The Impacts of FTAs on Latin America's Agricultural Exports to East Asia: A Gravity Model and Computable General Equilibrium Model Analysis

中南米農産品の東アジアへの輸出における自由貿易協定の影響
重力モデルおよび応用一般均衡(CGE)分析

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THE SUMMARY OF DOCTORAL THESIS

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Latin American countries rely greatly on agricultural exports whereby single commodities represent an important income of international earnings. Agriculture is one of the most dynamic and promising sectors of trade relations between Latin America (LA) and East Asian (EA), despite being the most protected in EA. With the creation of the Pacific Alliance (PA) in 2011, Chile, Colombia, Mexico and Peru, aimed to develop a platform that allows the promotion of LA into the Asia Pacific region. The PA agricultural exports main destinations in EA are Japan, China and Korea. Currently, Chile and Peru, both have Free Trade Agreements (FTAs) with Korea, China and Japan, Mexico has an FTA with Japan, and Colombia recently enacted an FTA with Korea and is under negotiations with Japan.

The objective of this dissertation is to study the impacts of FTAs on LA's agricultural exports to EA. The thesis consists of five chapters. Chapter one is the introduction, chapter two examines the patterns of agricultural trade between LA and EA regions by using various indicators, to set the stage for detailed analysis in the following chapters. Chapter three presents a quantitative study of the impacts on LA's agricultural exports to EA of the seven existing FTAs (Chile-Korea, Chile-China, Chile-Japan, Mexico-Japan, Peru-China, Peru-Korea and Peru-Japan) by undertaking a Gravity Model (GM) analysis. Chapter four uses a Computable General Equilibrium (CGE) Model to evaluate the effects the removal of tariff and non-tariff barriers (NTBs) would have on Colombian agricultural exports, under possible FTAs with Japan and China. Chapter five presents the conclusions.

Although GM and CGE models are common quantitative analytical methods in the area of trade, using to measure the impacts of FTAs, they have not been used to analyze the impact of the FTAs between EA and LA specifically on LA agricultural exports to EA. Furthermore, an important contribution of this analysis is while the GM measures the impact of seven FTAs in 2003-2015 period with disaggregated data including tariff information and FTA specific dummies in the explanatory variables, the CGE model analysis the impact of possible FTAs explicitly for the Colombian agricultural exports with the removal of tariff and NTBs through five different scenarios, specifically considering the tariff reduction reached by other PA members from Japan and China in their FTAs.

The GM is used in this thesis to examine whether LA countries' agricultural exports have expanded as a result of the FTAs with EA. The analysis is conducted using aggregated/sectorial and disaggregated product level at HS (6-digit) trade data and tariff reduction from each FTAs annex in 2003-2015 period.

The following equation (1) is estimated using PPML+FE, PPML+RE and OLS for the aggregated, sectoral and product levels:

$$\ln(Exports_{i,j,t}) = \beta_0 + \beta_1 \ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t}) + \beta_4 \ln(AgriL_{j,t}) + \beta_5\, FTADummy_{i,j,t} + \beta_6(FTADummy_{i,j,t} * FTADummy_{i,japan} + \beta_7(FTADummy_{i,j,t} * FTADummy_{i,Korea}) + \beta_8(FTADummy_{i,j,t} * FTADummy_{i,China}) + \varepsilon_t + C_j$$

Where $Exports_{i,j,t}$ is country i's agricultural exports to country j in year t, $Dist_{ij}$ distance between countries i and country j, GDP_{jt}(GDP_{it}) real GDP of country j (i) in year t, $AgriL_{jt}$ is the agricultural land available in countries j, *FTAijt* FTA dummy between countries i and j in year t.

$FTADummy_{i,j,t} * FTADummy_{i,Japan}$, $FTADummy_{i,j,t} * FTADummy_{i,Korea}$ and $FTADummy_{i,j,t} * FTADummy_{i,China}$ Are interactions dummies for country i with Japan, Korea, and China in year t. Countries i represents Chile, Mexico, and Peru, while country j represents the major agricultural export partners of each LA coutries.

For a product level analysis, equation (2) was also estimated:

$$In\,(Export_{i,j,t}) = \beta_0 + \beta_1 \ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t}) + \beta_4 \ln(AgriL_{j,t}) + \beta_5 FPM_{j,i,t} + \beta_6(FPM_{j,i,t} * FTADummy_{i,japan}) + \beta_7\,(FPM_{j,i,t} * FTADummy_{i,korea}) + \beta_8(FPM_{j,i,t} * FTADummy_{i,China}) + \varepsilon_t + C_j$$

Where $FPM_{j,i,t}$ is FTA Preferential Margin (FPM) (FPM=MFN-FTA tariff applied by country j to country i in year t), they are interaction variables which isolates the effect of trade agreements between country i and Japan, Korea and China. This equation is conducted to examine the tariff reduction impact on Chile, Mexico and Peru. Both above equations are also estimated for Japan, Korea and China's agricultural imports as country i, specifically considering the effect of FTAs between countries i and Chile, Mexico and Peru.

The model outcomes indicate at an aggregated level that LA countries have mixed results from the FTAs with EA, with four out of seven FTAs showing positive results for LA agricultural exports to EA. At a sectoral level, results indicate that 15 out of 28 agricultural subsectors, of the seven FTAs, have had positive effects. In contrast, The GM also shows that five out of seven FTAs show negative results for EA agricultural imports from LA, and 15 out of 28 agricultural subsectors indicate negative results. At product level, some positive and negative effects are found for some of the most exported products from LA to the world.

The CGE model implements five commercial policy simulation scenarios to examine the impacts of possible FTAs between Colombia - China and Colombia-Japan for Colombian agricultural exports. The CGE model used differs from others because it disaggregates the Colombian agricultural sector in 16 subsectors and considers the removal of tariff and NTBs for Colombian agricultural exports to those markets. Moreover, the model is calibrated for year 2014 and contemplates five types of productive factors (land, capital, unskilled waged labor, unskilled non-waged labor and skilled labor).

The study finds an important impact of the five simulation scenarios for Colombian agricultural exports. Among them, the scenario C (which considers the total effect for Colombian agricultural exports to China and Japan reaching the maximum tariff reductions by other Pacific Alliance members in their negotiations with China and Japan. As well as, 50% NTBs reduction of Colombian agricultural exports to China and Japan) is the most realistic, and it will be more beneficial for Colombian economy, obtaining a larger benefit from Japan (48%). In addition, the scenario E reveals that 100% of tariff and NTBs reduction of Colombian agricultural exports to China and Japan will bring the major benefit for Colombian agricultural export to Japan increasing 133% and 71% those to China. Thus, Colombian government negotiators should stress the importance of including in the negotiation with Japan and China the removal of NTBs such as SPS and TBT.

In the final concluding chapter, I intend to summarize the findings, discuss policy implications as well as limitations of the study, and present future research agenda.

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1. Introduction

1.1 Background

Although agricultural is one of the most protected sectors in Latin America (LA)[1] and East Asia (EA)[2], it remains nonetheless as one of the most dynamic trade sector between the regions. Latin American agricultural exports have had a positive growth from 2002 to 2013, in 2014 a scenario of world deceleration in food imports started, due to the impacts of the 2008 financial crisis and China's low demand for commodities including agricultural products.

Agriculture is a sensitive sector in EA. The region still imposes tariffs and Non-Tariff Measures (NTB) in such sector, making market access more difficult to Latin American countries.

Most countries in LA have had a historical export orientation towards the United States (U.S.) and the European Union, due to their geographical location, historical ties and the U.S. geopolitical influence in LA. Despite of the above, in 2015 EA became the main recipient of Latin American food exports. While Brazil and Argentina provide more than 75% of food products to East Asia, countries as Chile, Mexico, Peru, and Colombia are also important food providers. This study will focus on countries that recently the Pacific Alliance (PA).

The PA was created in 2011, by the most active economies in the region: Chile, Mexico, Peru and Colombia. It is expected that agricultural trade increases between EA and the PA, as one of the major component of their trade relations. The PA seeks the gradual construction of deep integration area among members, leading to a free movement of goods, services, capital and people. Precisely, the main objective of the PA is to establish a platform that allows the promotion of LA into the world with a special focus on the Asia Pacific region.

In 2015, The PA had a combined population of 217 million people with a Gross Domestic Product (GDP) of US$ 1.9 trillion, equivalent to the 39% of regional GDP, and

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[1] Generally speaking, Latin American region includes: 17 countries from South America and Central America: Mexico, Colombia, Chile, Peru, Brazil, Argentina, Uruguay, Paraguay, Bolivia, Ecuador, Venezuela, Costa Rica, Nicaragua, Honduras, El Salvador, Panama, Guatemala. Chapter 2, LA includes the 17 countries in LA in the description part, and then the study focuses on the Pacific Alliance members: Chile, Mexico, Peru and Colombia. Chapter 3: LA only includes three members of the PA: Chile, Mexico and Peru.

[2] East Asian region includes 13 countries: the ASEAN members (Malaysia, Thailand, Singapore, Indonesia, Brunei, Philippines, Vietnam, Laos, Cambodia and Myanmar) plus China, Japan, and South Korea (from now on Korea). Chapter 2: EA includes the 13 members, and later the analysis focuses on the main EA countries: Japan, Korea and China. Chapter 3: EA only includes Japan, Korea and China.

an average GDP per capita of US$ 16,759. These four countries represent 50 percent of total trade in goods in the region, with exports of US$ 513 billion and imports of US$549 billion. In the same year, these countries collectively received Foreign Direct Investment (FDI) for US$ 63 billion and 42.4 million tourists (Alianza del Pacifico, 2016) and (World Bank, 2016).

The PA was formally created with the Declaration of Lima in 2011 and it was further consolidated with the Framework Agreement signed at Antofagasta, Chile in 2012. Then, the PA members negotiated a trade agreement, called the Additional Protocol to the Framework Agreement signed in Cartagena, Colombia in 2014. This PA agreement builds upon previously existing (mainly bilateral) trade agreements between PA members. The agreement is composed by 19 chapters addressing issues, such as market access, trade in services, rules of origin, technical barriers to trade (TBT), sanitary and phytosanitary (SPS) requirements, trade facilitation and customs cooperation, government procurement, e-commerce, investment and dispute settlement, among other areas of cooperation between member countries.

Despite the fact that the PA has been recently created, it has already set a record of important achievements. Some of its key achievements include: the stock and exchange market integration among its members via the Integrated Latin American Market (MILA for its acronym in Spanish), the establishment of a visa waiver program among its members, the creation of a student and an academic mobility platform, and the PA Business Council (CEAP for its acronym in Spanish). Member countries have also set a series of cooperation mechanisms on tourism, trade and investment promotion, and even an agreement to share some of their embassies.

The PA has drawn the attention of the international community because the group currently has 55 observer countries belonging to all regions of the world. This includes ten APEC members (U.S., Canada, China, Japan, Singapore, Korea, Australia, New Zealand, Indonesia and Thailand). Four among the current observers, Singapore, Australia, New Zealand and Canada recently have become associated members and they are also currently negotiating a Free Trade Agreement (FTA) with the four PA members. Furthermore, the open and inclusive nature of the PA has also allowed it to approach to other Latin American integration blocks such as Mercosur (that include important countries like Brazil and Argentina).

Agriculture remains one of the most important export sectors for LA countries. Japan, China, and Korea are the main markets of such products in LA. Currently, Chile, and Peru have Free Trade Agreements (FTAs) with Korea, China, and Japan; Mexico has an FTA with Japan; and Colombia recently enacted an FTA with Korea and is currently pursuing negotiations with Japan.[3]

Compared with the PA members, Colombia is lagging behind in its insertion to the East Asian region. Out of the several FTAs that Colombia has concluded, only one has been negotiated with a partner in EA. This is the FTA between Colombia and Korea. Colombia is currently negotiating an Economic Partnership Agreement (EPA)[4] with Japan and this is pending of conclusion. In addition, China has approached Colombia on several times in order to negotiate an FTA.

The agricultural sector of PA members is expected to benefit from FTAs. However, it is important to take into account that although negotiation of trade agreements generally leads to tariff reduction, there are other types of NTBs that may affect market access for Latin American products to these markets regardless the existence of FTA. This is the case of quotas and the SPS measures imposed by Japan, Korea and China.

In this sense, it is relevant to evaluate the impact of the current FTAs between both regions on Latin American agricultural exports to EA with the reduction of agricultural tariffs from EA countries, and also evaluate the potential effects of the reduction of tariff and NTBs on agricultural Colombian products under the possible FTAs between such country and Japan and China.

Economic models are considered a theoretically reliable, rigorous and quantitative method to evaluate trade effects of different trade policies. Among generally used quantitative analytical techniques in the area of trade are Gravity Models (GM) and the Computable General Equilibrium models (CGE). GM use historical data (ex-post approach) to describe and to measure the effect on trade flows of a policy that has been already implemented. Different from CGE, GM are not used to predict the impact of a new policy. GM seek to explain the pattern of bilateral trade among nations and its evolution over time in terms of certain fundamental variables (Teh and Piermartini, 2005).

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[3] The FTA between Colombia and Korea was enacted on 15th July 2016. Colombia and Japan started negotiations of an Economic Partnership Agreement (EPA) since December 2012. Among the 18 chapters included in the Colombia-Japan negotiations, there are still two chapters under negotiations: the rule of origin and market access (SICE-OAS, 2016).

[4] The term Economic Partnership Agreement (EPA) was implemented by Japan and is considered more comprehensive than traditional Free Trade Agreement because besides the elimination of tariffs on trade, also liberalized other measures such as trade facilitation, investment liberalization and facilitation. They additionally include economic cooperation, which in the case of Japan is particularly important. Through the Official Development Assistant (ODA) the Asian country cooperates in a broader context with Latin America (Ando and Urata, 2011) and (Kuwayama, 2015). For the analysis, in order to be consistent with Korea and China, the term FTA is used also for Japan.

On the other hand, CGE models offer a theoretically consistent framework for analyzing trade policy questions. CGE models are computer-based simulations use to measure the degree that a policy change may represent for economic trade or welfare. They apply ex-ante simulations. However in most of the cases, an ex-post validation of CGE models is needed in order to improve some reliability in the numerical results (Teh & Piermartini, 2005).

Several recent studies have evaluated the trade effects of FTAs or Regional Trade Agreements using GM (Teh and Piermartini, 2005), (Urata and Okabe, 2013) and (Ando and Urata, 2011) but only few authors have focused the analysis on the impacts of FTA's on agricultural trade (Fulponi and Engler, 2012) and (Bureau and Jean , 2013). The GM applied in this study, differs from previous ones in the sense that it examines the impacts of FTAs agricultural exports from LA to EA through a GM analysis at three different levels of disaggregation: aggregate/sectoral level and disaggregated product level trade data, explicitly considering the FTAs and the preferential tariff rates on the most exported agricultural products by LA to major agricultural partners in the world, and the most imported agricultural products by EA from the main agricultural partners from the world and specifically from Latin America.

Similarly, the studies that measure the impacts on Latin American trade policy by using CGE models are led by the Economic Commission for Latin American and the Caribbean (ECLAC) and major recognized Latin American authors as (Durán et al, 2007), (Gurgel, 2007), (Wong and Arguello, 2010) and (Morley and Diaz-Bonilla, 2003), and specifically in Colombia (Hernandez , 2014) and (Botero, 2005).[5] However, this study contributes to the scholarly literature since it makes the first approach to the effects on Colombian eventual FTAs negotiations that may lead to the reduction of tariff and NTBs with Japan and China and the effects that such negotiations may have on exports of different agricultural subsectors, as well as consumption, trade balance and social welfare in Colombia.

In order to conduct a reliable analysis using a GM, Latin American agricultural exports and East Asian agricultural imports were analyzed at three different levels: Aggregated level comprises chapter 01-24 from the Harmonized System (HS); sectoral level includes four agricultural groups: live animals (HS01-05), fruits and vegetables (HS06-14), animal and vegetables oils (HS15) and products of food industry; and product level comprises products at HS 6-digit level.

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[5] Some CGE studies also worth to mention are: (Scollay and Gilbert, 2000), Petri (1997), (Urata and Kiyota, 2003), Plummer and Lee (2011), (Petri, Plummer and Zhai, 2011) and Kim, Park, and Park (2013), because they analyze prospective FTAs in Asian economies.

The exporting countries selected for the study are Chile, Mexico and Peru, whose exports are oriented towards their major agricultural markets. In 2015, for Chile, Peru and Mexico 15 to 16[6] major agricultural export partners receive more than 80% of their total agricultural exports. Similarly, the importing countries are Japan, Korea and China from main agricultural suppliers. Between 16 to 17 main agricultural suppliers account for more than 75% of their total agricultural imports. Thus, these major agricultural exporting and importing countries play a significant role in the sample.

The tariff information from the agricultural major export partners to LA and main agricultural import partners from EA was sourced mostly from each FTA tariff elimination schedule. The sample data pool is derived from the 2003 - 2015 period, during which the seven FTAs were enacted. PPML + FE, PPML+RE and OLS models are applied in four different equations. PPML and OLS were carefully studied, finding that PPML manages databases better with many zeros in the dependent variable. This is the case for the sectoral and product level, where not all the products are exported to all countries.

The study finds the GM outcomes at aggregate, sectoral and product level, that LA countries have mixed results from the trade agreements with EA on their agricultural exports. Similarly, the GM results for Japan, Korea and China's agricultural imports from LA also reveal diverse outcomes for East Asian countries. While the LA agricultural exports to EA have benefit from four out of seven FTAs, EA imports have had negative effects from five out of seven FTAs with LA. At product level, the FTAs positively influenced only certain products among those selected in the sample as LA's major agricultural products exported to the world. Unexpectedly, some products also reveal negative effects of the FTAs with EA and from the Free Trade Agreement Preferential Margin given from EA countries to LA agricultural exports.

In contrast to the GM, the CGE model is conducted only for the Colombian economy and it implements equations that incorporate different branches of the economy. The model is calibrated considering year 2014. The CGE model evaluates the effects on the agricultural exports under the reduction of tariff and NTBs that the Colombian economy will face under possible FTAs with Japan and China.

The structure of the CGE model classifies the Colombian agricultural sector into 16 disaggregated subsectors based on the Colombian National Account Codes in order to

[6] The main LA's agricultural export partners include Japan, Korea and China. However, for Mexico, Korea is not among its 15 major agricultural export partners, thus it was included in the analysis for the sake of the research. Similarly, the EA main agricultural import partners include Chile, Mexico and Peru despite sometimes those countries are not among their main 15 agricultural import partners.

adequately interpret the results for the Colombian economy. From those 16 agricultural subsectors, six belong to the agricultural subsectors and ten correspond to the agroindustry subsectors.

The CGE model analyzes five different commercial policy scenarios that involve possible FTAs between Colombia and Japan and between Colombia and China. Scenario A considers tariff and NTB reduction of Colombian agricultural exports to China. It compounds the maximum and minimal tariff reduction reached in average for agricultural products by the other PA members such as Chile and Peru on their tariffs applied for their previous negotiated FTAs with China. In addition, this scenario also includes 50% NTB reduction to Colombian agricultural exports to China. Scenario B is similar to A, but only includes tariff and non-tariff reduction of Colombian agricultural exports to Japan, also considering the maximum and minimal tariff reduction reached in average for agricultural products by the other PA members such as Chile, Mexico and Peru, on their tariffs applied for their previous negotiated FTAs with Japan. In addition, this scenario also includes 50% NTBs reduction to Colombian agricultural exports to Japan. Scenario C considers scenario A and B simultaneously, in order to see the total effect for Colombian agricultural exports to China and Japan. Scenario D studies the impact of 100% of tariff reduction and 50% of NTBs reduction of Colombian agricultural exports to China and Japan. Finally, Scenario E, analyzes the impact of 100% tariff and NTBs reduction of Colombian agricultural exports to China and Japan.

The findings of CGE model reflect that among the five simulations scenarios, the scenario C is more realistic and will have benefits for the Colombian economy, this can be explained by the trade diversion effect will be minimal when there is a tariff reduction and NTBs reduction in both Asian markets, obtaining a larger benefit from Japan (47.7%). In addition, Scenario E reveals that 100% of tariff and NTBs reduction of Colombian agricultural exports to China and Japan will bring the major benefit for Colombian agricultural export to Japan increasing 71.4% and 133.1% those to China. Moreover, the main benefits for Colombian exports will be derived from the tariff and NTBs reduction from Japan. The scenario with the highest impact for Colombia is scenario E, with the 100% removal of tariff and NTBs of Colombian agricultural exports to Japan and China.

1.2 Objectives of the study

Although GM and CGE models are common quantitative analytical methods in the area of international trade use in order to measure the impact of FTAs, they have not been used to analyze the impact of the FTAs between East Asia and Latin America specifically on LA agricultural exports to EA. Furthermore, the value of this analysis is while the GM measures the impact of seven FTAs in 2003-2015 period, with disaggregated data and including tariff information in the explanatory variables, the CGE model analyzes the impact of FTAs under negotiation process explicitly for the Colombian agricultural sector with the reduction of tariff and NTBs in five different scenarios, specifically considering the tariff reduction reached by other PA members from Japan and China. In the view of the above, this study has therefore four main objectives:

1. To observe the overall evolution of Latin American agricultural exports to East Asia between 2011 to 2015, in order to identify the main products and markets, narrowing down the analysis to the Pacific Alliance members (Chile, Mexico, Peru and Colombia) and main East Asian agricultural markets (Japan, Korea and China); to specifically study the PA's agricultural export similarity index and the comparative advantage for agricultural products in EA.

2. To describe the EA's agricultural imports from Latin America, in order to highlight the importance of Japan, China and Korea imports from the Pacific Alliance (market share and main markets) and then determine some import agricultural policies applied by Japan, Korea and China, which impede more agricultural exports from the PA.

3. To examine the impacts of seven FTAs between LA and EA on Latin America's agricultural exports to EA by means of implementing a GM analysis at aggregate, sectoral and product level, controlled by economic conditions such as distance, size of the economy and Free Trade Agreement Preferential Margin (FPM) in (2003-2015) period.

4. To implement a CGE model that evaluates the effect on the Colombian agricultural exports under the reduction of tariff and NTBs that the Colombian economy would face under possible FTAs with Japan and China.

1.3 Hypotheses

With the purpose to achieve the objectives of this study, the following hypotheses have been established:

- The FTAs signed between EA and LA regions have contributed to the expansion of LA agricultural exports to EA and consequently to the EA agricultural imports from Latin America.
- The Free Trade Agreement Preferential Margin given by Japan, Korea and China to Chile, Mexico and Peru has positively affected PA exports to EA.
- The removal of agricultural tariff and non-tariff barriers that the Colombian economy would face under possible FTAs with Japan and China will increase Colombian agricultural exports to these East Asian markets.

1.4 Research questions

This study aims to measure the impact of the FTAs between LA and EA on Latin America's agricultural exports to EA using a GM and CGE model analysis. Based on the objectives and hypothesis mentioned above, this study seeks to answer the following main question: Which are the impacts of FTA's between LA and EA regions to Latin American agricultural exports to East Asian Markets?

In order to address this seminal question, this thesis is structured in four different chapters. These chapters answer the following specific questions:

Chapter 2:

- Are Latin American agricultural exports to EA increasing and are they concentrating in terms of products and countries?
- How different is the PA's agricultural product offer within each EA country?
- How is the agricultural comparative advantage of the PA countries to EA?
- How important are the East Asian imports of agricultural products from the PA?
- Why do the import policies of Japan, Korea and China hamper the increase of PA agricultural imports?

Chapter 3:

- Have the seven FTAs increased Latin American agricultural exports to East Asia?
- How has the FPM given by Japan, Korea and China to Chile, Mexico and Peru's agricultural exports to East Asia influenced the Latin America's agricultural exports to EA?

Chapter 4:

- What are the effects on Colombian agricultural exports to Japan and China with the dismantling of tariff and non-tariff barriers under possible FTAs with those countries?
- What are the effects on the increase of Colombian agricultural exports to Japan and China on the Colombian economy?

1.5 Significance of the study

In Latin American countries, agriculture is a key sector in terms of employment, production, consumption and international trade. Historically, trade relations between EA and LA countries have been inter-industry. While the former export commodities (mainly agriculture and mining products) to EA the latest exports manufactured products and services to LA.

Since the creation of the Pacific Alliance in 2011, this new integration process aimed to establish a platform that will improve the market access of LA agricultural products to EA region. Agriculture is a key export sector for PA countries to EA, with the major destinations being Japan, China and Korea.

Although GM and CGE models are common quantitative analytical methods in trade studies in order to measure the impact of FTAs, they have not been used to analyze the impact of the FTAs between EA and LA, specifically on LA agricultural exports to EA. Furthermore, the value of this analysis is while the GM measures the impact of seven FTAs in 2003-2015 period with disaggregated data and including tariff information in the explanatory variables, the CGE model analyzes the impact of FTA under negotiation process explicitly for the Colombian agricultural sector with the removal of tariff and non-tariff barriers through five different scenarios, specifically considering the tariff reduction reached by other PA members from Japan and China in their previous FTAs.

More specifically, this study applies a GM analysis with four main equations conducted for the agricultural sector at three different levels: aggregate, sectoral and product level. The GM not only includes common explanatory variables such as distance and size of the economy (which are likely to influence bilateral trade) but also includes variables such as agricultural land and preferential margins at product level, indicating that these variables are important for agricultural trade.

Additionally, two different estimations are applied (Poisson Pseudo-Maximum-Likelihood (PPML) and Ordinary Least Squares (OLS). Finding that even though both of them are suitable for the analysis, the GM becomes more appropriate if it is carried out in its functional multiplicative form, it means, without proceeding to its linearization. Together with this, its estimation is proposed by using PPML estimator, which can be useful since it corrects the rejection of the variables that take zero value, as well as, solves the heteroscedasticity problem (Santos Silva and Teneyro, 2006).

This study uses valuable agricultural exports and imports data from the Harmonized System (HS) from the period 2003-2015. The exporting countries selected for this study are Chile, Mexico and Peru, whose exports are oriented towards their major agricultural markets, where the main 15 to 16 agricultural export partners account for more than 80% of their world agricultural exports. Comparatively, the importing countries are Japan, Korea and China from their main agricultural suppliers, where the main 16-17 agricultural suppliers (including Chile, Mexico and Peru) represent more than 75% of their total agricultural imports. Thus, these major agricultural exporting and importing countries play a significant role in the analysis. Finally, the GM conducted has an important significance because the tariff information from the agricultural major export partners to LA and main agricultural import partners from EA was taken mostly from each FTA tariff elimination schedule, so more than 38 FTAs were carefully revised in detail in order to find the tariff elimination schedule and then compound the Free Trade Agreement Preferential Margin (FPM) for each product selected for the sample. For the product level analysis, the four Chile, Mexico and Peru's most exported products to the world were cautiously studied, considering the FPM given by the East Asia countries from the importers side.

Lastly, the CGE model conducted in this study is also relevant because it disaggregates the agricultural sector into 16 agricultural subsectors (six agricultural subsectors and ten agroindustry subsectors). It should be noted that this study took the Colombian National Account Codes and their equivalent in the agricultural HS codes in order to ensure consistency and provide useful and applicable information for the Colombian policy makers. Furthermore, the tariff and non-tariff information data was found for each of the 16 agricultural subsectors and examined through five different scenarios, specifically considering the maximum and minimal tariff reduction reached for agricultural products by other Pacific Alliance members from Japan and China in their previous FTAs. Finally, the CGE model also allows to obtain short-term[7] results in other economic indicators for the Colombian economy.

1.6 Contribution of the research

This thesis aims to fill a gap in the existent scholarly literature, addressing the impacts of FTAs on trade, by focusing the analysis on agriculture in two specific regions. In doing so, the study does not only addresses the effects of the current seven measurable FTAs (Chile-Japan, Chile-China, Chile-Korea, Mexico-Japan, Peru-Japan, Peru-China, Peru-Korea) but also the impact of two possible future FTAs (Colombia-Japan and Colombia-China). Thus, this study contributes to the agricultural trade between LA and EA literature in four ways:

First, it further the knowledge by characterizing the agricultural trade between LA and EA regions, by means of analyzing the agricultural export concentration index, the LA similarity of agricultural export baskets to EA, the PA agricultural revealed comparative advantage in EA, the importance of Latin American agricultural imports for EA in terms of markets and share and the major EA imports agricultural policies for LA.

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[7] The model allows obtaining short term results because its aims to measure the impact of Colombian agricultural exports to Japan and China maintaining the current Colombian productive structure.

There are scarce studies that carefully examine the agricultural trade between these two regions with the above perspective.

Second, it contributes to the scholarly literature in the analysis of the impacts of FTAs on LA's agricultural exports to EA through a GM analysis by using information at three disaggregated level trade data, specifically considering the FTAs and tariff reduction by product explicitly when each product was enacted in each FTA. For product level analysis, the four most exported products by Chile, Mexico and Peru were selected to see their impact on East Asian markets. Tariff information was sourced from major export markets for Chile, Mexico and Peru, but also for the importers' agricultural markets (Japan, Korea and China) taking into consideration their major agricultural import origins. Furthermore, this study also discusses how import policies from Japan, Korea and China such as import quotas, SPS and TBT, as well as domestic agricultural support distort or impede the increase of LA agricultural exports to EA.

Third, this study could be an important source for LA policy makers in the sense that it does not only analyzes the reduction of tariff but also NTBs, using different scenarios. Particularly, in the case of Colombian possible future FTAs with Japan and China.

Finally, this study contributes practically to incorporating quantitative analytical techniques methodologies in the area of trade such as GM and the CGE models in the Latin American region studies related with EA, in one of the most dynamic regional research Center such as the Asia Pacific Studies Center,[8] that can be incorporated in future useful investigations in Colombia.

1.7 Organization of the study

This study is structured in five chapters. It starts with the introductory chapter, chapter 1. Next, chapter 2 emphasizes on the agricultural trade descriptive analysis between LA and EA. It starts with the agricultural trade literature review, then it continues with a detailed study of the principal markets and products that Latin America exports to East Asia. Further, the study focuses on the four countries of the PA and the main EA markets (Japan, Korea and China), analysing the PA's agricultural export offer and their comparative advantage to EA, as well as the agricultural sector in the PA countries. Chapter 2 also discusses EA food imports from LA, including the consumption trends in East Asia, the major markets and shares and their main import policies for agricultural

[8] The Asia Pacific Studies Center was founded in 2007, and it is located in Medellin, Colombia, at EAFIT University. This Center aims to be the model institution in Latin America for the research and the production of knowledge on the Asia Pacific region.

products as well as the agricultural support levels in both regions. Finally, it concludes with the findings from the qualitative information observed in the chapter.

Then, chapter 3 examines the impacts of FTAs on trade using GM econometric methodology. First this chapter describes Latin American agricultural exports to the world and EA, and it also examines the EA agricultural imports from the world and from LA, specifically considering the import tariff imposed by East Asian countries to agricultural imports. Then it defines the methodology and results. After that, chapter 3 characterizes some important trade restrictions for the agricultural imports in EA that can disturb LA exports to the East Asian region. Finally, chapter 3 presents the conclusions.

