise ending with an average price close to double the first period. All this occurs without having greater incidence in the imported quantity.

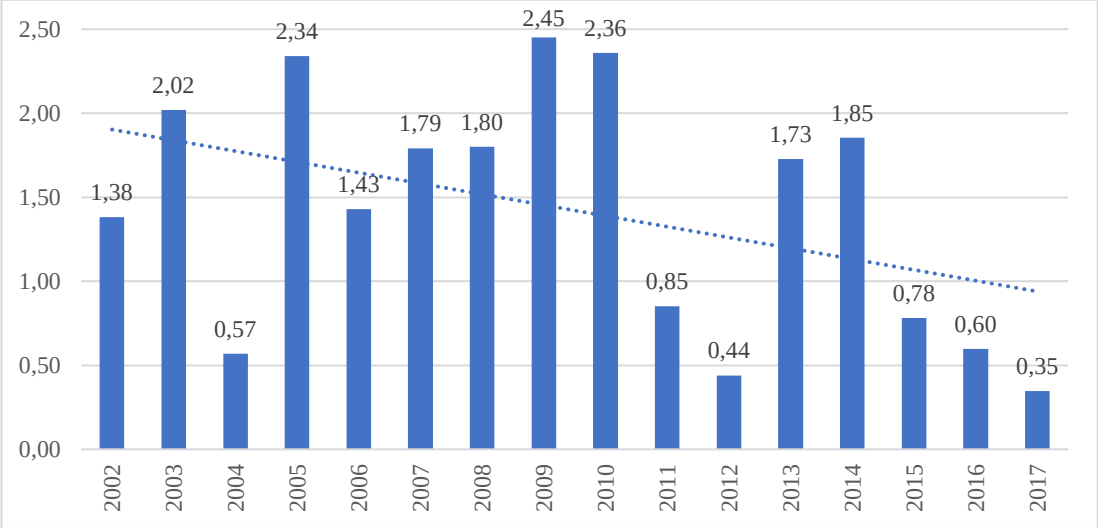
Other road tractors

The NANDINAS 8701200090 and 8701200000 are used to refer to this product. Item 8701200000 is more generic due to its age. The most recent item has the description "others". There is another departure for when these types of products come in assembly kits (CKD), so those that are taken in this case are all others.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "87 Motor vehicles, tractors, velocipedes and other land vehicles, their parts and accessories.
    - 01 Tractors (other than tractors of heading 87.09).
        - 20 Road tractors for semi-trailers."

Figure 2.15 Percentage share of other road tractors in the total of imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

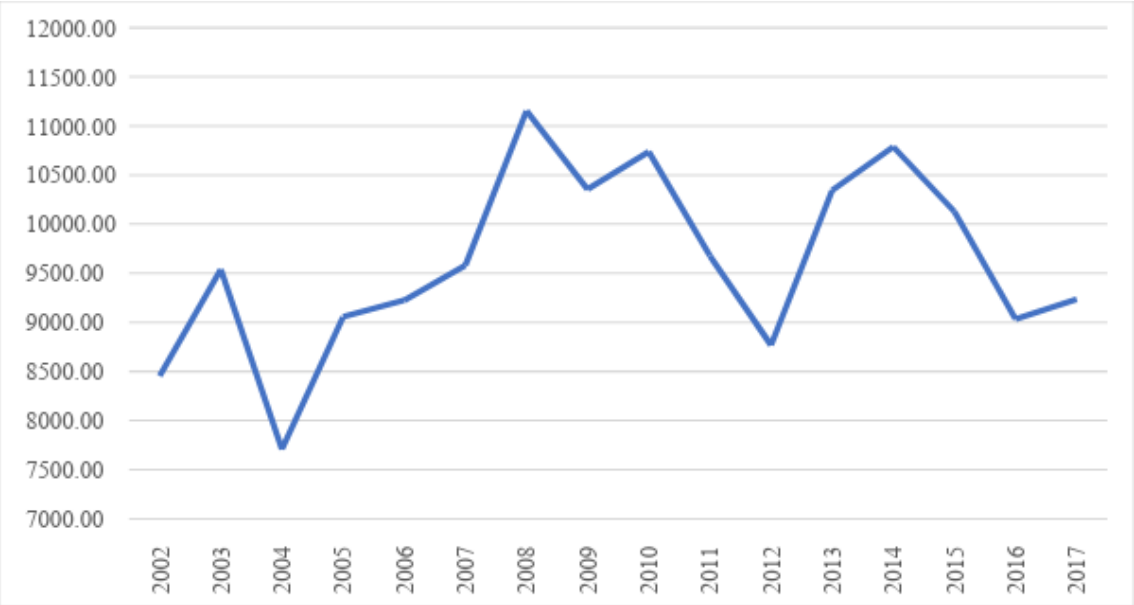


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The share of tractors in FOB imports is not constant, with large variations from year to year. Thus, it can also be seen that there is a downward trend in imports of tractors if the entire period is taken into account, especially in recent years. It must also be taken into account that this product is included in the agreement with the EU (Ministry of Foreign Trade and Investment, 2017).

Figure 2.16 Price per metric ton of other road tractors



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton of this product is also very variable. There is an upward trend throughout the period analyzed. The lowest years coincide, 2004 and 2012, with a drop in the share of the product in FOB imports; however, this is not seen in 2017, where it has the lowest participation of the entire period. For this reason and for the analysis of the years of most trade, it can be seen that, although there is a similar behavior in some moments between the price per metric ton and the share in FOB values, it is not directly related.

Fertilizer with potassium chloride

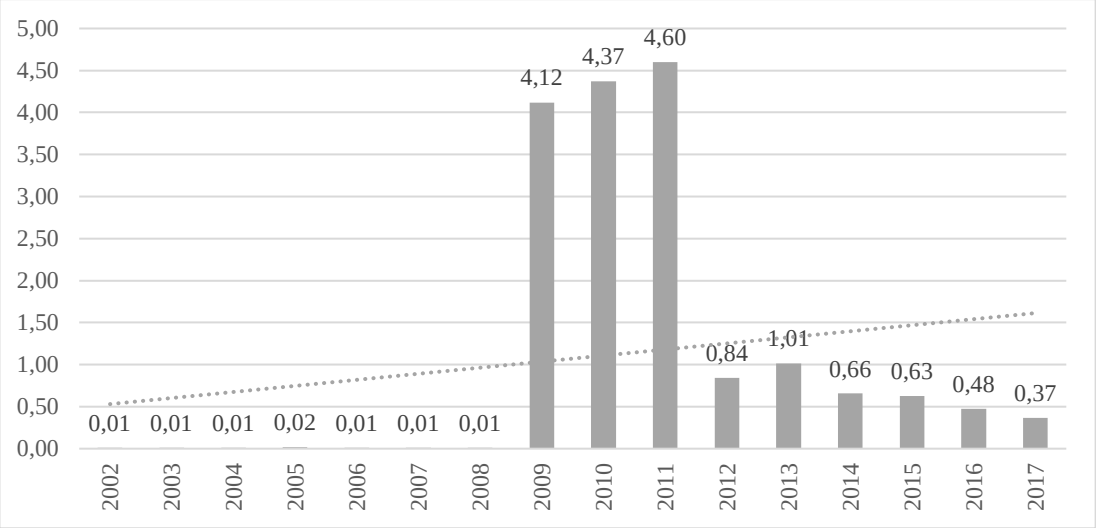
The NANDINAS 3104201000 and 3104200000 are used. The first and most current one is described as "with a potassium content, greater than or equal to 22% but less than or equal to 62% by weight, expressed as potassium oxide (quality fertilizer) ". (Committee on Foreign Trade, 2017) They deal with fertilizers with potassium chloride. The second NANDINA was divided into several in 2007, the only one relevant in the case of Germany being the first mentioned NANDINA.

The NANDINA is among those affected by the Trade Agreement with the EU, with immediate relief since the agreement is in force.

The product is under the following classification according to the (Committee of Foreign Trade, 2017):

- "31 Fees.
    - 04 Mineral or chemical potassium fertilizers.
        - 20 Potassium Chloride. "

Figure 2.17 Percentage share of fertilizer with potassium chloride in the total of Ecuadorian imports from Germany in the period 2002 - 2017 in FOB values

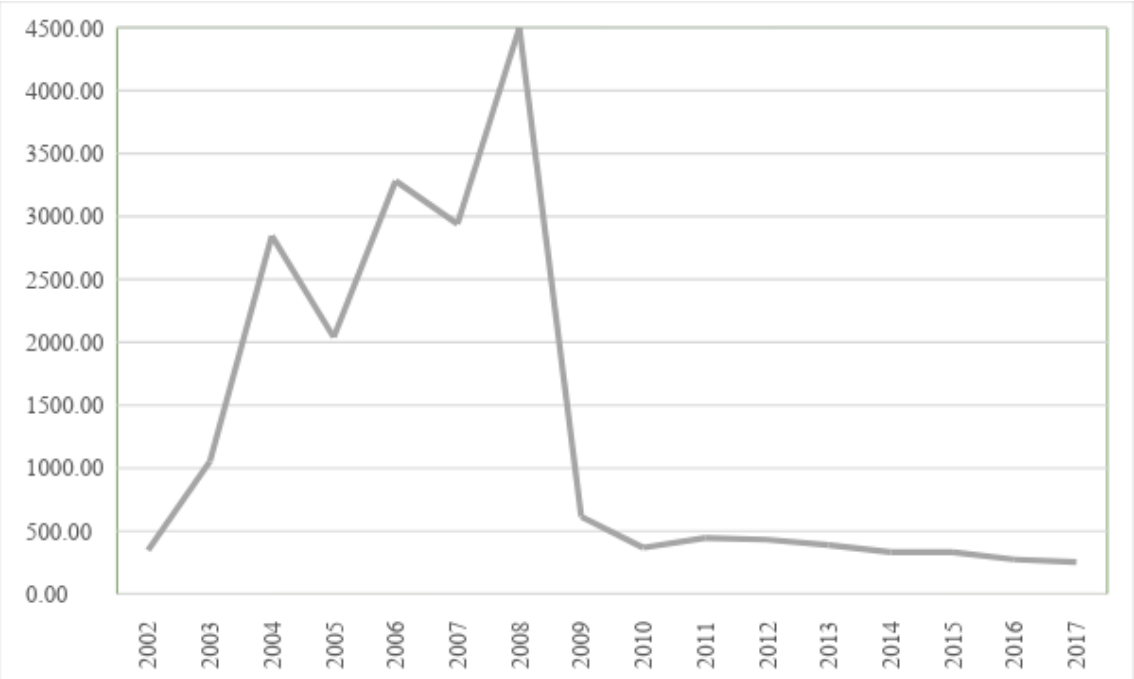


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The fertilizer with potassium chloride has an abnormal behavior. Throughout the period of analysis, it has an upward trend. However, this trend is because during the first six years its participation is minimal. Thus, if instead the last five years are taken, the trend is downward. The intermediate period, from 2009 to 2011, is the most unusual and represents a time in which the participation was always over 4% and even Germany becomes the main supplier of the product for Ecuador. After these three years, participation declines and no longer presents another period of great variation as the aforementioned.

Figure 2.18 Price per metric ton of fertilizers with potassium chloride



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Until 2009, when the participation of this product was minimal, it is evident that the cost per metric ton is very high. However, from the moment in which the import becomes massive, the price drops immediately and its variability decreases with a slight downward trend in recent years. This price maintains these last characteristics from 2009 onwards, although the quantity of the imported product has decreased.

Other passenger cars

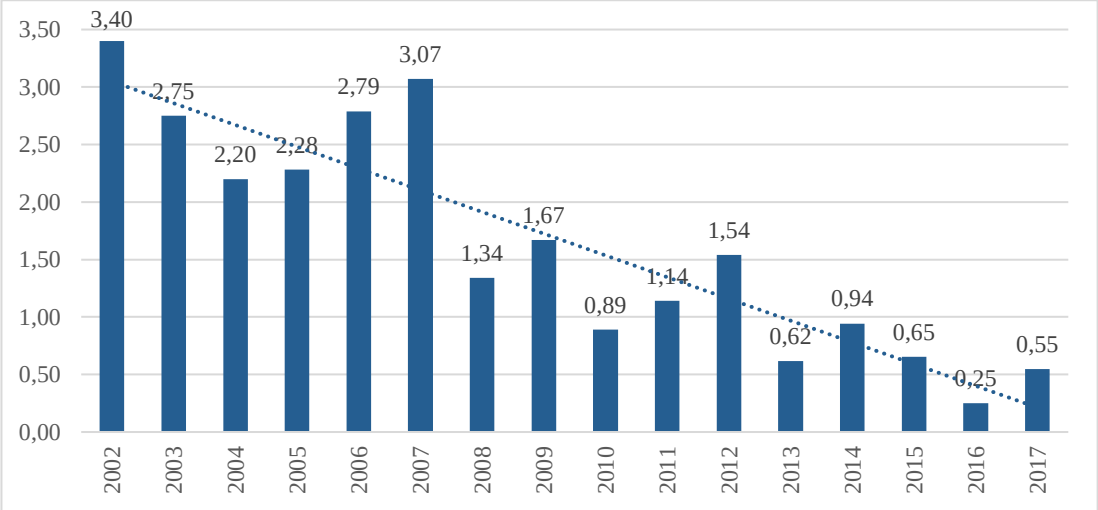
NANDINAS 8703239090, 8703230000 and 8703230090 are used to refer to this product.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "87 Motor vehicles, tractors, velocipedes and other land vehicles, their parts and accessories.
    - 03 Passenger cars and other motor vehicles designed primarily for the transport of persons (other than those of heading No. 87.02), including those of the family type ("break" or "station wagon") and racing cars.

- 23 With a displacement of more than 1,500 cm^3 but less than or equal to 3,000 cm^3. "

Figure 2.19 Percentage share of other passenger cars in total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

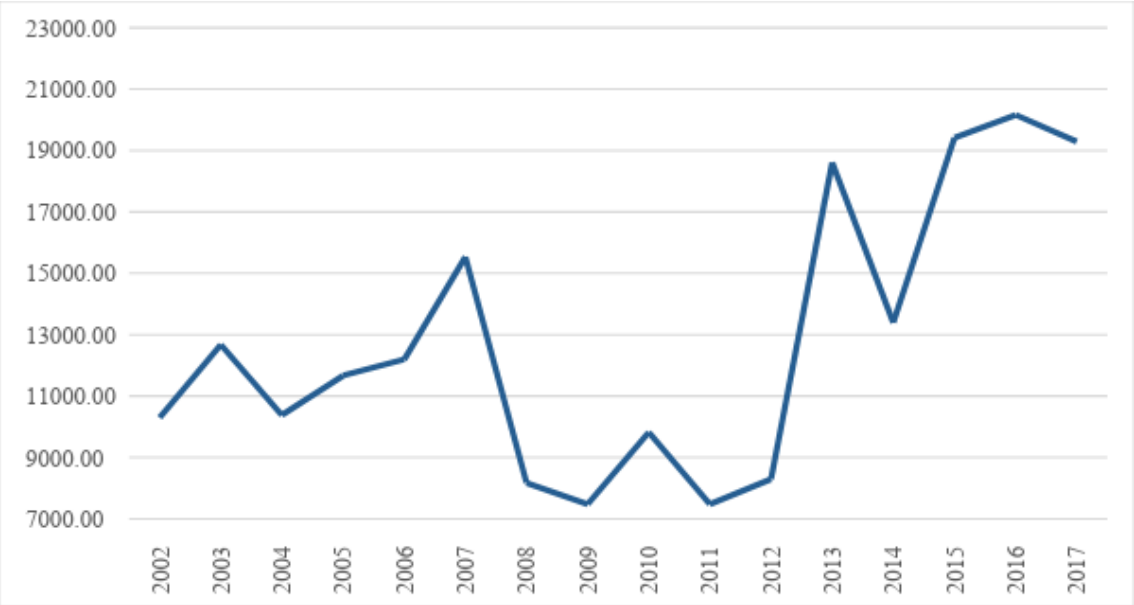


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The behavior of this product is to reduce its presence in the observed period. It coincides with a period that has been problematic for vehicle imports in the country. However, while the sector has already begun to recover, in this case, the imports of this type of vehicle from Germany have not done so.

Figure 2.20 Price per metric ton of other passenger cars



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton is unstable. It has three different periods. First, from 2002 to 2007, when it maintains a price higher than 10 thousand dollars per metric ton. Second, from 2008 to 2012, when its price collapses. Third, from 2013 onwards, when its price recovers and stays above 13 thousand dollars. These periods are not repeated clearly in the participation in FOB values.

On the position among the total suppliers of the country, Germany is not among the main ones of Ecuador. In the last ten years, it does not reach the top five at any time. Meanwhile, the main suppliers of this product, South Korea and Colombia, are always present in the first places during the same time. Regarding the other European suppliers, Germany has competition from Spain, France and the United Kingdom and its positions in terms of being the main suppliers from Europe change constantly (Trade Map, 2018). In summary, on the position with respect to other suppliers, Germany is not an important supplier for the country in terms of this product.

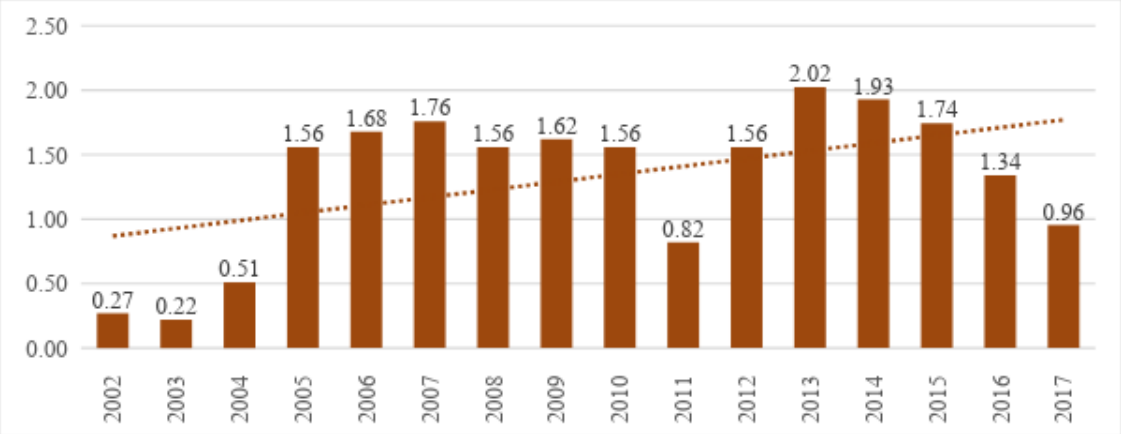
Other medical, surgical or veterinary devices

The NANDINA 9018909000 is used in this case. Its description is "others".

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "90 Optical, cinematographic, measuring, control or precision instruments and apparatus; medical and surgical instruments and apparatus; parts and accessories of these instruments or devices.
    - 18 Instruments and appliances used in medicine, surgery, dentistry or veterinary medicine, including scintigraphy and other electro-medical devices, as well as devices for visual tests.
        - 90 Other instruments and equipment. "

Figure 2.21 Percentage share of other medical, surgical or veterinary devices in the total exports from Ecuador to Germany in the period 2002 - 2017 in FOB values

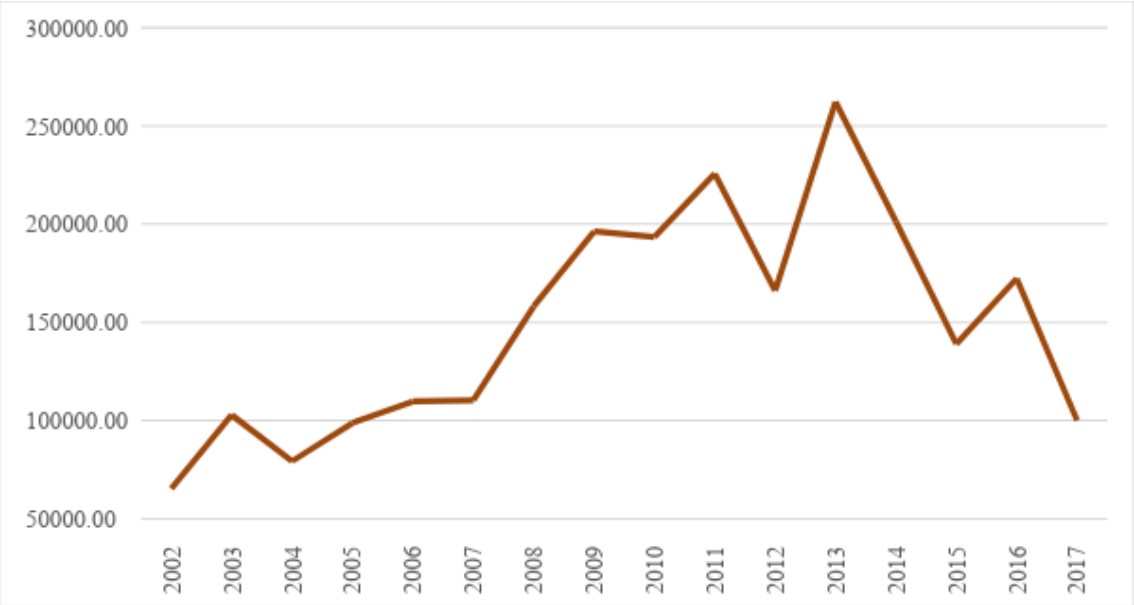


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

On its share of FOB imports, it is one of the most stable products. Different periods can be observed. The first moment, from 2002 to 2004, where the participation is less than 1%. The second moment goes from 2005 to 2010, with a participation always higher than 1.5%. The year 2011 marks a moment of change, with a significant decline. Subsequently, during the last moment, participation is recovered with a peak in 2013 that then gradually decreases.

Figure 2.22 Price per metric ton of other medical, surgical or veterinary devices



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton seems to have no relation to its share in FOB values. The moments described in the previous paragraph are not displayed in the price per metric ton. However, two processes that occur during the period of analysis are notable. First, the price growth that occurs from the year 2002 until the year 2013; and, second, the rapid fall in the price after 2013 that makes the last available values (of the year 2017) very similar to those of the year 2005. Thus, it is not possible to find a relationship between the price per metric ton and its participation in FOB values

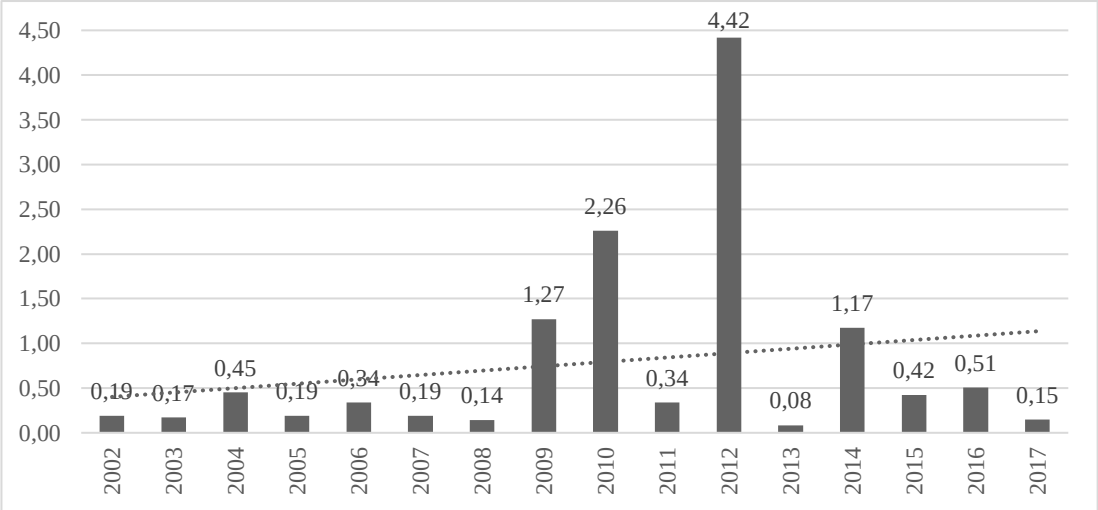
Other bottling devices, labeling, among others, for containers

Refers to NANDINAS 8422309000, 8422309090, 8422309020 and 8422309010. NANDINAS refer to "machines and apparatus for filling, closing, covering or labeling bottles, boats or cans, boxes, sacks "bags" and other continents; machines and apparatus for capsulating bottles, jars, tubes or similar containers; machines and apparatus for gassing beverages: the others "in addition to" to label "," to pack liquids "and" the others ", respectively and taking into account that the last three are the result of the division of the first in recent years.

The product is under the following classification according to the (Foreign Trade Committee, 2017):

- "84 Machines, mechanical appliances and devices, nuclear reactors, boilers; parts of these machines or devices.
    - 22 Dishwashing machines; machines and apparatus for cleaning or drying bottles or other containers; machines and apparatus for filling, closing, covering, plugging or labeling bottles, cans or cans, boxes, sacks (bags) or other continents; machines and apparatus for capsulating bottles, jars, tubes and similar containers; other machines and apparatus for packaging or wrapping merchandise (including wrapping with heat shrinkable film); machines and apparatus for gassing beverages.
        - 30 Machinery and apparatus for filling, closing, covering or labeling bottles, cans or cans, boxes, sacks (bags) and other continents; machines and apparatus for capsulating bottles, jars, tubes and similar containers; machines and apparatus for gassing beverages. "

Figure 2.23 Percentage share of other bottling devices, labeling, among others, for containers in the total of imports from Ecuador from Germany in the period 2002 - 2017 in FOB values



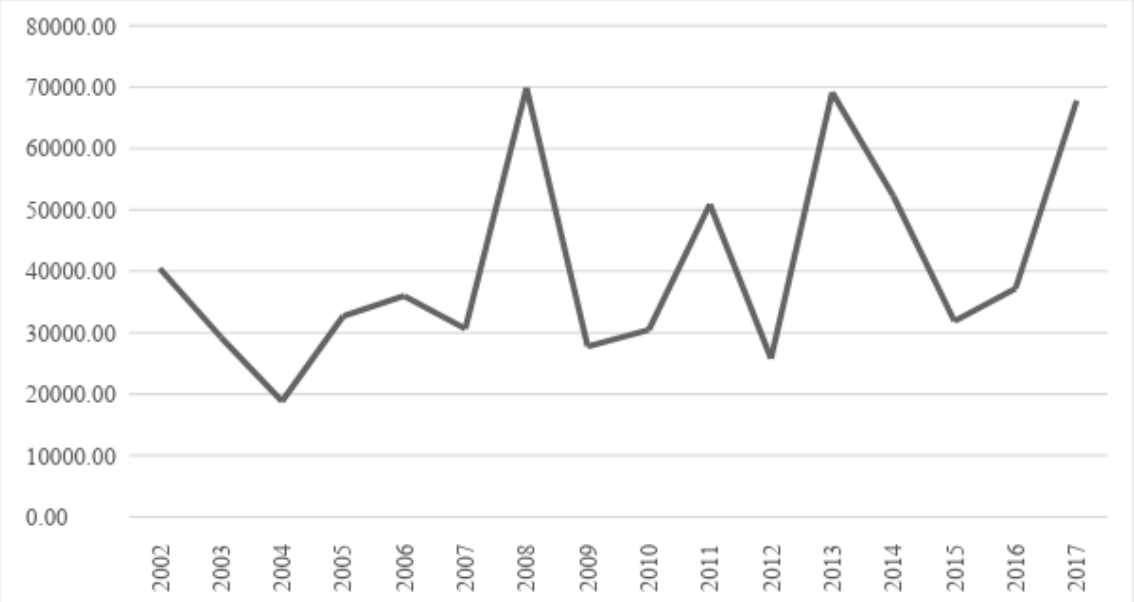
Source: www.bce. fin.ec.