Chapter 4 starts with the introduction and then it analyzes the scholarly literature that have applied CGE models in order to measure trade impacts. Later, chapter 4 describes the methodology of the CGE model applied. It then analyzes Colombian agricultural exports to Japan and China and the tariff and non-tariff barriers imposed by those countries to Colombian agricultural sector. Later, chapter 4 discusses five different scenarios, and then describes the results. Finally, the chapter presents the conclusions

Chapter 5 summarizes the major findings of this study steaming from different chapters. Then, it presents the concluding remarks derived from the major findings. Finally, chapter 5 identifies the limitations of the study proposing areas and questions that can be address in future research.

Chapter 2. Trade in Agricultural Products between Latin America and East Asia

2.1. Introduction

Throughout the history agricultural exports have been an important income for Latin American countries, but ultimately due to the region main economies development and evolution, this sector has been losing importance. Despite this overall decline of relevance, some LA countries continued to rely heavily on agricultural exports whereby single commodities such as coffee, cocoa or sugar represent an important income of international earnings. The agricultural sector has a core role in relations with East Asian economies since it is the most important trade component for most of Latin American countries.

In the international agricultural trade, Latin American exports to the East Asian countries has increased ultimately partially thanks to the Latin American exports peak in the first decade of the 2000, and to the food demand increase in such countries as China, where the economic development has changed the food consumption parameters. Likewise, countries like Japan and Korea highly depend on food import for their self-sufficiency

Accordingly, the current chapter examines the agricultural trade evolution between these two regions, based on the Latin American region food offer analysis and the East Asian food demand. The chapter starts with the literature review of the experts and institutions about agricultural trade in section 2.2, and then continues with a detailed study of the principal markets and products which LA exports to EA in section 2.3 Further, the study is being focused on the four countries of the Pacific Alliance (Chile, Mexico, Peru and Colombia) and the main East Asian markets (Japan, Korea and China) analysing the PA export similarity index, the PA comparative advantage of agricultural products exported to EA, as well as the agricultural sector in the PA countries in subsections 2.3.3, 2.3.4 and 2.3.5. Continuedly in section 2.4 the study is dedicated to the EA food imports analysis, basing on the consumption trends in EA, the major markets and share and the main import policies of EA for agricultural products and the agricultural support levels in both regions. Finally, the chapter concludes in section 2.5.

2.2 Literature review of agricultural trade

According to the FAO (2015), trade of agricultural products has continued to increase, driven by high demand, particularly in emerging economies. Many regions are expected to rise their reliance on trade. Asian region has been the fastest growing net importer, with a significant increase after 2007, and leaded mainly by China’s high demand of agricultural commodities, achieving the status of a net importer. LA has become the largest net exporter of agricultural products, accompanied by a significant production growth.

Agriculture has been a subject studied by multiple international institutions such as: The Food and Agriculture Organization of the United Nations (FAO), The Organization for Economic Cooperation and Development (OECD), The Asian Development Bank (ADB), The Economic Commission for Latin America and the Caribbean (ECLAC), The Interamerican Development Bank (IDB), the World Bank (WB) and the World Trade Organization (WTO), who sponsored studies from different perspectives. Specifically, it appears to be a lack of research in agricultural trade between regions such as EA and LA in recent years. This section describes the main studies on agricultural trade carried out by some international institutions and scholars, and their approach.

The FAO has studied the agricultural trade and its relation with food security, arguing that the expansion of agricultural trade will contribute to the elimination of hunger, food insecurity and malnutrition (Bruinsma, 2003), (FAO, 2009a, 2009b, 2012, 2015). Additionally, the FAO has made some prospective studies such as the world agriculture in years 2015-2030, analyzing the possible future development of food supply in the world. The main conclusion is that the development of local food production in emerging markets with high agricultural dependency on employment, will determine development in ameliorating food security of these countries. The report also warned about the slow and uneven evolution of some countries in food security and nutrition (Bruinsma, 2003). The FAO projections covered 140 countries and 32 crops and livestock commodities for developing countries, finding the factors contributing to the growth of agricultural production. The FAO also reviews the changing role of agricultural trade in the developing countries and offers complementarity and competition overview in global agricultural trade, highlighting some policies that have affected the current trading patterns between developing and developed countries (Bruinsma, 2003).

> According to Bruinsma (2003), in the last 50 years, the volume of global merchandise trade has increased, more than three times faster than the growth in world economic output, whilst the agricultural trade has also grown, but only at about the rate of the global economic output. Notable among the factors that contributed to this relatively slow growth in trade was the failure to fully include agriculture in the multilateral trade negotiations under GATT that were so successful in reducing industrial tariffs. As a result, agricultural tariffs are as high now, on average, as industrial tariffs were in 1950 (Bruinsma 2003, p.233).

Agricultural net exports from developing countries have been declining, as well as the importance of agriculture in total merchandise exports. More importantly, the study also stresses the declining significance of agricultural exports for developing countries, however, some developing countries still depend greatly on agricultural exports in their international trade (Bruinsma, 2003).

In the Agricultural Outlook both The FAO and the OECD, have also made an assessment of medium-term projections of national, regional and global agricultural commodity markets. The projections cover consumption, production, stocks, trade and prices of 25 products for the period 2014 to 2023 and 2017 to 2026. In addition, recent studies particularly focused on specific regions or countries such as India and South East Asia. Even though their analysis is based on projects, specific country information can be found such as the related to Japan's agricultural policy reform post-2014 (OECD-FAO, 2014), (OECD-FAO, 2017).

Precisely, numerous OECD reports have analyzed the impact of Regional Trade Agreements (RTAs) on trade in agricultural products (Korinek and Melatos, 2009), (OECD-IDB, 2010), (Bureau and Jean, 2013), (OECD, 2015). The study of Korinek and Melatos (2009) analyzes the trade effects of three Regional Trade Agreements (RTAs): AFTA, the Common Market for Eastern and Southern Africa (COMESA) and MERCOSUR in the agricultural sector, using a Gravity Model. The study basically concludes that the creation of the three RTAs has augmented trade in agricultural products between their member countries. Later, Bureau and Jean (2013) examine tariff data at a detailed product level in 78 agreements over the period 1998-2009, using an econometric assessment based on difference-in-differences panel estimations. They conclude that the preferential margins for the agricultural sector increased from 4.7% to 8.9% on average, within eight years in the 78 RTAs analyzed. The analysis also shows some important asymmetries: South exports to the North, receive a preferential margin of nearly 15% after eight years, while North exports to the South receive nothing but a 4.2% preferential margin. This study complements the previous study made by the OECD-IDB (2010) that observed almost 100 agreements and their market access contributions. Moreover, an study of the OECD in 2015 identifies the agricultural component of some 53 RTAs-between 1992 and 2009 of which 19 are bilateral agreements to find methods in which future RTAs can facilitate trade. The study finds that the tariff removal could facilitate market access while the implementation of SPS, TBTs, the export subsidies and other export restrictions could limit market access for agricultural products (OECD, 2015).

Darumi (2009) examines the product exclusions in 15 bilateral FTAs through binary and probability models. Among his results and particularly about the agriculture, he found that agricultural products are the more protected and excluded in the negotiations. He found among 20,915 tariff lines recorded in the sample, around 27% of which were excluded from tariff elimination in countries such as the US and Japan, while only about 1% of manufacturing products were excluded from the agreements.

It is also important to analyze the agricultural Policy Monitoring and evaluation made also by the OECD (2015a), (2016) and (2017a), due to their use of a comprehensive system for measuring and classifying support to agriculture focusing on the OECD member countries. The study of the agricultural support indicators is useful to evaluate the sector in each specific country, moreover, it allows to compare agricultural support among countries. For the OECD members, some progress has also been made in policy instruments such as market price support and input subsidies, however, market price support should be reduced and eventually eliminated in order to ensure a well-functioning domestic market and international trading system (OECD, 2015a), (OECD, 2017a).

Agricultural trade has also been studied by the ADB, considering agriculture and food security as one of its major focus areas. Some relevant studies about bilateral trade and food security in Asia such as (Brooks et al. 2013), (ADB-LIU 2013) highlight the importance of international trade in improving food access and availability. The studies also emphasis that the agricultural trade and trade policies should encourage food security through a fair and open world trading system, and also how the food importers' exposure to unexpected market failures differs from relying on a narrow range of international suppliers.

On the other hand, the ECLAC and the IDB carefully study the main Asian economies evolution and their relations with LA from the trade, investment, and cooperation perspective, through countries report and studies (King et al 2012), ECLAC (2014) and (2015), (IDB, 2013), (Kahn, 2016). Both institutions frequently remark the agricultural trade growth potential between Latin American and Asian regions. More specifically, the ECLAC also has been studying the perspectives of agriculture and a rural development in LA through annual reports in association with the Food and Agriculture Organization (FAO), and the Inter-American Institute for Cooperation on Agriculture (IICA). They analyze the most important agricultural in a macroeconomic and sectoral context, as well as public policies and institutional framework. These reports remark that even though Latin American agricultural exports have a positive growth since 2002 to 2013-2014, in 2014 a scenario of world deceleration in food imports started, due to the impacts of the 2008 financial crisis and the low demand of China for commodities such as agricultural products ECLAC, FAO, IICA (2015) and (2017).

The ADB has also leaded broad studies about Asia and LA in collaboration with the Interamerican Development Bank (ADB-IDB 2012). The ADB-IDB (2012) study highlights two factors that limit trade between Asia and LA: the high level of tariff and NTBs and the high transportation costs. These factors increase product prices for consumers and firms in Asian markets and reduce the returns for LA countries. In addition, the study notes that agriculture is one of the most dynamic and promising sectors of the relationship between both regions, in spite of being the most protected. Finally, the analysis remarks that economic integration between both regions has appeared as a major reason for the trade growth between both regions after the 2008-2009 financial crisis. However, Latin American countries show a low level of FTAs utilization.

Medalla and Balboa (2009) stress that agriculture is a sensitive sector in the Asia Pacific region, showing the region still imposes high applied tariffs and tariff quotas in the agricultural sector, making market access to agriculture difficult for Latin American countries.

The WB addresses agriculture basically from two perspectives: one from the global agricultural trade policy considering production and trade patterns (Aksoy and Beghin 2005), and the other from its implications for development and poverty reduction (World Bank 2007). For the World Bank (2007), the agriculture is in the center of the development agenda and classifies countries in three groups according to their dependence on agriculture to grow as follow: agriculture-based countries, where the agriculture is a major source for growth, accounting for 32 percent of GDP growth on average; transforming countries, where agriculture only accounts for seven percent of GDP growth; urbanized countries, where agriculture only accounts for five percent on average to growth. China and most of the countries in South East Asia are transforming countries, though, many Latin American countries are considered to be urbanized. The report also analyzes effective instrument in using agriculture for development such as how to increase access to assets as water, education, health and land, the relationship between products and markets. Finally, the study recommends the way countries should implement a development agenda. Even though this report does not study the agricultural trade in depth, it contains useful information about agriculture in the world and its major elements.

The WTO publishes annual countries reports about their trade policies. This chapter specifically includes the trade policy review of Japan, Korea and China on the issues related to agricultural trade and their policies to protect agricultural sector (WTO, 2016a, 2016b and 2017).

The following analysis differs from the previously mentioned studies because it explores the agricultural trade from the Latin America agricultural export offer to East Asia and at the same time the EA agricultural demand from Latin America, considering some indexes, the agricultural support levels, and import policies that can harm trade between both regions.

2.3 Latin America's Exports of Agricultural Products to East Asia

2.3.1 Agriculture in Latin America

Historically, Latin America has had a marginal insertion into the dynamic of global trade given its economic orientation to the production and exports of raw materials and low value added products. The recurring low exchange terms and inefficient macroeconomic policies condemn the region to continuous lag behind for many years.

> From 1950s to 1980s, in some developing countries and particularly in LA, import substitution policies for manufactures restricted capital goods imports for agriculture, raised input costs and resulted in often significant negative effective rates of protection. This held back real investment levels in agriculture and slowed export performance in many developing countries. In some developing countries, industrial protection and restrictions on capital goods imports for agriculture were accompanied by direct taxation of agricultural exports, placing agriculture at a disadvantage both relative to other sectors and vis-à-vis developed country competitors (Bruinsma, 2003, p.270).

However, during the first decade of 2000, LA had a satisfactory economic path. This can be explained by multiple factors: right macroeconomic policies adopted by most of the governments, relatively easy access to external capital markets, the strengthening of the internal demand due to better situation in the local labor markets, the increased demand of exports and a substantial improvement of the exchange terms (IMF, 2011). Particularly, the continuous commodities goods prices increase beneficiated the major region exporting economies. In the case of agricultural products: Argentina, Paraguay, and Uruguay; in metals and minerals: Bolivia, Chile and Peru; in the exports of energetic resources: Bolivia, Ecuador and Venezuela (ECLAC, 2011). Those countries have managed to expand considerably their international reserves and attract more foreign direct investment.

Despite of the above, Cardenas et al (2011) highlight that the dynamic is not homogeneous in LA. There is even a geography barrier that has separated the prosperous economies in the South from their neighbors in Central America. The latter countries have a strong link with U.S. in terms of trade and industry, so they have been recovering at the same pace of their giant neighbor. Furthermore, they were also affected by the high prices on food, accumulating alarming current account deficit. This high dependency in raw material prices has placed the Central American countries in a vulnerable position to any external shock.

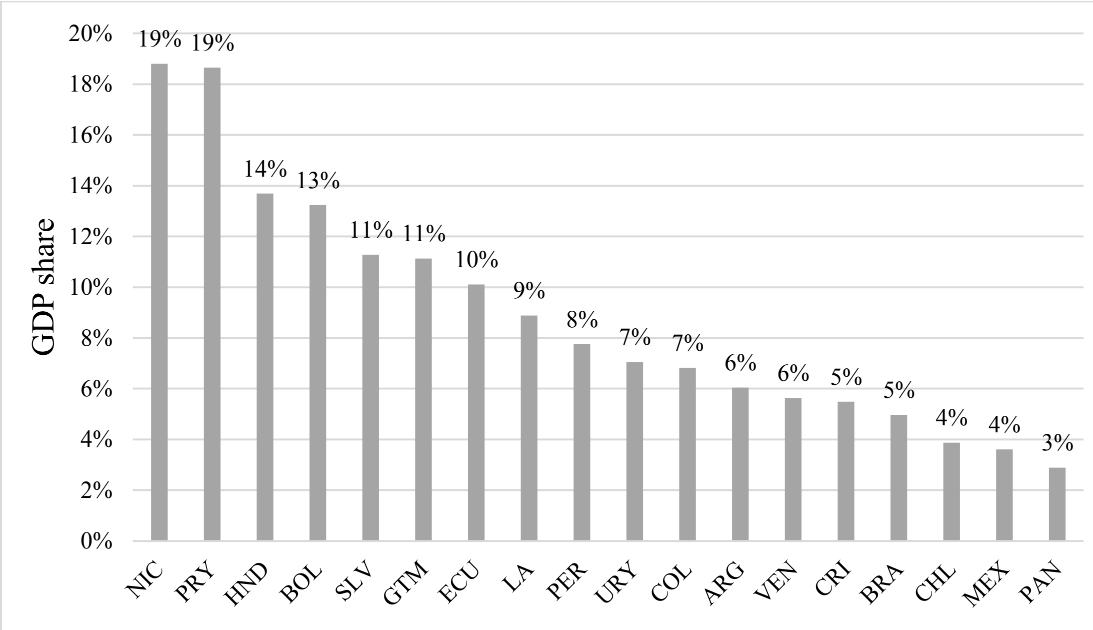
In the social sphere, LA has reduced poverty levels due to the economic performance and the adoption by local governments of appropriate initiatives focused on reducing the number of poor people. However, poverty and indigence indicators remain high in the Andean countries and Central America (FAO, 2010). In addition, net exporters of agriculture, have benefit from the exchange rate appreciation in the first decade of 2000. Countries such as Argentina, Brazil, Paraguay and Uruguay gained from the high prices of food, increasing their export incomes, consolidating their position as food power in the region.

There are big differences in the agricultural sector in terms of products and sub-regions. The growth of production and productivity has been favored by the increase in agricultural prices internationally and has also served as an incentive to diversify markets. Lambin et al (2011) illustrate the case of countries such as Argentina, Chile, Brazil, which have a good natural resource allocation in relation to their population, and which were able to expand their production in the areas with the highest international demand, such as the soybeans, beef and some fruits and vegetables.

Although in LA the agricultural sector has been losing participation in the regional economy, it is still relevant for most of the countries in the region. The agriculture sector represents for Latin America an average of nine percent of the total region GDP. For the poorest countries such as Nicaragua, Paraguay, Honduras, and Bolivia, the agriculture value as a percentage of their GDP is more than 13%, being Nicaragua and Paraguay the countries with a higher dependency on agriculture. Among the four countries of the PA, Peru is the one with the highest percentage of agricultural value as GDP share in Latin America (8%) followed by Colombia (7%). In contrast, for Chile and Mexico, the agriculture only accounts for 4% of total GDP (see figure 2.1).

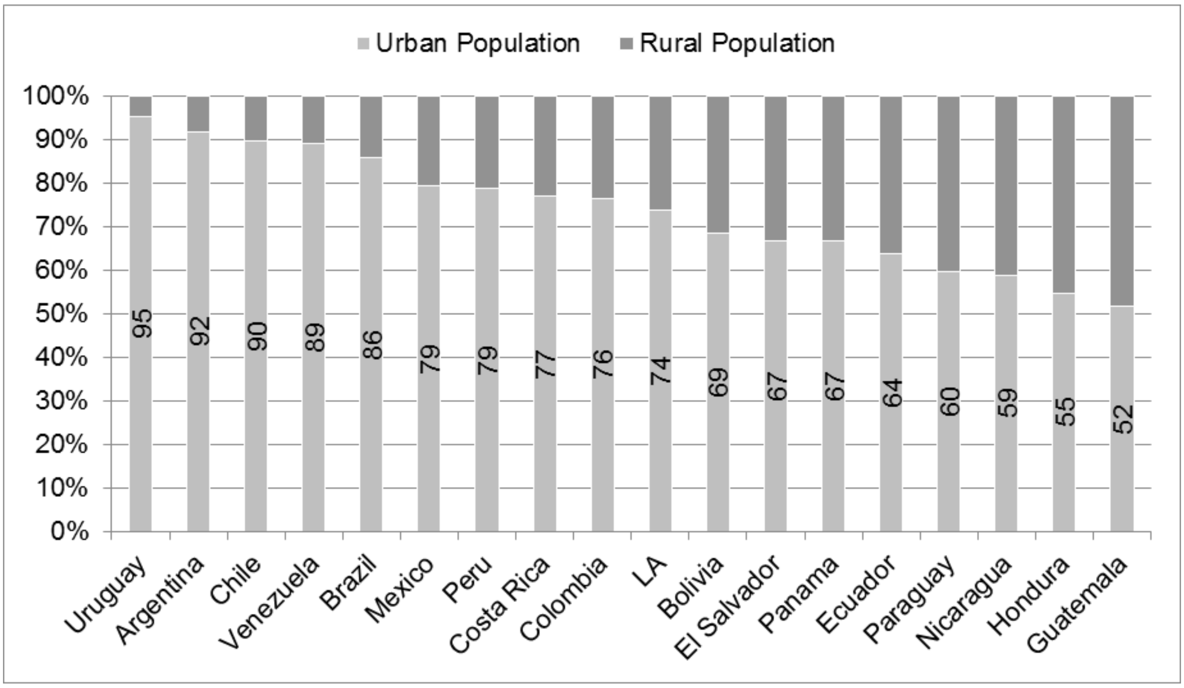
It is worth mentioning, that the improvement in the economic performance in LA region in recent years has contributed to a recomposition of the population by place of residence, evidenced by the strong urbanization process in the region. 74% of the Latin American population on average, live in cities, being Uruguay, Argentina, Chile, and Venezuela the most urbanized countries. In contrast, the Central American countries (Guatemala, Honduras, and Nicaragua) show lower levels of urbanization. Among the four PA members, Colombia shows the highest percentage of people living in rural areas, followed by Peru and Mexico. In Chile, only 10% of the population still live in rural areas (see figure 2.2)

Figure 2.1 Agricultural value added (% GDP) share in LA (2015)



Source: World Bank – Databank, 2017. Figure by the author.

Figure 2.2. Rural and urban population in Latin America (%) (2015)



Source: World Bank – Databank, 2016. Figure by the author.

Latin America is expected to play a leading role in global food supply thanks to its extension of arable land. Within the global availability of land (13.2 billion hectares), 12% are cultivated, 28% are forests and 35% are pasture and forest ecosystems. Most of the 159 million hectares of land incorporated into agriculture over the past 50 years have been low-irrigated. LA has 30% of surface water available in the world, which represents a comparative advantage over other geographies (FAO, 2010). It is also one of the regions in the world with available agricultural land, but its full utilization would require investments in infrastructure and technological development in order to enable its sustainable use. This endowment of natural resources represents an important productive capital that, in a context of high food prices and expectations of a rapid increase in world food demand, become an extraordinary opportunity for the economic development of Latin America.

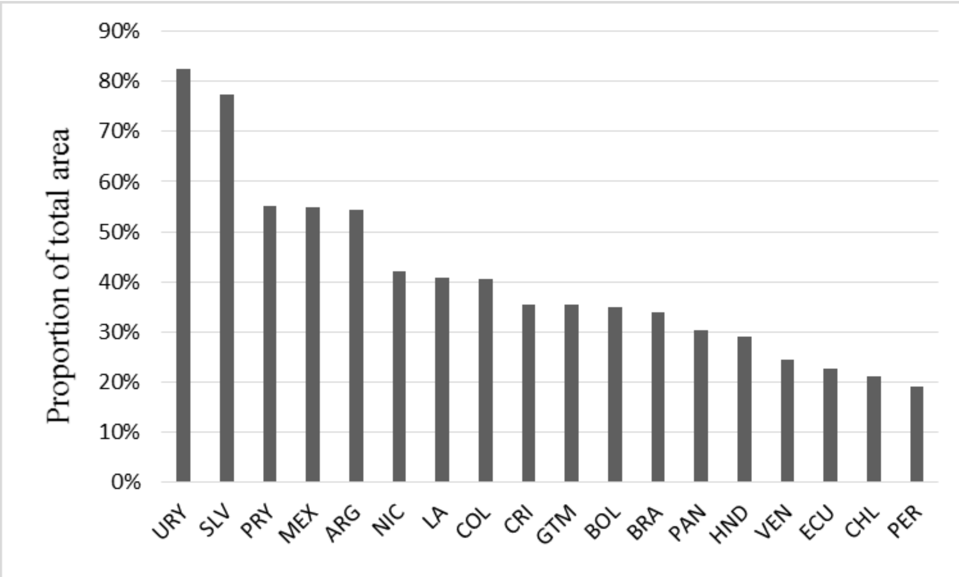
As shown in figure 2.3, agricultural land is still very important in the Latin American region as a proportion of total land area. LA on average has 40% of agricultural land. Countries such as Uruguay, El Salvador and Paraguay own the largest proportions. In Mexico, for example, the agricultural land is more than 50% of the total land area, in Colombia 40%. Peru and Chile show lower proportions.

2.3.2 Characteristics of LA's food exports to East Asia: main markets and products

Latin American countries have had different agricultural export strategies. Some countries have focused on the cereals and beef exports (Argentina and Uruguay), others on the exports of fruits and fish (Chile and Peru), others on vegetables (Mexico, Guatemala, and Costa Rica) and others on the exports of more value added agricultural products (Chile and Costa Rica). Those products have a high-income elasticity and good market in the developed countries. However, the new economic context demands a big effort from all countries to achieve more diversification and value added that will generate more employment and productivity to be sustainable in a long term (Derpsch and Friedrich, 2010).

Most of the countries in LA have had a strong export traditional orientation to U.S. and European markets thanks to their geographical location, historical ties and influence into the region. However, in 2015, the EA region became the main recipient of Latin American food exports. As is shown in Table 2.1 below, in 2003 European Union (EU) was the main recipient of LA food exports, accounting for 29% of total region´s agricultural exports, followed by the United States 27%. East Asia countries only accounted for 14%. However, in 2015, LA food exports participation in the US and EU decreased and East Asia region increased, representing 24% of total LA agricultural exports.

Figure 2.3 Agricultural land as proportion of total land area in LA (2015)



Source: World Bank – Databank, 2017. Figure by the author.

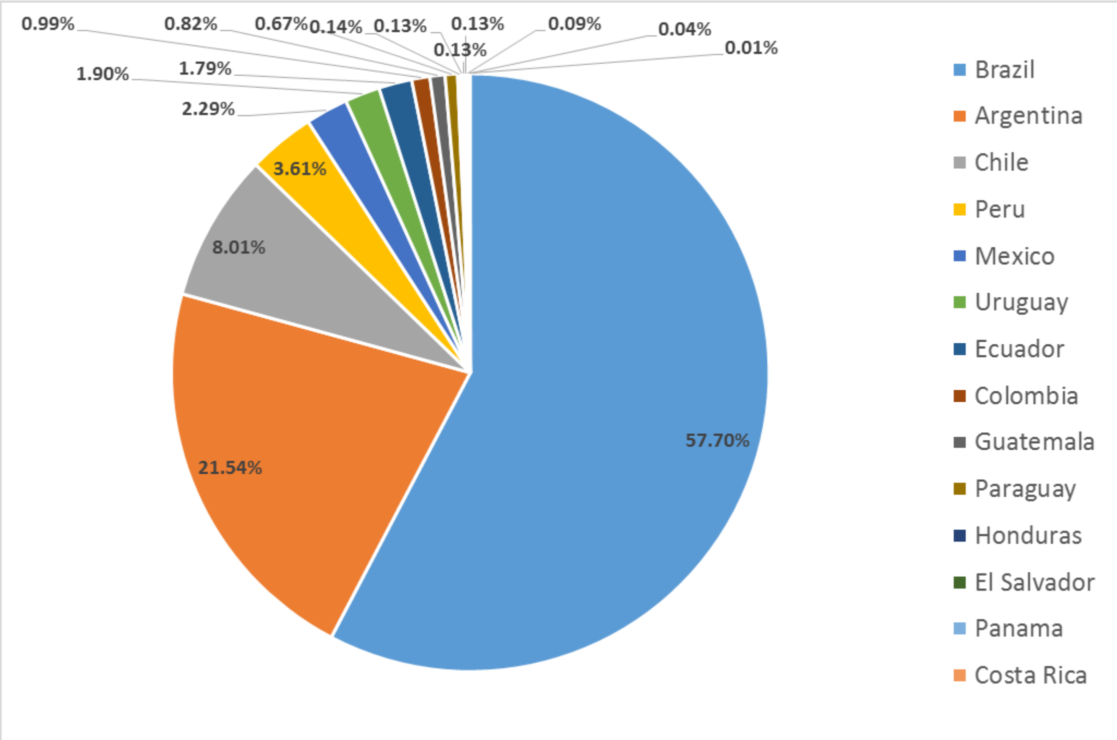
Table 2.1 LA agricultural exports destinations by region and share 2003 and 2015 (thousands of dollars)

Destination	**Exports**		**Share of total exports**	
	2003	**2015**	**2003**	**2015**
East Asia (13)	9,222,557	47,795,525	14%	24%
USA and Canada	17,822,519	44,900,839	27%	23%
LA (17)	9,106,451	27,713,325	14%	14%
EU (27)	19,324,666	36,958,384	29%	19%
Others	11,549,002	41,699,970	17%	21%
Total	67,025,195	199,068,043	**100%**	**100%**

Source: ITC-Trademap, 2017. Figure by the author.

By far, only two Latin American countries provided more than 75% food products to EA (Brazil and Argentina). In the last five years, between 2011 and 2015, Brazil accounted for 57.7% of total LA agricultural exports to EA, followed by Argentina 21.54%. The Pacific Alliance members were also important food suppliers to EA region accounting for 15%: Chile represented 8%, Peru 3.6%, Mexico 2.9% and Colombia 1% (see figure 2.4).

Figure 2.4 Main suppliers in LA to EA: Share of total exports to East Asia (2011-2015)



Source: ITC-Trademap, 2017. Figure by the author.

LA agricultural exports recipients are concentrated in few countries in EA: China, Japan and Korea. However, countries such as Vietnam, Indonesia and Malaysia have also become important recipients. Brazil agricultural exports to EA accounted for US$ 26,566 million (2011-2015) concentrated in China 65.5%, Japan 10.8%, and Korea 6.3%. Argentina's agricultural exports to EA were US$ 9,918 million, China represented 44.9%, Indonesia 12.7%, and Vietnam 11.5%. Among the PA members, Chile's agricultural exports to EA were US$ 3,668 million and the main recipient was Japan 47.1%, followed by China 31.2% and Korea 12.8%. Mexico, agricultural exports to EA represented US$ 1,056 million, its main agricultural export destination in EA was Japan, accounting for 73%, followed also by China 9.3% and Korea 6.5%. In the case of Peru (US$ 1,663 million), its main destination was China 68.7%, followed by Japan 12.9% and Korea 8.1%. Finally, for Colombia (US$ 454 million), the main destinations in EA were Japan 73.9%, Korea 17.8%, and China only accounted for 3.1%. It is important to mention other important food suppliers: Uruguay whose exports went mainly to China 91% and Ecuador exporting to Vietnam 46.31%, China 26% and Japan 17% (see table 2.2 and table A2.1).

Table 2.2 LA´s agricultural exports to East Asia by country (thousands of dollars 2011-2015 average).