Elaboration: García, Paulo.

The behavior of this product is also irregular. It is well known that the years of highest and lowest participation are followed (2012 and 2013 respectively), becoming in 2012

the main supplier of the product, something that due to its high variability does not hold over time.

Figure 2.24 Price per metric ton of other bottling devices, labeling, among others, for containers



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Like its participation in the total FOB, the price per metric ton is very variable and with an upward trend in the period analyzed. It is normal for this product to double or lose half of its price per ton from one year to the next. Additionally, there is no clear relationship between the share of the product and its price per metric ton.

Extruders for rubber or plastic

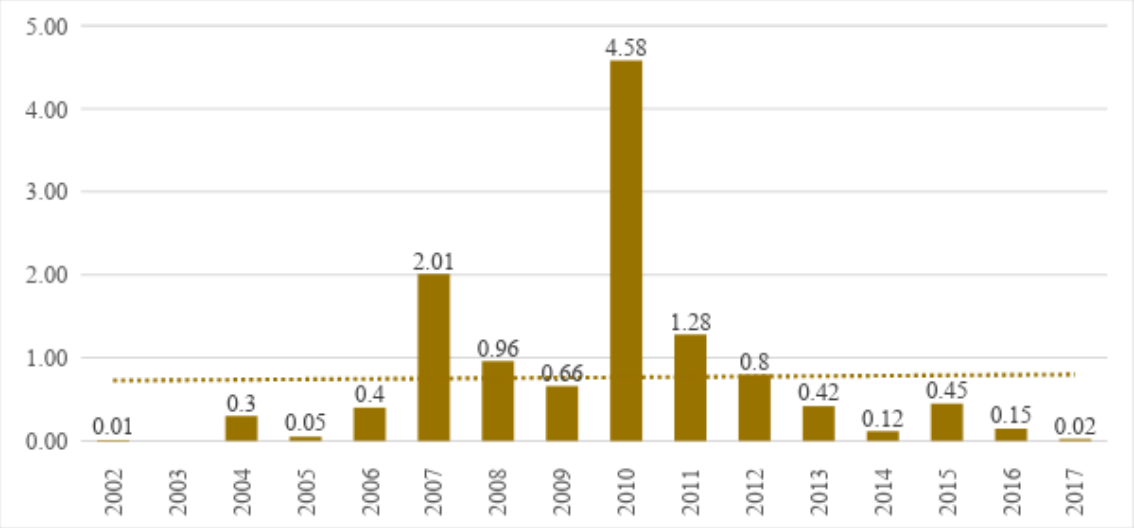
The NANDINA 8477200000 is used, which is valid throughout the period. Its description is "extruders".

The NANDINA is among those affected by the Trade Agreement with the EU, with immediate relief since the agreement is in force. (Ministry of Foreign Trade and Investment, 2017)

The product is under the following classification according to the (Committee on Foreign Trade, 2017):

- "84 Nuclear reactors, boilers, machines, appliances and mechanical devices; parts of these machines or devices.
    - 77 Machinery and apparatus for working rubber or plastics or for making products from these materials, not specified or included elsewhere in this Chapter.
        - 20 Extruders. "

Figure 2.25 Percentage share of extruders for rubber or plastic in total imports from Ecuador from Germany in the period 2002 - 2017 in FOB values

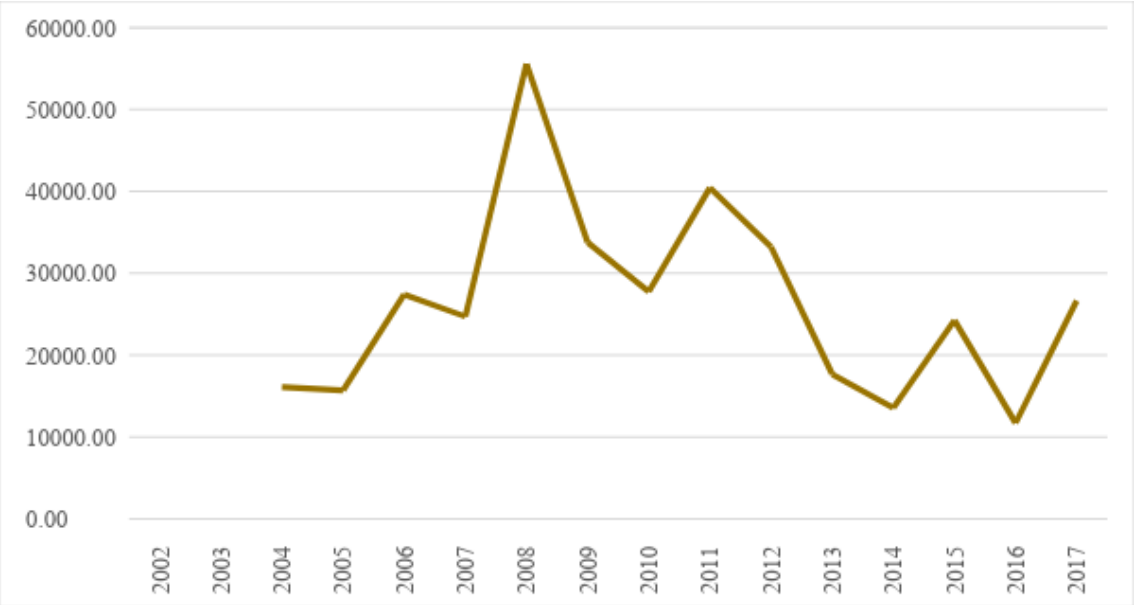


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

It is another product with unusual behavior. Its presence is not constant and goes from having a very low presence in some years to rapidly increase their participation and reduce it again in the following years. Its presence is stronger at the center of the period, having its lowest participation both at the beginning and at the end of it.

Figure 2.26 Price per metric ton of extruders for rubber or plastic



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

The price per metric ton has important variations. In general, there is a very slight upward trend throughout the period. However, after its peak in 2008, its price has decreased significantly. In fact, this decrease is so pronounced that, if the first few years are not taken into account, the trend is marked downwards. In any case, it does not seem to have a relationship with its participation in relation to the FOB values.

Table 2.4 Position of extruders for rubber or plastic

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
5	4	5	5	4	4	4	3	3	4	3	3	3	5	6	4

Source: www.trademap.org

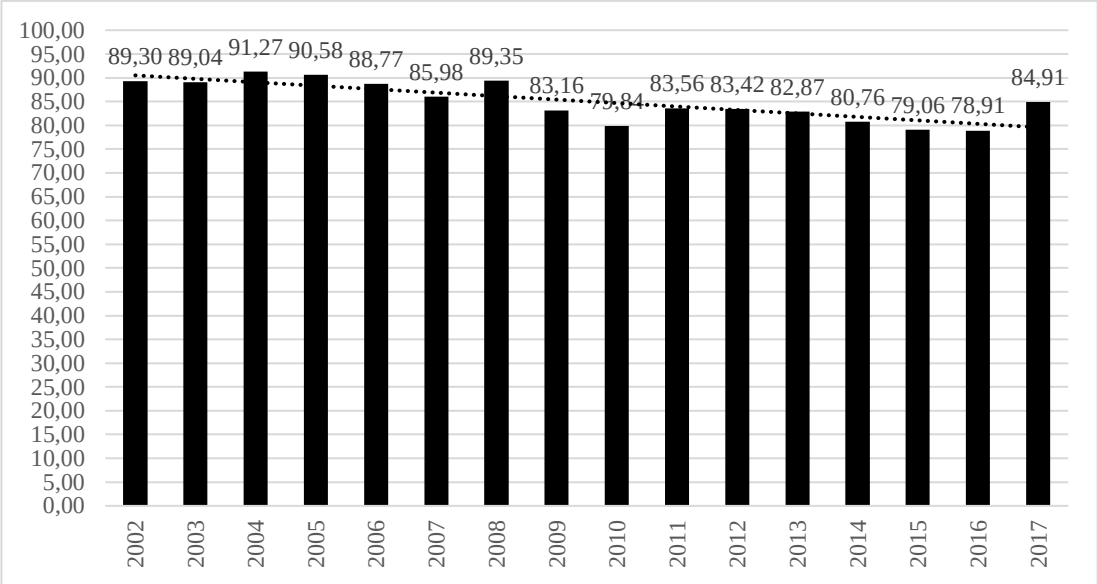
Elaboration: García, Paulo.

Regarding its position as a supplier, Germany is usually in third or fourth place, but it is far from the main suppliers of the product.

Other

This category includes all other products that do not fall within the aforementioned.

Figure 2.27 Percentage share of the Other item in the total of imports from Ecuador of Germany in the period 2002 - 2017 in FOB values

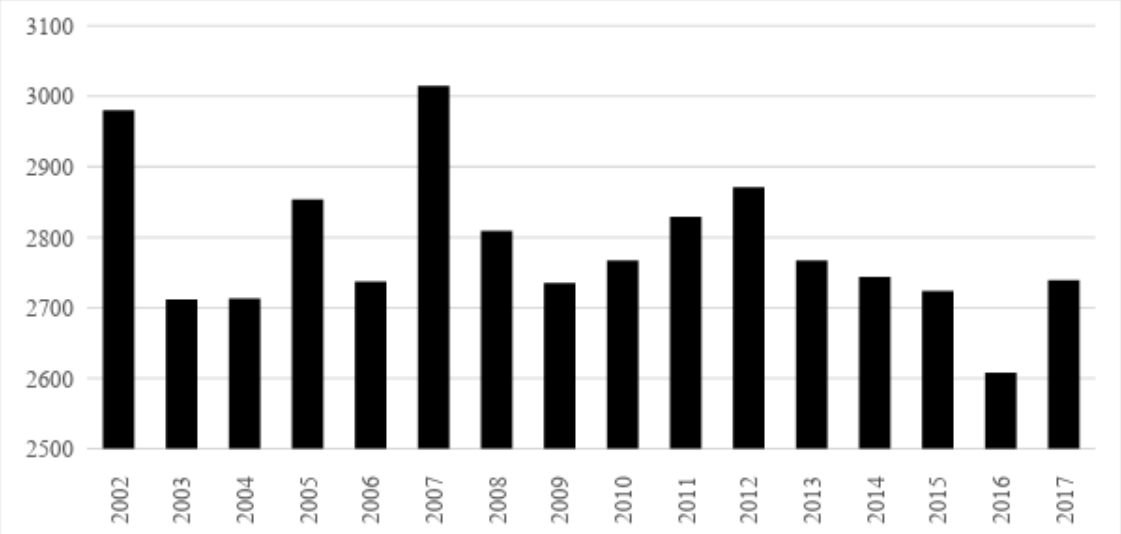


Source: www.bce.fin.ec.

Elaboration: García, Paulo.

With respect to the other products, there is a decrease in their participation since the beginning of the period of analysis, especially in the last years of the study. However, its lowest participation reaches 78.91% while at the time of its greatest participation it reaches 91.27%. This category is mostly made up of NANDINAS with a share of less than 1%. This does not necessarily indicate a decrease in the number of imported products (which is discussed in the next paragraph), but it means that there are no products that are particularly dominant in terms of their share of imports.

Figure 2.28 Quantity of NANDINAS corresponding to the products imported by Ecuador from Germany in the period 2002 - 2017



Source: www.bce.fin.ec.

Elaboration: García, Paulo.

Regarding the diversity of products imported from Germany, it can be seen that, contrary to what happens with exports, this decreases with the passage of time. Although this does not imply that imports in general are less diverse, since in reality they are imported, on average, 9.46 times more NANDINAS than those that are exported. The variability is also another difference, while in the case of exports the highest point is 2.44 times higher than the lowest; in the case of imports, the highest is 1.16 times higher. All this indicates that imports, in terms of the number of imported NANDINAS, are more diverse and less variable than exports.