	Total EA	China	Brunei	Cambodia	Indonesia	Japan	Korea	Laos	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Argentina	9,918,036	4,447,811	4,145	1,200	1,260,483	563,773	631,582	31	920,949	4,368	412,872	36,914	493,592	1,140,318
%		44.85%	0.04%	0.01%	12.71%	5.68%	6.37%	0.00%	9.29%	0.04%	4.16%	0.37%	4.98%	11.50%
Bolivia	16,715	658	-	-	22	9,955	1,206	-	2,195	-	-	114	86	2,479
%		3.94%	0.00%	0.00%	0.13%	59.56%	7.21%	0.00%	13.13%	0.00%	0.00%	0.68%	0.51%	14.83%
Brazil	26,565,536	17,402,125	677	3,720	1,115,436	2,859,301	1,667,057	155	811,371	23,414	149,473	375,859	1,222,745	934,203
%		65.51%	0.00%	0.01%	4.20%	10.76%	6.28%	0.00%	3.05%	0.09%	0.56%	1.41%	4.60%	3.52%
Chile	3,688,389	1,156,268	43	1,088	27,749	1,738,726	470,696	312	30,976	139	21,683	45,217	104,616	90,877
%		31.35%	0.00%	0.03%	0.75%	47.14%	12.76%	0.01%	0.84%	0.00%	0.59%	1.23%	2.84%	2.46%
Colombia	454,138	14,394	-	125	968	335,785	80,707	-	16,182	5	422	2,907	669	1,974
%		3.17%	0.00%	0.03%	0.21%	73.94%	17.77%	0.00%	3.56%	0.00%	0.09%	0.64%	0.15%	0.43%
Costa Rica	59,495	19,536	-	127	3,944	19,311	10,854	-	366	269	417	300	2,375	1,994
%		32.84%	0.00%	0.21%	6.63%	32.46%	18.24%	0.00%	0.62%	0.45%	0.70%	0.50%	3.99%	3.35%
Ecuador	824,253	211,485	-	10	14,870	138,640	36,648	-	-	33,107	1,068	2,316	4,385	381,726
%		25.66%	0.00%	0.00%	1.80%	16.82%	4.45%	0.00%	0.00%	4.02%	0.13%	0.28%	0.53%	46.31%
El Salvador	61,007	7,463	-	-	8,672	29,337	12,081	-	3,252	-	2	138	23	41
%		12.23%	0.00%	0.00%	14.21%	48.09%	19.80%	0.00%	5.33%	0.00%	0.00%	0.23%	0.04%	0.07%
Guatemala	375,276	69,063	-	-	4,972	171,751	102,594	4	16,310	307	808	6,482	132	2,854
%		18.40%	0.00%	0.00%	1.32%	45.77%	27.34%	0.00%	4.35%	0.08%	0.22%	1.73%	0.04%	0.76%
Honduras	65,236	2,822	-	-	278	30,022	29,151	-	15	-	356	220	524	1,847
%		4.33%	0.00%	0.00%	0.43%	46.02%	44.69%	0.00%	0.02%	0.00%	0.55%	0.34%	0.80%	2.83%
Mexico	1,056,273	97,873	-	38	9,267	772,073	68,636	-	10,101	-	11,674	19,741	13,860	53,010
%		9.27%	0.00%	0.00%	0.88%	73.09%	6.50%	0.00%	0.96%	0.00%	1.11%	1.87%	1.31%	5.02%
Nicaragua	43,047	4,408	-	8	144	21,829	9,730	-	57	-	157	773	1,482	4,458
%		10.24%	0.00%	0.02%	0.33%	50.71%	22.60%	0.00%	0.13%	0.00%	0.36%	1.80%	3.44%	10.36%
Panama	59,524	11,183	3	91	644	8,263	19,960	-	1,843	-	11	1,158	1,433	14,934
%		18.79%	0.01%	0.15%	1.08%	13.88%	33.53%	0.00%	3.10%	0.00%	0.02%	1.95%	2.41%	25.09%
Paraguay	308,872	2,959	-	-	-	41,887	69,695	55,795	50,626	2,156	2,385	842	30,098	52,429
%		0.96%	0.00%	0.00%	0.00%	13.56%	22.56%	18.06%	16.39%	0.70%	0.77%	0.27%	9.74%	16.97%
Peru	1,663,107	1,141,282	-	119	33,211	214,267	136,005	-	6,579	16	3,350	6,185	56,366	65,726
%		68.62%	0.00%	0.01%	2.00%	12.88%	8.18%	0.00%	0.40%	0.00%	0.20%	0.37%	3.39%	3.95%
Uruguay	873,865	793,230	319	2	7,634	5,923	7,798	-	5,912	672	10,977	13,298	4,433	23,666
%		90.77%	0.04%	0.00%	0.87%	0.68%	0.89%	0.00%	0.68%	0.08%	1.26%	1.52%	0.51%	2.71%
Venezuela	3,044	8	-	-	-	3,029	2	-	-	-	-	-	-	5
%		0.25%	0.00%	0.00%	0.00%	99.51%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.18%

Source: ITC-Trademap, 2017. Figure by the author.

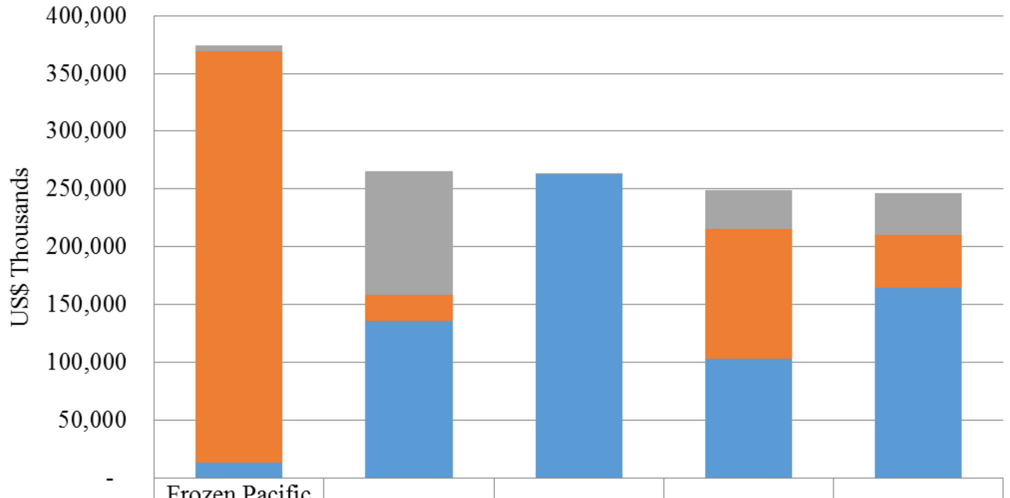
The basic way to measure export diversification is a Concentration Index, such as the Herfindahl-Hirschman index. It intends to determine to which different countries depend on a small range of products for their export earnings. The LA agricultural exports to EA are not only concentrated in terms of products but also in terms of countries. The export concentration index in Table A2.1 in the Appendix, shows that the 17 LA countries concentrate their agricultural exports on five countries in EA, exporting more than 90% of their total agricultural exports to the region. In terms of products, only five products represent more than 80% for most of the countries, and sometimes one single product represents more than 30% of their total agricultural exports to the region. Brazil, for example, concentrated 81.8% on five products where only the soy beans (HS 120190) represented 54.3% and 10% other type of soy beans (HS 120100). The same products accounted for Argentina 30.35% and 10.1% respectively. For Uruguay, the soy beans (HS 120190) is also representative among its total agricultural export accounting for 45.6%. For Paraguay, the soy beans (HS 120190) accounted for 25.6%. For Bolivia, the main agricultural product is the sesame seeds (HS120740) 39.50% and also export soy beans (HS 120190). So those five countries compete for the soy market in EA, being Uruguay, Paraguay and Bolivia small suppliers compared to Brazil and Argentina. Ecuador agricultural exports to EA were also concentrated, and the main exported product was frozen shrimps and prawns (HS 030617) accounting for 46.3%, followed by fish flour and bananas. Among the Central American countries, major exports to EA were coffee and raw sugar cane. Among the PA members, Colombia showed the highest export concentration index in terms of countries and products, by contrast, Chile has the lowest index in terms of products. This means that Chile is one of the countries with more export diversification in term of agricultural products to EA (see table A2.1).

2.3.3 The Pacific Alliance food export basket to East Asia

2.3.3.1 The Pacific Alliance main agricultural exports to EA (2011-2015)

This section narrows down the analysis and describes in detail the leading recent agricultural exports from Chile, Mexico, Peru and Colombia to the main EA countries: Japan, China, and Korea in 2011-2015 average. As a major agricultural exporter in the PA, Chile has used its proximity with the Pacific Ocean to export food products to the region. Frozen pacific salmon is the major product followed by fresh grapes, fresh cherries, wine and fish flour. Among those five products, the frozen pacific salmon goes mainly to the Japanese market, US$ 355 million. Fresh cherries are principally exported to the Chinese market, US$ 263 million. The main markets for fresh grapes are China and Korea, but Japan also receives less proportion of Chilean fresh cherries compared to the EA countries. Wine is a product of exportation mainly to Japan, China, and Korea, and finally, the fish flour goes principally to China and some to Japan and Korea (see figure 2.5)

Figure 2.5 Main agricultural export products from Chile to East Asia (thousands of dollars 2011-2015 average)



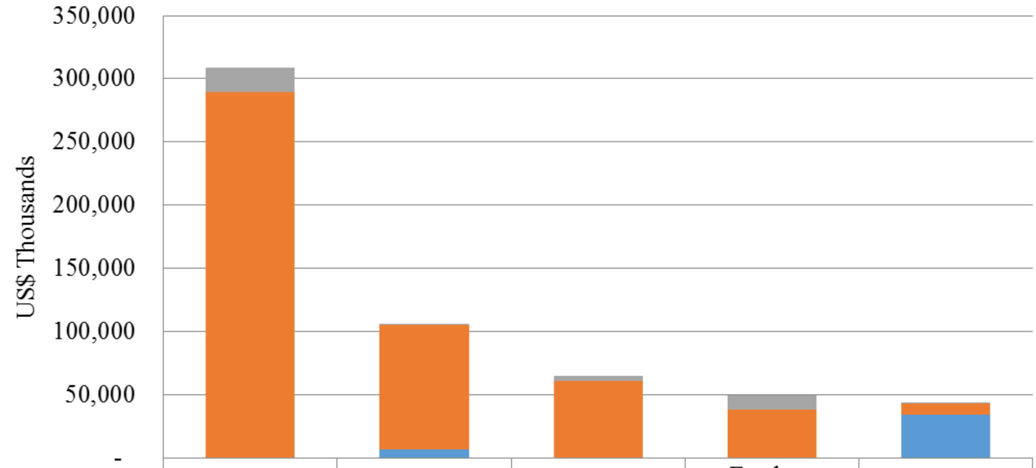
	Frozen Pacific salmon (030312)	Fresh grapes (080610)	Fresh cherries (080929)	Wine (220421)	Fish flour (230120)
Korea	5,477	107,550	40	33,239	35,585
Japan	355,412	22,392	129	112,224	46,431
China	13,497	135,563	262,687	103,451	164,127

Source: ITC-Trademap, 2017. Figure by the author.

The main five products exported from Mexico to EA are frozen pork meat, fresh or dried avocados, frozen meat of bovine, fresh or chilled meat of pork and fish flour. As it was already mentioned above, Japan is the main recipient of Mexico's agricultural exports. The frozen and fresh meat of pork exports go mainly to Japanese and Korean markets. The fish flour goes principally to China. The Mexican avocados and beef go to the Japanese market (see figure 2.6).

Peruvian agricultural exports to EA are not well diversified, given that only a single low value-added product (the fish flour) represents 66% of its total exports. Hence, the five most exported products are lead by fish flour, preserved cuttlefish and squid, cuttlefish and squid, fresh grapes and coffee beans. The main market for the fish flour is China followed by Japan. For the preserved cuttlefish and squid is also China followed by Korea. For fresh grapes China and Korea. For cuttlefish and squid - China and Japan. And finally, the Peruvian coffee goes mainly to Korea and Japan (see figure 2.7).

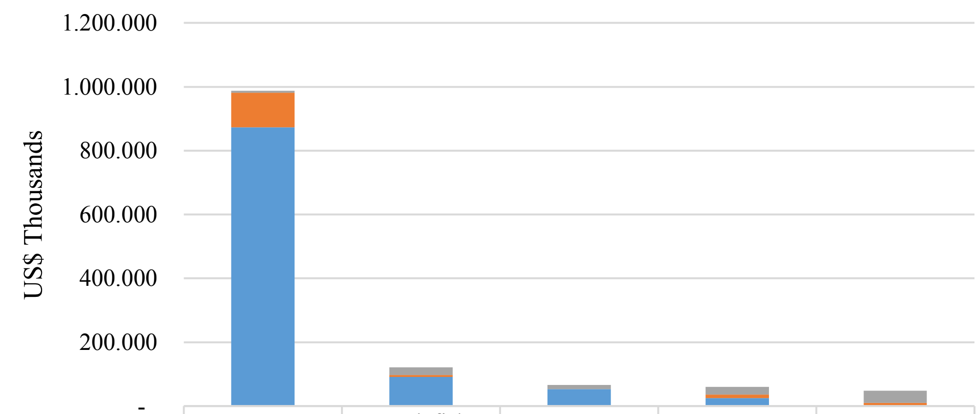
Figure 2.6 Main export products from Mexico to East Asia (thousands of dollars 2011-2015 average)



	Frozen meat of pork (020329)	Fresh or dried avocados (080440)	Frozen meat of bovine (020230)	Fresh or chilled meat of pork (020319)	Fish flour (230120)
Korea	18,986	108	3,631	10,560	166
Japan	289,697	98,267	61,006	38,778	8,754
China	78	6,891	112	-	34,703

Source: ITC-Trademap, 2017. Figure by the author.

Figure 2.7 Main export products from Peru to East Asia (thousands of dollars 2011-2015 average)

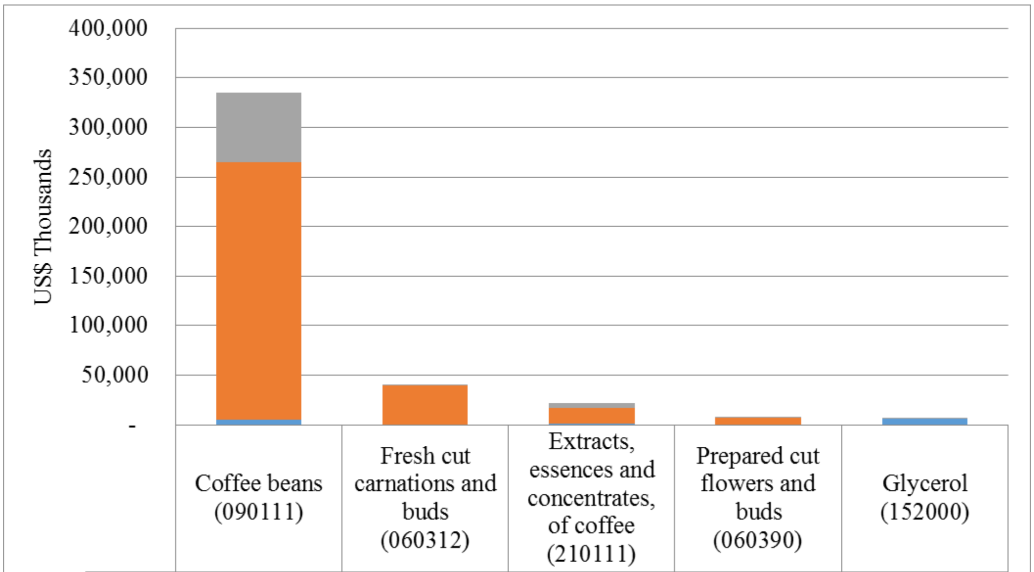


	Fish flour (230120)	Cuttlefish and squid, prepared or preserved (160554)	Fresh grapes (080610)	Cuttlefish and squid (030749)	Coffee beans (090111)
Korea	6.289	23.705	12.395	24.007	38.479
Japan	108.240	5.918	-	11.044	9.655
China	872.722	91.501	53.268	24.720	3

Source: ITC-Trademap, 2017. Figure by the author.

The case of Colombian agricultural exports to EA also reflects a high concentration in a single product: Coffee, this is by large the most exported product to the region, representing 77% of coffee beans, plus 6% of extract essences and coffee concentrates, meaning that Colombian total coffee exports to China account for 83% (followed by flowers 8.9% and 1.56% and glycerol 1.3%). Colombian coffee is exported mainly to Japan but Korea also represents an important market, China is still a small market for Colombian coffee beans. The flowers are sold mainly to Japan, the coffee extracts and concentrates are exported to Japan and Korea. Finally, the main market for the glycerol is China (see figure 2.8).

Figure 2.8 Main export products from Colombia to East Asia (thousands of dollars 2011-2015 average)



	Coffee beans (090111)	Fresh cut carnations and buds (060312)	Extracts, essences and concentrates, of coffee (210111)	Prepared cut flowers and buds (060390)	Glycerol (152000)
Korea	69,891	77	4,643	8	1
Japan	260,339	39,734	16,119	6,944	-
China	4,707	3	1,052	58	5,718

Source: ITC-Trademap, 2017. Figure by the author.

2.3.3.2 The Pacific Alliance food export basket to East Asia: Exports Similarity Index

Three of the PA members are based in South America and only Mexico is located in North America. The Mexican agricultural exports are mainly focused on the U.S. market because the geographic proximity to this country and also due to the strong commercial and historical ties. The other three Latin American countries share the South American position, however, the Southern geographical location of Chile and Peru, make their weather conditions highly different from Colombia, which is located in the Northern part of South America. Colombia has no seasons and its tropical weather makes its land suitable for certain products. In the new integration process of the PA, the four countries should create strategies for competing in international markets, but because of their position and climate conditions, they can still produce and export similar products. In this sense, there is a need to study their agricultural export basket to the main EA markets (Japan, China, and Korea) in order to identify whether there are any similarities between the four countries agricultural export structure.

According to Durán and Alvarez (2011) the Export Similarity Index is calculated as:

$$ES = \sum_{k=1}^{n} Min\left[\frac{X_i^k}{X_i}, \frac{X_j^k}{X_j}\right]$$

Where:

X_i^k = agricultural exports from product k to country i.
X_i = total agricultural export from country i.
X_j^k = agricultural exports from product k to country j.
X_j = total agricultural exports from country j.

For the agricultural exports, the Harmonized System (HS) chapters from 01 to 24 were included. The results fluctuate between zero and one; where if the export structure is totally different, the index will be equal to zero and one otherwise (Durán and Alvarez, 2011).

Table 2.3 below reflects the Export Similarity Index results in 2011-2015 average. The results infer that despite the fact that the four countries are agricultural producers and exporters, their agricultural export structure to Japan, China and Korea is different. The closest agricultural export baskets are those from Chile and Mexico (0.5213) and Peru-Chile (0.2485). Practically, Colombia does not have any similarity with any of the Pacific Alliance members and among the four countries, the Colombian export basket is the most different one.

Chile and Mexico exports baskets are similar in products such as pork, beef, fish flour and some vegetables and fruits. In the case of Peru and Chile exports baskets are alike in products such as fish, some specific fruits as grapes and also fish flour (see Table 2.3).

Table 2.3 Export Similarity Index of the Pacific Alliance agricultural exports to EA (2011-2015 average)

	Chile	Mexico	Peru	Colombia
Chile	-	0.5213	0.2485	0.0344
Mexico	0.5213	-	0.2265	0.0752
Peru	0.2485	0.2265	-	0.0617
Colombia	0.0344	0.0752	0.0617	-

Source: ITC-Trademap, 2017. Table by the author.

2.3.4 The Pacific Alliance Comparative Advantage in major agricultural markets in EA (Japan, China, and Korea)

According to the World Bank (2007), agriculture's comparative advantage originates from three reasons: first, from factor endowments of each country. Second, from the agricultural productivity, and third, from the economy of scale developed in the sector.

In order to analyze the PA agricultural competitiveness in major agricultural markets in EA, two indexes of comparative advantage will be measured in this section. The revealed comparative advantage index and the Balassa index, both are considered by Duran and Alvarez (2011) as indicators of commercial dynamism.

- The Balassa Index (standardized)

This index was developed by Bela Balassa in 1965. It measures the importance level of one product exports in one country exports to another region or economy vis-á-vis the importance of the same product in the country's exports to the world (Laursen, 1998); (Duran and Alvarez, 2011) is calculated as follows:

$$IB_{ij}^{k} = \frac{X_{ij}^{k} / XT_{ij}}{X_{iw}^{k} / XT_{iw}}$$

Where:

X = Agricultural Exports
XT = Total Agricultural Exports
k = Agricultural product
i = Origin country
j = Country or region of destination

- The Revealed Comparative Advantage Index (standardized)

This is a variation of Balassa Index which measures the importance of a product in one country's exports, against the importance of the same product, in the country or region destination imports from the world.

According to Durán and Alvarez (2011), the index calculation is:

$$IVCR = \frac{X_{ij}^{k} / XT_{ij}}{MT_{jw}^{k} / MT_{jw}}$$

Where:

X = Agricultural Exports
XT = Total Agricultural Exports
MT= Total Agricultural Imports
k= the agricultural product
i = Origin country
j = Country or region of destination
w = the world

In order to achieve a better analysis of the index, they are standardized to a maximum of 1 and a minimum of -1. Where 1 means there is a high revealed comparative advantage of product k, and -1 means a comparative disadvantage. The standardized index is as follows:

$$IB_e = \frac{IB - 1}{IB + 1}$$
$$IVCR_e = \frac{IVCR - 1}{IVCR + 1}$$

The results are interpreted according to the following numbers:

$1 > BI_e$ o $RCAI_e > 0.33$	Comparative advantage
$0.33 > BI_e$ o $RCAI_e > -0.33$	It is not possible to determine
$-0.33 > BI_e$ o $RCAI_e > -1$	Comparative disadvantage

It is important to bear in mind that the index is based on the amount of agricultural commercial flows -reported by the origin country- it means, the index reflects the comparative advantage based on the same flows. However, probably it does not capture the potential comparative advantage of one product that is only commercialized at a domestic level and not at an international level (Reina, 2008). The standardized revealed comparative advantage index is calculated by different sectors (or chapters) considered in this research. The 24 chapters from the HS comprised in four agricultural subsectors (HS 01-05), (HS 06-14), (HS 15) and (HS 16-24). Additionally, the Balassa Index (standardize) is calculated by the four members of the PA for each HS6-digit level products that are part of the 24 agricultural chapters. For the Balassa Index table, the five products with higher Balassa index in each PA members, mean those with high advantage between the products analyzed[9] (see Table 2.4 and 2.5).

2.3.4.1 The Revealed Comparative Advantage Index (standardized)

Table 2.4 shows the agricultural chapters where the PA countries have Revealed Comparative Advantage (RCA) in the three main food markets in East Asia (China, Japan, and Korea). It should be mentioned that in the case of Chile the chapters that clearly have a comparative advantage are: fruits (HS08), fish (HS03), beverage (HS22) and lac, gums, and vegetable extracts (HS13). Other chapters where it is not possible to determine if there is a comparative advantage are: residues and waste from the food industry (HS23), (where the main product is the fish flour), and meat (HS02).

In Mexico, the chapters with remarkable comparative advantage are: meat (HS02), lac, gums, vegetable extracts (HS13), and fruits (HS08). Mexico also has other chapters with signs of comparative advantage such as: product of animal origin (HS05), preparation of vegetables and fruits (HS20), beverages (HS22) and residues and waste from the food industry (HS23).

In the case of Peru, the main comparative advantage is in the chapter of fish flour (HS23), followed by the vegetables plaiting materials (HS14), the preparations of fish meat (HS16) and coffee (HS09). It is also interesting to remark that Peruvian fruits (HS08) do not have a clear comparative advantage in the East Asian markets.

Finally, Colombia shows comparative advantage in chapters like coffee (HS09) and flowers (HS06) being the first coffee and flower supplier to Japan, Korea and China from the PA countries, and it also has an advantage in the miscellaneous edible preparations.

[9] In the cases where the Balassa index are the same, those with higher average exports (2011-215) to EA were considered.

Table 2.4 The Revealed Comparative Advantage Index between the PA members and Japan, China and Korea by agricultural chapter (standardized, 2011-2015 average)

Chapter	Product label	Chile	Mexico	Peru	Colombia
01	Live animals	-0.2739	-0.9140	-0.9793	-0.9987
'02	Meat and edible meat offal	0.0909	0.6903	-0.9995	-0.9964
'03	Fish and crustaceans, molluscs and other aquatic invertebrates	0.5639	-0.0198	-0.2631	-0.9150
'04	Dairy products	-0.6824	-0.8307	-0.9976	-0.9992
'05	Products of animal origin, not elsewhere specified or included	-0.7009	0.2723	-0.7299	-0.5662
'06	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	-0.3170	-0.8335	-0.9368	0.9322
'07	Edible vegetables and certain roots and tubers	-0.7948	-0.2674	-0.3997	-0.9846
'08	Edible fruit and nuts; peel of citrus fruit or melons	0.6636	0.5314	0.1381	-0.8139
'09	Coffee, tea, maté and spices	-0.9240	-0.1161	0.3438	0.9602
'10	Cereals	-0.9883	-0.9994	-0.9410	-1.0000
'11	Products of the milling industry; malt; starches; inulin; wheat gluten	-0.8192	-0.9302	-0.6169	-0.9955
'12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit	-0.7627	-0.9364	-0.8590	-1.0000
'13	Lac; gums, resins and other vegetable saps and extracts	0.3643	0.6190	-0.4788	-0.9882
'14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	-0.0716	-0.0617	0.6127	-0.1788
'15	Animal or vegetable fats and oils and their cleavage products	-0.7836	-0.6883	-0.4139	-0.6448
'16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	-0.5090	-0.8303	0.4930	-1.0000
'17	Sugars and sugar confectionery	-0.8615	-0.7060	-0.9995	-0.4362
'18	Cocoa and cocoa preparations	-0.9984	-0.6011	-0.8875	-0.4808
'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	-0.9828	-0.9937	-0.9609	-0.9955
'20	Preparations of vegetables, fruit, nuts or other parts of plants	-0.0689	0.2391	-0.9140	-0.8301
'21	Miscellaneous edible preparations	-0.9918	-0.0061	-0.9470	0.4145
'22	Beverages, spirits and vinegar	0.4497	0.1549	-0.9494	-0.9927
'23	Residues and waste from the food industries; prepared animal fodder	0.2624	0.0342	0.8743	-0.9995
'24	Tobacco and manufactured tobacco substitutes	-0.9977	-0.9880	-1.0000	-0.9967

Source: ITC-Trademap, 2017. Table by the author.

Among the four PA countries, Colombia shows the highest comparative advantage in two traditional exports chapters. Chile shows more diversification and Peru only shows a comparative advantage in low value-added products. It is also interesting to see that Chile, Mexico and Peru compete in the fruit market and in the residues and waste from the food industry (HS23) (fish flour). Colombia and Peru are also competitors in the coffee market.

> Precisely, related to the previous analysis the WB mentioned that a key problem for developing countries has been their export reliance on a small number of agricultural commodities. This export concentration leaves them vulnerable to external shocks and the downward trend in commodity prices. Preferences could provide incentives for investment in sectors in which countries have a comparative advantage but that are not being exploited because of difficulties in accessing export markets (World Bank, 2007, p.68).

2.3.4.2 The Balassa Index (standardized)

The Balassa Index shows the main five products in the PA countries where their average exports are remarkable in the three EA countries, not precisely because of their amount of exports, but due to the fact that they are exported almost completely only to the three East Asian markets, or to one or two of them, reflecting opportunities in those dynamic countries, either to increase their export or to start new exports of similar products.

In the case of Chile, the products with clear Balassa Index are frozen eels, frozen sandiness, foliage or part of plants, melons, and pig fat (oil). In the case of Mexico, frozen bovine, frozen cod, fresh or chilled pacific salmon and some pig oils. For Peru, live fresh or chilled mollusks, urchins, aquatic invertebrates, seaweeds and caviar substitutes. Finally for Colombia, the products with Balassa index are frozen tunas, some edible products, dried mushrooms and dried beans (see table 2.5).

According to table 2.5, it is worth mentioning that there are opportunities for export diversification for the PA members in the case of bovine meat, fish, flowers, some fruits and preparations of fish meat.

Table 2.5 The Balassa Index with China, Japan and Korea (standardized, 2011-2015 average)

HS code	Description	Chile	Mexico	Peru	Colombia
'020210	Frozen bovine carcases and half-carcases	-1.0000	0.9247	-	-1.0000
'030326	Frozen eels	0.6511	-	-1.0000	-
'030341	Frozen albacore or longfinned tunas	-1.0000	-	-1.0000	0.8818
'030363	Frozen cod	-	0.9247	-	-
'030371	Frozen sardines	0.6511	0.6344	-	-
'030441	Fresh or chilled fillets of Pacific salmon	-0.9980	0.9247	-1.0000	-
'030791	Live, fresh or chilled molluscs, fit for human consumption	0.5164	0.5440	0.6591	-
'030829	Smoked, frozen, dried, salted or in brine, sea urchins	0.6442	-1.0000	0.6639	-
'030890	Aquatic invertebrates	-	-0.2654	0.6694	-
'041000	Turtles' eggs, birds' nests and other edible products	-1.0000	-1.0000	-1.0000	0.8818
'060499	Foliage, branches and other parts of plants	0.6511	-1.0000	0.5947	0.2387
'071231	Dried mushrooms of the genus	-0.9511	-0.5457	-0.9865	0.8754
'071350	Dried, shelled broad beans	-1.0000	-1.0000	-0.9770	0.8818
'081400	Peel of citrus fruit or melons	0.6511	0.2399	-0.6527	-1.0000
'121229	Seaweeds and other algae	0.5323	0.6464	0.6649	-
'150100	Pig fat	0.6511	0.9247	-1.0000	-
'150120	Pig fat (excluding lard)	-1.0000	0.9247	-	-1.0000
'152000	Glycerol, crude; glycerol waters and glycerol lyes	-1.0000	-1.0000	-1.0000	0.8694
'160432	Caviar substitutes prepared from fish eggs	-1.0000	-	0.6694	-

Source: ITC-Trademap, 2017. Table by the author.

2.3.5 Agricultural Policies in the Pacific Alliance

2.3.5.1 Agriculture in Chile

Chile is a dynamic growing economy in Latin America, experiencing annual GDP growth of around 4% in the last ten years with a GDP of US$ 242,517 million in 2015, where trade represented 60% of the total GDP. This stable growth has helped Chile to obtain a GDP per capita of US$ 13,653 in 2015. The contribution of the agricultural sector to GDP was 4.3% and the employment of the sector was 9.6%. The agricultural sector makes an important contribution to exports, representing 25% of total exports, while agricultural imports only accounted for 9.4 % of total imports. Chile is a net exporter of agro-food products with a trade surplus of US$ 9,747 million in 2015. Among the PA members, Chile is the smallest country with 743,532 km squares and a population of 17.8 million (see table A2.2).

Main agricultural policies in Chile emphasize the development of small-scale agriculture and reinforce agricultural productivity, competitiveness, social inclusion and sustainability with investments targeted to a number of areas, notably irrigation, the recovery of degraded soils, and maintaining Chile’s strong sanitary and phytosanitary conditions, strengthening policy instruments that promote family farming and rural economy development. Programmes enhancing productivity and competitiveness were the most important area of budgetary allocations in 2014 accounting for 27% of total budget expenditures. Due to new challenges created by natural disasters, which have become more frequent over the past few years, some initiatives were adopted in 2015 to better deal with risk and improve water resources management. Training and skill development for agricultural workers and farmers were also strengthened. However, Chilean agricultural policy does not create significant distortions on agricultural markets and the fact that money is spent on public goods does not itself guarantee that policies are effective (OECD, 2016).

Chilean agricultural policy is characterized by its export orientation by the combination of a set of regulations (sanitary, commercials, environmental and labor), different lines of credit, granted by the Agricultural Development Institute (INDAP) and the State Bank of Chile (Banco Estado), with a package of public state subsidies transferred to farmers and agro-industries, which seeks to improve sectoral competitiveness. The Chilean agricultural policy, can be broadly described according to six main thematic axes:

- Risk management and stabilization. This area is aimed at generating a stable framework required by agriculture and considers mainly an agricultural insurance to face climatic adversities. It also includes legal instruments to face unfair competition or the volatility of international prices of agricultural products (safeguards, countervailing duties, anti-dumping duties).
- Market development. This work axis seeks the opening of external markets, the elimination of trade restrictions and the protection of investments abroad.
- Improvement of the productivity of natural resources. This line of work includes three areas applied to the physical resources of farmers: The System of Incentives for the Recovery of Degraded Soils (SIRSD), the Law of Irrigation Promotion and the Law of Forest Plantations Promotion.
- Development of competitiveness: This area contemplates the Research and Development (R&D) programs, essentially the work of the Agricultural Research Institute (INIA), the Foundation for Agrarian Innovation (FIA) and the Production Development Corporation (CORFO), the programs of technological transfer of INDAP, the Groups of Technological Transfer (GTT) and others of training, financing and the associativity promotion.
- Health, environment, safety and quality. This one considers all regulations associated with pest and disease control, food inspection, good agricultural practices, Genetically Modified Organisms (GMOs), pesticides and quality seals, among other technical areas.
- Forest development. It includes forest plantations promotion (i.e, exotic species) and native forest conservation, as well as the development of programs to economically value forests non-wood functions.

These six axes intersect with other transversal policies applied to the rural world, such as infrastructure or anti-poverty programs, executed by other sectoral ministries (ECLAC, 2014)

> The agricultural, forestry and fishing sectors are the main economic activities in several regions of the country. In the last two decades, the importance of these sectors has been increasing because of trade agreements. In this situation, the Government for Agriculture Program defined for the period 2014 to 2018, is organized around two complementary axes: the first axis is the reduction of inequality, prioritizing aids and promotion instruments for farmer family agriculture, and the second axis is related to the promotion of the inclusive growth of the entire sector (ECLAC, 2014, p.104).

2.3.5.2 Agriculture in Mexico

Mexico is a large country in terms of population (126 million) and land area (1.9 km million squares) when compared with other Latin American countries. Since the mid-1990s, the Mexican economy had been characterized by a relatively low inflation and stable exchange rates. Although economy shrunk in 2009, it then has been growing steadily. In 2015, the Mexican GDP was US$ 1,152,263 million and trade represented 72.2% of the total GDP. The GDP per capita was US$ 16,983. The contribution of the agricultural sector to the GDP was 3.6% and the employment of the sector was 13.5% in the same year. The agricultural sector accounted for 7% of total exports, and agricultural imports accounted for 6.2 % of the total imports. Differently from other PA members the trade agricultural surplus is relatively small, US$ 2,037 million in 2015 (see table A2.2). "Half of the territory of Mexico is subject to communal land ownership (ejidos in Spanish) which, despite reforms, constrains the sale of agricultural land" (OECD, 2015a, p.205).

Since 1982, coincidentally with the called debt crisis of the Latin American countries, Mexico begins its integration process. In 1986, Mexico ratified the General Agreement on Tariffs and Trade (GATT) with the purpose of promoting a more open, stable and transparent world trade order and fight against protectionism and discrimination. In 1994, Mexico signed the North American Free Trade Agreement (NAFTA), in 1995 they became a member of the WTO and signed other trade agreements. In this way, the State's agro-industries were settled: the installed capacity for the fertilizers and seeds production and distribution, agricultural extension service, prices regulation, imports control and, practically, the development bank. The storage functions were also privatized, the State capacities and participation were reduced, as well as the prices of goods and services aligned to international standards and other measures, in order to move from an import substitution model orientation to the domestic market and with appearances of the welfare state, to an economy of free competition in the global market (ECLAC, 2014)

Mexico has two large subsidies programs based on historical parameters: the Productive Program to Improve Livestock Productivity (PROGAN) that is based on the historical number of livestock and imposes environmental conditions, and the Productive Program for Agriculture (PROAGRO) that is based on the historical area. The last one marks a new link of production and inputs support and a set of fixed-rate payments for 2014-18 that differs according to the species and size of the farms; the payment rates for small farmers are around 25% higher than those of farmers of the same species. The payment per person is subject to a limitation of 300 animals per beneficiary. In addition, other services are provided through the program to support farmers, which include identifiers, technical services (technical assistance and training) and heritage protection services (OECD, 2015a)

Mexico's Agricultural Development Plan for 2013-18 seeks to boost agricultural production, achieve greater self-sufficiency in principal grains and oilseeds, and reach a positive balance in agro-food trade. The streamlining of rural development and small farmer support programmes continued to improve programmes administration, efficiency and transparency of budgetary spending (OECD, 2017a).

> Policy approaches should be differentiated to respond to the needs of commercial farms and small farmers producing largely for their own consumption. As the overall economy develops, poverty reduction should be pursued through place-based development policies and targeted social assistance, rather than through production-linked subsidies (OECD, 2017a, p.131)

2.3.5.3 Agriculture in Colombia

Colombia is the third largest and the second most populous country in the PA, with a population of 48 million and 1.1 million km squares of land. Colombia has abundant agricultural land and fresh water, it is very biodiverse and rich in natural minerals and fossil fuels. In 2015, the Colombian GDP was US$ 291,519 million and trade represented only 39% of it, comparatively low among the PA members. The GDP capita was US$ 6,045 in the same year. The contribution of the agricultural sector to the GDP was 7% and the employment of the sector was 13.7% in 2015. Colombia is a net exporter of agricultural products, they accounted for 19.2% of total exports, and agricultural imports accounted for 10.6 % of total imports with an agricultural trade surplus of US$ 1,115 million in 2015 (table A2.2).

Colombia only uses 24.1% of the potential agricultural of its territory, equivalent to 5.3 million hectares out of a total of 22.1 million available. This corresponds to 36.2% of the territory covered by traditional systems, where agriculture corresponds to 19.3%, livestock 13.3% and agrosilvopastoral sector 3.55% (Perfetti and Cortés, 2013). Since 1960, Colombia has suffered a process of agrarian reform, without achieving remarkable success and without being able to solve the problems derived from land tenure (ECLAC, 2014).

> Colombia, like many Latin American countries, has decided for an economic model that favors big agricultural businessmen at the expense of small producers, which has welfare policies that do not contribute to an integral and sustained development. This, added to the fact that there has not been a solid-State policy, rather than each government has come up with its own proposals, has fragmented activities, temporary actions that do not approach the underlying problem and subtract the importance of social and human capital (ECLAC, 2014, p.125).

Despite recent mobilizations of the farmer sector, there is no consolidated social movement capable of demanding and charging the Government. A frequent topic that affects Colombian population in this sector is the problem of land tenure. To address this, a series of reforms have been implemented that have not been solved so far, which is more difficult due to factors such as violence and lands dispossession. To solve this a land restitution unit was created in the Ministry of Agriculture and Rural Development (MADR).

Currently, the debate about the rural-agriculture in Colombia is between the coexistence and importance of a rural development model based on small property and production, and a business model of large modern companies, and their relations with the State and public policy. In Colombia, agriculture has historically been marked by the problem of property access by small and medium producers, or by those who do not have this productive product, by the weakness of property rights and the inability of the State to guarantee them. This issue has generated multiple conflicts, between owners, farmers and settlers, and between them and the State, rural and urban society. These conflicts have extended from the colonial era to the present.

> The policy framework "Colombia Siembra" (Colombia Sow in English), created in 2015, led to increase planting of agricultural products covering 434,000 hectares of new land (coming mostly from idle land) in 2016. The main crops planted were rice, maize, palm oil, fruit trees, forestry, cocoa, soybeans, and beans. The policy framework has also promoted the production of pig meat, beef and milk (OECD, 2016, p.81).

The current framework for agricultural policy design has been articulated by the National Development Plan (PND) 2014-18, the Mission for the Transformation of the Countryside initiative, and the peace negotiations between the Colombian government and the Revolutionary Armed Forces of Colombia (FARC), the main guerrilla group of the country.

The peace agreement was finally signed on the 26th of September 2016 by the FARC and the Colombian Government and approved by the Congress on the 30th of November 2016. This situation will have important implications as the first article of the agreement relates to investments for rural and agricultural development. Finally, Colombia faces the twin challenges of high concentration of land ownership and under-exploitation of arable land. Improved land rights should contribute to long-term growth in the agriculture sector and contribute to rural development promotion (OECD, 2017a).

2.3.5.4 Agriculture in Peru

Among the four PA countries, Peru is the smallest economy and it has the highest reliance on agriculture. Employment in the agricultural sector represents 26% of total employment in Peru. In 2015, the Peruvian GDP was US$ 189,212 million and trade accounted for 45% of total GDP, the GDP capita was US$ 6,030. The contribution of the agricultural sector to GDP was 8%. Peru is also a net exporter of agricultural product, it accounted for 22.3% of total exports, and agricultural imports accounted for 11.7 % of total imports with a trade surplus of US$ 2,955 million in 2015 (table A2.2).

The provision of good quality agricultural land is considerably low in Peru (0.17 cultivable hectares per habitant) and is already in exploitations, at least in the Coast and the Sierra, although with low levels of intensity. Peru also has a potential area for crops (7.6 million hectares), of which 1.73 million have irrigation systems. Every year, 2.75 million hectares are planted (FAO-CAF, 2005).

A low profitability level and low competitiveness characterize many agricultural holdings, as a consequence of a set of structural and non-structural factors, internal and external to the sector. In consequence, an unstable productive behavior in the last decades and a low contribution to the reduction of rural poverty may be noticed. Although there is a prosperous agro-export sector. That does not happen in the big self-consumption agriculture and the domestic market. However, agriculture is an important sector for economic growth and the reduction of rural poverty in Peru, where almost a third of the population lives in rural areas and approximately 50% of their income comes from agriculture (ECLAC, 2014).

The wealthiest Peruvian agriculture is export-oriented and is mostly located on the coast. It generates employment and income that can exceed ten times the average income of agricultural workers in the Sierra. As small plots and small holdings do not generate enough income for their conservation, rural families must supplement them through wage labor in other activities, when this is possible (FAO-CAF, 2006).

The Ministry of Agriculture has invested over $177 million in irrigation-related projects, its single largest investment, which has benefited some 315,000 agricultural producers. Peru's agricultural sector grew an average of 3.2 percent per year from 2011-2016. Growth has been propelled by increased cultivation of non-traditional crops such as asparagus, avocados, quinoa, and grapes; these now account for 85 percent of Peru's agro-exports. Average monthly income from agricultural activity nearly doubled from 2006-14, with rural poverty decreasing from 63 to 47.2 percent (GAIN report, 2016).

The National Agrarian Policy consist of twelve policy axes that generate a medium and long-term administrative framework that seeks to favour the sustainable development of agriculture, with priority in farming families and will allow to activate the development and social inclusion for the benefit of the rural population, contributing to food and nutrition security in Peru (MINAGRI, 2018). The twelve pillars of the Peruvian National Agricultural Policy are: sustainable management of soil and water, development of forests and native plants, legal land ownership, investment in infrastructure and technology for irrigation, agricultural finance and insurance, agricultural innovation and technological development, disaster risk management in the agricultural sector, development of skills, transition to improved production methods and diversification, greater market access, food safety, and institutional development (GAIN report, 2016).

2.4. East Asia's imports of agricultural products from Latin America

The East Asian region is conformed by multiple economies with a wide diversity and disparity in terms of size, income, level of industrialization and population. There is a big contrast between the economies with high income such as Japan, Korea and Singapore and those with large poverty levels and inequality as Laos, Myanmar, and Cambodia. Those differences have highly influenced the population's eating habits, especially in economies like China, where due to its economic growth, the middle class has augmented and thus the demand for imported and better-quality products.

Latin American countries and specifically the PA members are very attractive for EA economies, because of the abundance of natural resources, their agricultural production, young population, and their economic stability. This is the reason why there has been an active agricultural exchange between both regions in recent years. However, in despite of the improvement in the economic performance in both regions and the new free trade agreements, the exchange of products has not been diversified and LA still lags behind, exporting commodities to the region, even after 2000 despite the changes in production structure and technological intensity in some products in LA (ADB - IDB, 2012).

Among the products imported by EA from LA, the agricultural products are the most important. In spite of strong import policies and the agricultural support to agriculture in EA, LA food products are growing presence in those dynamic and demanding markets.

2.4.1 The food demand trends in East Asia

Since 2003 and even after the financial crisis in 2009 which affected multiple economic sectors worldwide, among them, the food demand and the agricultural trade in EA, there is a constant increase in the EA agricultural imports from the world and more specifically from LA region.

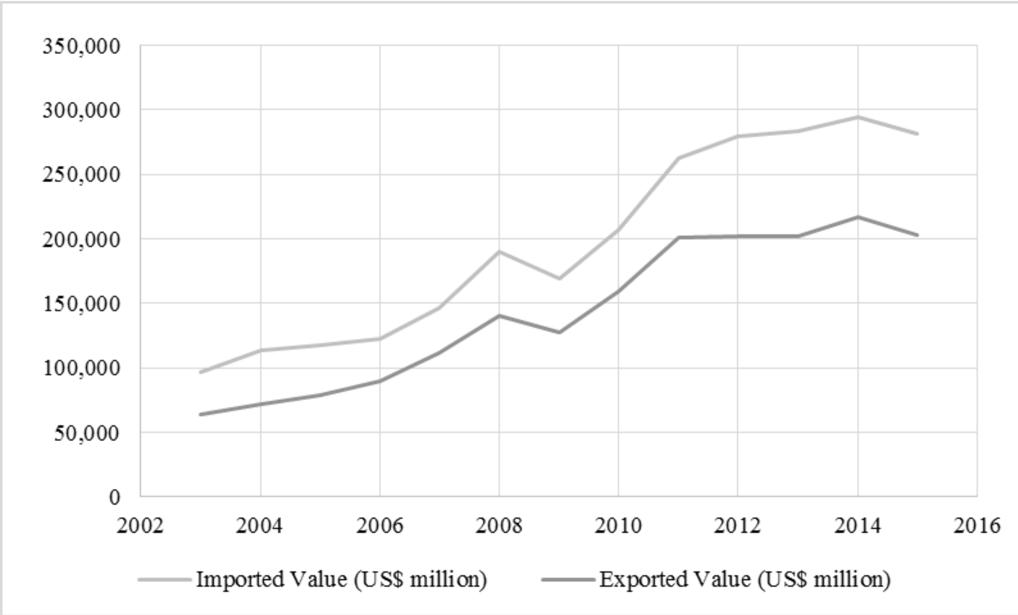
EA region has an increasing food trade deficit in the last years. The region's agricultural exports grew from US$63,518 million in 2003 to US$ 202,849 million in 2015, and agricultural imports also grew from US$ 96,428 in 2003 to US$ 281,115 in 2015. In 2015, the region's agricultural deficit was US$78,266 (ITC-Trademap, 2017), (See figure 2.9).

As mentioned above, the EA economies show a negative agricultural trade balance reflecting a high import dependency on food. Therefore, the food offer in the region is incapable of covering the region's food demand. However, the case of each country among the 13 countries considered in the region varies considerably. Figure 2.10 below, describes the agricultural imports as a proportion of agricultural production and as a proportion of total imports for each country in EA in 2013.

For countries like Singapore, Brunei, Japan, and Korea and in less proportion Malaysia, their agricultural imports are larger than their agricultural production. Figure 2.10 clearly illustrates that in the case of Singapore and Brunei, the agricultural production is insignificant compared to their large agricultural imports. For most of the EA countries, the agricultural imports represent an important share of their total imports.

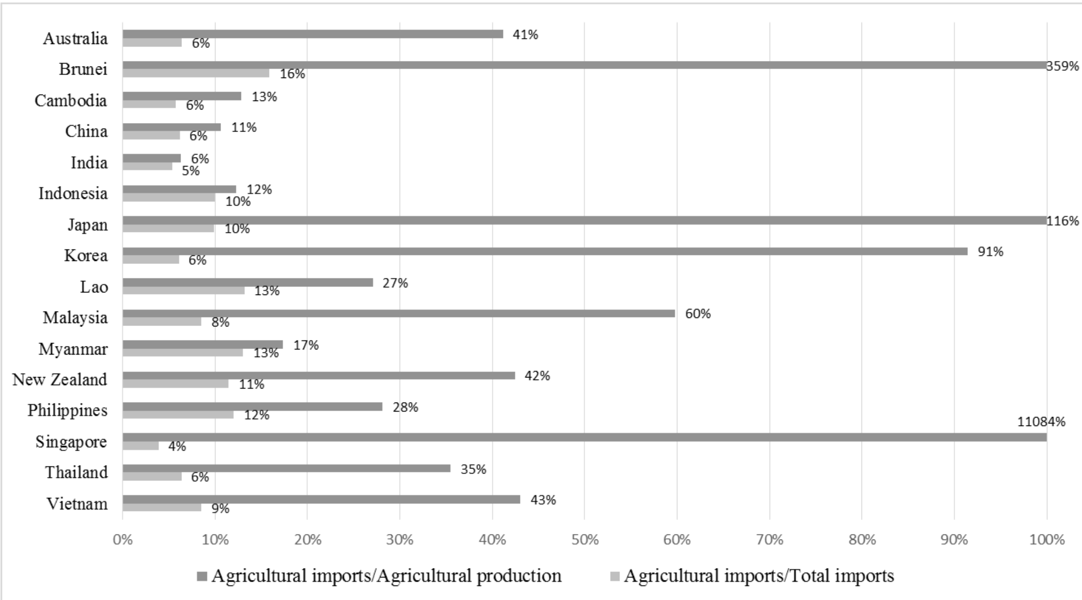
According to figure 2.11, China is by large the main EA agricultural importer from the Latin American region, representing 55.3% of the total imports followed by Japan with 16.2%, and Korea with 7%. Indonesia, Vietnam, Malaysia, and Thailand are also becoming important importers from LA region, representing 5.5%, 5%, 4.6%, and 4.3% respectively.

Figure 2.9 East Asia agricultural exports and import evolution (US$ millions)



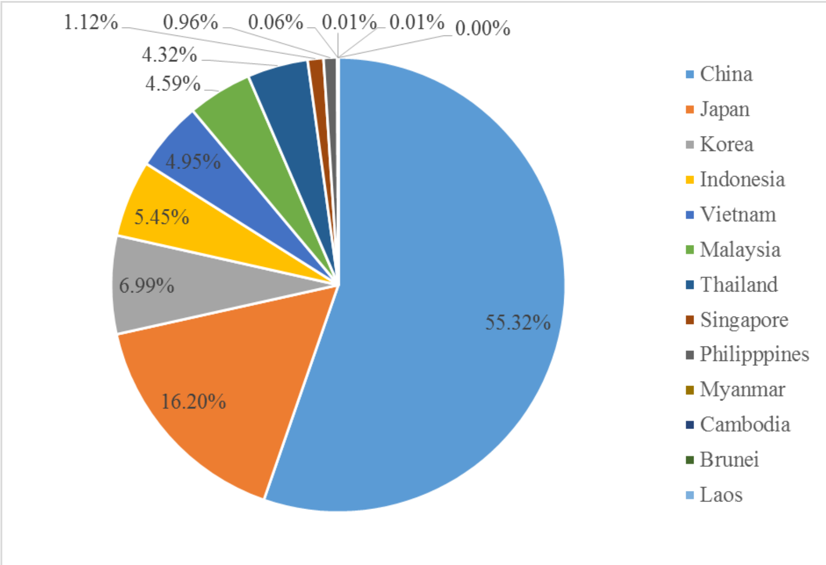
Source: ITC, Trademap, 2017. Figure by the author.

Figure 2.10 Agricultural imports (% of agricultural production and % of total imports, 2013)



Note: The agricultural production data, was only available for the year 2013.
Source: ITC-Trademap, 2017 and FAO, 2017. Figure by the author.

Figure 2.11 Main importers in East Asia from LA: share (2011-2015 average)



Source: ITC-Trademap, 2017. Figure by the author.

Current food demand in EA, particularly in major countries like Japan, Korea, and China, has been reconfigured mainly because of changes brought from the rapid urbanization and new nutritional needs linked to changes in lifestyles. Besides, the increase in the level of international food prices also influences the region's food demand.

- The rapid urbanization in EA

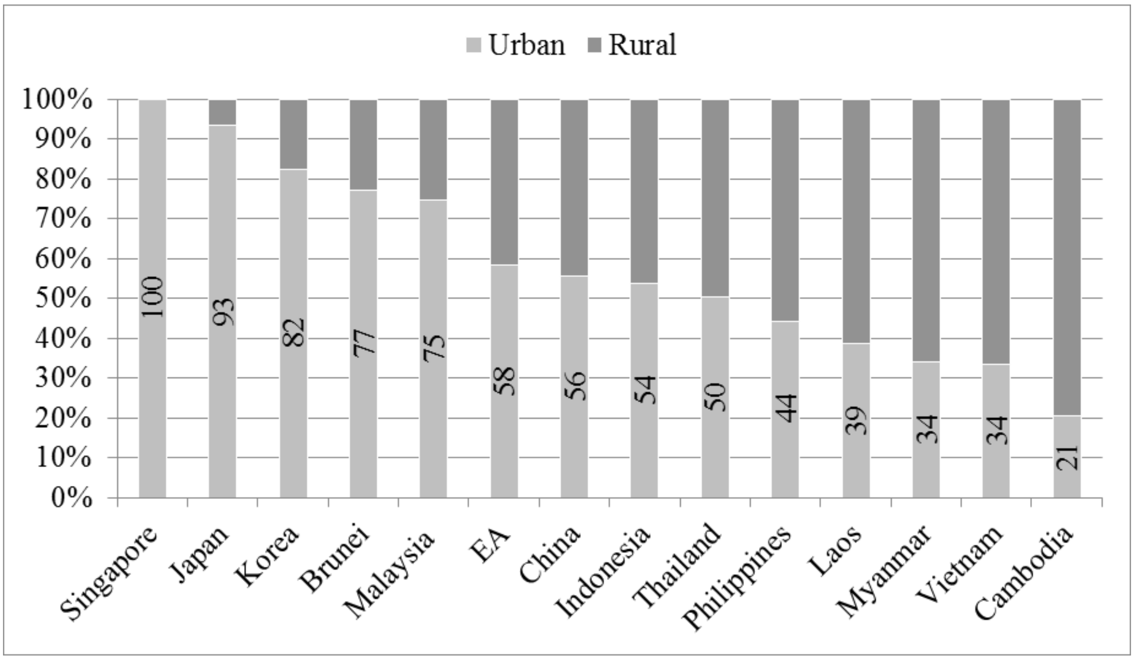
The economic growth in Asia Pacific has been accompanied by a shift from rural labor to urban labor, fueled in part by better relative wages and the promise of increased quality of life offered by cities. This transition is normal in an industrialization process where the capital factor becomes more relevant than the land factor for the GDP growth of nations.

An average percentage of urban population of 58% is recorded in East Asia in 2015. Singapore, Japan, and Korea are the most urbanized countries in the region. It should be noted that they are also the highest per capita income economies, and those with the lowest rural population.

Population growth is exponential, which drives the demand for basic goods, such as food. At this point, the agricultural trade appears as one of the areas of greatest interest to policymakers or political leaders in the region.

It is notorious that capital and knowledge are concentrated in cities, while agricultural activity is relegated to peasant families, who cultivate for self-sustenance, and to a lesser extent to supply nearby populations, or to investors with large area of land interested in the business, for a later commercialization in the urban centers (FAO, 2013) (See figure 2.12).

Figure 2.12 Urban and rural population in East Asia (2015)



Source: World Bank – Databank, 2016. Figure by the author.

Changes from rural areas to the cities are accompanied by variations in diet and nutrition, and they are reflected in a transition from staple food consumption to a greater variety and high added value in meals. As income levels rise, people are willing to pay more for precooked or ready-to-eat meals, which frees up time for their work activities. There is a processed food boom, with short periods of preparation, which are in fact a marked preference of the female labor force (Pingali and Khwaja, 2004).

Urban consumers show a high preference for meat, dairy products, and tropical products such as apples. Other groups of food that have gained adherents are the convenience food and processed beverages - including juices - as well as nutraceutical supplements that accompany daily food intake.

The convenience food is designed for easy consumption. They are preparations that can be cold, hot or at room temperature, long-lasting but always "ready to eat or drink". They are also characterized by being very attractive to the buyer in terms of packaging, presentation, and require a quick or no preparation. This type of food is available in the convenience stores that gain popularity every day due to the great growth and excellent location in the main cities of countries like Japan, Korea and China (Pingali y Khwaja, 2004).

The trends described above respond to the growing insertion of female workers in the labor market; the reduction of time for different activities different to, position the packed foods, and ready to consume within the most demanded in East Asian cities.

An additional context is the new conformation of families, generally with low fertility rates that result in small cores and better incomes that allow them to frequently access meals outside the home and processed foods in general.

- Changes in lifestyle

The most recent model of the agricultural labor division is known as the "global salad bowl" which means the concentration of the world fruits and vegetables supply in third world countries. In this way, the leading countries in East Asia (Korea, Japan, China) focused their strategy on the self-sufficiency of basic commodities in their diet (rice, soy, wheat), importing other products. During the last decade, the main changes in the Asian diet have been mainly a higher consumption of animal protein, and a lower intake of traditional cereals, as well as a growing demand for fruits, vegetables, and seafood. This situation has favored the promotion of poultry activities, pig raising, and dairy products production, as well as stimulating imports of the same items (Popkin, 1999).

Although it is not easy to determine a pattern of food consumption for the entire East Asia region given its full cultural plurality and differences in purchasing power, it is important to highlight some factors derived from lifestyle changes in new food consumption trends. The first brings together what has been called "westernization" of the Asian diet, a concept that embraces a greater consumption of meat, dairy products, wheat and its derivatives, fast foods, canned and ready to consume, all with a high protein and energetic value.

The second pattern groups is highly informed and conscious of health and environment, individuals that follow the convergence between tradition, information and new consumption trends of functional food[10], in particular those based on the concepts of

[10] The "Functional foods", which brings together those who fulfill an additional function in the body, because in addition to nourishing, modulate physiological systems such as digestive and immune, conserve or improve the health of those who consume (NMI, 2008).

green consumption[11] and Life Based On Health and Sustainability (LOHAS) that have determined the eating habits of the growing middle class in EA (Fabiosa, 2006).

Giovannucci (2005) points out that Japan and Korea stand out as the most important markets for functional foods, combining three factors: growing per capita income, new lifestyles, and an ancient cultural tradition that rewards the positive influence of food on human healthcare. The most popular functional foods include mineral and vitamin supplements, shark cartilage oil, mollusk oil, medicinal fungi, herbal spices, honey extracts, pollen, and floral extracts, glucosamine and Q10 enzyme. Those with the higher commercial flow are foods with probiotic additions and tonic beverages.

The LOHAS consumers also value organic products. Organic products are all agricultural or agro-industrial products that are produced under a set of standardized procedures that allow the generation of products free of fertilizers, pesticides or herbicides of chemical origin, and therefore, retain in their molecular structure a greater number of nutrients and minerals, also implying an environmentally friendly production.

According to Giovannucci (2007), organic agriculture promises broad benefits over conventional agriculture, both for the local farmer - in terms of a price premium and more efficient soils - as well as for the consumer. He also indicates the following characteristics of organic markets in East Asia:

- The most consumed organic products are fruits, vegetables, meats, dairy products and infant foods (such as compotes and milk).
- Japan has traditionally been a claimant of organic food. In addition, there is now greater coverage in both China and Korea; it is possible to find a better variety of organic products and great availability of them in food stores and restaurants.
- Consumers, in general, perceive organic foods as healthier. It is not just a niche.
- Organic foods are also perceived as being of higher quality.
- The East Asian consumer shows a traditional sensitivity and concern towards the harmonization of their diet and their physical and mental state. Organic production meets the expectations of individual well-being and cares for ecosystems.
- Increased concern for good agricultural practices and animal welfare.
- Asian consumers pay special attention to food safety because of their sensitivity to food emergencies and reduced exposure to pesticides.

[11] The green consumer is a consumer interested on having the least negative impact on the environment and moves this interest to their purchasing decisions. They are generally well-informed people and seek to be aware of the environmental policies of companies, or clean processes in the production of what they consume.

Organic agriculture has also emerged as an alternative to cleaner production and positive externalities for the environment while providing food with high organoleptic qualities - texture, color, taste, and freshness - and greater nutritional value for those who consume. The quality of food depends on the amount of minerals they contain; organic agriculture allows 72% of the minerals to remain around the plant to absorb them; in addition, conventional agriculture displaces minerals, given the high concentrations of nitrogen and water, which implies the use of agrochemicals (Giovannucci, 2005).

Modern diets differ from traditional ones in fat and protein content, the latter being more intensive in carbohydrates, and local ingredients. In general, the transition of food consumption trends in EA can be summarized in five elements: reduction of per capita rice consumption, greater per capita consumption of wheat and products based on this cereal, a diet increasingly supported by protein and caloric contribution, increased consumption of tropical products and finally, the popularity of "easy food" and cold drinks.

- The increase in food prices at the international level

The agricultural sector is the most sensitive to economic cycles, and therefore, its observation is a priority for governments. Policies in EA are especially focused on sourcing since the goal of self-sufficiency is difficult to achieve for some of their economies.

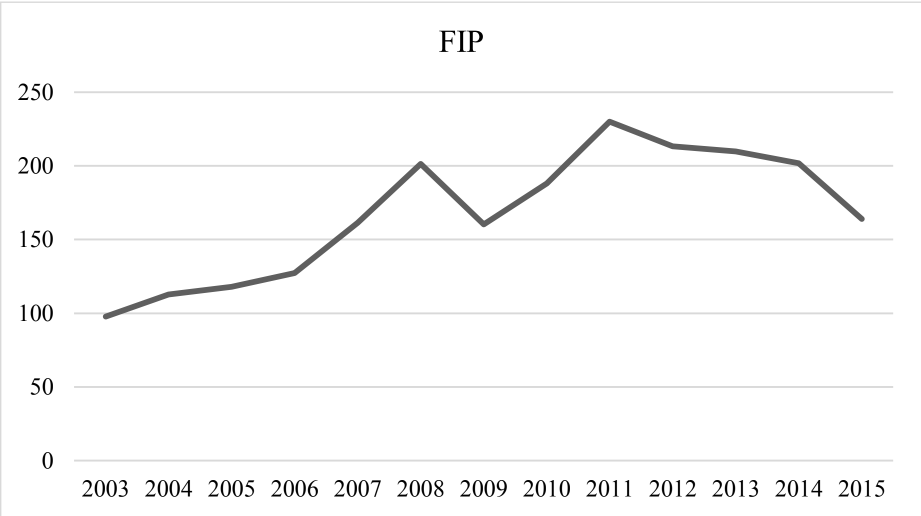
The high food price volatility seriously affect the East Asian region due to its natural climatic characteristics (droughts, monsoons, floods), accentuated by global warming phenomena. This was more than evident in the global commodities price increase in 2008, followed by a fall in 2009, and then again reaching the historical peak in 2012. Later, the international prices of major crops have dropped significantly from their historical highs, basically in response to bumper crops in 2013/14. In contrast, meat and dairy product prices were at historically high levels, primarily because their supply fell short of expectations in 2013. World prices of ethanol and biodiesel continued their declines from the historical peak levels they had reached in 2011 in a context of ample supply for both (OECD-FAO 2014).