2.4 Conclusions of the chapter

Germany has an economic structure very different from that of Ecuador and that is evident in its exports. Ecuador mainly imports medicaments, chemical products or even machinery and vehicles that have a higher level of manufacturing. This is reflected in their costs per metric ton, which are generally much higher than that of the main export products from Ecuador to Germany. Thus, with a relatively lower amount in metric tons than other countries that are among the suppliers in Ecuador, Germany gets a high share of FOB imports. An example that shows this, is the case of Spain, which has more than double of the share of imports in MT in the last year but that is much closer to FOB imports. In addition, this helps to understand the reason why the

imports from Germany, measured in FOB, have a higher growth than the imports in MT, since the products are more expensive and a small variation in MT can cause a great variation in FOB.

In this case, there is no dominant product as there was in the case of exports. In fact, during most part of the period, the ten main import products do not reach more than 20% of the FOB share, with an average of only 16.24% of the total for the whole period. Other medicaments, the most imported category, only reaches 4.76% of the total of the period. In addition, the large amount of NANDINAS that are imported indicate that there is an overwhelming number of products that are imported and that have a minimum participation in both FOB and CIF. This indicates that there is no high risk that all imports will collapse due to the loss of only one of these products.

CHAPTER 3: APPLICATION OF THE GRAVITY MODEL

This chapter is divided into three parts. First, there is a brief review of what the gravity model is when applied to international trade and then its application to bilateral trade flows between Ecuador and Germany. The last point contents the conclusions of the chapter. With these data, it is possible to obtain the numerical results of the application of the model for its final analysis in the conclusions of the thesis.

3.1 Description of the gravity model

During the last decades, globalization has emerged with a significant increase in international trade. Advances in technology and infrastructure have allowed decreasing transportation costs (Krugman, Obstfeld, & Melitz, 2018). Countries have sought to increase the number of trade agreements they have with others (International Monetary Fund, World Bank and World Trade Organization, 2017) and their domestic markets have become more dependent on others. Thus, despite the fact that in recent years there have been warnings of an increase in the levels of protectionism, countries continue to advocate for the reduction of trade barriers and increasing trade between countries.

In this context, different theories and models are used to try to understand the development of this trade and to analyze it more clearly. One of the most applied economic models in this area is the gravity model. It is commonly used, in the area of international economics to model trade flows between two or several countries (Krugman, Obstfeld, & Melitz, 2018).

The gravity model has come a long way since the first time it was used in the 1960s by Timberger (De Benedictis & Taglioni, 2011). Originally, the model of gravity was considered more like an empirical model due to the absence of theoretical foundations that supported the model (Brakman & van Bergeijk, 2010). Despite this lack, the model consistently helped to analyze trade flows with great precision, which made it imperative to establish a theoretical foundation for it (Brakman & van Bergeijk, 2010).

Different investigations helped to relate the gravity model with the main theories of international trade. This is the way the model has been connected to the three main approaches: the Ricardian model, because of the difference in the opportunity cost; the Heckscher-Ohlin model, because of the importance of the factors; and the Helpman

and Krugman model, from monopolistic competition and scale production (Brakman & van Bergeijk, 2010).

The gravity model gets its name because it is based on the same logic of Isaac Newton's Law of Gravity (Krugman, Obstfeld, & Melitz, 2018). This indicates that, having two objects, the attraction of them is based on the size of the objects and their distance. In terms of size, their relationship is direct: the larger the more attraction they create. However, regarding its distance, the relation is inverse: greater distance equals less attraction. The historical importance of the Law of Gravity was notorious in its field, but it was slow to spread to others, although by the 19th century, authors such as Ravenstein began to apply it in migratory flows, leaving its initial use in physics (De Benedictis & Taglioni, 2011). Then it was understood that the same happens in foreign trade, giving rise to the model of gravity used in this document.

In the case of the gravity model of foreign trade, the size is represented by the Gross Domestic Product (GDP) while the distance is maintained as a proxy of the trade costs necessary to carry out the commercial exchange. In the same way that what is given in the Law of Gravity, the higher GDP, the commercial flows will increase; and, at higher trade costs, trade flows will decrease. This configures the relationship between the two main factors of the equation.

This is because the size of the GDP, as indicated in (Yotov, Piermartini, Monteiro, & Larch, 2016), carries useful information about the relationship between the size of the country, its purchasing power and bilateral trade flows. Large and rich markets import more from all sources, have greater purchasing power and trade flows will increase the more similar in size are the trading partners.

Distance, on the other hand, serves to observe how difficult it is to trade between countries. If the distance is less than the end of the multilateral resistance term (the average barriers that the country faces when trading with other countries) in each country, trade will be easier, while, if it is greater, it will be more complicated (Anderson & van Wincoop, 2003). This is due to the reality of international trade, where elections are made based on the opportunity cost, which, in turn, when made at the same time by all countries creates a general equilibrium (Krugman, Obstfeld, & Melitz, 2018). The distance was originally obtained from the geographic distance between the capitals or the borders of the countries, but now it includes many other

factors, such as transportation costs, the time elapsed during the shipment, taxes, communication costs and even the cultural distance. That allowed researchers to understand the difficulty of a bilateral trade between two countries (De Benedictis & Taglioni, 2011). Because it is very complicated to obtain an accurate approximation to these factors, distance is used as an approximation to them (De Benedictis & Taglioni, 2011).

Thus, nowadays, the authors (Krugman, Obstfeld, & Melitz, 2018) present the following equation for the general gravity model:

$$T_{ij} = \frac{A * Y_i * Y_j}{D_{ij}}$$

Where:

- A is a constant. This includes other variables that influence trade flows.
- T_{ij} is the value of trade between country i and country j.
- Y_i is the country's GDP i.
- Y_j is the GDP of the country j.
- D_{ij} is the distance between the two countries.

The gravity model has proven its usefulness in different types of interactions both over time and in different places. Thus, as Leamer and Levinsohn assured, the model of gravity "has produced some of the clearest and most robust discoveries in Economics", although the same has been ignored by the absence of theoretical foundations for years (as cited in Anderson, 2011). Its explanatory power, over 80%, was too high to be a coincidence and indicated the presence of a possible underlying economic law (Anderson, 2011).

Nowadays, the gravity model is widely used by economists, governments and international organizations. The World Trade Organization (WTO) through a discussion document states that the model has a high explanatory value of bilateral trade flows and that it allows analyzing the influence of other variables indicated (Yotov, Piermartini, Monteiro, & Larch, 2016). Likewise, the Economic Commission for Latin America and the Caribbean of the United Nations (ECLAC) also uses the

gravity model for its commercial analyzes both within and outside the region (Perrotti, 2015).

3.2 Methodology

The data came from the following sources:

- GDP of Ecuador: (Central Bank of Ecuador, 2018).
- GDP of Germany: (Federal Statistical Office, 2018).
- CIF and FOB imports from Ecuador: (Central Bank of Ecuador, 2018).
- Exports FOB of Ecuador: (Central Bank of Ecuador, 2018).
- CIF imports from Germany: (United Nations, 2017).

For the conversion of the German GDP values from euros to US dollars, the averages of each year of the official exchange rate reflected by the Central Bank of Ecuador were used. CIF values relating to imports by Germany did not need to be converted into dollars because the United Nations database already shows them converted into dollars.

Additionally, a *dummy* variable was used to indicate the presence of safeguards in 2015, 2016 and 2017. This type of variable is used to represent the existence or not of a particular element in the statistical calculation and only has two possible values (Gujarati & Porter, 2010). In this case, the two values were: zero (0) when safeguards were not present and one (1) when they were present. This was done with the aim of increasing the accuracy of the model.

The calculations of the trade costs were made as follows: First, Ecuador's FOB imports were subtracted from Ecuador's CIF imports. Second, FOB exports from Ecuador were subtracted from the CIF imports from Germany, as they did not have this data in the same source. Third, the two values resulting from the previous steps were added to obtain the costs of trade.

The equation used for this model was the one used by the authors (Krugman, Obstfeld, & Melitz, 2018), described in the previous section. The final calculation was done through a regression using Microsoft Excel. The different values were converted to logarithms to simplify the equation in the following way:

$$\ln(T_{ij}) = \beta_0 + \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) - \beta_3 \ln(D_{ij}) + \beta_4 Dummy$$

In addition, the model was applied as follows. First, individually to the flows of imports and exports. Second, to the total flows. This in order to better identify the importance of each part of the flow and perform a more complete analysis.

3.3 Results

The results were the following:

Table 3.1 Result of the application of the regression to the Ecuador - Germany trade flows from 2002 to 2017

Type	R^2	Adjusted R^2	Ecuation
Exports	0.8713	0.8392	$\ln(X_{Ecuador\ Germany}) = -24{,}2890 + 1{,}7886\ln(Y_{Germany}) - 0{,}1840\ln(D_{Ecuador\ Germany}) + 0{,}0301 Dummy$
Imports	0.9908	0.9885	$\ln(M_{Ecuador\ Germany}) = -3{,}7310 + 0{,}5347\ln(Y_{Ecuador}) + 0{,}7021\ln(D_{Ecuador\ Germany}) - 0{,}0766 Dummy$
Total trade flows	0.9811	0.9743	$\ln(T_{Ecuador\ Germany}) = -2{,}7047 + 1{,}0567\ln(Y_{Ecuador}) - 0{,}0463\ln(Y_{Germany}) - 0{,}1448\ln(D_{Ecuador\ Germany}) - 0{,}3459 Dummy$

Source: several (explained in the methodology section).

Elaboration: García, Paulo.

The following information can be interpreted from these results:

The effect of Ecuador's GDP increase is positive in trade flows. In other words, for each 1% increase in GDP, trade flows increase by 1.0567%. In contrast, for every 1% of Germany's GDP increase, trade flows decrease by 0.0463%. Additionally, trade costs also influence the trade flows with a decrease of 0.1448% for each increase of 1% in them. Safeguards also have a negative effect, with a 0.3445% decrease in commercial flow.

The value of R^2, which explains how well the data is adjusted to the regression line (Gujarati & Porter, 2010), indicates that the reliability is close to 98%, however, it is

necessary to make the following precisions. The values of the GDP of Ecuador and the Safeguards individually speaking are statistically significant. The values of the German GDP and of the Total trade costs are not statistically significant. The latter is due to a problem of multicollinearity, a high linear relationship between the variables that affects the correct performance of the regression (Gujarati & Porter, 2010), among the GDPs of the countries. However, this drawback goes beyond the limits proposed for this thesis, so it requires deeper analysis in the future made by an economist to improve the accuracy of the model and avoid multicollinearity.

The precision of the model seems to be due especially to the behavior of imports. When applying the model only to imports, the values of R^2 and R^2 adjusted, another measure of adjustment of the data to the regression that tries to correct the possible errors of R^2, reaches up to 99,08% and 98, 85% respectively, while in the case of applying it only to exports, the values are 87.13% and 83.92% respectively. This in turn explains the reason why Ecuador's GDP is less likely to cause an error: because of its influence on what Ecuadorians buy from Germany.

Ecuador's GDP has a greater influence than Germany's GDP. This can be visualized, in addition to the values of the equation of total trade flows, by seeing how the value of R^2 decreases when the model is applied only to exports and how it increases when it is applied only to imports. Thus, it is evident that the economy and the Ecuadorian buyers are those that most influence the total commercial flows.

In addition, it can be seen that trade costs do not have a negative effect in the case of imports. This implies that imported products behave more as luxury goods or that they do not have a clear substitute from other markets outside of Germany. Thus, despite the increase in trade costs in the case of imports, they do not decrease but instead increase. This implies that the increase of the costs of trade in imports does not matter because the Ecuadorian consumers will continue buying the German products.

3.4 Chapter conclusions

As can be seen, the application of the gravity model provides information on the influence of GDPs and trade costs on trade flows. On the one hand, the economic growth of Ecuador increases the trade flows, which implies that, by increasing the size of the economy, the country can import and export more products. On the other hand, the growth of the GDP of Germany seems to affect the opposite of the Ecuadorian

GDP, reducing the commercial flows, which indicates that, as the German economy grows, the consumption of the Ecuadorian products does not necessarily increase. Equally, the distance influences negatively, as expected, in the behavior of commercial flows, decreasing their quantity. In addition, as expected, safeguards negatively affect flows.

Another point to note is the influence of the Ecuadorian GDP on the results. While it can be seen that the German GDP has a smaller influence, the Ecuadorian GDP is the most important factor to explain the increases or decreases in trade between the two countries. This seems to be especially related to the flow of imports, which has a greater adjustment than that of exports. In other words, the Ecuadorian economy is the one that most influences the trade between the two countries for the products that are acquired by Ecuadorians.

It can also be seen that imports have a behavior contrary to the expected, creating an increase in trade costs. Precisely, imports behave like luxury goods or goods without easy substitutes in other markets. This means that when the costs of trade increase, imports also increase, instead of decreasing. Thus, despite the increase in costs, Ecuador continues to import the products from Germany.

CONCLUSIONS AND FINAL RECOMMENDATIONS

Conclusions

What has been observed during the realization of this study is that it is possible to apply the gravity model to trade flows between Ecuador and Germany. First, the importance of Germany with respect to exports from Ecuador and the main export products was analyzed. Second, the importance of Germany with respect to imports from Ecuador and the main imported products was analyzed. Third, the gravity model was applied to trade flows, obtaining the results on the factors that most influence trade between the two countries. Then, the results are indicated below:

1. Germany is an important country for Ecuador in terms of its exports to the European Union. However, its importance is very far from that of other countries, such as the United States, which would be almost irreplaceable destinations for Ecuadorian exporters. Even so, Germany stands out as an excellent destination for Ecuador's non-oil exports.
2. The composition of imports and exports is very different. Less products are exported and of lower intensity in terms of manufacturing, mainly products of the primary sector. Exports are also more concentrated in the main products, with the four most exported products representing 80% of the total. On the other hand, imports are much more diverse and less concentrated. In this case, the four main products only represent 9.5% of the total. In addition, they have a much higher level of manufacturing. In general, the main imported products do not come from the primary sector of the German economy, but from the secondary sector. This means that the trade that has developed between the two countries is largely complementary, with each country providing things that are missing on the other.
3. Imports do not decrease due to the increase in trade costs. Normally, as in the case of exports and total trade flows, in the face of an increase in trade costs, a decrease in trade flows would be expected, but in the case of imports, this does not occur. On the other hand, they behave like luxury goods or goods without clear substitutes in other markets, so that, by increasing costs, imports also increase. Thus, although costs increase, Ecuadorians continue to import German products.

4. The profile of both countries is also opposite. On the one hand, Germany has a very good infrastructure and is very competitive internationally. Its culture is oriented towards the fulfillment of personal objectives and the search for individual success. On the other hand, Ecuador has a more backward infrastructure and is much less competitive internationally, less than its close neighbors such as Colombia or Peru. In addition, culturally, Ecuadorian society also seems to be oriented towards the search for success, but as a group, and gives more importance to the circumstances surrounding the objectives. Thus, although they may have some similarities, the countries have largely opposite profiles.
5. The application of the gravity model to trade flows between both countries allows the author to identify the influence of GDPs and the costs of trade in them. The results require more research in the future; however, they are a good first step to carry out more research in greater depth. They also make it possible to say that Ecuador's GDP is the most important factor in determining trade flows between the two countries and the only one with direct influence, since, as GDP increases, trade flows increase. This is mainly due to imports, which seems to indicate the individual application of the model to imports and exports. The other factors: German GDP, trade costs and safeguards; they negatively influence total trade flows. Thus, the GDP of Ecuador, more than any other factor, is the one that ends up having the greatest influence on trade flows.

Recommendations

After having performed the analysis of trade flows through the application of a gravity model, the following points can be recommended:

1. It is necessary to continue with the analysis of the proposed model. It has already presented useful information, as detailed in this document, and there are still possibilities for improvement. The problem of multicollinearity can be solved with the support of economists. The reasons why Germany's GDP growth may negatively affect trade flows should be investigated in greater depth. In addition, the influence of other factors can be analyzed, such as language, culture, policies, among others; to see its influence statistically by applying a more complex model to the one presented here.

2. Gravity models have been very useful to analyze the impact of commercial treaties, so in the future it would be convenient to continue the research and see the possible differences caused by the Multiparty Trade Agreement with the European Union. This could allow to understand how positive or negative the agreement has resulted, which would help to make better decisions regarding public policies.
3. Ecuador should try to diversify its exports to Germany. As has been evidenced in this document, the majority of products that Ecuador sends to Germany are cheap, most of them have a low level of manufacturing and are related to the primary sector. In addition, the dominance of products such as bananas, tuna or cacao, make exports from Ecuador to Germany dependent on these few products, so if one of them experiences an issue, it may notoriously affect the total flow of exports. All this should be done in order to avoid losing complementarity in trade between both countries.
4. The products that Ecuador imports are mostly expensive. This practice occurs primarily because there is no, or it is difficult to find valid substitutes, at the national level. However, due to Ecuador's dependence on its trade balance to keep dollarization stable, this can bring problems in the future. Therefore, it would be convenient to analyze the products that could be produced at the national level so that they are not imported at such a high cost for the country.

GLOSSARY

- **CIF:** It is an Incoterm that means "cost, insurance and freight" and that, in addition to what the Incoterm FOB already includes, includes transportation or freight and the insurance of the cargo. (International Chamber of Commerce, 2010)
- **FOB:** It is an Incoterm that means "free on board" and that includes within its value the cost of merchandise, cargo and transportation in the country of origin, the costs of customs formalities and cargo handling charges at the port of origin. (International Chamber of Commerce, 2010)
- **Incoterms:** These are the International Trade Terms created by the International Chamber of Commerce that are used to know the value, responsibilities and risks of the transportation of merchandise in the different stages of its journey. (International Chamber of Commerce, 2010)
- **GDP:** Gross Domestic Product, is the sum of all final goods and services produced in a country in a certain period. (Krugman & Wells, Economics, 2015)
- **MT:** Metric tons.
- **EU:** Abbreviation referring to the European Union.
- **USD:** Dollars of the United States of America.

BIBLIOGRAPHY

Anderson, J. (2011). *The Gravity Model.* Retrieved on June 2, 2018, from https://nottingham.ac.uk/gep/documents/lectures/nottm-lectures-in-int-economics/2011/jandersonbackgroundreading.pdf

Anderson, J., & van Wincoop, E. (2003). Gravity with Gravitas: A Solution to the Border Puzzle. *The American Economic Review, 93*(1), 170-192.

Argentina Trade Net. (2011). *Trade guide of the Federal Republic of Germany*. Retrieved on May 22, 2018, from http://argentinatradenet.gov.ar/sitio/mercado/material/Guia%20Alemania%202011.pdf

National Constituent Assembly. (2008). *Constitution of the Republic of Ecuador.* Retrieved on June 1, 2018, from https://www.asambleanacional.gob.ec/es/contenido/constitucion-de-la-republica-del-ecuador

Central Bank of Ecuador. (2016). *Regional National Accounts.* Retrieved on May 28, 2018, from https://contenido.bce.fin.ec/documentos/Estadisticas/SectorReal/CuentasCantonales/Indice.htm

Banco Central del Ecuador. (2018). *Economic issues*. Retrieved on May 1, 2018, from https://www.bce.fin.ec/cuestiones_economicas/

Central Bank of Ecuador. (2018). *Real Sector*. Retrieved on May 28, 2018, from https://bce.fin.ec/index.php/informacioneconomica/sector-real

World Bank. (2017). *Doing Business 2017.* Retrieved on May 28, 2018, from http://doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB17-Report.pdf

World Bank. (2018). *Doing*Business.Retrieved on May 20, 2018, from http://espanol.doingbusiness.org/data/exploreeconomies/germany

Brakman, S., & van Bergeijk, P. (Edits.). (2010). *The Gravity Model in International Trade: Advances and Applications.* New York: Cambridge University Press.

Chamber of international trade. (2010). *ICC GUIDE FOR TRANSPORTATION and the Incoterms® 2010 rules.*

Committee on Foreign Trade. (June 15, 2017). *Resolution No. 020-2017.* Retrieved on June 1, 2018, from https://www.aduana.gob.ec/wp-content/uploads/2017/08/Resoluci%C3%B3n-No.-020-2017.pdf

De Benedictis, L. , & Taglioni, D. (2011). The Gravity Model in International Trade. In L. De Benedictis, & L. Salvatici (Edits.), *The Trade Impact of European Union Preferential Policies.*

Deardorff, A. (1995). *Determinants of bilateral trade: Does gravity work in a neoclassical world?* Cambridge

Delegation of the European Union in Ecuador. (2017). *Primer of the EU Trade Agreement with Ecuador.* Retrieved from https://eeas.europa.eu/sites/eeas/files/cartilla_acuerdo_comercial_ue-ecuador_0.pdf

International Monetary Fund. (April 2018). *GDP, current prices*. Retrieved on May 25, 2018, from http://imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD/GAB

International Monetary Fund, World Bank and World Trade Organization. (2017). *Making Trade an Engine of Growth for All.* Retrieved on June 2, 2018, from https://www.imf.org/~/media/Files/Publications/PP/041017joint-wto-wb-imf-trade-paper.ashx

Gujarati, D., & Porter, D. (2010). *Econometrics* (Fifth ed.). Mexico, DF Retrieved on May 23, 2018

Hofstede Insights. (2018). *Ecuador.*Retrieved on June 3, 2018, from https://hofstede-insights.com/country/ecuador/

Hofstede Insights. (2018). *Germany* Retrieved on May 20, 2018, from https://hofstede-insights.com/country/germany/

Krugman, P., & Wells, R. (2015). *Economics* (Fourth ed.). Worth Publishers.

Krugman, P., Obstfeld, M., & Melitz, M. (2018). *International Economics* (Eleventh ed.). Pearson Education.

Ministry of Foreign Trade and Investments. (February 2017). *Trade Agreement Ecuador - European Union*. Retrieved on June 1, 2018, from https://www.comercioexterior.gob.ec/acuerdo-comercial-ecuador-union-europea/

Naciones Unidas. (2017). *Database of International Trade Statistics of the United Nations*. Retrieved on May 1, 2018, from https://comtrade.un.org/data/

Federal Statistics Office. (2018). *National Accounts*. Retrieved on May 1, 2018, from https://www.destatis.de/EN/FactsFigures/NationalEconomyEnvironment/NationalAccounts/NationalAccounts.html

Federal Bureau of Statistics. (June 19, 2018). *Ranking of Germany's trading partners in foreign trade.* Retrieved on June 29, 2018, from https://destatis.de/EN/FactsFigures/NationalEconomyEnvironment/ForeignTrade/Tables/OrderRankGermanyTradingPartners.pdf

Perrotti, D. (2015). The People's Republic of China and Latin America: the impact of Chinese economic growth on Latin American exports. *CEPAL REVIEW 116*.

Pro Ecuador. (2018). *Technical Sheet of Germany*. Retrieved on May 2, 2018, from https://proecuador.gob.ec/ficha-tecnica-de-alemania/

Pro Ecuador. (2018). *Investor's Guide* Retrieved on June 1, 2018, from https://proecuador.gob.ec/guia-del-inversionista/

ProChile. (February 23, 2018). *Country Guide Germany.* Retrieved on May 26, 2018, from https://prochile.gob.cl/wp-content/uploads/2018/02/guia_pais_alemania.pdf

National Secretariat for Planning and Development. (2017). *National Development Plan 2017-2021-Whole Life.* Quito

SIICEX. (2017). *Multisectorial Guide: Germany.* Retrieved on May 22, 2018, from http://siicex.gob.pe/siicex/documentosportal/alertas/documento/doc/745699408rad8EF20.pdf

Trade Map. (June 5, 2018). *Bilateral trade between Ecuador and Germany*. Retrieved on June 5, 2018, from https://www.trademap.org/Bilateral_10D_TS.aspx?nvpm=3|218||276||870323|||||||||||||||||||||||||||||||||||||||||||||||| | 1 | 1

Yotov, Y., Piermartini, R., Monteiro, J.-A., & Larch, M. (2016). *An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model.* World Trade Organization.

ANNEXES

Annex 1: GDPs and exchange rate

Year	GDP Ecuador	GDP Germany		
	In thousands of US dollars	Thousands of euros	Exchange rate	In thousands of US dollars
2002	28,548,945	2,209,290,000	0.9452	2,088,220,908
2003	32,432,858	2,220. 080,000	1.1303	2,509,356,424
2004	36,591,661	2,270,620,000	1.2435	2,823,515,970
2005	41,507,085	2,300,860,000	1.2445	2,863,420,270
2006	46,802,044	2,393,250,000	1.2556	3,004,964,700
2007	51,007,777	2,513,230,000	1.3701	3,443,376,423
2008	61,762,635	2,561,740,000	1.4711	3,768,575,714
2009	62,519,686	2,460,280,000	1.3946	3,431,106,488
2010	69,555,367	2,580,060,000	1.3261	3,421,417,566
2011	79,276 .664	2,703,120,000	1.3917	3,761,932,104
2012	87,924,544	2,758,260,000	1.2847	3,543,536,622
2013	95,129,659	2,826,240,000	1.3279	3,752,964,096
2014	101,726,331	2,932,470,000	1.3291	3,897,545,877
2015	99,290,381	3,043,650,000	1.1100	3,378,451,500
2016	98,613,972	3,144,050,000	1.1569	3,637,351,445
2017	103,056,619	3,263,350,000	1.1297	3,686,606,495

Source: www.bce.fin.ec and www.destatis.de.

Elaboration: García, Paulo.