Low-income countries in the region and without total self-sufficiency are affected by these price shocks since they influence consumer decisions whose sensitivity to price changes is more elastic than those with higher per capita incomes. Especially in low-income countries, trade flows are constrained by some subsidies and export restrictions.

The sensitivity of food consumption to the price level can be followed through the Food Price Index (FPI). Figure 2.13 shows its evolution during the last 13 years. The FPI is an average of five groups of commodity indices at the international level (meat, dairy products, cereals, oils and sugar). It can be observed that since the economic crisis of 2008, food shortages were common worldwide, food price index climbed in 2011 and 2012 to 230 and 213 respectively. In 2013 world price index started to decrease until 164 in 2015.

Price behavior is volatile and increasing, obeying the numerous factors that shape the demand and supply of food; these include high prices for inputs such as energy, fuels, fertilizers, and irrigation systems.

Figure 2.13 Food Price Index Behavior (FAO) from 2003 to 2015



Source: FAO – World Food Situation, 2013.

2.4.2 The importance of the Pacific Alliance food imports in China, Japan and Korea: Major markets and share.

As it was mentioned previously, China, Japan, and Korea are the main agricultural importers from LA. This section narrows down the analysis and describes the participation of the PA countries food imports in Japan, China and Korea in a larger period from 2003-2015.

China's agricultural imports from the world have increased from US$15,511 million in 2003 to US$ 105,410 million in 2015. Latin American as a region, is the main supplier of agricultural products to China representing 28.9 % of total food imports in 2015. US and Canada followed LA accounting for 25.7%, the East Asia region is the third provider with 16.5 % and Europe the fourth with 10.5%. It is interesting to remark that China's food imports have grown in the last 12 years. The share of total imports has decreased for all the regions where Europe is the only exception, gaining participation in China's food import representing 5.7% in 2003 and 10.5% in 2015 (see Table 2.6).

Table 2.6 China's agricultural imports by region (2003 and 2015 US$ 000 and share)

Destination	Imports		Share of total imports	
	2003	2015	2003	2015
East Asia (13)	2,972,502	17,421,252	19.2%	16.5%
Australia, NZ and India	936,716	9,924,399	6.0%	9.4%
US and Canada	4,201,925	27,109,195	27.1%	25.7%
LA (13)	4,378,150	26,990,360	28.2%	25.6%
Pacific Alliance (4)	498,822	3,459,725	3.2%	3.3%
EU(27)	886,599	11,081,584	5.7%	10.5%
Others	1,636,486	9,423,628	10.6%	8.9%
Total	15,511,200	105,410,143	**100%**	**100%**

Source: ITC-Trademap, 2017. Table by the author.

China's agricultural imports from the PA increased from US$499 million in 2003 to US$ 3,460 million in 2015, representing 3.3% of total agricultural imports of China from the world. Chile is the main origin of food imports from China among the PA members. China's imports from Chile have increased from US$ 182 million in 2013 to US$1,835 million. Chile gains participation in total China's food imports from 1.17% to 1.74%. The main agricultural subsector of China's imports from Chile is the vegetables and fruits (HS06-14) accounting for 58.16% (mainly fresh cherries and grapes), followed by live animals (HS 01-05) (salmon) and products of the food industry (HS 16-24) where the main product is wine. Vegetables and fruits and live animals increased participation in the Chinese food market, while the products of the food industry have considerably lost it (see Table 2.7).

Peru is the second origin of food imports from the PA to China. China's food imports from Peru have augmented from US$ 288 million in 2003 to US$ 1,411 million in 2015. However, Peru's share of total China food imports has decreased from 1.86% in 2003 to 1.34% in 2015. Although main agricultural subsector in Peru is the products of the food industry, it has been losing participation from 2003 to 2015. However, in 2015 represented 77.60% of total imports, being the fish flour the main product. Fruits and vegetables (HS06-14) have been gaining participation in China, representing 18.27%, where fresh grapes are the main product.

Mexico is the third China's main provider among the PA members. China's agricultural imports from Mexico have changed from US$28 million in 2003 to US$ 191 million in 2015. The share of Mexico on China food imports from the world is notably low, only 0.18% and it has not varied in the last years. China's agricultural imports from Mexico are from products of the food industry subsector, where the fish flour is the main product, accounting for 52.47% in 2015. However, this subsector has been losing participation. The imports from the fruits and vegetables subsector accounts for 29.24%, and this subsector has been gaining participation in the Chinese market, the main products being the avocados. Finally, the live animal subsector represents 17.54% and it has been losing participation in China, being frozen beef and pork meat the most relevant products.

Finally, China's food imports from Colombia are very low, only represent 0.02% of total China's imports from the world. The China's food imports from Colombia have increased from US$ 1,2 million in 2003 to US$ 23 million in 2015. The Chinese food imports from Colombia are mainly from the fruits and vegetables subsector representing 43.74%, followed by the products of the food industry and oils, and among those three subsectors the main products are coffee beans, extracts, and coffee concentrates, and glycerol (see Table 2.7).

Table 2.7 Japan, China and Korea agricultural imports share from LA by subsector (2003 and 2015)

	Japan		**China**		**Korea**	
	2003	**2015**	**2003**	**2015**	**2003**	**2015**
World Total (USD 000)	48,866,235	65,265,259	15,511,200	105,410,143	10,241,744	26,799,390
Chile						
Total agri-value(000)	986,669	1,650,566	181,576	1,834,646	85,060	594,109
Total Agriculture %	2.02%	2.53%	1.17%	1.74%	0.83%	2.22%
HS 01-05	71.76%	68.97%	11.01%	20.98%	54.97%	38.26%
HS 06-14	10.56%	10.86%	21.74%	58.16%	19.65%	41.43%
HS 15	0.60%	1.15%	1.15%	0.14%	0.01%	0.59%
HS 16-24	17.08%	19.02%	66.10%	20.72%	25.37%	19.72%
Mexico						
Total agri-value(000)	432,687	961,067	27,592	190,763	27,261	85,377
Total Agriculture %	0.89%	1.47%	0.18%	0.18%	0.27%	0.32%
HS 01-05	55.87%	55.55%	31.79%	17.54%	10.98%	47.50%
HS 06-14	35.75%	32.93%	5.20%	29.24%	14.61%	17.70%
HS 15	0.31%	0.79%	0.60%	0.74%	0.21%	0.50%
HS 16-24	8.08%	10.73%	62.41%	52.47%	74.20%	34.30%
Peru						
Total agri-value(000)	142,848	157,546	288,392	1,410,852	16,561	200,059
Total Agriculture %	0.29%	0.24%	1.86%	1.34%	0.16%	0.75%
HS 01-05	9.90%	20.51%	3.48%	2.49%	40.65%	17.75%
HS 06-14	9.24%	37.92%	0.10%	18.27%	21.02%	43.64%
HS 15	5.63%	2.15%	0.20%	1.64%	1.43%	0.82%
HS 16-24	75.23%	39.43%	96.23%	77.60%	36.91%	37.79%
Colombia						
Total agri-value(000)	165,635	412,093	1,262	23,464	14,056	102,089
Total Agriculture %	0.34%	0.63%	0.01%	0.02%	0.14%	0.38%
HS 01-05	2.37%	0.51%	0.24%	0.96%	3.04%	1.16%
HS 06-14	89.76%	94.09%	76.62%	43.74%	73.36%	88.57%
HS 15	0.01%	0.18%	0.00%	26.10%	0.00%	0.12%
HS 16-24	7.86%	5.22%	23.14%	29.19%	23.60%	10.15%

Source: ITC-Trademap, 2017. Table by the author.

In 2003, Japan's agricultural imports from the world were larger than those from China, however, due to China's recent economic growth, increasing the giant food demand, in 2015 Japan's agricultural imports were almost half of those from China. Japan´s total agricultural imports from the world were US$48,866 million in 2003 and US$ 65,265 million in 2015. Different from China, LA region is not the main food provider for Japan. Japan's food imports are mainly from EA representing 30.6% of total agricultural imports and US and Canada with 27.8%. Food imports from EU accounted for 11.4% and LA for 11.3%. It is worth mentioning that compared to 2003, Japan's food imports from LA and EA enlarged while from other regions dropped. However, the imports from the PA increased from US$1,728 million, representing 3.5% of world food imports to US$ 3,181 (4.9%) in 2015 (see Table 2.8).

Similar to China, among the four PA members, main agricultural imports of Japan came from Chile. They have increased from US$987 million in 2003, representing 2.02% to US$ 1,651 million in 2015 representing 2.53% of total imports. It means that Chile's participation in total Japan´s food imports increased in recent years. Japan's food imports from Chile are principally from the live animal subsector (HS 01-05) representing 68.97% where frozen pacific salmon is the main product. In addition, Japan´s imports of wines and fruits from Chile are also relevant. The imports of the food industry products (HS 16-24) accounted for 19.02%, and the fruit and vegetable subsector (HS 06-14) for 10.86%. In recent times Chile's import from the live animal subsector have slightly declined and those from other subsectors have increased.

Japan's second origin of agricultural imports from the PA is Mexico. Imports from Mexico have grown from US$ 433 million in 2003 to US$ 961 million in 2015. Mexico's share of total Japan food imports has raised from 0.89% in 2003 to 1.47% in 2015. The main agricultural subsector in Mexico is the live animal (HS 01-05) being pork meat the main product. The subsector of fruits and vegetables is also important representing 32.93%, being avocados the most important product. Finally, the imports of the food industry products represent 10.73% of total imports from Mexico, the late subsector has gained participation while the fruits and vegetable and live animals have gone down.

Colombia is the third Japan's main supplier of the PA members. Japan's agricultural imports from Colombia have augmented from US$166 million in 2003 to US$ 412 million in 2015. Japan's total food imports from Colombia have also gain participation from 0.34% to 0.63%. Being coffee the main imported product from Colombia, the imports from the fruits and vegetables subsector represent 94.09%, increasing participation in the last years. Japan also imports from Colombia coffee extract, flowers and some fruits such as bananas, nonetheless their participation among Japan's food import from Colombia is low.

Finally, Japan's food imports from Peru are only 0.24% of total Japan's imports from the world. Japan's food imports from Peru have marginally increased from US$ 143 million in 2003 to US$ 158 million in 2015. Japan's food imports from Peru include fish flour and the food industry products (39.43% of total imports in 2015). However, this subsector has a decrease participation compared to 2003. The subsectors of live animals (HS 01-05) and the fruits and vegetables (HS 06-14) have gained participation in Japan's agricultural imports from Peru (see Table 2.7 above).

Table 2.8 Japan's agricultural imports by region (2003 and 2015 US$ 000 and share)

Destination	Imports		Share of total imports	
	2003	2015	2003	2015
East Asia (13)	13,583,771	19,993,988	27.8%	30.6%
Australia, NZ and India	4,402,548	5,806,029	9.0%	8.9%
US and Canada	17,310,042	18,138,718	35.4%	27.8%
LA (13)	1,666,389	4,180,923	3.4%	6.4%
Pacific Alliance (4)	1,727,839	3,181,272	3.5%	4.9%
EU(27)	5,497,400	7,417,826	11.2%	11.4%
Others	4,678,246	6,546,503	9.6%	10.0%
Total	48,866,235	65,265,259	**100%**	**100%**

Source: ITC-Trademap, 2017. Table by the author.

Korea is another relevant food importer in EA from the PA. Its world agricultural imports have risen from US$ 10,242 million in 2003 to US$ 26,799 million in 2015. Korean major origin of food imports are the East Asian countries followed by US and Canada, both regions are losing participation in the last years, representing 27.2% and 25.5% respectively. LA region incremented its participation representing 12.16% and imports from Europe, which accounts for 11.2%. The Korean food imports from the PA increased from US$ 143 million in 2003 to US$ 982 million in 2015, representing 3.7% of total Korean agricultural imports.

Similar to China and Japan, among the PA members, Korean import is mostly agricultural products from Chile. Korea's food imports from Chile have intensified from US$ 85 million in 2003 to US$ 594 million in 2015, gaining also participation in the last years to represent 2.22% of total Korean food imports. The fruits and vegetables subsector (HS 06-14) accounted for 41.43%, which is the main subsector that gained participation, where the fresh grapes are the key product. The Korean imports of live animal (HS 01-05) were also important showing 38.26% of share. Lastly, the products of food industry represented 19.72%, where wine is the most relevant product followed by the fish flour.

Korean agricultural imports from Peru are the second among the PA members. They have increased from US$ 16,6 million in 2003 to US$ 200 million in 2015, representing

0.75% of total Korean food imports from the world and reinforcing their participation. The main subsector is fruits and vegetables (HS 06-14) led by coffee as the most imported product, followed by fresh grapes. The second subsector is (HS 16-24) being the fish flour the major product and finally, the subsector of live animals, that even after losing participation among the total imports from Peru, still represent 17.75% of the total.

Colombia is the third origin of food imports to Korea. Korean food imports from Colombia only represented 0.38% of its total food imports from the world. Korea imports from Colombia mainly fruits and vegetables (HS 06-14) subsector, representing 88.57% where coffee is the main product, and also from the (HS 16-24) subsector which represents 10.15% , where the coffee extract is the major product.

Finally, Korea's food imports from Mexico only represent 0.32%, going up from US$ 27,26 million in 2003 to US$ 85,3 million in 2015. The main subsector is the live animals accounting for 47.50%. Its participation in the market has grown more among the total Korean food imports from Mexico, where the main product is the pork meat. The subsector of the food industry products stands for 34.30% and the fruit and vegetables account for 17.70% among the Korean food imports from Mexico (See tables 2.9 and 2.7).

Table 2.9 Korea's agricultural imports by region (2003 and 2015 US$ 000 and share)

Destination	**Imports**		**Share of total imports**	
	2003	**2015**	**2003**	**2015**
East Asia (13)	3,854,497	7,276,874	37.6%	27.2%
Australia, NZ and India	1,079,385	3,270,834	10.5%	12.2%
US and Canada	2,904,288	6,833,323	28.4%	25.5%
LA (13)	651,985	2,660,366	6.4%	9.9%
Pacific Alliance (4)	142,938	981,634	1.4%	3.7%
EU(27)	947,923	3,005,743	9.3%	11.2%
Others	660,728	2,770,616	6.5%	10.3%
Total	10,241,744	26,799,390	**100%**	**100%**

Source: ITC-Trademap, 2017. Table by the author.

2.4.3 Import policies of Japan, China, and Korea for agricultural products

Agricultural protection remains among the most difficult issue in global trade negotiations. Despite the inclusion of agriculture under the WTO, agricultural tariff reductions in major industrial countries have been low. Moreover, the continuous agricultural protection in developed countries was one of the main causes of the breakdown of the Cancun Ministerial Meeting in 2003. As a consequence, the developing countries have to face many difficult processes because of their inability to meet food safety and health standards (Aksoy and Beghin, 2005).

The TBT and SPS measures are the main multilateral rules for food safety. Both are included in the WTO regulations and in most of the FTAs.

> According to Bruinsma, (2003) the SPS Agreement covers regulations that aim to protect people, animals or plants from direct and definable health risks, such as the spread of disease, potentially allergic reactions or pest infestations, are covered by the SPS Agreement. While the TBT Agreement covers all other technical regulations. Like the SPS Agreement, the TBT Agreement aims to distinguish measures that are necessary for achieving some regulatory objective from disguised trade protection. Specifically, the TBT Agreement extends the GATT principles of national treatment and most favored nation obligations. As under the SPS Agreement, the TBT Agreement also stipulates that countries avoid unnecessary trade impediments. The TBT Agreement includes food regulations. Although it has played less of a role in food-related technical barrier trade disputes than the SPS Agreement, many of the current controversies have to do with the product and process attributes of food and not directly their safety (Bruinsma, 2003, p.258).

The UNIDO also remarks that "Agrifood trade between countries in Asia is actually governed by very strict SPS standards. …. While each country has the right to challenge the spread of quarantine pests and diseases at home, related regulations and standards are often implemented as forms of technical barriers to trade" (UNIDO-Norad-IDS, 2015, p.108).

In addition to the SPS and TBT, the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) helps to avoid trade conflicts that can arise when countries rely on different instruments for the protection of intellectual property rights (IPR). In the case of agricultural trade between developed and developing country, the IPR could impede trade because obtaining IPR is a costly process for developing countries. Likewise, the developing countries fail to protect their IPR because they are unaware of the patentable innovations (Bruinsma, 2003).

Food safety and quality are important sources for tensions in the study of agricultural trading system. That is why most FTAs include a chapter on SPS and TBT, with some specific provisions found in annexes. However, they provide generic guidelines and reiterate the commitments made at the multilateral level under the WTO. This is the case of the FTA between the Pacific Alliance members with East Asia.

According to what was previously said, it is important to identify some agricultural import policies applied by Japan, China, and Korea, which impede more agricultural trade with the PA countries.

2.4.3.1 Japan's import policies for agricultural products

Japan is a land scarce country, where only 30% of its total area is suitable for agriculture or urban use. The share of agriculture in total GDP is low at 1.1%, while its share in employment was 3.8% in 2015. The GDP was US$ 4.383.076 million and the GDP per capita of US$ 34.474. The agricultural imports represent 10.4% of total imports and agricultural exports 0.9% of total exports (see Table A2.2).

Japan has a high dependency on agricultural imports and even had a deficit in trade in agriculture equivalent to US$ 59,869 million in 2015. Agricultural imports accounted for 10.4% of the world total imports (see Table A2.2). There is a large variety of the food imported products by Japan from the world, among the main ten agricultural products were: maize (4.9%), tobacco (cigarettes) (4.7%), frozen pork meat (3.13%), preparation of meat (2.89%), soya beans (2.61%), wheat (2.37%), fresh beef meat (2.29%) fresh or chilled pork meat (2.23%), coffee (2.26%) and frozen shrimps (2,25%) (ITC-Trademap, 2017).

According to the authorities, for food security, "in 2015, there were about 2.2 million farm households with an average size of 2.2 ha. Although agriculture is a relatively small part of the economy and employment, it is important for historical and cultural reasons" (WTO, 2017, p.87). The responsible for agricultural policy in Japan is The Ministry of Agriculture, Forestry and Fisheries (MAFF), which also controls the tariff quotas, statistics, domestic market supervision, agricultural insurance, and SPS and TBT measures relating to agriculture, and support the Agriculture, Forestry and Fisheries Research Council.

> In March 2015, the MAFF established the Food, Agriculture and Rural Areas Basic Plan which is reviewed roughly every five years. This plan has the objectives of doubling incomes in agriculture and rural areas over the next ten years by increasing domestic and export demand, improving value chains, reducing costs, promoting structural reform, and improving productivity. Agricultural policy continues to emphasize self-sufficiency, and the new Basic Plan sets self-sufficiency targets for FY2025 of 45% on a calorie basis and 73% on a production value basis….. Agricultural policy in Japan uses a comprehensive set of policy measures which result in a relatively high level of protection and support to producers for most products, with the exception of export subsidies, which Japan does not have the right to use under its WTO commitments…. In addition, in May 2016, MAFF developed the Strategy to Promote Agriculture,

Forestry, Fisheries Products and Foods. In June 2016, the Cabinet adopted the Japan Revitalization Strategy 2016, which sets the export target for major agriculture, forestry, and fisheries products and foods at more than ¥1 trillion by 2020 (WTO, 2017, p. 91, 93).

In November 2016, Japan revised the “Plan to Create Vitality for the Industry and Regional Communities by adding various policy packages to improve competitiveness and to promote agro-food exports” (OECD, 2017a, p.118). The Plan outlines the agricultural policy reform agenda including input cost reduction, the introduction of a revenue insurance scheme, the reform of the raw milk distribution system, productivity improvement in the beef and dairy sectors, the reforms of agricultural supply-chains, and the promotion of feed rice production. The Plan also aims to boost agro-food exports through promoting production according to international standards; protection of intellectual property rights and promotion activities on Japanese cuisine and food culture.

The MAFF has established domestic support for specific sectors and products in Japan in order to protect domestic and encourage internal agricultural production, such as rice, cereals, sugar beet, starch potatoes, soy beans, wheat, fruits and vegetables, tobacco, livestock products, dairy and fish products.

It is worth highlighting the domestic policies that can affect the products imports from the PA countries. As an example, there is a standard policy for fruit and industry promotion which objective is to increase the domestic production, consumption, and processing of fruits in Japan through the financial assistance. “The budget allocated to this assistance was ¥5.6 billion in FY2016. Assistance to farmers that convert their production to more valuable fruits (peaches, oranges and mangoes) is to be raised by ¥10,000 to ¥230,000 per 10 are, while assistance for apples is to be increased to ¥170,000 per 10 are” (WTO, 2017, p. 95).

The MAFF also administers prices and establishes the price stabilization program for products such as: eggs, calves, beef and pig meat and dairy products to help ease the influence of sudden surges in compound feed prices upon farmers. Additionally, in Japan also exists, the Japan Dairy Council (JDC) for the dairy products support. It distributes and controls the annual production allowance based on the demand estimates. “For milk destined for cheese production producers are eligible for a subsidy of ¥15.5 per kg of milk (FY2015). Under this scheme, ¥6.67 billion was paid to dairy farmers producing liquid milk for cheese production in FY2015” (WTO, 2017, p. 95).

According to the WTO (2017), in Japan tariffs on agricultural products an average of 14.9 %, were greater than tariffs on non-agricultural products, with an average of 3.6% in 2014. Furthermore, the Japan’s market access measures (tariff, special safeguards, and tariff quotas) are high and strict, helping to keep domestic price and maintain domestic agriculture. "Japan reserved the right to use the special agricultural safeguard (SSG) on 121 tariff lines" (WTO, 2017, p. 92). Moreover, the MAFF has a complicated method to allocate quotas to agricultural products.

Additionally, the Japanese government has identified five critical product categories to be protected from tariff elimination, those five categories include around 586 tariff line products in Japan that have never been subject to tariff elimination such as rice, wheat, beef and pork, dairy products and sugar. Those products are called (sanctuary products). Among them, imports of beef from Mexico and pork from Mexico and Chile are especially sensitive for Japan. In the Japanese beef market, in 2012 Japanese suppliers accounted for 42 percent, followed by Australian, US, New Zealand and Mexico. Similarly, in the Japanese pork market, Japanese suppliers accounted for 55 percent of total supply followed by US, Canada, Denmark, Mexico, and Chile. Japan protects the beef and pork producers by maintaining high tariffs, applying gradual reductions over long periods and implementing imports quotas (Kawai, 2014).

Main policy instrument support of Japan is resulting from border measures, administrated prices, and payments based on output serve as the main instruments of agricultural policy in Japan. Tariff-rate quota (TRQ) systems are applied to major commodities such as rice, wheat, barley and dairy products. Administered prices are applied to pig meat, beef, and calves (OECD, 2015a).

Japan proposes to negotiate economic partnerships with other countries and promote agricultural exports. While these signals are seen as a move towards a more market-oriented agricultural sector, the reduction of border measures on agricultural products would contribute to structural change and further productivity growth of the Japanese agricultural sector through its participation in global value chains (OECD, 2017a).

The Japanese Ministry of Health, Labor and Welfare (MHLW) and The Food Safety Basic Act of 2003 (Act No. 48, 2003) are in charge of ensuring the safety of foods imported into Japan. The responsibilities of the MHLW include promotion of food safety awareness during the production, manufacture, and processing of foodstuffs in exporting countries; provision of information on Japanese food safety regulations to embassies located in Japan and to importers; publication of the information through the MHLW website; holding bilateral discussions with exporting countries; conducting onsite inspections; and provision of technical support. In addition, the MHLW conducts onsite inspection at facilities in exporting countries to verify safe management practices if necessary (UNIDO-IDE-JETRO, 2013, p. 25).

In order to ensure the safety of imported food products into Japan, the Article 27 of the Japanese Food Sanitation Law (Act No. 233 of 1947) also obliges importers to submit an import notification to the MHLW Quarantine Station prior to importation. After multiple inspections, the MHLW has the right to reject the importation of certain products and refuse their entry into the Japanese market.

The UNIDO-Norad-IDS (2015), study measured the most rejected agricultural categories by Japan over the period 2006-2010, finding that the fish and fisheries products are the most rejected category by Japan, followed by the fruits and vegetables, and the cereals. The main reasons for the ban of agricultural product imports into Japan were bacterial contamination and pesticide residues. Among the Pacific Alliance members, Peru is one of the countries with the largest number of Japanese refusals.

Among the three FTAs that Japan has with the PA members called Economic Partnership Agreements (EPA) are: EPA Japan-Mexico (2005), EPA Japan-Chile (2007) and EPA Japan-Peru (2012). Japan imposed quotas on agricultural imports from LA and also excluded quite a large number of products (See table 3.2 in chapter 3).

Some examples of TBT and SPS measures imposed by Japan to agricultural imports from the PA:

- Safeguard measures for pork and beef meat: Reference price and safeguard for the meat of pork. Since 1995 Japan has had a system for the entrance price of pork called Gate Price (GP). This system consists in establishing a minimum Cost Insurance and Freight (CIF) price once the product enters the Japanese market. The product will have to have a higher or equal to GP CIF price, in order to be accepted. Any product with a lower than GP will be fitted to it, paying the difference between the GP and the CIF price (Duty = GP – CIF). There are different GP depending on the type of the product.

  Additionally, to the GP there are two special measurements called Safeguard (SG) and Special Safeguard (SSG). These safeguards affect refrigerated or frozen pork. The first one is activated when the imported volume accumulated during the first three semesters of the current tax year, exceeds 119% the average imported volume of the same period in the last three years. The GP rises, which is applied from the first day of the subsequent month (2 months later), to the month which surpassed the quota, until the end of the Japanese tax year. The Special Safeguard is activated when the imported volume surpasses 739,677 tons, rising the duty by 5.7%.

  Bovine meat. The safeguard measurement which affects this product is activated when the imported volume in one trimester exceeds the same period of the previous year by 117%. The duties rise from 38.5 % to 50 %, for the first trimester of the next year. The consequence of this safeguard is noticeable when applied, and the Chilean exporters have to pay a much higher duty, the product price is being increased and they are left discriminated regarding the national products (DIRECON, 2015, p.174-175).

- Quota on dairy products: In Japan there are quotas for natural cheese import, which are used for making processed cheese under the duty code 040610. For 2015 tax year (from April 2015 till March 2016) the quota was 63.000 tons. In addition, cheese import has the following condition in order to participate in the quota: fresh/processed imported cheese for the industrial use with 0% duty, under the condition that the final product has been elaborated with Japanese cheese in proportion 2:1 (half of the product amount of Japanese origin).

  To import cheese for industrial use with 0 % duty, the importer necessarily must be able to obtain/produce the double amount of local cheese. A similar quota is applied for other dairy products like low-fat milk powder, the quota for 2015 tax year is 74.973 tons with 0% duty. The import which surpasses the quota will be fined with 30% of the price + between 500 and 1.204 yens per 1 imported kilo. Condensed milk without sugar: the quota for 2015 tax year is 1.500 tons with 0% duty. The import which surpasses the quota will be fined with 30% of the price.

  Whey: The quota for 2015 tax year is 14.000 tons with 0% duty. The import which surpasses the quota will be fined with 35% of the price + 500 yens per 1 imported kilo. Butter and oils of dairy origin: The quota for 2015 tax year is 581 tons with 0% duty. The import which surpasses the quota will be fined with 30% of the price + between 500 and 1.363 yens per 1 imported kilo (DIRECON, 2015, p.176)

- Quotas for tomato paste: Japan established quotas for the tomato paste import for the ketchup or tomato sauce for 2015 tax year (from April 2015 till March 2016) the quota is 37.600 tons, 5.000 of which are assured for Chile (DIRECON, 2015, p.177).

- In the case of Mexican agricultural exports of tomatoes, cucumbers and avocados to Japan, additionally to the international phytosanitary certificate that exporters should submit the Japanese authorities do not accept products made in the State of Chiapas, and exporters should submit a special origin declaration. Additionally, those products have to show that the shipment free of quarantine pests and soil and vegetable waste related to transport. If exporters do not accomplish those regulations, those products cannot access the Japanese market. (Secretaría de Economía, 2017)

In the case of Chile, there are some Japanese SPS notifications that could restrict Chilean agricultural exports to the Japanese market. Since Japan became a WTO member in 1995, it has presented 505 SPS notifications to Chile.The above place Japan on the eighth position among members who have established the greatest number of rules and norms of animal and plant health requirements that could affect Chilean exports.

2016 was the year when Japan registered the biggest number of notifications, 61 ordinary and 5 additional. Out of those 66, 34 regulate meat and offal, 10 various agricultural products, nine additives for food, three seafood and aquaculture, two dairy and plant health products, and one cereal, horticultural frozen products and food packaging. Moreover, three of them communicate previously notified norms coming into force.

Regarding the notifications of the Technical Regulations and Accordance Evaluation Procedures, Japan has reported 817 since its entrance into WTO. The above places Japan on the eleventh position among the markets which have established the greatest number of rules and norms of technical requirements that could affect Chilean exports (DIRECON, 2017).

2.4.3.2 Korea's import policies for agricultural products

Korea is a robust economy with a GDP of US$1.382.764 million and US$27.105 GDP per capita in 2015, it is a country with dynamic growth and low unemployment levels, where trade as a share of GDP represented 83.7%. The agriculture (including forestry and fishing) contributed to 2.3% of GDP and accounted for 5.2% of employment. Korea is also a land scarce country with a high population density (523.3) (see table A2.2). "Farmland continued to decline, from 1.73 million hectares in 2012 to 1.68 million hectares in 2015. More than half of the farmland (about 54%) is in rice paddies. Most farms are small family farms: by December 2014, there were 1,121 thousand farm households of which 65% farm on an agricultural area of under 1 hectare" (WTO, 2016b, p.114).

Similar to Japan, Korea has a high dependency on agricultural imports, being a net agricultural importer. Agricultural imports accounted for 6.1% of total world imports and agricultural exports for 1.3% in 2015, maintaining a trade deficit equivalent to US$ 19,730 million. The top ten major agricultural products imported by Korea from the world were: maize (8.26%), frozen pork meat (4.61%), wheat (4.12%), food preparation (3.41%), frozen beef meat (3.25%), oilcake and other solid residues (3.13%), soybeans (2.40%), raw sugar cane (2.33%), frozen fish (2.01%) and frozen bovine cuts (1.83%) (See table A2.2) (ITC-Trademap, 2017)

In Korea, the responsible for agricultural policy is the Ministry of Agriculture, Food and Rural Affairs (MAFRA), however, the tariff quotas, and the import quotas are administered or allocated by different organizations (as of 2016) including ministries, state trading entities such as the Korea Agro-Fisheries and Food Trade Corporation (and The Ministry of Strategy and Finance (MOSF) (WTO, 2015b).