Annex 2: Data used for regression in thousands of US dollars

Year	GDP Ecuador	GDP Germany	FOB Imports	CIF Imports	Imports Trade Costs	FOB Exports	CIF Exports	Export Trade Costs	FOB Trade Flows	Trade Costs	Safeguards
2002	$ 28.548.945,00	$ 2.086.740.683,70	$ 170.255,36	$ 181.497,79	$ 11.242,43	$ 172.165,76	$ 323.902,00	$ 151.736,24	$ 342.421,12	$ 162.978,67	0
2003	$ 32.432.859,00	$ 2.502.096.762,40	$ 167.172,64	$ 178.100,53	$ 10.927,89	$ 215.687,08	$ 403.910,00	$ 188.222,92	$ 382.859,72	$ 199.150,81	0
2004	$ 36.591.661,00	$ 2.823.243.495,60	$ 195.689,91	$ 206.554,22	$ 10.864,31	$ 198.204,34	$ 453.173,00	$ 254.968,66	$ 393.894,25	$ 265.832,97	0
2005	$ 41.507.085,00	$ 2.864.478.665,60	$ 219.158,46	$ 232.161,60	$ 13.003,14	$ 201.374,47	$ 537.430,00	$ 336.055,53	$ 420.532,93	$ 349.058,67	0
2006	$ 46.802.044,00	$ 3.007.166.490,00	$ 223.306,43	$ 237.301,58	$ 13.995,15	$ 223.224,11	$ 473.810,00	$ 250.585,89	$ 446.530,54	$ 264.581,04	0
2007	$ 51.007.777,00	$ 3.445.512.668,50	$ 272.692,19	$ 288.396,13	$ 15.703,94	$ 247.630,28	$ 518.003,00	$ 270.372,72	$ 520.322,47	$ 286.076,66	0
2008	$ 61.762.635,00	$ 3.767.192.374,40	$ 354.300,80	$ 375.738,50	$ 21.437,70	$ 314.976,96	$ 665.362,00	$ 350.385,04	$ 669.277,76	$ 371.822,74	0
2009	$ 62.519.686,00	$ 3.428.769.222,00	$ 365.379,81	$ 384.293,20	$ 18.913,39	$ 326.865,48	$ 558.857,00	$ 231.991,52	$ 692.245,29	$ 250.904,91	0
2010	$ 69.555.367,00	$ 3.426.526.084,80	$ 451.743,34	$ 475.646,65	$ 23.903,31	$ 320.263,71	$ 519.883,23	$ 199.619,52	$ 772.007,05	$ 223.522,83	0
2011	$ 79.276.664,00	$ 3.765.094.754,40	$ 539.405,58	$ 568.468,78	$ 29.063,20	$ 492.588,10	$ 700.540,66	$ 207.952,56	$ 1.031.993,68	$ 237.015,76	0
2012	$ 87.924.544,00	$ 3.545.963.890,80	$ 563.932,62	$ 592.207,54	$ 28.274,92	$ 376.784,02	$ 682.651,91	$ 305.867,89	$ 940.716,64	$ 334.142,81	0
2013	$ 95.129.659,00	$ 3.752.172.748,80	$ 626.845,00	$ 655.895,10	$ 29.050,10	$ 410.662,30	$ 651.529,71	$ 240.867,41	$ 1.037.507,30	$ 269.917,51	0
2014	$ 101.726.331,00	$ 3.895.773.198,89	$ 629.361,20	$ 657.452,20	$ 28.091,00	$ 525.637,40	$ 704.536,33	$ 178.898,93	$ 1.154.998,60	$ 206.989,93	0
2015	$ 99.290.381,00	$ 3.382.834.356,00	$ 525.933,90	$ 546.316,30	$ 20.382,40	$ 548.916,50	$ 555.816,49	$ 6.899,99	$ 1.074.850,40	$ 27.282,39	1
2016	$ 98.613.972,00	$ 3.479.677.337,50	$ 422.430,20	$ 438.224,50	$ 15.794,30	$ 530.651,50	$ 572.045,57	$ 41.394,07	$ 953.081,70	$ 57.188,37	1
2017	$ 103.056.619,00	$ 3.685.105.354,00	$ 511.215,40	$ 530.473,50	$ 19.258,10	$ 502.227,70	$ 571.879,35	$ 69.651,65	$ 1.013.443,10	$ 88.909,75	1

Elaboration: García, Paulo.

Annex 3: Data used for regression in logarithms

Year	GDP Ecuador	GDP Germany	FOB Imports	CIF Imports	Imports Trade Costs	FOB Exports	CIF Exports	Export Trade Costs	FOB Trade Flows	Trade Costs	Safeguards
2002	17,16713054	21,4588692	12,04505471	12,10899876	9,327450292	12,05621301	12,68819628	11,92989903	12,7437966	12,00137461	0
2003	17,29468263	21,64039492	12,02678233	12,09010345	9,299073516	12,28158393	12,90894736	12,14538228	12,85542393	12,20181766	0
2004	17,41533093	21,76115224	12,18428659	12,23831822	9,293238384	12,1970538	13,02402923	12,44889591	12,88383775	12,49062346	0
2005	17,54137469	21,7756522	12,29755031	12,35518896	9,472946146	12,21292149	13,1945538	12,72503169	12,94927807	12,7629953	0
2006	17,66143744	21,82426411	12,31630023	12,3770871	9,54646612	12,31593152	13,06856168	12,43155701	13,00926308	12,48590287	0
2007	17,74748867	21,96033855	12,51609893	12,57209027	9,661666915	12,41969211	13,15773631	12,50755673	13,16220403	12,5640151	0
2008	17,93880913	22,04959583	12,77790155	12,8366487	9,972906333	12,66025477	13,40808653	12,76678794	13,41395444	12,82617251	0
2009	17,95099204	21,95546721	12,80869267	12,85916108	9,847625416	12,69730399	13,23364891	12,3544561	13,44769564	12,4328293	0
2010	18,05763364	21,95481278	13,02086947	13,07243053	10,08177222	12,67690003	13,16135951	12,20416843	13,55674896	12,31726883	0
2011	18,18845437	22,04903887	13,19822303	13,25070167	10,27722805	13,10742861	13,45960769	12,24506526	13,8470031	12,37588192	0
2012	18,29198955	21,98907586	13,24269006	13,29161243	10,24973047	12,83942741	13,43374036	12,63090857	13,75439725	12,71932376	0
2013	18,37075135	22,04560091	13,34845458	13,39375615	10,2767772	12,9255265	13,38707827	12,39200189	13,85233157	12,50587167	0
2014	18,43779674	22,08315801	13,35246062	13,39612734	10,24320452	13,1723669	13,46529518	12,09457629	13,95960969	12,24042542	0
2015	18,41355926	21,94197976	13,17293082	13,21095339	9,922427062	13,21570161	13,22819347	8,839275386	13,88769205	10,21399675	1
2016	18,40672351	21,97020541	12,95377951	12,99048662	9,667404394	13,18186078	13,25697394	10,63089294	13,76745591	10,95410585	1
2017	18,45078909	22,02756495	13,14454631	13,18152528	9,86568703	13,12680888	13,25668332	11,15126165	13,8288641	11,39537708	1

Elaboration: García, Paulo.

Annex 4: Summary table of the regression of total flows

Regression Statistics	
Multiple R	0.990514341
R Square	0.981118659
Adjusted R Square	0.974252717
Standard Error	0.069525479
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	2.762926768	0.690731692	142.8964367	2.10911E-09
Residual	11	0.053171715	0.004833792		
Total	15	2.816098483			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2.704707054	4.312619814	-0.627161023	0.543351749	-12.19671927	6.787305158	-12.19671927	6.787305158
GDP Ecuador	1.056672732	0.131461188	8.037906451	6.24494E-06	0.767328608	1.346016857	0.767328608	1.346016857
GDP Germany	-0.046288656	0.31307683	-0.147850789	0.885135852	-0.735366113	0.6427888	-0.735366113	0.6427888
Trade costs	-0.144805212	0.072128354	-2.00760456	0.069887049	-0.303558648	0.013948224	-0.303558648	0.013948224
Safeguards	-0.345892437	0.117065142	-2.954700525	0.013098828	-0.603551077	-0.088233796	-0.603551077	-0.088233796

Elaboration: García, Paulo.

Annex 5: Summary table of the regression of exports

Regression Statistics	
Multiple R	0.93345435
R Square	0.871337024
Adjusted R Square	0.83917128
Standard Error	0.161972687
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.132050042	0.710683347	27.08897472	1.25483E-05
Residual	12	0.314821814	0.026235151		
Total	15	2.446871856			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-24.28903094	5.468527347	-4.441603635	0.000804592	-36.20392849	-12.3741334	-36.20392849	-12.3741334
GDP Germany	1.788556346	0.257117593	6.956180353	1.52532E-05	1.228345237	2.348767456	1.228345237	2.348767456
Trade costs	-0.184048807	0.086944378	-2.1168569	0.055846422	-0.373484333	0.00538672	-0.373484333	0.00538672
Safeguards	0.030114404	0.221348571	0.136049689	0.894037695	-0.452162703	0.512391511	-0.452162703	0.512391511

Elaboration: García, Paulo.

Annex 6: Summary table of the regression of imports

Regression Statistics	
Multiple R	0.99539226
R Square	0.990805751
Adjusted R Square	0.988507188
Standard Error	0.051006654
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	3.364396278	1.121465426	431.0545432	1.76455E-12
Residual	12	0.031220144	0.002601679		
Total	15	3.395616422			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-3.731008318	1.124694776	-3.31735187	0.006140217	-6.181507725	-1.28050891	-6.181507725	-1.28050891
GDP Ecuador	0.534692379	0.133632679	4.001209759	0.001757866	0.243531784	0.825852975	0.243531784	0.825852975
Trade costs	0.702121752	0.139520291	5.032398865	0.000292999	0.398133153	1.006110351	0.398133153	1.006110351
Safeguards	0.076633478	0.082343323	0.930658075	0.370375366	-0.10277721	0.256044166	-0.10277721	0.256044166

Elaboration: García, Paulo.

Annex 7: Summary table of export products

Descripción	2002					2003				
	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
Cavendish Valery Banana.	501723,49	114178,27	227,57	93,97%	66,32%	522588,12	124373,63	238,00	89,36%	57,67%
Tuna.	3038,33	6688,97	2201,53	0,57%	3,89%	3826,07	8721,32	2279,45	0,65%	4,05%
Coffee Extracts.	2643,03	10288,78	3892,80	0,50%	5,98%	3009,21	9667,27	3212,56	0,51%	4,49%
Cacao.	9219,88	15714,52	1704,42	1,73%	9,13%	18293,93	31331,75	1712,69	3,13%	14,53%
Roses.	1475,23	5973,90	4049,47	0,28%	3,47%	1428,04	6249,63	4376,37	0,24%	2,90%
Broccoli.	6498,74	5353,43	823,76	1,22%	3,11%	6850,11	5642,01	823,64	1,17%	2,62%
Palm oil.	0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%
Wood.	136,60	452,10	3309,66	0,03%	0,27%	147,05	464,17	3156,55	0,03%	0,22%
Pineapples.	1821,00	981,31	538,89	0,34%	0,57%	14704,89	7702,12	523,78	2,51%	3,58%
Vegetables, cooked in water or	0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%
Others.	7382,57	12534,48	1697,85	1,38%	7,26%	13960,41	21535,18	1542,59	2,39%	9,94%
Total.	**533938,87**	**172165,76**	**322,44**	**100,00%**	**100,00%**	**584807,83**	**215687,08**	**368,82**	**100,00%**	**100,00%**

2004					2005					2006				
MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
469088,51	104012,25	221,73	87,18%	52,48%	520046,40	117354,95	225,66	88,73%	58,28%	478374,95	118627,19	247,98	87,71%	53,15%
8147,12	18334,29	2250,40	1,51%	9,26%	3359,78	8627,82	2567,97	0,57%	4,29%	5264,20	16744,50	3180,83	0,97%	7,51%
3270,68	10540,37	3222,68	0,61%	5,32%	3193,01	11580,54	3626,84	0,54%	5,76%	3061,02	12231,90	3996,02	0,56%	5,48%
13369,62	19989,71	1495,16	2,48%	10,09%	12649,76	18738,81	1481,36	2,16%	9,32%	19832,45	32151,53	1621,16	3,64%	14,41%
1351,59	6362,69	4707,56	0,25%	3,22%	1361,52	6810,85	5002,39	0,23%	3,39%	1341,82	7272,48	5419,86	0,25%	3,26%
10184,69	5501,82	540,20	1,89%	2,78%	10293,82	8687,59	843,96	1,76%	4,32%	8241,43	7160,05	868,79	1,51%	3,21%
0,00	0,00	0,00	0,00%	0,00%	3921,90	1451,11	370,00	0,67%	0,73%	0,00	0,00	0,00	0,00%	0,00%
307,55	1003,69	3263,50	0,06%	0,51%	846,74	3127,51	3693,59	0,14%	1,56%	880,92	3745,44	4251,74	0,16%	1,68%
16481,10	7703,67	467,42	3,06%	3,89%	18922,65	9033,81	477,41	3,23%	4,49%	16033,76	5671,47	353,72	2,94%	2,55%
0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%
15886,50	24755,85	1558,29	2,95%	12,45%	11520,09	15961,48	1385,53	1,97%	7,86%	12394,48	19619,55	1582,93	2,27%	8,75%
538087,36	**198204,34**	**368,35**	**100,00%**	**100,00%**	**586115,67**	**201374,47**	**343,57**	**100,00%**	**100,00%**	**545425,03**	**223224,11**	**409,27**	**100,00%**	**100,00%**