The agriculture sector is regulated under the Framework Act on Agriculture, Fisheries, Rural Community and Food Industry. Based on the Framework Act, in 2013, a five-year (2013-17) implementation plan was announced. It aims at increasing the volume-based self-sufficiency ratio of grains (including animal feed) to 30% in 2017, from 23.1% in 2013, via measures such as expanding the agriculture production infrastructure, and encouraging economies of scale for rice production, distribution and consumption.

> The five-year Plan emphasized adding value to agricultural products in an innovative way, and creating jobs by converging agriculture with other industries such as manufacturing, processing, and information and communication technology. Further, in January 2016, MAFRA presented "Measures to boost rural economy and export by transferring agriculture into the 6th industry", to link agricultural manufacturing, distribution, and export, with tourism. The authorities indicated that support measures include export subsidies to some agricultural products under Article 9.4 of the Agreement on Agriculture (WTO, 2015b, p.114, 115).

A new five-year (2016-20) Promotion Plan for Environmentally Friendly Agriculture has been implemented. Aiming to expand the market size for environmentally friendly agricultural products, the government plans to increase the share of pesticide-free (including organic) cultivation area and more generally to reduce the input of chemical fertilizers and pesticides in crop production (OECD, 2017).

Tariffs and a wide range of Tariff Rate Quotas (TRQs) continue to be the main instruments to support domestic prices. Rice has been one of the most sensitive products, remaining heavily protected by a combination of border measures and domestic support. Direct payment programmes have been implemented from 1997 with different objectives; including early retirement payment, rice income compensation, promotion of environmentally-friendly agriculture, maintaining agriculture in less-favoured areas, and rural landscape conservation. The most important direct payment is the rice income compensation scheme. This scheme includes both fixed and variable payment (OEDC, 2015). Rice is excluded from all the Korean FTAs with the world and its domestic price is high. Its import quota regime was replaced by a TRQ system in 2015.

The Korean government also provides assistance to beef production, and its domestic prices remains high. Foreign direct investment of less than 50% of investment assets is permitted in cattle-raising and meat wholesale. Korea is a major leader of fish production and consumption in the world that is the reason why the government created in 2013, the Ministry of Oceans and Fisheries (MOF), and the Korea Fisheries Resources Agency (FIRA) in 2011, in order to efficiently manage and control fisheries resources (WTO, 2015b).

"The last notification from Korea on its export subsidy program for certain farm products was in 2010, for the years from 2005 to 2008. In 2008, export subsidies totaled ₩32.68 billion, and covered fruits, flowers, vegetables, kimchi, ginseng, livestock, grain and processed food, and traditional liquor" (WTO, 2015b, p.117). These subsidies were used to reduce exporters' marketing costs, and are exempt from the WTO reduction commitments.

The average MFN tariff on agricultural products (WTO definition) reached 60% in 2016. And it remained much higher than the tariff rate for non-agricultural products (6.6%). In addition, "Korea continues to apply, from time to time (flexible tariffs), such as adjustment duties, seasonal tariffs, autonomous tariff quotas, (usage tariffs), and safeguard and special safeguard duties to agricultural products, The Ministry of Strategy and Finance (MOSF) sets (adjustment tariffs) annually"[12] (WTO, 2015b, p.116).

"In the case of the Korea–Chile FTA, seasonal preferential duties have been levied on grapes imported from Chile since 2004. And in the case of the Korea–Peru FTA, seasonal preferential duties on grapes and oranges have been in place since 2011" (WTO, 2015b, p.58).

"Korea applied agricultural tariff quotas (TQs) on 227 ten-digit tariff lines in 2016 (Section 3.2.4.1). In-quota tariffs range from zero to 50%, while out-of-quota rates range from 9% to 887.4% (for manioc). Currently, all tariff quotas are global quotas. Quotas are valid for the whole calendar year, and import permits (valid for either 30 days or 90 days) are required" (WTO, 2015b, p.116).

The main laws affecting food standards and specification are the Food Sanitation Act (last amended in 2016), the Food Code and the Food Additive Code. The Food

[12] According to the WTO (2015b, p. 63) a (flexible tariff) help to stabilize prices through increased supply and/or increasing the competitiveness of the domestic agricultural and livestock industries, which are faced with increasing pressure from imports under RTA/FTA preferential treatment challenging domestic products. The number of items covered by flexible tariffs dropped from 216 (HS six-digits) in 2012 to 145 in 2016. According to the authorities, the leading principle of flexible tariffs is to maintain its application to a minimum as prescribed by the law.

Sanitation Act requires all foreign food facilities and establishments to be registered by the MFDS. Allegedly, this act is to facilitate sound transactions and enhance public health by guaranteeing the safety of imported foods in the domestic market and food exported overseas (WTO, 2015b, p.74).

The MFDS remains responsible for regulating pesticide residues in foodstuffs, in accordance with the maximum residue levels (MRLs) set in the Food Code and applied for both domestic and foreign products. Moreover, in Korea food additives require prior approval. In December 2015, Korea stablished a positive list of 605 approved food additives. Korea's legislation on the marketing of genetically modified agricultural products (GMAPs) revised in 2014.

The three FTAs that Korea has with the PA members, Korea-Chile (2004) and Korea-Peru (2011), Korea also imposed quotas to some agricultural products and excluded some products from the agreement (see table 3.2 in chapter 3).

The following are some examples of SPS and TBTs measures implemented by Korea to agricultural imports from the PA:

- SPS: Ministry of Food and Drug Safety (MFDS) has modified the regulation system of agrochemicals in agricultural and livestock products, as well as animal drugs in livestock and sea products for positive list system since 2010. MFDS hopes the positive list system to be applied to dried fruit and tropical fruit starting at the end of 2016. Due to the change, the agrochemicals and animal drugs used in Chile but not registered in the Korean system will be refused and/or Chilean agricultural exportation will be suspended. For the mentioned agrochemicals and animal drugs, the drugs producers must solicit the MFDS through the Diplomatic Mission in Korea to establish Import Tolerance, which is the maximum limit of the substance waste which will be applied only to imported food.

  It is important to review if all the substances applied to Chilean exports to Southern Korea are registered in the Korean system.

- TBT: Organic Products Certification. In 2009 Korean authorities issued a new law to regulate the issuance of organic certifications to protect the consumer. Initially, the new law coming into force was planned for the 1st of January 2010. At the end of 2012, the date of coming into force was moved again until the 1st of January 2014, the date until which Chile kept its recognition. With this norm, Chilean exporters and their Korean importers will have to hire a Korean certification agency service or international companies which have been authorized by the Ministry of Forest, Food and Agriculture.

Chilean organic products certifying companies will have to ask Korean authorities directly to authorize them to issue certificates according to the new procedures. These interested companies will have to demonstrate all the required precedents in Korean, and after that cover all the land inspection costs made by Korean officials. Furthermore, depending on the law availability, at least three experts from those companies will have to take a three-month training course in Korea. Currently, Chile is a candidate to be recognized for equivalence by Korea under its new system.

- TBT: Sanitary authority discretion in the peeled nuts inspection since January 2012, Korea partially prohibited the import of peeled nuts from several countries, one of which was Chile. This measurement was materialized through the modification of the "Plant Protection Act" law, in which the names of some countries from which the peeled nuts import was prohibited, were erased.

  Among import requirements, Korean authorities require a phytosanitary certificate and also that the product must be "without peel, avoiding pointing at any tolerance margin for peel waste. Due to the fact that there is no detailed information about what is meant by "without peel", Korean authorities inform that the expression "without peel" included in the Plant Protection Act Law is restricted in regard to the fact that the nuts must come without any rests of the peel.

  Due to the lack of a written norm about product peel admitted limits, Korean authorities hand over the function of accepting or refusing a shipment to shift leader inspector in the entrance point, which is interpreted as a big discretion margin and eventual arbitrariness.

- TBT: Fish sub-products inspection and record. The establishments where some fish entrails and heads are been processed for human consumption must be registered with the original competent authority by the Southern Korean Ministry of Food And Drug Safety (MFDS) in order to export their products to the Korean market. The products allowed to be exported to South Korea are:

  a. Atlantic cod, Greenland cod, Pacific cod, and hake (frozen) heads
  b. Edible parts around the head of any edible fish (frozen). However, the balloon fish parts are excluded.
  c. Roe (except balloon fish roe), pollock entrails, fish sperm, squid nidamental glands (separated and frozen)

     All the mentioned products must be frozen at least at – 18C in the middle and appropriate for human consumption.

The installations must be reported to Korean authorities to be signed in by the Chilean government and will be subject to a possible sanitary inspection in situ by the Korean authorities (DIRECON, 2015, p.146-149).

- SPS for fresh salmon: 18% of Chilean salmon shipment are subject to laboratory tests to confirm lack of crystalline violet, it takes 10 days, which complicates the product sales due to its perishability (DIRECON, 2017, p.143).

- In Mexico: Plant Health International certificate (PHIC) declaration is required "This is to further certify that avocado fresh covered by this certificate are free from *Nectria galligena*, and produced from Michoacán, the mediterranean fruit fly free area" (Secretaría de Economia, 2017)

2.4.3.3 China's import policies for agricultural products

Although China has the highest GDP among the EA countries (US$ 11,064,666 million), its GDP per capita was just US$8,069 from which trade represented 40.5% of GDP in 2015. China is a country with high density in terms of population (1,371 million). The contribution of the agricultural sector to GDP was 8.8% and the employment of the sector was 28.9% in 2015. This country has a significant agricultural area (515,361 thousand ha) which can return an important agricultural production in the country (see table A.2.2).

In spite of Chinese agricultural production, the country can be considered as a net importer of agricultural products. Chinese agricultural imports represent 6.3% of its total imports, this is more than its agricultural exports which only represent 3% of the total exports. It should be mentioned that in 2015, China's agricultural trade deficit was US$37,127. The top ten major China's agricultural imports from the world were: soy beans representing 33.04% of total agricultural imports, followed by palm oil (3.51%), grain sorghum (2.82%), barley (2.72%), food preparation for infant use (2.39%), manioc (2.01%), brewing or distilling dregs and waste (1.90%), frozen beef meat (1.89%), wines (1.78%) and fish flour (1.71%) (Table 2.7) (ITC-Trademap, 2017).

China also ranks first in worldwide farm production, producing as much as the combined total value of all OECD member countries. The growing demand for food can be explained due to its fast income growth. This clearly represents a challenge for China's sustainable use of natural resources used in farm production. While feeding almost 20% of the world's population, China has only 7% of the world's drinking water and 10% of the world's agricultural land (OECD, 2015a).

A key driver behind agricultural policy measures employed adopted in China deals with its desire to maintain 95% self-sufficiency in corn, wheat, and rice. At the end of

2013, China’s announced the implementation of a new food security strategy intended to enhance the role of trade in the achievement of its food security goals. This suggest that while the Chinese government will try to maintain self-sufficiency in wheat and rice, it will also allow it to “moderate” the imports of grain used for feed (OECD, 2015a).

In 2015, China undertook a number of policy measures in order to keep a growing positive gap between domestic and also international prices under control. In 2016, China continued policy reforms to diminish the negative effects of high domestic prices compared to those on international markets. In order to do this, China extended a single payment scheme called “agricultural support and protection subsidy” to the entire country. Being implemented as a pilot basis in 2015, the above mentioned programme combines three earlier area payments (direct payments for grain producers, comprehensive subsidy on agricultural inputs and seed variety subsidy) into a single area payment. Four-fifths of the funds allocated for this payment are intended to protect arable land fertility and to preserve grain production capacity and one-fifth to support large-scale production (OECD, 2015a).

In China, The Central Government is the responsible for developing the agricultural policy framework. The Ministry of Agriculture, the Ministry of Finance, and the Ministry of Commerce (MOFCOM) are in charge of implementing the agricultural policy (WTO, 2015a).

> China's agricultural policies are established in numerous five-year plans, the latest is the 13th Five-Year Plan (2016-2020). It aims at modernizing the sector through mechanization and promoting the development of moderate-scale operations to increase productivity, deepening the reform of land contract rights and finance policies in rural areas, protecting the quality of farmland to increase productivity, and ensuring grain self-sufficiency (at least 95%) and food safety… The main agricultural products in China are: corn, rice and wheat, sugarcane, oilseeds, and cotton, some of which require large-scale operations and mechanization to achieve higher productivity, hence, China's main agricultural policy objective in 2015 was to reform the sector through innovation and modernization (WTO, 2015a, p. 115).

China’s governmental support for agriculture continues to be granted mainly through the "four subsidies" programs: The Direct Subsidy to Farmers (rice, wheat, and corn); the Comprehensive Subsidy for Agricultural Inputs; the Subsidy for Promoting Superior Strains and Seeds; and the Subsidy for Purchasing Agricultural Machinery and Tools. According to Chinese, the most important support program is the Subsidy for Purchasing Agricultural Machinery and Tools program. “However, in terms of expenditures, the Comprehensive Subsidy for Agricultural Inputs program seems to be more important. In 2008 budgetary transfers for this program were more than doubled and have continued to increase each year reaching RMB 107.8 billion by 2012 and remaining unchanged thereafter"(WTO, 2015a, p. 120).

China also applies price control for some agricultural products, however, it has been liberalizing the price of most of them. The agricultural products such as grains, cotton, edible vegetable oil (materials), sugar, and tobacco leaf are classified as key reserve materials and controlled by the Chinese government, in addition to the "four subsidies programs" and the price control policies. China also supports a subsidized agricultural insurance scheme since 2007 and the People's Bank of China (PBOC) has adopting measures in order to finance rural areas promoting special financial products and services (WTO, 2015a).

In China, the average tariff applied for agricultural products was 14.8% in 2015, while, the average applied MFN rate was 9.8%. Products considered sensitive by China are subject to higher protection tariff. This is the case of sugars and confectionary (30.9%), cereals and preparations (23.3%), cotton (22.0%), and beverages, spirits, and tobacco (21.8%). Soybeans, one of China's major imports, have the lowest tariff protection at 10.5% (WTO, 2015a).

China also applies tariff quotas for some agricultural products. While the competent authority the responsible for allocating TRQs for grains and cotton, is the National Development and Reform Commission (NDRC), and the MOFCOM allocates the rest. In 2015, tariff rate quotas (TRQs) were applied to 47 tariff lines included in chapter 10 (wheat and muslin, maize, rice), chapter 11 (cereals), and chapter 17 (cane or beet sugar). In addition, some products were subject to automatic import licenses. In 2015, import licenses were applied to 83 agricultural products (WTO, 2015a). It should be noted that China does not impose quotas on agricultural products in the two FTAs that it has with Chile and Peru. China does not impose quotas to agricultural products. However it excludes fewer products if compared with the number of those excluded from Japan and Korea, and also imposes some TBT and SPS measures (see table 3.2).

> In China, there are six institutions in charge of the SPS system: The Ministry of Health (MOH), the Ministry of Agriculture (MOA), the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), the State Administration for Industry and Commerce (SAIC), the MOFCOM, and the State Food and Drug Administration (SFDA). In 2015, a new Food Safety Law was promulgated, which stipulates the procedures to establish SPS requirements and to regulate imports subject to SPS measures, including their inspection, quarantine, and supervision. In general terms, the new Food Safety law also imposes greater responsibility for food safety on food producers and traders, and on local governments; and at the same time imposes severe punishments to those that violate the law (WTO, 2015a, p. 67, 68).

Finally, the above-mentioned law allows every department to establish additional food security requirements, which can differ from one province to another. This aspect can make trade more difficult in China.

Under the General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ), the Standardization Administration of China (SAC) is in charge of centralizing the administration of the standardization system in China. China has four types of standards: national, industry/sectoral, local, and enterprise standards. The first three types can be either voluntary or mandatory (technical regulations). AQSIQ is China's TBT Enquiry Point and the body responsible for preparing, checking and submitting China's TBT notifications. In 2014 and 2015 China submitted 141 TBT notifications, most of them under Article 2.9. The majority of the technical regulations notified were applied to regulate the market and to protect human health, safety and the environment, and were related to chemical products, machinery, electronic equipment, and transport equipment (WTO, 2015a). Some examples of SPS and TBTs measures implemented by China on imported agricultural products from the PA (mainly to Chile) are:

- According to Chilean trade authorities, the new Food Safety law, applied in China, grants each Chinese province has the right to establish additional food security procedures. These procedures can differ from one province to another. This can make trade difficult in China, particularly for agricultural products.
- TBT measures for Chilean wines: Some Chinese customs offices (for example, Shanghai) do not allow ink jet system used to print the bottling date on the back labelling. However, some Chinese customs offices, as Xiamen, accept it. The difference in the criteria between some Chinese customs offices generates uncertainty and rises transaction costs for Chilean wine exporters.
- TBT measures for Chilean fruits: in the Northern Chinese ports such as Tianjin, Dalian and Qingdao, Chilean fruit is unloaded during various days. Such practice does not seem to occur in the ports of Shanghai and Guangzhou, this increase the cost of products. This certainly affects the competitive opportunities for Chilean companies in the Chinese market.
- TBT measures for agricultural products from Chile: Unnecessary delays in containers inspection. China performs inspections in almost half of the containers of those products originated in Chile that can potentially benefit from tariff reduction or elimination. The above is inconsistent with the international practice of random inspection. The inspection (capacity) of practically all containers coming from Chile, notably affects agricultural exports originated in this country. This gives at the same time giving the third countries competitors which do not have a FTA with China, and to which random inspection are applied, a 2 or 3-day advantage (DIRECON, 2015, p.139, 140).

- TBT measures for avocados from Mexico: In addition to the International SPS certificate, the Mexican exporters should also certify that the Avocados are produced specifically in the state of Michoacán (Secretaría de Economía, 2017).
- SPS for frozen fruit. Measurement description: Since 2014, China has prohibited the entry of IQF (Individual Quick Freezing) products (DIRECON, 2017, p.136).

2.5 Agricultural support levels in East Asia and the Pacific Alliance

The OECD has a complete system for measuring and classifying agriculture support. The most comprehensive indicator is the Total Support Estimate (TSE) that is measured as a share of the GDP. It measures the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures which support agriculture regardless of their objectives and impact on farm production and income, or consumption of farm products (OECD, 2016a).

> According to the OECD (2016), the main elements of the TSE are the Producer Support Estimate (PSE), and the General Services Support Estimate (GSSE). The value of transfers to agricultural producers is measured using the PSE defined as the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income. And, the indicator of support to general service to agriculture is the GSSE defined as the annual monetary value of gross transfers arising from policy measures that create enabling conditions for the primary agricultural sector through development of private or public services, and through institutions and infrastructures regardless of their objectives and impacts on farm production and income, or consumption of farm products. It includes policies where primary agriculture is the main beneficiary, but does not include any payments to individual producers. GSSE transfers do not directly alter producer receipts, costs or consumption expenditures (OECD, 2016, p. 17, 18).
>
> Among the agricultural support indicators, the OECD (2016a) notes the PSE was at first used for modelling the effects on world commodity prices of a small reduction in agricultural subsidies, it was also recognized as a very useful tool in its own right to establish a consistent and comparative method to evaluate agricultural policies between countries (OECD 2016, p.21). Furthermore, the PSE includes estimates for the value of transfers provided by market access measures, such as tariffs and tariff quotas, as well as input subsidies, direct payments to producers that are coupled to prices or production, and direct payments decoupled from prices and production (WTO, 2017, p.97).

Table 2.10 includes the TSE as a share of GDP disaggregated by its different components: the PSE, the transfers to consumers from taxpayers and the GSSE. All of them measured as a share of GDP in years 2003 and 2015, in order to analyze their variations, for six countries out of the seven studied. Chile (2010), Mexico (1994), Japan (1964) and Korea (1996) are current members of the OECD. Colombia is in accession discussion since 2013. China is not an OECD member, however, it works closely with the OECD and it is included in all the studies, statistics and reports. Peru is not an OECD member and it is neither considered in its studies.

The agricultural support levels have been by a great amount higher in EA than in the PA. In fact, they are comparatively higher than those paid by the average of OECD members'. The Total Support Estimate to Agriculture as a share of the GDP has decreased for almost all the countries analyzed in this thesis, with the sole exception of China in 2003 and 2015.

Among the three East Asian countries, Japan is the one with the lowest TSE as a share of the GDP, it decreased from 1.38% in 2003 to 1.04% in 2015. Both PSE and GSSE dropped in the same period and the major recipients of agricultural support were the producers. PSE as a share of GDP in 2003 was 1.09%, declining to 0.85% in 2015 with no transfer to consumers from tax payers.

In Korea, the TSE was considerably high in 2003 representing 2.84% of the Korea's GDP, it decreased to 1.72% in 2015. Similar to Japan, the large amount of support is granted to producers, Korea's PSE was 2.34% in 2003 and it declined to 1.51% in 2015. The agricultural support to services, institutions and infrastructure diminished from 0.46% to 0.21% in the same period. In 2003, transfers to consumers from taxpayers as a share of GPP were 0.04% in 2003 and 0% in 2015.

The case of China is remarkable in the sense that its TSE rose from 2.27% in 2003 to 2.52% in 2015. Such growth is explained by the PSE increase as a share of GDP representing 1.52% and 2.09% in 2015, while the GSSE felt. The transfers to consumers from taxpayers were zero.

According to the OECD (2017a), as water and land are very scarce in China and environmental pollution caused by farming has become an alarming issue, any further increase in agricultural production should only be achieved through sustainable improvement of productivity. Therefore, existing agricultural policy instruments should be studied in order to improve their consistency with agro-environmental objectives. The share of public expenditures for general services, especially the agricultural knowledge and innovation system, in total support to agriculture is low compared to the OECD average. Further efforts are needed to restructure agricultural support towards longer term growth and competitiveness in the sector (OECD, 2017a).

When contrasting EA and the PA, one can see that Mexico is the only country registering transfers to consumers from taxpayers. The TSE as a share of GDP is very low in Chile, only representing 0.43% in 2003 and 0.33% in 2015. The major destination of the agricultural support is the Chilean agricultural producers decreasing their support in the same period, while the GSSE augmented, reaching the same lever of the PSE as percentage of GDP in 2015. The reason could be because the Chilean government does not protect in large scale the agricultural sector maintaining a low level of protection. In Chile, the agricultural support does not create practically distortions to agricultural market, owing to the fact that the support provided to farmers is very small.

China agriculture in Mexico has undertaken a significant agricultural policy reform since the early 1990s. However, the TSE in Mexico is still higher compared to the one of OECD members. In 2003, it was 1.10% of the GDP and 0.67% in 2015. Both PSE and GSSE have diminished and the transfers to consumers from taxpayers as a share of GDP augmented in the same period.

Table 2.10. Agricultural support indicators as a share of GDP for EA and the PA (2003 and 2015)

	Japan		Korea		China		Chile		Mexico		Colombia	
	2003	2015	2003	2015	2003	2015	2003	2015	2003	2015	2003	2015
TSE (% GDP)	1.38	1.04	2.84	1.72	2.27	2.52	0.43	0.33	1.10	0.67	1.68	1.50
PSE (% GDP)	1.09	0.85	2.34	1.51	1.52	2.09	0.32	0.17	0.96	0.54	1.60	1.27
Transfers to consumers from taxpayers (% GDP)	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00
GSSE (% GDP)	0.29	0.19	0.46	0.21	0.75	0.43	0.11	0.17	0.12	0.08	0.08	0.23

Note: At OECD measure as an average of all members, the TSE as percentage of GDP for 2003 was 0.93% and for 2015 was 0.58%
Source: OECD.Stat, 2017.

Even though, the TSE as a share of GDP decreased from 1.68% in 2003 to 1.50% in Colombia its level of support to agriculture is high compared with the other PA members, and even with Peru and the OECD's members. The producers received more support representing more of 90% of the TSE as a share of GDP. So the GSSE were comparatively low.

> Investments in general services to agriculture have been low during the last two decades, while the Colombian agricultural sector continues to face numerous structural challenges. Policy efforts should focus on strategic investments like land restructuring and land tenure system, investments in irrigation and improvement of regulatory oversight on water supply, usage and storage, investments in transport infrastructure, strong R&D and innovation capacity of the sector, animal and plant health protection and control services and promotion

of sustainable use of natural resources. Without adequate investment in these areas, it will be very difficult to improve productivity, competitiveness and ensure the sustainable development of the sector (OECD, 2015a).

2.6 Conclusions

The agricultural sector is still important in LA, representing in average nine percent of total GDP. In addition, the region's endowment of natural resources suggests an opportunity to increase its agricultural exports to the East Asian region. Despite the historical reliance on the U.S. and theEU markets (for LA agricultural exports), in 2015, the EA region became the main recipient of the region's food exports accounting for 24% of total LA agricultural exports.

Albeit the PA members are not the main food suppliers in the LA region to EA, the four countries represent 15% of total region's agricultural exports to East Asian markets being China, Japan and Korea their main destinations. Futhermore, the East Asian countries show a negative agricultural trade balance reflecting a high import dependency on food.

The PA food exports to China, Japan, and Korea are concentrated in few products. This include salmon, pork, beef, wine, grapes, cherries , avocados, coffee, flowers and fish flour. And despite the fact that there are some similarities in the LA export offer to EA in products in the case of grapes, fish flour and pork, each country has a different comparative advantage in certain agricultural chapters. For example, coffee and flowers for Colombia; fruit such as cherries and grapes, beverages and salmon for Chile; fruits and vegetables for Mexico, and fish flour and also coffee for Peru.

The EA region agricultural imports from LA are not significant in terms of participation among EA' agricultural imports from the world. Between the four PA members, Chile is the country with more volume of exports and larger agricultural diversification to EA. Chile´s export oriented agricultural policy combines flexible regulations with small support of agricultural services and institutions that help to improve sectoral competitiveness.

Factors such as the rapid urbanization, lifestyle changes and in less extent the increase in the international food prices have reconfigured the trends in food demand in EA. China is the main importer of agricultural products from the world and LA as a region is the main provider. China also leads the food imports from the PA, followed by Japan and Korea. However, PA agricultural imports participation among total agricultural imports in Japan is higher than China.

For China, Japan and Korea, the agricultural protection remains the most difficult challenge for the PA agricultural exports. The NTM such as quotas and the imposition of SPS and TBT measures create tensions and affects agricultural exports from the PA to EA.

The agricultural support levels in major EA countries are higher than those paid by the PA and the OECD countries. And even China has increased the Total Support Estimate to Agriculture as a share of the GDP from 2003 to 2015. In addition, the three East Asian countries highly protect specific agricultural products in order to promote competitiveness in their own domestic agriculture competitiveness in order to ensure their own food self-sufficiency.

Appendices

Table A2.1 Concentration index: Agricultural exports from LA to EA (thousands of dollars average value (2011-2015)

Exporter	Partner	Value of export to Asia	Value export to partner	%	C.I	Product	Description	Value of export to Asia	Value	%	C.I
Argentina	China	9,918,036	4,447,811	44.85%	84.71%	'120190	Soya beans, whether or not broken	8,401,142	2,550,075	30.35%	89.71%
	Indonesia		1,260,483	12.71%		'230400	Oilcake and other solid residues		2,436,280	29.00%	
	Vietnam		1,140,318	11.50%		'100590	Maize		867,748	10.33%	
	Malaysia		920,949	9.29%		'120100	Soya beans, whether or not broken		862,653	10.27%	
	Korea		631,582	6.37%		'150710	Crude soya-bean oil, whether or not degummed		820,133	9.76%	
Bolivia	Japan	16,715	9,955	59.56%	98.67%	'120740	Sesamum seeds, whether or not broken	16,493	6,514	39.50%	71.46%
	Vietnam		2,479	14.83%		'230400	Oilcake and other solid residues		1,903	11.54%	
	Malaysia		2,195	13.13%		'120190	Soya beans, whether or not broken		1,250	7.58%	
	Korea		1,206	7.21%		'120799	Oil seeds and oleaginous fruits		1,072	6.50%	
	China		658	3.94%		'090111	Coffee (excluding roasted and decaffed)		1,046	6.34%	
Brazil	China	26,565,536	17,402,125	65.51%	91.35%	'120190	Soya beans, whether or not broken	24,266,664	13,175,090	54.29%	81.82%
	Japan		2,859,301	10.76%		'120100	Soya beans, whether or not broken		2,401,549	9.90%	
	Korea		1,667,057	6.28%		'020714	Frozen cuts and edible offal of fowls of the species Gallus domesticus		1,663,739	6.86%	
	Thailand		1,222,745	4.60%		'230400	Oilcake and other solid residues		1,414,645	5.83%	
	Indonesia		1,115,436	4.20%		'100590	Maize		1,200,000	4.95%	
Chile	Japan	3,688,389	1,738,726	47.14%	96.55%	'030312	Frozen Pacific salmon	3,561,183	380,759	10.69%	40.52%
	China		1,156,268	31.35%		'080610	Fresh grapes		278,212	7.81%	
	Korea		470,696	12.76%		'080929	Fresh cherries		267,085	7.50%	
	Thailand		104,616	2.84%		'220421	Wine of fresh grapes		262,988	7.38%	
	Vietnam		90,877	2.46%		'230120	Fish flour		253,997	7.13%	

Exporter	Partner	Value of export to Asia	Value export to partner	%	C.I	Product	Description	Value of export to Asia	Value	%	C.I
Colombia	Japan	454,138	335,785	73.94%	99.08%	'090111	Coffee (excluding roasted and decaffed)	449,975	346,652	77.04%	94.49%
	Korea		80,707	17.77%		'060312	Fresh cut carnations and buds		39,845	8.85%	
	Malaysia		16,182	3.56%		'210111	Extracts essences and concentrates of coffee		25,741	5.72%	
	China		14,394	3.17%		'060390	Dried, dyed, bleached, impregnated prepared cut flowers and buds		7,010	1.56%	
	Singapore		2,907	0.64%		'152000	Glycerol		5,949	1.32%	
Costa Rica	China	59,495	19,536	32.84%	94.16%	'090111	Coffee (excluding roasted and decaffeinated)	56,021	15,524	27.71%	59.79%
	Japan		19,311	32.46%		'170114	Raw cane sugar		5,262	9.39%	
	Korea		10,854	18.24%		'200830	Citrus fruit, prepared or preserved		4,917	8.78%	
	Indonesia		3,944	6.63%		'020230	Frozen, boneless meat of bovine animals		3,965	7.08%	
	Thailand		2,375	3.99%		'200949	Pineapple juice		3,827	6.83%	
Ecuador	Vietnam	824,253	381,726	46.31%	97.25%	'030617	Frozen shrimps and prawns	801,605	371,048	46.29%	80.57%
	China		211,485	25.66%		'230120	Fish flour		83,512	10.42%	
	Japan		138,640	16.82%		'080390	Fresh or dried bananas		72,295	9.02%	
	Korea		36,648	4.45%		'030616	Frozen cold-water shrimps and prawns		63,048	7.87%	
	Malaysia		33,107	4.02%		'030613	Frozen shrimps and prawns, whether in shell or not		55,920	6.98%	
Guatemala	Japan	375,276	171,751	45.77%	97.58%	'170114	Raw cane sugar	366,200	155,244	42.39%	95.15%
	Korea		102,594	27.34%		'090111	Coffee (excluding roasted and decaffed)		139,502	38.09%	
	China		69,063	18.40%		'170111	Raw cane sugar		27,198	7.43%	
	Malaysia		16,310	4.35%		'120740	Sesamum seeds, whether or not broken		18,900	5.16%	
	Singapore		6,482	1.73%		'090831	Cardamoms, neither crushed nor ground		7,609	2.08%	

Exporter	Partner	Value of export to Asia	Value export to partner	%	C.I	Product	Description	Value of export to Asia	Value	%	C.I
Honduras	Japan	65,236	30,022	46.02%	98.67%	'090111	Coffee (excluding roasted and decaffed)	64,367	41,271	64.12%	68.82%
	Korea		29,151	44.69%		'120740	Sesamum seeds		1,590	2.47%	
	China		2,822	4.33%		'170111	Raw cane sugar		742	1.15%	
	Vietnam		1,847	2.83%		'030617	Frozen shrimps and prawns		379	0.59%	
	Thailand		524	0.80%		'170113	Raw cane sugar		317	0.49%	
Mexico	Japan	1,056,273	772,073	73.09%	95.75%	'020329	Frozen meat of pork	1,011,333	308,803	30.53%	56.76%
	China		97,873	9.27%		'080440	Fresh or dried avocados		105,584	10.44%	
	Korea		68,636	6.50%		'020230	Frozen, boneless meat of bovine animals		65,925	6.52%	
	Vietnam		53,010	5.02%		'020319	Fresh or chilled meat of pork		49,338	4.88%	
	Singapore		19,741	1.87%		'230120	Fish flour		44,396	4.39%	
Nicaragua	Japan	64,498	32,438	50.29%	94.89%	'090111	Coffee (excluding roasted and decaffed)	61,202	14,087	23.02%	49.67%
	China		13,119	20.34%		'120740	Sesamum seeds, whether or not broken		4,300	7.03%	
	Korea		7,069	10.96%		'170111	Raw cane sugar		4,186	6.84%	
	Thailand		5,606	8.69%		'030617	Frozen shrimps and prawns		4,096	6.69%	
	Vietnam		2,970	4.60%		'170113	Raw cane sugar		3,729	6.09%	
Peru	China	1,663,107	1,141,282	68.62%	97.03%	'230120	Fish flour	1,613,646	1,041,616	64.55%	86.39%
	Japan		214,267	12.88%		'160554	Cuttlefish and squid, prepared or preserved		121,356	7.52%	
	Korea		136,005	8.18%		'030749	Cuttle fish and squid		93,669	5.80%	
	Vietnam		65,726	3.95%		'080610	Fresh grapes		89,199	5.53%	
	Thailand		56,366	3.39%		'090111	Coffee (excluding roasted and decaffed)		48,265	2.99%	

Exporter	Partner	Value of export to Asia	Value export to partner	%	C.I	Product	Description	Value of export to Asia	Value	%	C.I
Panama	Korea	59,524	19,960	33.53%	94.39%	'240220	Cigarettes, containing tobacco	56,183	17,485	31.12%	79.18%
	Vietnam		14,934	25.09%		'230120	Fish flour		11,403	20.30%	
	China		11,183	18.79%		'030616	Frozen cold-water shrimps and prawns		8,297	14.77%	
	Japan		8,263	13.88%		'220820	Spirits obtained by distilling grape wine or grape marc		4,937	8.79%	
	Malaysia		1,843	3.10%		'020610	Fresh or chilled edible offal of bovine animals		2,362	4.20%	
Paraguay	Japan	308,872	69,695	22.56%	87.55%	'120190	Soya beans, whether or not broken	270,432	69,131	25.56%	87.68%
	Korea		55,795	18.06%		'230400	Oilcake and other solid residues		65,412	24.19%	
	Vietnam		52,429	16.97%		'120740	Sesamum seeds, whether or not broken		38,184	14.12%	
	Malaysia		50,626	16.39%		'120100	Soya beans, whether or not broken		35,212	13.02%	
	Indonesia		41,887	13.56%		'100590	Maize		29,163	10.78%	
El Salvador	Japan	61,007	29,337	48.09%	99.67%	'090111	Coffee (excluding roasted and decaffed)	60,804	32,344	53.19%	96.34%
	Korea		12,081	19.80%		'170114	Raw cane sugar		26,026	42.80%	
	Indonesia		8,672	14.21%		'010620	Live reptiles		118	0.19%	
	China		7,463	12.23%		'210390	Preparations for sauces and prepared sauces		55	0.09%	
	Malaysia		3,252	5.33%		'230120	Fish flour		34	0.06%	
Uruguay	China	873,865	793,230	90.77%	97.15%	'120190	Soya beans, whether or not broken	848,969	387,239	45.61%	81.58%
	Vietnam		23,666	2.71%		'020230	Frozen, boneless meat of bovine animals		189,336	22.30%	
	Singapore		13,298	1.52%		'120100	Soya beans, whether or not broken		46,391	5.46%	
	Philippines		10,977	1.26%		'020220	Frozen bovine cuts, with bone in		39,273	4.63%	
	Korea		7,798	0.89%		'020629	Frozen edible bovine offal		30,325	3.57%	
Venezuela	Japan	3,044	3,029	99.51%	100.00%	'180100	Cocoa beans, whole or broken	6,887	4,985	72.38%	97.64%
	China		8	0.25%		'120740	Sesamum seeds		1,394	20.23%	
	Vietnam		5	0.18%		'030559	Dried fish		146	2.12%	
	Korea		2	0.07%		'180632	Chocolate and other preparations		127	1.84%	
						'030371	Frozen sardines		74	1.07%	

Data Source: ITC-Trademap, 2017. Figure by the author.

Table A.2.2 LA and EA's economic and agriculture indicators 2015

	Japan	China	Korea	Colombia	Mexico	Chile	Peru
Economic indicators 2015							
GDP (million USD)	4,383,076	11,064,666	1,382,764	291,519	1,152,263	242,517	189,212
Population	127,141,000	1,371,220,000	51,014,947	48,228,697	125,890,949	17,762,681	31,376,671
Land area (Km^2)	364.56	9,388,211	97.48	1,109,500	1,943,950	743,532	1,280,000
Population density	348.8	146.1	523.3	43.5	64.8	23.9	24.5
GDP per cápita (current USD)	34,474.1	8,069.2	27,105.1	6,044.5	9,152.90	13,653.20	6,030.30
Trade as percentage of GDP	35.6	40.5	83.7	38.6	72.2	59.5	45
Agriculture in the economy							
Agriculture in GDP (%)	1.1	8.8	2.3	6.6	3.6	4.3	7.8
Agriculture share in employment (%)	3.8	28.9	5.2	13.7	13.5	9.6	25.6
Agro food exports (%of total exports)	0.9	3.0	1.3	19.2	7.0	25.1	22.3
Agro food imports (%of total imports)	10.4	6.3	6.1	10.6	6.2	9.4	11.7
Agro food trade balance (million USD)	(-59.869)	(-37.126)	(-19.736)	1,115	2,037	9,747	2,955
Crop in total agricultural production (%)	68	64	63	58	55	63	NA
Livestock in total agricultural production (%)	32*	36*	37*	42*	45*	37*	NA
Agricultural area (AA) (thousand ha)	4,549	515,361	1,788	44,513	106,705	15,809	24,330
Share of arable land in AA (%)	93*	21*	85*	5*	22*	8*	
Share of irrigated land in AA (%)	54*	12*	45*	-	5*	7*	

Note: *2013 Data

Sources: Data Base - World Bank, 2018, Agricultural Policy Monitoring, 2015, ITC-Trademap, 2017 and https://tradingeconomics.com/peru

Chapter 3. The Impacts of FTAs on Latin America's Agricultural Exports to East Asia: A Gravity Model Analysis

3.1 Introduction

In Latin American countries, the agricultural sector is key in terms of employment, production, consumption and international trade. Trade relations between East Asia (EA) [13] and Latin America (LA) [14] have been interindustry where LA exports commodities, mainly mining and agricultural products to EA, while EA exports products of manufacturing and services to Latin America (LA).

With the creation of the Pacific Alliance in 2011, Chile, Colombia, Mexico, and Peru, aimed to develop a deep regional integration going further liberalizing trade of goods, services, investment, and to establish a platform that allows the promotion of LA into the Asia Pacific region. As it was mentioned before agriculture is one of the most important export sectors for these countries, with the major destinations in EA being Japan, China, and Korea. To date, Chile, and Peru have FTAs with Korea, China, and Japan, Mexico has an FTA with Japan, and Colombia recently enacted an FTA with Korea. In addition, Colombia is currently pursuing negotiations with Japan.[15]

The objective of this chapter is to examine the effects of seven FTAs on Latin America's agricultural exports to EA implementing a gravity model (GM) analysis. It is worth mentioning that although previous studies have observed the effects of FTAs on trade in general, the analysis on the agricultural sector and specifically between these two regions has been rather limited. This chapter focuses on the analysis of disaggregated agricultural export data, showing some agricultural subsectors and products that have benefit from tariff reduction under current FTAs, and others identified with no noticeable impact. In this sense, this chapter addresses factors that may hinder agricultural trade between two regions that have the potential to consolidate trade relations.

Other topic addressed in this chapter are as follows: section two reviews previous studies that assessed the effects of FTAs on trade using GM econometric methodology. Section three first explains Latin American agricultural exports to EA, and second, it also examines the EA agricultural imports from the world and from LA, specifically by considering import tariffs charged by East Asian importing countries. Section five defines the methodology and results. Section six briefly describes some important trade

[13] For this chapter, EA only includes major East Asian countries: China, Japan, and Korea.
[14] LA includes the Pacific Alliance countries with active FTA's with EA: Chile, Mexico, and Peru.
[15] The FTA between Colombia and Korea is not included in this study because it was recently enacted on 15th July 2016 and the period for this study is from 2003 to 2015.

restrictions for the agricultural imports in EA that can affect the LA exports to the East Asian region. Section seven presents the conclusions.

3.2 Literature review of GM

Gravity Models are common quantitative tools that have been proven to be very effective in explaining bilateral trade flows and the impacts of FTAs on trade in terms of certain fundamental variables. They are used to measure the effects of implemented FTAs, and help to improve policy-making (Piermartini and Teh, 2005). Furthermore, it has been shown that the GM may be derived from various trade models including the Heckscher-Ohlin model.

The studies of authors such as Tinbergen (1962), Pöyhönen (1963) and Anderson (1979) are considered the theoretical approach and the pioneer studies for gravity models. Tinbergen (1962) defines the fundamentals of the Gravity Models. He establishes that there is an important relation between the distance of countries and the trade volume between them. From this postulate, an empirical and theoretical trend has been developed that seek to answer questions about trade policy using variations of the Tinbergen gravitation model as a fundamental tool. Basically, distance is a measure of the trade cost, the theory indicates that the greater the distance, the less trade.

Recent studies have evaluated the trade effects of FTAs or Regional Trade Agreements (RTAs) using GM. However, only some authors have focused their analysis on the impacts of FTAs specifically on agricultural trade. As a broad example, (Kepaptsoglou, Karlaftis, and Tsamboulas, 2010) reviewed the recent empirical literature on GM from 1999 to 2009. They concluded that despite earlier criticism, the research community has made efforts both in improving the model's theoretical foundation while adopting novel econometric methods for estimating its parameters with more precision.

In regards to the estimation of the GM, Kepaptsoglou, Karlaftisand, and Tsamboulas (2010), perform a meta-analysis where it can be observed that in most of the studies prior to 2010 in which the model is estimated, they are done by a linear regression of Ordinary Least Squares (OLS) on a panel of countries as a database. This is done through the model's log-linearization due to its multiplicative and exponential nature in its estimable parameters, and to the nature and linearity condition of OLS.

Recently there is a generalized trend that turns towards a different methodology that proposes, firstly that the GM should not be estimated in its log-linearized form (to take the logarithm of the series in both sides of the gravitational equation), because it fails when the independent variable takes values equal to 0, due to the non-existence of zero logarithm, as well as they also suggest that such estimation by Ordinary Least Squares

(OLS) is not ideal since it incurs strong biases, as well as problems of heteroscedasticity, which means that, the variance nature of the error is not constant, therefore violating the basic homoscedasticity assumption of OLS (Santos Silva and Teneyro, 2006). In order to solve the above identified limitation, it is established that the estimation of the GM becomes more appropriate if it is carried out in its functional multiplicative form, it means, without proceeding to its linearization. Together with this, its estimation is proposed by using the Poisson Pseudo-Maximum-Likelihood (PPML) estimator, which is useful since it corrects the rejection of the variables that take zero value, as well as, solves the heteroscedasticity problem (Santos Silva and Teneyro, 2006). Although this methodology has been criticized due to its efficiency in estimating short time series with a high presence of zeros (Martin and Pham, 2008), in later works, scholars in the field that use the PPML estimator, reinforce the argument that properly works, when the endogenous variable shows a significant number of zeros, which is the case of trade flows (Santos Silva and Teneyro, 2011).

In a relevant study, Urata and Okabe (2013) analyzed trade creation and diversion effects of RTAs at the product level applying PPML fixed effects. The authors found that RTAs impacts on trade flows differ by product and type of RTA. Trade creation was found for many products, while the trade diversion effect was presented for fewer products in customs unions (CUs) compared with FTAs.

Ando and Urata (2011) also studied the impacts of the Japan-Mexico Economic Partnership Agreement (EPA) on bilateral trade by using two different approaches; trade statistics and the EPA's utilization rate. They used OLS fix and random effects and incorporated FTA dummy variables to capture the impacts of FTAs on trade. They used tariff information at a disaggregated level. The earlier study, Ando and Urata (2015) examined the impacts of specific FTAs such as Japan's FTAs with Malaysia, Thailand, and Indonesia on Japan's trade with them, using disaggregated product level trade data, considering the tariff levels and FTA dummies. Their results did not show significantly positive impacts at the aggregate/sectoral level however they did find positive impacts for specific products whose tariffs were reduced under FTAs.

More specifically on the agricultural sector, Sun and Reed (2010) looked at the effects of FTAs on agricultural trade creation and trade diversion. They estimated the model using a Poisson Pseudo-Maximum-Likelihood (PPML) estimator. They found that the PPML estimation is preferred to Ordinary Least Squares (OLS) and that the estimated impacts of FTAs are different if zero trade observations are considered. They also found that the impacts are sensitive to the specification of the fixed effects and that those impacts vary over time.

In addition, Bureau and Jean (2013) tried to measure the effects of RTAs on trade in agricultural products, estimating a difference-in-differences panel, to quantify the benefits of 78 bilateral trade agreements. They estimated the model at product level. They found benefits on pre-existing trade flow and increase in the probability of exporting new products. They tried to solve the endogeneity issue, by excluding all the zero exports. This could create bias in the estimations, which could be solved using PPML+Fix Effects (FE).

Additionally, Fulponi and Engler (2012) analyzed the case of the impact of RTAs on Chilean fruit exports, in particular, the effects of preferential tariffs on Chile's fruit exports. They concluded that Chilean FTAs with the world have had a positive impact on fruits trade for Chile.

The current study differs from previous ones in the sense that it examines the impacts of FTAs on LA's agricultural exports to EA through a GM analysis by using data on agricultural trade at disaggregated levels. First it considers the agricultural sector (HS 01 to 24), then the four agricultural subsectors (live animals: HS 01-05, fruits and vegetables: 06-14, oils:15 and agroindustry products 16-24) and finally it considers the four most exported products by Chile, Peru and Mexico to the world. The model also includes the FTAs dummies and the preferential tariff rates variables at product level on the most exported agricultural products by LA to major agricultural partners in the world. Two estimators are used PPML fix and random effects and OLS. Thus, this analysis would be useful for evaluating FTA policies in both LA and EA regions.

Table A3.1 shows some GM studies, this analysis varies from others in the implementation of both PPML Fix/Random effect and OLS from two different dependent variables: the LA exports to their main partners in the world and the EA imports from their major partners in the world to measure the FTAs effects between EA and LA specifically for the LA most exported products to the world.

3.3 Chile, Mexico and Peru's agricultural exports to the world and EA

Chile's agricultural exports accounted for 25% of its total worldwide exports in 2015. These exports increased from US$ 6,175 million in 2003 to US$ 15,644 million in 2015 (ITC Trademap, 2016), while its main destinations were: The US, accounting for 25.2% of the total, Japan 9.4%, and China 9.2%. Korea was the ninth destination representing 3.3% (Table 3.1).

Chile's first FTA with an East Asian country was with Korea (enacted in April 2004). It was also the pioneer to develop an agreement between EA and the Latin American region. Chile subsequently initiated negotiations with China and later with Japan. The agreements came into effect in October 2006 and in September 2007, respectively (SICE-OAS, 2016a).

It is important to underline, that Japan is the main destination for Chile's agricultural products to EA, exporting in average (2003-2015) US$1,429 million. The FTA Chile-Japan covers 1,007 agricultural products, however, 338 among them were excluded, accounting for 34% of total negotiated products. Furthermore, 21 products have quotas to access the Japanese market. Japan also imposes some seasonal tariff for products such as fresh grapes. Among products excluded from Japan are: some bovine and pork meat, some fish, dairy products, some vegetables, wheat, rice, sugarcane, cocoa powder, some alcoholic beverages and tobacco (table 3.2) (SICE-OAS, 2016d).

Table 3.1. Chile's main agricultural export partners (2003) and (2015) (US$ 000)

Chile Main Partners	Exported value in 2003	Share 2003	Exported value in 2015	Share 2015
US	2,031,397	32.69%	3,961,661	25.21%
Japan	842,147	13.55%	1,472,751	9.37%
China	178,692	2.88%	1,448,518	9.22%
Brazil	117,937	1.90%	913,257	5.81%
Netherlands	218,023	3.51%	619,487	3.94%
Russia	43,488	0.70%	581,093	3.70%
Mexico	286,503	4.61%	568,265	3.62%
UK	277,184	4.46%	560,965	3.57%
Korea	80,844	1.30%	515,274	3.28%
Peru	100,755	1.62%	399,499	2.54%
Colombia	90,128	1.45%	373,288	2.38%
Germany	195,220	3.14%	333,480	2.12%
Canada	90,259	1.45%	328,719	2.09%
Spain	222,309	3.58%	299,177	1.90%
Italy	118,600	1.91%	234,252	1.49%

Data source: ITC Trademap (2016).

The second destination for Chile's agricultural products in EA is China, exporting in average (2003-2015) US$663 million. Even though the Chilean agricultural exports to China are less than Japan, the Chinese market is rapidly increasing for Chile's agricultural products. In this FTA, 1,151 products were included and only 50 (4.3%) of them excluded. China does not impose either quotas or seasonal tariff to any LA country, and it also excluded products such as wheat, maize, palm oil, sugar and urea (SICE-OAS, 2016c).

Despite the fact that the FTA Chile-Korea is the oldest agreement for Chile, Korea is the third market for Chile´s agricultural products in EA, exporting only in average US$ 309 million. Among the 1,670 products included in the agreement, 387 of them were removed, representing 23%. Additionally, 16 products were subjected to quota to enter the Korean market, furthermore, the fresh grapes and orange have seasonal tariffs. Korea excluded some Chilean products such as rice, pears, apples, frozen peppers and some food preparations made with cocoa (SICE-OAS, 2016b).

Among the most exported by Chile agricultural products to the world (2003-2015)[16] were fresh grapes, wines, apples and fish flour. Those were selected for the product level analysis. The fresh grapes are exported to the three EA markets and subjected to seasonal quota to enter the Japanese and Korean markets. Amongst the three countries, fresh grapes have the highest preferential margin (PM) from Korea (PM is defined as the difference between Most Favored Nation (MFN) tariff rate and the FTA tariff applied). Whereas the wines are subjected to import quotas into the Japanese market, they pay tariffs to enter China and Korea. As for Chilean apples, they are exported mainly to China, where their PM is slightly better than in Japan, whose market is difficult for them giving strong SPS restrictions. Chilean apples were excluded from the FTA with Korea. Finally, fish flour is an important product for three EA countries imports, being China its main destination and Korea the market with a better PM (see table 3.3) and (table A.3.6).

With regard to Mexico, its agricultural exports accounted for seven percent of total its worldwide exports in 2015. Lately, Mexico's worldwide agricultural exports have increased from US$ 9,176 million in 2003 to US$ 26,470 million in 2015 (ITC Trademap, 2016). By far, The US is the main destination for Mexico's agricultural exports representing 79% of the total, followed by Japan (3%) and Canada (2%). Among EA countries, Japan is the main destination, followed by China and Korea (table A3.2)

In the EA region, Mexico only has enacted an FTA with Japan, in April 2005. Mexico's agricultural exports to Japan were on average (2003-2015) US$ 552 million. Among the 931 products negotiated in the FTA, 383 (41%) Mexican agricultural products were excluded from the agreement and 36 were subjected to import quotas. Some important agricultural products such as some bovine and pork, some fish, dairy products, some fruits and vegetables, maize, wheat, rice, soybeans, palm oil and coffee were excluded by Japan (SICE –OAS, 2016e) (table 3.2).

[16] It is important to highlight the period taken in this chapter differs from the period analyzed in section 2.3.3. In this chapter the period is longer for the sake of the econometric analysis.

Among the most agricultural products exported from Mexico to the world are the malt beer, tomatoes, ethyl alcohol (tequila) and avocados. However, the malt beer was not included in the GM analysis because beer showed not Preferential Margin in the Japan-Mexico FTA, so the cucumbers and gherkins (HS 070700) were included in the analysis because were also among the most exported products from Mexico to the world and showed PM in the Japan-Mexico FTA. The avocados were the most exported product from Mexico to Japan with a preferential margin of 3%. The ethyl alcohol (tequila) is exported to Japan and is subjected to import quotas and SPS restrictions (table 3.3).

Peru's agricultural exports represented 22.16% of its total exports worldwide. In 2003 total agricultural exports were US$ 1,850 million, and in 2015 they increased up to US$ 7,367 million in 2015. The main recipients of Peruvian agricultural exports were: The US 25%, China 15%, and Netherlands (9%). China was the first export destination in EA, followed by Korea and Japan (ITC Trademap, 2016), (table A3.3).

Compared to Chile, Peru is a latecomer for FTA with EA. The first FTA enacted by Peru with any EA country was with China in March 2010. Later, the FTAs with Korea and Japan came into effect in August 2011 and March 2012 respectively (SICE-OAS, 2016a).

China is the main destination for Peru's agricultural products in EA, exporting in average (2003-2015) US$827 million. Among the 1,178 agricultural products included in the FTA Peru-China, 90 (7.6%) were excluded from the agreement. Those excluded products from this FTA were some fish, coffee, maize, wheat, vegetable oils, some salmon, sugar, and tobacco (table 2) (SICE-OAS, 2016f)

Japan is the second destination for Peru's agricultural products to EA, exporting in average (2003-2015) US$197 million. 1,057 products were included in the FTA, however, 273 (24%) products were excluded. Furthermore, 19 products are subjected to import quotas to enter the Japanese market. Among products excluded from Japan, there are some meat of bovine and pork, some fish and salmons, dairy products, rice, maize, wheat, sugar, cocoa powder, some fruit juices, extract of coffee, and tobacco (SICE-OAS, 2016h).

Korea is the third market for Peru´s agricultural products in EA, exporting only (2003-2015) US$ 80 million in average. Among the 1,796 products included in the FTA Peru-Korea, 107 (6%) were dropped. Korea excluded products such as fish, onions, sweet peppers, garlic, apple, and rice (SICE-OAS, 2016g).

Fish flour, coffee, fish oils, and fresh asparagus are the most exported agricultural products from Peru worldwide. The fish flour is the most exported product from Peru to

EA. It has a PM to access the Chinese and Korean market. The coffee is excluded from the Chinese market, and does not pay any tariff to the Japanese market and has a PM from Korea. The fish oils have a PM in all three markets, having the major benefit from China. Finally, fresh asparagus has a PM in three countries, obtaining the best benefit from Korea (table 3.3).

Table 3.2. Chile, Mexico and Peru's agricultural exports by subsector to Japan, China, and Korea. Products included and excluded from each FTA.

	Japan	China	Korea
Chile			
Agricultural exports US$ million (2003-2015)	US$1,429	U$663	US$309
Live animals (HS 01-05)	75%	19%	47%
Fruits and vegetables (HS 06-14)	8%	39%	29%
Animal and vegetables oils (HS 15)	1%	1%	1%
Products of food industry (HS 16-24)	16%	41%	23%
Products included in the FTA	1,007	1,151	1,670
Products excluded from the FTA	215	50	21
Products under category "R"	123	0	0
Products under category "DDA"	0	0	366
Products with quota	21	0	16
Mexico			
Agricultural exports US$ million (2003-2015)	US$552	US$57	US$48
Live animals (HS 01-05)	64%		
Fruits and vegetables (HS 06-14)	24%		
Animal and vegetables oils (HS 15)	1%		
Products of food industry (HS 16-24)	11%		
Products included in the FTA	931		
Products excluded from the FTA	383		
Products with quota	36		
Peru			
Agricultural exports US$ million (2003-2015)	US$197	US$827	US$80
Live animals (HS 01-05)	12%	3%	31%
Fruits and vegetables (HS 06-14)	17%	5%	39%
Animal and vegetables oils (HS 15)	5%	2%	2%
Products of food industry (HS 16-24)	66%	90%	28%
Products included in the FTA	1,057	1,178	1,796
Products excluded from the FTA	256	90	107
Products under category "R"	17		
Products with quota	19	0	0

Note: In FTA Chile-Japan and FTA Peru-Japan: Category "R" means that customs duties on originating goods classified under the tariff lines indicated with "R" shall be excluded from any tariff commitment and be subject to negotiation between the Parties in the fifth year from the date of entry into force of this Agreement.
In the FTA Chile-Korea: Category "DDA" means that tariff elimination schedule shall be negotiated after the end of the Doha Development Agenda negotiations of the WTO. Products under category "R" and "DDA" have not been negotatied.
Source: ITC Trade Map 2016, SICE-OAS (2016 b,c,d,e,f,g, h).

Table 3.3 Selected products with FPM in the Chile, Mexico, and Peru FTAs with EA.

Exporter	HS Code	Description	Exports average (2003-2015) to the world (000)	Product share of total agricultural exports to the world (2003-2015)	Export average (2003-2015) to EA (000)	Product share of total agricultural exports to EA (2003-2015)	FTA Preferential Margin (FPM) 2015		
							Japan 2015	Korea 2015	China 2015
Chile	080610	Fresh grapes	1,218,475	10.01%	121,685	5.49%	7.97	45.00	13.00
Chile	220421	Wine of fresh grapes	1,155,679	9.49%	121,358	5.48%	N.A	15.00	14.00
Chile	080810	Fresh apples	581,266	4.77%	9,122	0.41%	9.56	N.A	10.00
Chile	230120	Fish flour	460,543	3.78%	256,769	11.59%	0.00	5.00	3.50
Peru	230120	Fish flour	1,325,197	25.38%	808,719	73.28%	0.00	5.00	2.78
Peru	090111	Coffee beans	651,069	12.47%	32,161	2.91%	0.00	2.00	N.A
Peru	150420	Fish oils	280,944	5.38%	25,568	2.32%	7.00	3.00	9.00
Peru	070920	Fresh or chilled asparagus	265,847	5.09%	3,277	0.30%	3.00	27.00	13.00
Mexico	220890	Ethyl alcohol (Tequila)	789,967	4.47%	13,400	2.04%	N.A	0.00	0.00
Mexico	080440	Fresh or dried avocados	720,672	4.08%	69,608	10.58%	3.00	0.00	0.00
Mexico	070200	Tomatoes, fresh or chilled	1,388,897	7.86%	78	0.01%	3.00	0.00	0.00
Mexico	070700	Cucumbers and gherkins	312,492	1.76%	-	0.00%	3.00	0.00	0.00

Note: this table is a summary of the 12 selected products with PM in each of the seven FTA in the year 2015. Tariff information was analyzed for each product from the importer side from 2003 to 2015 when the product was enacted in each FTA. See also Table A.3.3 for information about other major agricultural export partners. "Detailed information is also available from the author on request".
Data source: Tariff information was taken from each FTAs annex at SICE-OAS (2016a) and from WITS (2016).

3.4 Japan, Korea and China's agricultural imports from the world and from LA

This section complements the previous one as, it includes EA agricultural imports from major agricultural partners in the world and from LA at aggregate, sectoral and product level. Agricultural imports at product level are subject to a careful examination since the section analyzes in detail the preferential margin offered by Japan, China, and Korea to their main agricultural suppliers. In the sample, the same products selected on the previous section were also considered for the sake of consistency, accounting 11 products taking into account that fish flour was a common product for both Chile and Peru.

As was already mentioned in chapter 2, Japan total agricultural imports have increased from US$ 48,866 million in 2003 to US$ 65,266 million in 2015. In 2015, main agricultural import partners were: The U.S. accounting for 22.1% of total world agricultural imports, followed by China (13.45%), Thailand (6.18%), Australia (5.84%) and Canada (5.69%). Among the main agricultural import partners, Chile only represents 2.53% of Japan's total agricultural imports being the 8th most important import partner, while agricultural imports from Mexico only represents (0.0014%) and Peru (0.00024%) occupying the 15th and 40th place respectively among Japan total imports (see table 3. 4).

Among the main agricultural import partners, Japan has an EPA with Chile (2007), Peru (2012), Australia (2014) and ASEAN countries (2008). Although, Japan has an EPA with ASEAN, it also has bilateral EPA with the ASEAN major agricultural import partners selected in the sample such as: Thailand, Philippines, Indonesia, and Vietnam. For the sake of the analysis in the case of ASEAN members, the PM was taken from the EPA Japan- ASEAN instead of each bilateral agreement. This in order, to be consistent with the agreements that ASEAN has as well with Korea and China, their agreement with ASEAN as a whole group will be considered in this analysis (see table A3.7).

Among the 11 products identified as the main exported products by the PA to EA, only two represent more than 1% of Japan's total agricultural import from the world, coffee (1.84%), and wine (1.34%) in 2003-2015 average. In the case of coffee, Japan's coffee imports from Peru, Chile, and Mexico only represented 1.66% of Japan's total agricultural imports from the world. Even though Peru and Mexico are small suppliers of coffee to the world, Japan´s major imports of coffee beans come from other origins such as Brazil, Colombia and Vietnam representing 34%, 20%, and 10% respectively. Japan´s imports of Coffee beans from Peru only accounted for 0.5% and from Mexico 0.4% among total Japan's coffee imports from the world. It is important to highlight that Peruvian and Mexican coffee beans do not have PM to enter to Japan because they do not pay any tariff, as well as, the other FTA partners.