2007					2008					2009				
MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
437758,55	111508,88	254,73	88,20%	45,04%	532406,10	157919,63	296,61	91,39%	50,14%	524957,27	195146,38	371,74	91,04%	59,71%
11631,77	39380,91	3385,63	2,34%	15,91%	14431,76	63214,35	4380,22	2,48%	20,07%	3033,13	10264,39	3384,09	0,53%	3,15%
4383,02	20781,29	4741,32	0,88%	8,40%	4213,90	24497,46	5813,49	0,72%	7,78%	4024,53	22641,19	5625,80	0,70%	6,93%
13345,58	32774,57	2455,84	2,69%	13,24%	7413,94	19182,19	2587,31	1,27%	6,10%	13816,46	38604,47	2794,09	2,40%	11,82%
1016,72	5645,43	5552,59	0,20%	2,29%	686,24	4572,34	6662,89	0,12%	1,46%	2091,06	11376,45	5440,52	0,36%	3,49%
9989,63	8953,54	896,28	2,01%	3,62%	9504,17	9335,50	982,25	1,63%	2,97%	9383,88	9457,62	1007,86	1,63%	2,90%
0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%
971,06	4321,50	4450,29	0,20%	1,76%	1212,11	4899,85	4042,41	0,21%	1,56%	1261,98	5265,17	4172,15	0,22%	1,62%
7288,57	2447,80	335,84	1,47%	0,99%	2007,98	966,17	481,17	0,34%	0,31%	7500,84	2330,46	310,69	1,30%	0,72%
0,01	0,01	1000,00	0,00%	0,01%	0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%
9921,71	21816,35	2198,85	2,00%	8,74%	10693,73	30389,47	2841,80	1,84%	9,61%	10536,06	31779,35	3016,25	1,83%	9,66%
496306,62	**247630,28**	**498,95**	**100,00%**	**100,00%**	**582569,93**	**314976,96**	**540,67**	**100,00%**	**100,00%**	**576605,21**	**326865,48**	**566,88**	**100,00%**	**100,00%**

2010					2011					2012				
MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
532406,10	157919,63	296,61	91,39%	50,14%	574011,34	224075,71	390,37	83,81%	45,49%	532406,10	157919,63	296,61	91,39%	50,14%
14431,76	63214,35	4380,22	2,48%	20,07%	5206,78	25736,82	4942,94	0,76%	5,23%	14431,76	63214,35	4380,22	2,48%	20,07%
4213,90	24497,46	5813,49	0,72%	7,78%	6273,60	45070,02	7184,08	0,92%	9,15%	4213,90	24497,46	5813,49	0,72%	7,78%
7413,94	19182,19	2587,31	1,27%	6,10%	20078,58	61119,61	3044,02	2,93%	12,42%	7413,94	19182,19	2587,31	1,27%	6,10%
686,24	4572,34	6662,89	0,12%	1,46%	1803,37	11443,72	6345,74	0,26%	2,33%	686,24	4572,34	6662,89	0,12%	1,46%
9504,17	9335,50	982,25	1,63%	2,97%	3837,54	4005,22	1043,69	0,56%	1,15%	9504,17	9335,50	982,25	1,63%	2,97%
0,00	0,00	0,00	0,00%	0,00%	40934,07	45953,02	1122,61	5,98%	9,33%	0,00	0,00	0,00	0,00%	0,00%
1212,11	4899,85	4042,41	0,21%	1,56%	1197,41	5660,33	4727,14	0,17%	0,82%	1212,11	4899,85	4042,41	0,21%	1,56%
2007,98	966,17	481,17	0,34%	0,31%	5987,49	2443,69	408,13	0,87%	0,50%	2007,98	966,17	481,17	0,34%	0,31%
0,00	0,00	0,00	0,00%	0,00%	6707,61	7666,21	1142,91	0,98%	1,56%	0,00	0,00	0,00	0,00%	0,00%
10693,73	30389,47	2841,80	1,84%	9,61%	18873,49	59413,75	3148,00	2,76%	12,02%	10693,73	30389,47	2841,80	1,84%	9,61%
582569,93	**314976,96**	**540,67**	**100,00%**	**100,00%**	**684911,28**	**492588,10**	**719,20**	**100,00%**	**100,00%**	**582569,93**	**314976,96**	**540,67**	**100,00%**	**100,00%**

2013					2014					2015				
MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
396556,77	171902,78	433,49	85,65%	41,86%	679140,15	294593,97	433,77	90,64%	56,05%	712367,05	323841,05	454,60	92,64%	59,00%
15952,72	91433,76	5731,55	3,45%	22,26%	14139,09	67435,29	4769,42	1,89%	12,83%	10514,36	38858,29	3695,74	1,37%	7,08%
5814,38	45393,33	7807,09	1,26%	11,05%	7317,05	50153,69	6854,36	0,98%	9,54%	7512,13	54581,70	7265,81	0,98%	9,94%
14183,36	34711,83	2447,36	3,06%	8,45%	5804,78	16843,52	2901,67	0,77%	3,20%	7812,54	23909,81	3060,44	1,02%	4,35%
1812,31	11115,31	6133,24	0,39%	2,71%	2104,86	13261,88	6300,59	0,28%	2,52%	1906,23	11986,89	6288,29	0,25%	2,18%
1239,56	1370,31	1105,48	0,27%	0,33%	1337,30	1564,81	1170,13	0,18%	0,30%	123,00	144,10	1171,50	0,02%	0,00%
0,00	0,00	0,00	0,00%	0,00%	6963,99	6055,19	869,50	0,93%	1,15%	0,00	0,00	0,00	0,00%	0,00%
1940,16	8314,95	4285,70	0,42%	2,02%	2432,44	10144,00	4170,29	0,32%	1,93%	2276,05	9578,08	4208,21	0,30%	1,74%
6664,66	2546,04	382,02	1,44%	0,62%	6819,50	3450,04	505,91	0,91%	0,66%	5772,38	2785,32	482,53	0,75%	0,51%
6183,48	7347,56	1188,26	1,34%	1,79%	6402,69	7660,59	1196,46	0,85%	1,46%	7955,11	9819,38	1234,35	1,03%	1,79%
12644,39	36526,47	2888,75	2,73%	8,89%	16801,49	54474,40	3242,24	2,24%	10,36%	12705,84	73411,93	5777,81	1,65%	13,40%
462991,79	**410662,34**	**886,98**	**100,00%**	**100,00%**	**749263,34**	**525637,39**	**701,54**	**100,00%**	**100,00%**	**768944,67**	**548916,55**	**713,86**	**100,00%**	**100,00%**

2016					2017					TOTAL				
MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)	MT (Net Weight)	FOB (x1000 USD)	Price per MT	Participation MT (%)	Participation FOB (%)
720764,82	324730,33	450,54	91,94%	61,19%	562046,91	257830,51	458,73	86,81%	51,34%	7981943,46	2633195,89	3031,28	82,23%	53,35%
7598,27	26320,10	3463,96	0,97%	4,96%	7200,70	32315,23	4487,79	1,11%	6,43%	142207,59	580504,73	244,97	1,47%	10,48%
7138,13	43650,96	6115,18	0,91%	8,23%	7389,98	51248,82	6934,91	1,14%	10,20%	77671,46	461322,23	168,37	0,80%	8,33%
12999,88	37771,63	2905,54	1,66%	2,51%	12338,85	25855,36	2095,44	1,91%	5,15%	195987,50	447063,69	438,39	2,02%	8,07%
1713,14	9207,28	5374,50	0,22%	1,74%	1762,87	8490,33	4816,20	0,27%	1,69%	23227,47	128913,86	180,18	0,24%	2,33%
0,00	0,00	0,00	0,00%	0,00%	0,00	0,00	0,00	0,00%	0,00%	93852,08	87502,11	1072,57	0,97%	1,58%
0,00	0,00	0,00	0,00%	0,00%	19176,90	11915,79	621,36	2,96%	2,37%	70996,86	65375,11	1085,99	0,73%	1,18%
1694,39	7102,54	4191,80	0,22%	1,34%	1127,30	4799,45	4257,46	0,17%	0,96%	21496,12	77023,37	279,09	0,22%	1,39%
8261,56	4258,60	515,47	1,05%	0,80%	8931,59	4884,56	546,89	1,38%	0,97%	131213,92	59137,40	2218,80	1,35%	1,07%
4847,42	6131,40	1264,88	0,62%	1,16%	0,01	0,00	1,00	0,00%	0,00%	32096,32	38625,15	830,97	0,33%	0,70%
18952,36	71478,67	3771,49	2,42%	18,07%	27448,71	104887,68	3821,22	4,24%	20,88%	221109,28	639363,56	345,83	2,28%	11,54%
783969,96	**530651,51**	**676,88**	**100,00%**	**100,00%**	**647423,83**	**502227,72**	**775,73**	**100,00%**	**100,00%**	**9706501,25**	**5540766,00**	**1751,83**	**100,00%**	**100,00%**

Elaboration: García, Paulo.

Annex 8: Summary table of import products

Description	2002							2003						
	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT
Other medicaments.	66,62	2363,34	2469,77	1,39%	0,13%	1,36%	35474,93	116,24	2879,95	3042,35	1,73%	0,22%	1,71%	24775,89
Other diagnostic or laboratory reagents.	28,51	1956,48	2053,68	1,16%	0,06%	1,13%	68624,34	33,18	2588,59	2761,47	0,02%	0,06%	1,55%	78016,58
Other fungicides.	529,87	4780,74	4879,11	2,81%	1,04%	2,69%	9022,48	519,37	3315,83	3429,37	1,99%	1,00%	1,93%	6384,33
Reagents that are not used in the patient.	0,00	0,00	0,00	0,00%	0,00%	0,00%	0,00	0,00	0,00	0,00	0,00%	0,00%	0,00%	0,00
Road tractors.	275,60	2329,72	2504,02	1,38%	0,54%	1,38%	8453,27	353,86	3375,90	3594,43	2,02%	0,68%	2,02%	9540,21
Fertilizer with potassium chloride.	48,69	16,81	19,80	0,01%	0,10%	0,01%	345,25	6,99	7,37	8,58	0,01%	0,01%	0,00%	1054,36
Touring cars.	560,42	5770,97	6084,52	3,40%	1,10%	3,35%	10297,58	362,21	4588,86	4777,02	2,75%	0,70%	2,68%	12669,06
Medical devices.	8,95	584,38	614,16	0,35%	0,02%	0,34%	65293,85	11,79	1212,55	1270,58	0,73%	0,02%	0,71%	102845,63
Apparatus for containers.	7,74	313,22	321,08	0,19%	0,02%	0,18%	40467,70	9,30	272,24	276,77	0,17%	0,02%	0,16%	29273,12
Extruders.	1,30	11,50	12,25	0,01%	0,00%	0,01%	8846,15	0,00	0,00	0,00	0,00%	0,00%	0,00%	0,00
Others.	49518,03	152128,20	162539,40	89,30%	97,01%	89,55%	3072,18	50513,72	148931,35	158939,96	89,04%	97,28%	89,24%	2948,33
Total.	**51045,73**	**170255,36**	**181497,79**	**100,00%**	**100,00%**	**100,00%**	**3335,35**	**51926,66**	**167172,64**	**178100,53**	**100,00%**	**100,00%**	**100,00%**	**3219,40**

2004							2005							2006						
MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT
119,52	3562,97	3759,12	1,83%	0,30%	1,82%	29810,66	100,94	3725,55	3930,87	1,70%	0,23%	1,69%	36908,56	213,09	6085,07	6468,70	2,73%	0,42%	2,73%	28556,34
33,48	2773,67	3000,81	1,43%	0,09%	1,45%	82845,58	35,17	3352,09	3602,74	1,55%	0,08%	1,55%	95311,06	38,96	4308,28	4604,29	1,93%	0,08%	1,94%	110582,14
436,72	2775,89	2838,52	1,42%	1,11%	1,37%	6356,22	319,96	1557,01	1608,24	0,72%	0,72%	0,69%	4866,26	385,36	2073,77	2124,14	0,93%	0,76%	0,90%	5381,38
0,00	0,00	0,00	0,00%	0,00%	0,00%	0,00	0,00	1,17	1,23	0,01%	0,00%	0,00%	0,00	0,00	0,00	0,00	0,00%	0,00%	0,00%	0,00
144,60	1114,67	1189,66	0,57%	0,37%	0,58%	7708,64	566,05	5126,00	5404,38	2,34%	1,28%	2,33%	9055,74	345,59	3188,16	3358,00	1,43%	0,68%	1,42%	9225,27
4,88	13,89	14,97	0,01%	0,01%	0,01%	2846,31	13,22	26,96	29,56	0,02%	0,03%	0,01%	2039,33	5,00	16,41	17,99	0,01%	0,01%	0,01%	3282,00
413,75	4293,84	4496,89	2,20%	1,05%	2,18%	10377,86	426,70	4978,30	5207,47	2,28%	0,96%	2,24%	11666,98	510,37	6220,94	6513,35	2,79%	1,00%	2,74%	12189,08
12,61	1000,30	1041,96	0,52%	0,03%	0,50%	79325,93	12,36	1221,45	1272,46	0,56%	0,03%	0,55%	98822,82	13,45	1476,56	1550,24	0,67%	0,03%	0,65%	109781,41
46,65	877,52	906,73	0,45%	0,12%	0,44%	18810,72	12,67	414,14	423,54	0,19%	0,03%	0,18%	32686,66	20,69	744,47	766,22	0,34%	0,04%	0,32%	35982,12
35,48	571,29	592,41	0,30%	0,09%	0,29%	16101,75	6,77	106,31	106,55	0,05%	0,02%	0,05%	15703,10	32,18	882,39	900,93	0,40%	0,06%	0,38%	27420,45
38052,08	178705,87	188713,15	91,27%	96,83%	91,36%	4696,35	42760,93	198649,48	210574,56	90,58%	96,62%	90,70%	4645,58	49259,09	198310,38	210997,72	88,77%	96,92%	88,92%	4025,86
39299,77	**195689,91**	**206554,22**	**100,00%**	**100,00%**	**100,00%**	**4979,42**	**44254,77**	**219158,46**	**232161,60**	**100,00%**	**100,00%**	**100,00%**	**4952,20**	**50823,78**	**223306,43**	**237301,58**	**100,00%**	**100,00%**	**100,00%**	**4393,74**

2007							2008							2009						
MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT
121,52	6615,13	6975,29	2,43%	0,45%	2,42%	54436,55	187,85	7770,83	8243,32	2,20%	0,22%	2,19%	41367,21	116,04	9022,92	9560,55	2,47%	0,16%	2,49%	77756,98
44,86	4006,15	4366,13	1,47%	0,17%	1,51%	89303,39	55,59	4195,45	4651,64	1,19%	0,07%	1,24%	75471,31	67,82	4979,30	5461,42	1,37%	0,09%	1,42%	73419,35
441,05	4878,10	5028,57	1,79%	1,64%	1,74%	11060,20	653,02	5369,16	5507,23	1,52%	0,78%	1,47%	8222,05	523,98	4599,17	4681,75	1,26%	0,72%	1,22%	8777,38
3,55	975,51	1015,76	0,36%	0,01%	0,35%	274791,55	5,87	1598,44	1672,76	0,46%	0,01%	0,45%	272306,64	10,69	2207,02	2306,31	0,61%	0,01%	0,60%	206456,50
508,85	4875,00	5128,27	1,79%	1,90%	1,78%	9580,43	571,39	6373,28	6715,13	1,80%	0,68%	1,79%	11153,99	864,20	8948,18	9440,79	2,45%	1,18%	2,46%	10354,29
5,00	14,70	16,20	0,01%	0,02%	0,01%	2940,00	0,70	3,15	3,48	0,01%	0,00%	0,00%	4500,00	24456,59	15029,35	16440,50	4,12%	33,39%	4,28%	614,53
537,51	8347,45	8666,66	3,07%	2,00%	3,01%	15529,85	580,02	4741,83	5075,81	1,34%	0,69%	1,35%	8175,29	812,25	6070,34	6443,10	1,67%	1,11%	1,68%	7473,49
22,17	2444,25	2553,99	0,90%	0,08%	0,89%	110250,34	22,97	3630,68	3784,76	1,03%	0,03%	1,01%	158061,82	17,74	3483,08	3609,37	0,96%	0,02%	0,94%	196340,47
16,05	491,32	508,21	0,19%	0,06%	0,18%	30611,84	6,62	462,55	477,51	0,14%	0,01%	0,13%	69871,60	166,41	4617,88	4765,07	1,27%	0,23%	1,24%	27750,02
220,83	5456,95	5622,48	2,01%	0,82%	1,95%	24711,09	60,95	3387,37	3456,98	0,96%	0,07%	0,92%	55576,21	70,43	2378,06	2408,15	0,66%	0,10%	0,63%	33764,87
24905,26	234587,63	248514,57	85,98%	92,84%	86,17%	9419,20	81449,19	316768,06	336149,88	89,35%	97,43%	89,46%	3889,15	46149,24	304044,51	319176,19	83,16%	63,00%	83,06%	6588,29
26826,65	**272692,19**	**288396,13**	**100,00%**	**100,00%**	**100,00%**	**10164,97**	**83594,17**	**354300,80**	**375738,50**	**100,00%**	**100,00%**	**100,00%**	**4238,34**	**73255,39**	**365379,81**	**384293,20**	**100,00%**	**100,00%**	**100,00%**	**4987,75**

2010							2011							2012						
MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	
153,21	11287,50	12012,62	2,50%	0,13%	2,53%	73673,39	268,04	16503,49	17589,22	3,06%	0,19%	3,09%	61571,00	174,97	16745,92	17684,53	2,97%	0,18%	2,99%	
89,91	6955,58	7544,25	1,54%	0,08%	1,59%	77361,58	142,52	13060,02	14137,42	2,43%	0,10%	2,49%	91636,40	117,68	11596,83	12421,22	2,06%	0,12%	2,10%	
151,91	1405,90	1442,01	0,32%	0,13%	0,30%	9254,82	534,04	4193,19	4289,56	0,78%	0,39%	0,75%	7851,83	562,56	7142,40	7259,17	1,27%	0,57%	1,23%	
4,82	2615,60	2667,11	0,58%	0,00%	0,56%	542655,60	4,76	4162,42	4223,55	0,78%	0,00%	0,74%	874457,98	5,23	4258,88	4322,48	0,76%	0,01%	0,73%	
989,22	10621,07	11192,53	2,36%	0,86%	2,35%	10736,81	471,29	4561,03	4823,69	0,85%	0,34%	0,85%	9677,76	277,27	2430,99	2573,38	0,44%	0,28%	0,43%	
53742,30	19732,89	23141,72	4,37%	46,56%	4,87%	367,18	55937,57	24810,50	28397,96	4,60%	40,56%	5,00%	443,54	10916,03	4709,62	5436,83	0,84%	11,09%	0,92%	
407,30	3999,31	4199,84	0,89%	0,35%	0,88%	9819,08	820,06	6124,82	6532,81	1,14%	0,59%	1,15%	7468,75	1042,67	8641,62	9163,44	1,54%	1,06%	1,55%	
17,58	3402,07	3525,45	0,76%	0,02%	0,74%	193519,34	27,98	6315,41	6529,43	1,18%	0,02%	1,15%	225711,58	49,90	8293,19	8553,21	1,48%	0,05%	1,44%	
334,41	10177,00	10445,85	2,26%	0,29%	2,20%	30432,70	35,53	1809,35	1841,42	0,34%	0,03%	0,32%	50924,57	965,21	24883,89	25951,03	4,42%	0,98%	4,38%	
744,78	20676,64	21130,95	4,58%	0,65%	4,44%	27762,08	169,49	6855,34	6944,37	1,28%	0,12%	1,22%	40446,87	134,77	4475,88	4568,77	0,80%	0,14%	0,77%	
58782,52	360869,78	378344,32	79,84%	50,93%	79,54%	6139,07	79497,76	451010,01	473159,35	83,56%	57,65%	83,23%	5673,24	84171,78	470753,40	494273,48	83,42%	85,52%	83,46%	
115417,96	**451743,34**	**475646,65**	**100,00%**	**100,00%**	**100,00%**	**3913,98**	**137909,04**	**539405,58**	**568468,78**	**100,00%**	**100,00%**	**100,00%**	**3911,31**	**98418,07**	**563932,62**	**592207,54**	**100,00%**	**100,00%**	**100,00%**	

	2013							2014							2015						
Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT
95707,38	409,00	43123,36	44581,64	6,88%	0,38%	6,80%	105436,12	541,58	46008,56	47753,09	7,31%	0,49%	7,26%	84953,12	626,72	46172,19	47697,53	8,78%	0,65%	8,73%	73672,29
98545,46	133,79	15135,00	15915,46	2,41%	0,12%	2,43%	113127,98	95,69	9309,56	9912,75	1,48%	0,09%	1,51%	97288,70	109,43	7614,65	8074,07	1,45%	0,11%	1,48%	69583,57
12696,25	708,71	11299,54	11460,85	1,80%	0,65%	1,75%	15943,73	997,65	14928,30	15145,35	2,37%	0,90%	2,30%	14963,53	703,83	11405,52	11540,35	2,17%	0,73%	2,11%	16204,82
814317,40	8,11	5345,73	5425,86	0,85%	0,01%	0,83%	659221,09	22,71	15174,82	15463,60	2,41%	0,02%	2,35%	668113,72	35,82	21066,27	21399,04	4,01%	0,04%	3,92%	588137,73
8767,59	1046,73	10827,16	11602,31	1,73%	0,97%	1,77%	10343,80	1080,91	11659,79	12408,47	1,85%	0,98%	1,89%	10787,00	405,06	4101,87	4340,44	0,78%	0,42%	0,79%	10126,60
431,44	16397,46	6357,91	7307,46	1,01%	15,13%	1,11%	387,74	12490,03	4136,62	4602,71	0,66%	11,29%	0,70%	331,19	9911,72	3294,01	3652,15	0,63%	10,30%	0,67%	332,33
8287,97	207,72	3864,20	4016,55	0,62%	0,19%	0,61%	18603,37	443,40	5938,69	6210,92	0,94%	0,40%	0,94%	13393,46	176,91	3434,90	3534,38	0,65%	0,18%	0,65%	19416,64
166196,19	31,67	8306,95	8530,30	1,33%	0,03%	1,30%	262299,33	28,75	5787,83	6006,85	0,92%	0,03%	0,91%	201333,64	60,91	8464,93	8731,79	1,61%	0,06%	1,60%	138966,89
25780,80	7,60	525,49	532,76	0,08%	0,01%	0,08%	69110,05	141,29	7386,54	7483,31	1,17%	0,13%	1,14%	52280,96	69,61	2218,60	2267,00	0,42%	0,07%	0,41%	31871,95
33211,25	148,38	2623,03	2708,53	0,42%	0,14%	0,41%	17677,23	53,97	731,16	763,08	0,12%	0,05%	0,12%	13546,55	97,24	2358,54	2422,73	0,45%	0,10%	0,44%	24255,96
5592,77	89293,36	519436,64	543813,41	82,87%	82,38%	82,91%	5817,19	94724,02	508299,35	531702,10	80,76%	85,63%	80,87%	5366,11	83997,72	415802,45	432656,81	79,06%	87,32%	79,20%	4950,16
5729,97	**108392,53**	**626845,01**	**655895,14**	**100,00%**	**100,00%**	**100,00%**	**5783,10**	**110619,99**	**629361,20**	**657452,24**	**100,00%**	**100,00%**	**100,00%**	**5689,40**	**96194,97**	**525933,92**	**546316,29**	**100,00%**	**100,00%**	**100,00%**	**5467,37**

2016							2017							TOTAL					
MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)	Price per MT	MT (Net Weight)	FOB (x1000 USD)	CIF (x1000 USD)	Participation FOB (%)	Participation MT (%)	Participation CIF (%)
414,09	39581,17	40779,72	9,37%	0,53%	9,31%	95587,04	615,94	35506,73	36599,76	6,95%	0,59%	6,90%	57646,47	4.245,36	296.954,67	309.148,07	4,76%	0,33%	4,72%
108,47	7405,18	7882,54	1,75%	0,14%	1,80%	68272,17	107,52	9393,01	9949,69	1,84%	0,10%	1,88%	87362,52	1.242,57	108.629,83	116.339,59	1,74%	0,10%	1,78%
778,39	9969,47	10088,85	2,36%	1,00%	2,30%	12807,74	705,70	8633,27	8706,21	1,69%	0,67%	1,64%	12233,63	8.952,13	98.327,26	100.029,28	1,58%	0,70%	1,53%
24,45	17488,83	17718,87	4,14%	0,03%	4,04%	715227,05	16,24	10728,26	10916,39	2,10%	0,02%	2,06%	660782,05	142,25	85.622,95	87.132,95	1,37%	0,01%	1,33%
278,72	2517,39	2646,69	0,60%	0,36%	0,60%	9032,01	192,70	1779,52	1873,73	0,35%	0,18%	0,35%	9234,55	8.372,04	83.829,73	88.795,93	1,34%	0,66%	1,36%
7356,72	2008,53	2242,90	0,48%	9,43%	0,51%	273,02	7411,48	1872,78	2061,97	0,37%	7,06%	0,39%	252,69	198.704,38	82.051,48	93.394,79	1,32%	15,63%	1,43%
52,90	1066,42	1092,70	0,25%	0,07%	0,25%	20158,57	144,76	2792,18	2855,00	0,55%	0,14%	0,54%	19287,98	7.498,95	80.874,67	84.870,46	1,30%	0,59%	1,30%
36,44	6280,85	6469,06	1,49%	0,05%	1,48%	172363,43	55,42	5545,58	5819,36	1,08%	0,05%	1,10%	100065,18	430,69	67.450,07	69.862,98	1,08%	0,03%	1,07%
57,67	2144,97	2170,53	0,51%	0,07%	0,50%	37193,21	11,19	758,97	774,02	0,15%	0,01%	0,15%	67810,60	1.908,64	58.098,15	59.911,05	0,93%	0,15%	0,91%
52,73	617,32	640,87	0,15%	0,07%	0,15%	11706,14	4,31	114,80	116,23	0,02%	0,00%	0,02%	26658,97	1.833,62	51.246,58	52.395,28	0,82%	0,14%	0,80%
68881,23	333350,04	346491,76	78,91%	88,26%	79,07%	4839,49	95763,79	434090,34	450801,16	84,91%	91,18%	84,98%	4532,93	1.037.719,73	5.225.737,49	5.486.847,81	83,76%	81,64%	83,78%
78041,82	**422430,17**	**438224,50**	**100,00%**	**100,00%**	**100,00%**	**5412,87**	**105029,05**	**511215,44**	**530473,52**	**100,00%**	**100,00%**	**100,00%**	**4867,37**	**1.271.050,36**	**6.238.822,89**	**6.548.728,20**	**100,00%**	**100,00%**	**100,00%**

Elaboration: García, Paulo.