Table 3.4 Japan's main agricultural import partners (2003 and 2015) (US$000)

Japan's Main Partners	Average (2003-2015)	Imported value in 2003	Share 2003	Imported value 2015	Share 2015	Change
USA	15,950,941	14,602,162	29.88%	14,425,273	22.10%	-9.56%
China	8,735,972	6,635,671	13.58%	8,780,673	13.45%	0.51%
Thailand	3,462,333	2,443,960	5.00%	4,030,878	6.18%	16.42%
Australia	4,310,753	3,146,634	6.44%	3,813,617	5.84%	-11.53%
Canada	3,842,752	2,707,880	5.54%	3,713,445	5.69%	-3.36%
Brazil	2,402,092	989,736	2.06%	3,011,614	4.61%	25.37%
Korea	1,715,042	1,377,625	2.82%	1,888,425	2.89%	10.11%
Chile	1,545,353	986,669	2.00%	1,650,566	2.53%	6.81%
France	1,688,474	1,325,628	2.71%	1,626,097	2.49%	-3.69%
Vietnam	669,316	716,947	1.49%	1,351,787	2.07%	101.97%
New Zeland	1,137,811	825,591	1.71%	1,218,051	1.87%	7.05%
Philipinnes	814,250	751,081	1.65%	1,180,580	1.81%	44.99%
Indonesia	729,890	974,272	2.04%	1,112,763	1.70%	52.46%
Russia	1,181,929	1,063,364	2.18%	1,021,463	1.57%	-13.58%
Mexico	737,130	432,687	0.90%	961,067	0.00%	122.12%
Peru	224,201	142,848	0.29%	157,546	0.00%	10.29%

Data source: ITC Trademap (2006).

In the case of Japan's imports of wine from Chile, they accounted for 8% of the total imports from the world. However, Chile is the third origin of wine in Japan after France whose imports of wine accounted for 54% and Italy 17%. The U.S. is ranked at the fourth place representing 7.6% of total imports. Japan imposes an import quota for wines from all origins and this explains why there is no FPM for wine in the case of Chile and other important trading partners.

Another relevant fact is that among Japan's total imports from the three LA countries the main products are fish flour representing 8.14%, followed by avocados (3.73%), wine (2.68%), asparagus (1.16%), fish oils (0.9%) and coffee (0.77%). In the case of fish flour, Japan's world imports average (2003-2015) were US$ 341 million, and among them, 62% were imported from the PA. The main fish flour's suppliers to Japan are Peru (40%) and Chile (20%). Other important fish flour suppliers to Japan are Ecuador, Thailand, the United States and Vietnam. Mexico only represented 0.02%. Fish flour does not pay any tariff in order to enter the Japanese market.

With respect to avocados, it is important to remark that Mexico, Chile and Peru are suppliers of avocados to Japan. The three countries represent 93% of total Japan's avocados imports from the world. Mexico has been supplying avocados to Japan for many years and it is by large the main world supplier accounting for 91% of total imports. Chile also supplies small quantities, and Peru has started avocados since 2015.[17] Other avocados suppliers to Japan are the US and New Zealand. Avocados exports from Mexico, Peru and Chile have preferential margin because the product is liberalized in the first year of the agreement enactment for the three markets: In contrast, the U.S. and New Zealand have a 3% tariff for their avocados to enter the Japanese market.

Japan's imports of fresh asparagus were US$ 73 million in average (2003-2015). The main supplier of asparagus to Japan is Mexico accounting for 30% of total imports, followed by Australia 22% and Thailand 17%. Peru has recently been increasing exports of asparagus to Japan but this only accounts for 11%, and the U.S. 7.3%. The three countries from the PA, the ASEAN countries and Australia have a PM of 3% to enter the Japanese market, other suppliers have to pay tariffs.

Imports of fish oils from Japan were US$ 40 million, where the three LA countries are suppliers of this product and accounted for 59% of the total, being Chile, the main supplier, followed by Peru, the U.S., Denmark and Mexico. It is important to note that China and Korea also exported this product to Japan. The three countries from the PA, Australia and ASEAN have a PM of 12% to enter the Japanese market. Other countries have to pay the MFN tariff of 12%.

It worth mentioning that Japan imports apples for many sources worldwide (US$ 1.5 million), however, it does not import any apples from LA. The main supplier of apples are New Zealand, followed by Australia with small exports. Chile and Peru have PM to enter the Japanese market as well as ASEAN countries and Australia (ITC-Trademap, 2017), (Table 3.5) and (Table A.3.8).

Similar to Japan, Korea´s total agricultural imports increased from US$ 10,241million in 2003 to US$ 26,805 million in 2015. In 2015, main agricultural import partners were: the US accounting for 23.74% of total world agricultural imports, followed by Australia (8.83%), Brazil (6.84%), Vietnam (3.49%) and Russia (3.29%). Among the agricultural major import partners, Chile only represents 2.22% of Korea's total agricultural imports being the 10th most important import partner, while agricultural imports from Peru only represent (0.75%) and Mexico (0.32%) ranked the 26th and 34th place respectively among Korea's total agricultural imports (see table A3.4).

Among the main agricultural import partners, Korea has an FTA with Chile (2004), ASEAN (2006), India (2010), Peru (2011), EU (2011), the US (2012), Australia (2014),

[17] In the case of Colombian avocados, it is important to mention that after many years of negotiations between MFF in Japan and the Colombian Institute of Agriculture (ICA in Spanish), the exports of avocados "Hass" from Colombia to Japan (export protocol) were recently approved on March 16th, 2018 (ICA,2018).

China (2015) and Canada (2015). Similar to Japan, Korea also has an FTA with some of the ASEAN partners considered as most important agricultural partners such as Vietnam, Thailand, and the Philippines (see table A3.7).

Among the 11 products identified as the main exported products by LA to EA, only one product represents more than 1% of Korea's total agricultural import from the world, coffee (1.37%), in 2003-2015 average, followed by wines, grapes and fish flour representing only 0.56%, 0.47% and 0.30% respectively among its total agricultural imports.

Korea's imports of coffee were US$267 million in 2003-2015 average, representing 23% of those from Japan. Even though coffee imports from Korea are less than the ones from Japan, coffee imports of Korea have been steadily increasing in the period studied, reaching US$ 433,933 in 2015. In the period 2003-2015 average, the main provider of coffee to Korea has been Vietnam (22%), followed by Brazil (20%) and Colombia (19%), however, Vietnamese coffee has been losing participation in the Korean market and Brazil while in contrast Colombia´s coffee has been increasing its participation. Peru is also a coffee supplier for Korea, representing 9% of total Korean coffee imports. Korean coffee imports from Mexico only represent 0.71%. Besides Vietnam, it is important to analyze the participation of other coffee producers in Asia. This is the case of Indonesia (2.51%), India (1.38%) and even China (0.85%). China is a small producer of Arabica coffee, however, it started to selling coffee to Korea in 2002 and it has been increasing its small participation in the Korean coffee market (ITC-Trademap, 2017). Korea applies a low MNF tariff of 2% to imported green coffee beans. All of the Korean FTA's partners enjoy a tariff reduction from this country, however, in the case of Brazil there is no PM due to the fact this Latin American country does not currently have an FTA with Korea.

Among the total agricultural imports of Korea from Chile, Mexico, and Peru in the same period, grapes appear to be the most relevant of the 11 products analyzed, accounting for 16.29%, followed by fish flour 7.49%, coffee 5.47%, and wine 4.84%. In the case of grapes, Korea´s imports were US$ 91 million and from those, US$ 80 million were imported from the PA, being Chile the main supplier accounting for 83%, and Peru for 5%. The U.S. accounted for 12% in the period of 2003 and 2015. It worth noting that Korean grape imports from Peru just started when the FTA entered into force in 2011. The same happened with Australia, which only in 2011 started exporting grapes to Korea. Canada and the Philippines also have been supplying grapes to the Korean market but in small quantities and occasionally (ITC-Trademap, 2017). Korea applies seasonal tariff for its imports of grapes from all origins, the PM given to main agricultural import partners is calculated in Table A3.8. Korean grapes imports from Chile and ASEAN have a better PM than the other grape export partners.

Korea's imports of fish flour only account for US$ 58 million, among them, imports from Chile and Peru represent 63% of the total agricultural imports from the world, being Chile the main supplier accounting for 56% of the total. Other important fish flour suppliers for Korea are Denmark (13%), US (6.8%) and Peru (6.6%). Countries such as Vietnam and even Russia also supply fish flour to Korea. The PM offered by Korea to fish flour imports are similar to those in the case of Chile and Japan, and less than the PM offered to ASEAN, the U.S., Canada and even China.

Korea's imports of wines only account for US$109 million, where the main supplier is France accounting for 33%, followed by Chile 22%, Italy 14%, and the US 12%. Australia is also an important supplier in the region. Korea's imports of Chilean wines have been steadily increasing from US$3 million in 2003 to US$ 41 million in 2015. The wine's MFN tariff is 15% and Korea varies the years of tariff reduction for each FTA partner, in 2015, Korea applied the same tariff for major wine import partner (ITC-Trademap, 2017), (Table 3.5) and (Table A.3.8).

In China, total agricultural imports have considerably increased from US$15,511 million in 2003 to US$ 105,410 million in 2015. In 2015, major agricultural import partners were: the US accounting for 21.05% of total world agricultural imports, followed by Brazil (18.62%), Australia (5.07%), Argentina (4.77%), Canada (4.67%) and Thailand (4.60%). Among the main agricultural import partners, Chile only represents 1.74% of China's total agricultural imports being the 12th most important import partner, while agricultural imports from Peru only represent (1.34%), and Mexico (0.18%), ranking the 18th and 40th place respectively among China's total agricultural imports (see table A3.5).

Taking into account the main agricultural import partners, China has an FTA with ASEAN (2005), Chile (2006), New Zealand (2008), Peru (2010) and Australia (2015). Additionally, China also has Bilateral Free Trade Agreements with major agricultural partners from ASEAN such as Malaysia, Indonesia, Thailand, and Vietnam (see table A3.7).

Among the 11 products identified as the main exported by LA to the world, only two represent more than 1% of China's total agricultural import from the world, fish flour (2.27%), in 2003-2015 average, followed by wines (1.18%). China's imports of grapes are also relevant, but they are only 0.42% of the world agricultural imports.

China's imports of fish flour were US$1,321 million in 2003-2015 average. China's fish flour imports from LA represented 72% of its world import from this product. Peru is the main supplier of fish flour to China in the world, representing 56% of China's world import of this product, the second is Chile (14%) and the third is the US (10%). Mexico's fish flour imports only account for 1%. The fish flour PM given by China to its major

FTA partners is an average of two tariff lines, and in the case of Chile, the PM is better compared with other partners such as Peru. Fish flour from the US has to pay a tariff to access the Chinese market.

China's imports of wines were US$ 686 million in 2003-2015. Major China's wine suppliers are: France accounting for 49% of world total imports, followed by Australia (18%), Chile (7%), Spain (6%) and Italy (6%). China's MFN tariff for wine is 14%. Chile has enjoyed a tariff reduction. Since China enacted the FTA with Australia, Australian wines have also benefited from tariff reduction. However, China's imports of wine from the EU do not have a similar benefit since there is no FTA between those two countries. In this case, it is important to note that despite the absence of an FTA, France remains as China's main wine supplier.

Among the 11 products selected in the sample, the most relevant China's imports from LA include, fish flour accounting for 49%, followed by grapes (9%), and wines (2.6%). China's imports of grapes were US$ 246 million in 2003-2015 average, among them, imports from LA accounted for 69% being Chile the main supplier, representing 42% of China's total imports from the world, followed by the US as the second grapes provider with 29% of the total and by Peru with 19%. China also imports grapes from Australia, accounted for 3% of the total grape imports. Although the average China's MFN tariff on grapes is 13%, in 2015, grapes imported from Chile did not have to pay tariffs. It is worth mentioning that to date, Peru has a PM of 11.7%, Australia has a PM of 2.6% and the U.S. does not have any PM.

To each of the most exported products from LA to EA, it's important to remark some products such as apples and coffee. China's imports of apples are small (US$ 60 million in 2003-2015 average), only representing 0.10% of its total agricultural imports from the world. However, the main supplier of apples to China is Chile (49%). Imports of this country have a PM of 10%. The U.S. amounts as the second supplier representing 34%, however, it does not have the benefit of any tariff reduction due to the fact that it has not signed any FTA with China. New Zealand ranks as China's third apples supplier accounting for 15% of China's total apple imports and similarly to Chile, it enjoys a PM of 10%. With regards to coffee, China's imports from LA seem rather small (US$61 million in 2003-2015 average). The main coffee suppliers to China are from the EA region: Vietnam represents the 66% of China's total imports and Indonesia for 25%. China's coffee imports from Brazil and Colombia only represent 6% and 4% respectively. Peruvian coffee is excluded from the FTA with Chin, however, China imports some small quantities of Peruvian coffee. China's MFN tariff for coffee is 8%. Coffee from ASEAN countries such as Vietnam and Indonesia have a PM of 7.3%.

Table 3.5 Selected products with FPM in Japan, Korea, and China´s FTAs with LA.

Importer	HS Code	Description	Imports Average (2003 - 2015) (000) from the world	Product share of total agricultural imports from the world	Imports Average (2003 - 2015) (000) from LA	Chile, Mexico and Peru's share in total agricultural imports from the world	Product share of total agricultural imports from LA	FTA PREFERENTIAL MARGIN		
								Chile 2015	Peru 2015	Mexico 2015
Japan	HS080610	Fresh grapes	33,785	0.05%	17,760	52.57%	0.69%	7.97	3.54	8.40
Japan	HS220421	Wine of fresh grapes	868,432	1.34%	69,102	7.96%	2.68%	N.A	N.A	N.A
Japan	HS230120	Fish flour	341,395	0.53%	210,117	61.55%	8.14%	0.00	0.00	0.00
Japan	HS080810	Fresh apples	1,477	0.00%	-	0.00%	0.00%	9.56	4.53	N.A
Japan	HS090111	Coffee beans	1,189,422	1.84%	19,802	1.66%	0.77%	0.00	0.00	0.00
Japan	HS150420	Fish oils	40,288	0.06%	23,137	57.43%	0.90%	7.00	7.00	7.00
Japan	HS070920	Fresh or chilled asparagus	73,227	0.11%	29,944	40.89%	1.16%	3.00	3.00	3.00
Japan	HS220890	Ethyl alcohol	144,097	0.22%	11,412	7.92%	0.44%	N.A	N.A	N.A
Japan	HS070200	Tomatoes	16,963	0.03%	602	3.55%	0.02%	3.00	1.20	3.00
Japan	HS080440	Fresh or dried avocados	103,939	0.16%	96,244	92.60%	3.73%	3.00	3.00	3.00
Japan	HS070700	Cucumbers and gherkins	641	0.00%	1	0.12%	0.00%	3.00	3.00	3.00
Korea	HS080610	Fresh grapes	90,958	0.47%	80,197	88.17%	16.29%	45.00	22.50	0.00
Korea	HS220421	Wine of fresh grapes	108,764	0.56%	23,808	21.89%	4.84%	15.00	15.00	0.00
Korea	HS230120	Fish flour	58,296	0.30%	36,854	63.22%	7.49%	5.00	5.00	0.00
Korea	HS080810	Fresh apples	42	0.00%	-	0.00%	0.00%	N.A	N.A	0.00
Korea	HS090111	Coffee beans	266,839	1.37%	26,947	10.10%	5.47%	2.00	2.00	0.00
Korea	HS150420	Fish oils	14,468	0.07%	4,422	30.56%	0.90%	3.00	3.00	0.00
Korea	HS070920	Fresh or chilled asparagus	1,769	0.01%	768	43.41%	0.16%	27.00	27.00	0.00
Korea	HS220890	Ethyl alcohol	7,745	0.04%	2,086	26.93%	0.42%	26.00	26.00	0.00
Korea	HS070200	Tomatoes	-	0.00%	-	0.00%	0.00%	45.00	32.14	0.00
Korea	HS080440	Fresh or dried avocados	2,439	0.01%	235	9.63%	0.05%	30.00	30.00	0.00
Korea	HS070700	Cucumbers and gherkins	50	0.00%	-	0.00%	0.05%	27.00	13.50	0.00
China	HS080610	Fresh grapes	245,513	0.42%	169,118	68.88%	8.78%	13.00	11.70	0.00
China	HS220421	Wine of fresh grapes	686,362	1.18%	49,415	7.20%	2.6%	14.00	5.60	0.00
China	HS230120	Fish flour	1,320,955	2.27%	945,640	71.59%	49.1%	3.50	2.78	0.00
China	HS080810	Fresh apples	60,239	0.10%	28,406	47.16%	1.5%	10.00	6.00	0.00
China	HS090111	Coffee beans	60,544	0.10%	74	0.12%	0.0%	8.00	N.A	0.00
China	HS150420	Fish oils	57,922	0.10%	26,435	45.64%	1.4%	12.00	9.00	0.00
China	HS070920	Fresh or chilled asparagus	25	0.00%	-	0.00%	0.0%	13.00	13.00	0.00
China	HS220890	Ethyl alcohol	33,194	0.06%	2,215	6.67%	0.1%	10.00	9.33	0.00
China	HS070200	Tomatoes	-	0.00%	-	0.00%	0.0%	13.00	13.00	0.00
China	HS080440	Fresh or dried avocados	4,696	0.01%	4,688	99.82%	0.2%	25.00	25.00	0.00
China	HS070700	Cucumbers and gherkins	4	0.00%	-	0.00%	0.0%	13.00	13.00	0.00

Note: this table is a summary of the 11 selected products with PM in each of the seven FTA in the year 2015. Tariff information was analyzed for each product from the importer side since 2003 to 2015, when the product was liberalized in each FTA. See also Table A.3.7 for information about other major agricultural import partners. "Detailed information is also available from the author on request".

Data source: Tariff information from Japan, Korea and China was taken from each FTAs annex at SICE-OAS (2016a) and from WITS (2016).

Even though China's imports of avocados are small (US$ 5 million in 2003-2015 on average), it is important to highlight the importance of LA as an avocado supplier to China. Avocados from Mexico represent 87.78% of the total, followed by Chile 11.49% and Peru 0.5%. In spite that Mexico is the first supplier it nonetheless pays 25% in order to access the Chinese market since there is no an FTA between the two countries. Chile and Peru have a PM of the same percentage. Chile started exporting avocados to China in 2014 for US$ 293 thousand and it increased exports up to US$ 6.7 million in 2015 and US$ 36 million in 2016. Similar to Chile, Peru recently started exporting avocados to China. In 2015 Peruvian exports were US$ 303 thousand, increasing to US$ 11 million in 2016. The above suggest and opportunity to increase the presence of avocados from Chile, Peru, and Mexico in the Chinese market.

3.5 Gravity Model estimation

3.5.1 Methodology

This section quantitatively analyzes the impacts of seven FTAs between LA and EA. More explicitly, its aim is to examine whether LA countries' agricultural exports and EA's agricultural imports have expanded due to the FTAs signed between countries of both regions. This analysis is conducted by applying a GM controlled by economic conditions that are likely to influence bilateral trade, such as distance and size of the economy.

Given the high explanatory power of the standard variables used in the GM, this model also includes other variables such as agricultural land and preferential margins indicating that these variables are important for agricultural trade. Although the inclusion of the variable of agricultural land is novel in the scholarly literature, and it is nonetheless relevant since this analysis is focused on agriculture.

For this purpose, the GM is conducted at the aggregate, sectoral and product levels, with a specific focus on products mentioned in section 3.3. The sample data pool is derived from the 2003-2015 period, during which the seven FTAs were enacted. PPML + FE, PPML+RE and OLS models are applied.[18] PPML manages databases better with

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[18] As was already mentioned in the Literature review in section 3.2. Since the mathematical formalization of the equation is given in an exponential multiplicative way, it´s necessary to express it in a linear way to estimate the parameters. This is achieved by applying natural logarithm to the equation by OLS, since it´s appropriate to log-linearized the estimation. Also, since the problem that ln (0) generates missing and the presence of heteroscedasticity is common by the nature of trade variables, the use of PPML is applied, which allows estimation based on the original functional form of the model.

many zeros in the dependent variable. This is the case for the sectoral and product level, where not all the products are exported to all countries.

The following equation is estimated for the aggregate, sectoral and product levels:

$$(1)\quad \ln(Exports_{i,j,t}) = \beta_0 + \beta_1 ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t}) + \beta_4 ln(AgriL_{j,t}) + \beta_5 FTADummy_{i,j,t} + \beta_6 (FTADummy_{i,j,t} * FTADummy_{i,Japan}) + \beta_7 (FTADummy_{i,j,t} * FTADummy_{i,Korea}) + \beta_8 (FTADummy_{i,j,t} * FTADummy_{i,China}) + \varepsilon_t + c_j$$

Where $Exports_{i,j,t}$ is country i´s agricultural exports to country j in year t, $Dist_{ij}$ distance between countries i and country j, $GDP_{j,t}$ ($GDP_{i,t}$), real GDP of country j (i) in year t, $AgriL_{j,t}$ is the agricultural land available in countries j. $FTA_{\,i,j,t}$ is a generic FTA dummy between countries i and j in year t. $FTADummy_{i,j,t} * FTADummy_{i,Japan}$, $FTADummy_{i,j,t} * FTADummy_{i,Korea}$ and $FTADummy_{i,j,t} * FTADummy_{i,China}$ are interactions dummies for country i with Japan, Korea, and China in year t. Countries i represents Chile, Mexico and Peru, while country j represents the major agricultural export partners of each LA country.

Note that FTA dummy variables are used for Chile, Mexico, and Peru, based on the date of the FTA have come into force, which is one if Chile, Mexico, and Peru have an FTA with country j and came effective before year t and 0 otherwise. At product level is 1, when tariff reduction is applied and 0 otherwise.

For a product level analysis, equation (2) was also estimated:

$$(2)\quad \ln(Exports_{i,j,t}) = \beta_0 + \beta_1 ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t}) + \beta_4 ln(AgriL_{j,t}) + \beta_5 FPM_{j,i,t} + \beta_6 (FPM_{j,i,t} * FTADummy_{i,Japan}) + \beta_7 (FPM_{j,i,t} * FTADummy_{i,Korea}) + \beta_8 (FPM_{j,i,t} * FTADummy_{i,China}) + \varepsilon_t + c_j$$

Where $FPM_{j,i,t}$ is FTA Preferential Margin (FPM) (FPM= MFN-FTA tariff applied by country j to country i in year t), and $(FPM_{j,i,t} * FTADummy_{i,Japan})$, $(FPM_{j,i,t} * FTADummy_{i,China})$,$(FPM_{j,i,t} * FTADummy_{i,Korea})$, are interaction variables which isolates the effect of trade agreements between country i and China, Japan and Korea. This additional equation is conducted to examine the tariff reduction impact on Chile, Mexico and Peru.

The following equations are also estimated for the aggregate, sectoral and product levels:

$$(3)\quad \ln(Imports_{i,j,t}) = \beta_0 + \beta_1 ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t})$$

$+ \beta_4 ln(AgriL_{j,t}) + \beta_5 FTADummy_{i,j,t} + \beta_6(FTADummy_{i,j,t} * FTADummy_{i,Chile}) + \beta_7(FTADummy_{i,j,t} * FTADummy_{i,Mexico}) + \beta_8(FTADummy_{i,j,t} * FTADummy_{i,Peru)} + \varepsilon_t + c_j$

Where $Imports_{i,j,t}$ is country i´s agricultural imports from country j in year t, $Dist_{ij}$ distance between countries i and country j, $GDP_{j,t}$ ($GDP_{i,t}$), real GDP of country j (i) in year t, $AgriL_{j,t}$ is the agricultural land available in countries j. $FTA_{i,j,t}$ is a generic FTA dummy between countries i and j in year t. $FTADummy_{i,j,t} * FTADummy_{i,Chile}$, $FTADummy_{i,j,t} * FTADummy_{i,Mexico}$ and $FTADummy_{i,j,t} * FTADummy_{i,Peru}$ are interaction dummies for country i with Chile, Peru and Mexico in year t. Countries i represents Japan, Korea and China while country j represents the major agricultural import partners of each EA country.

Note that FTA dummy variables are used for Japan, Korea, and China, based on the date of the FTA have come into force, which is one if Japan, Korea, and Mexico have an FTA with country j and came effective before year t and 0 otherwise. At product level is 1, when tariff reduction is applied and 0 otherwise.

For a product level analysis, equation (4) was also estimated:

(4) $\ln(Imports_{i,j,t}) = \beta_0 + \beta_1 ln(Dist_{i,j}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(GDP_{i,t}) + \beta_4 ln(AgriL_{j,t}) + \beta_5 FPM_{i,j,t} + \beta_6(FPM_{i,j,t} * FTADummy_{i,Chile}) + \beta_7(FPM_{i,j,t} * FTADummy_{i,Mexico}) + \beta_8(FPM_{i,j,t} * FTADummy_{i,Peru)} + \varepsilon_t + c_j$

Where $FPM_{i,j,t}$ is FTA Preferential Margin (FPM) (FPM= MFN-FTA tariff applied by country i to country j in year t), and $(FPM_{i,j,t} * FTADummy_{i,Chile})$, $(FPM_{i,j,t} * FTADummy_{i,Mexico})$,$(FPM_{i,j,t} * FTADummy_{i,Peru})$, are interaction variables which isolates the effect of trade agreements between country i and Chile, Peru and Mexico. This additional equation is conducted to examine the tariff reduction impact on China, Japan and Korea's imports from LA.

3.5.2 Data section

The Agricultural exports and imports were taken from ITC Trademap (2016) based on UN Comtrade and INTRADE-IDB (2017) from 2003 to 2015.

Agricultural exports:

- Aggregated level comprises chapter 01-24 from the Harmonized System (HS).

- Sectoral level includes four groups: live animals (HS01-05), fruits and vegetables (HS06-14), animal and vegetables oils (HS15) and products of food industry (HS15-24).
- Product level comprises products at HS 6-digit level.

The exporting countries selected for this study are Chile, Mexico, and Peru, whose exports are oriented towards their main agricultural markets. For Chile and Peru, 15 major agricultural export partners receive 80% and 84% respectively of total Chilean and Peruvian agricultural exports. For Mexico, 16 main agricultural export countries account for 92%. With reference to Mexico, Korea was included for the sake of preserving consistency in the analysis. Therefore, it is clear that these major agricultural export countries are playing an important role in the export scenarios for Chile, Mexico, and Peru (see tables A3.1 and A3.2).

Similarly, the importing countries are Japan, Korea, and China from their main agricultural suppliers. For Japan, 16 main agricultural suppliers account for 75% of Japan´s total agricultural imports. In the case of Korea, 17 countries account for 80% of Korea's world agricultural imports and for China, 17 countries account for 83% of China's total agricultural imports. The main agricultural suppliers for Japan, Korea and China include Chile, Mexico and Peru since these countries are key in the analysis. Thus, these major agricultural import countries are playing a significant role in the total world agricultural imports for Chile, Mexico and Peru (see tables A.3.5 and A.3.6).

The tariff information from the agricultural major export partners to LA and main agricultural import partners from EA[19] was taken mostly from each FTA tariff elimination schedule (for more details see notes in (tables A.3.4 and A.3.8) and from WITS (2016) using the tariff information from the importer's tariff elimination schedules.[20]

Each FTA's annex contains information at different digit level at the HS. For negotiations with Japan at HS (6-digit level), with Korea HS (10) and for China at HS (8). Japan Customs Tariff contains tariff information for Japan at HS (9-digit level). The number of products in table 3.2 was carefully counted manually from each FTA annex.

[19] It is also important to note that the sample of major agricultural export and import partners is limited between 15 to 17 countries due to the difficulty to find the FPM for each product from each FTA. The research includes the revision of the tariff schedules list of each negotiated FTA in detail. See also the list of the FTAs tariff schedules used in econometric estimations in table A.3.6.

[20] WITS (2016) tariff information is at HS 10-digit level and it was converted at HS 6-digit level using simple average in order to compare tariff information with agricultural exports and imports at the same level of disaggregation.

The wholesale price index in the US was used as a proxy for the deflator to convert nominal export values into real terms. Data on the wholesale price index in the US, real GDP, agricultural land, and population are accessible from the World Bank (2016), and distance measures were obtained from the Centre d'Etudes Prospective et d'Informations Internationales (CEPII, 2016).

3.5.3 Criteria for identifying products with preferential margin

For the product level analysis, the four Chile, Mexico, and Peru's most exported products to the world were carefully studied, considering the Free Trade Agreement Preferential Margin (FPM) given by the East Asia countries from the importers side. In the case of the products selected for Chile and Peru, the FPM had to exist in at least one of the three East Asian countries. Regarding Mexico, the FPM had to be found in the FTA Mexico-Japan.

Then, those products were analyzed individually from each tariff elimination schedule, first in the different FTAs that each LA country has with its main agricultural partners and second, the same products were studied in each East Asian country major agricultural suppliers from the FTA's tariff elimination schedule. The tariff information was always taken from the importer side.

The criteria for identifying and analyzing the FPM follows the next conditions:

1. When MFN = FTA tariff applied = 0, then FPM = 0 and FTA dummy = 1 in the year when the product came into effect, and 0 otherwise.
2. When MFN is 0, then FTA dummy = 0, so the FPM=0.
3. When the product does not have a tariff reduction but has a quota, then FPM = N.A (missing observation) and FTA dummy = 1 in the year of enactment, and 0 otherwise.
4. When MFN is positive but the product is excluded from the negotiation, then FPM = N.A and FTA dummy = 0

3.6 GM results

3.6.1 GM results for LA exports

It is important to highlight that before running all the equations Hausman´s test was applied showing diverse results at aggregate, sector and product level.[21] So the equations

[21] Hausman test is a *Chi squared* test that determines if there are significant systematic differences between two estimates. It works to prove if one estimator is consistent by comparing it with another more efficient;

were estimated at PPML + Fix Effects (FE) in some cases and at PPML + Random Effects (RE) in some others according to Hausman results.

Table 3.6 shows the results of the GM estimations at the aggregate level. According to PPML+FE and RE, Mexico's agricultural exports to countries with large economies (GDP coefficient positive) are significant. In the case of Peru, it's the opposite: Peru's agricultural exports to countries with large economies are negative and significant.[22] Additionally, Chile and Peru´s agricultural exports grow with the increase of the Chilean and Peruvian GDP. For Mexico, agricultural exports decrease with the Mexican GDP growth. The results also indicate that distance of major agricultural exports partners has negative significant effects for Mexico as expected.[23] Finally, the results of the parameters reveal that the inclusion of the variable agricultural land is significant and positive in the case of Mexico, significant and negative for Peru and not significant to explain agricultural exports in the case of Chile.

The GM outcomes indicate at an aggregate level that LA countries have mixed results from the trade agreements with EA on their agricultural exports. Generally speaking, LA FTAs with major agricultural partners demonstrate positive effects for Chile and Mexico and no significant effects in the case of Peru. The results of specific dummies show that four out of seven FTAs have positive effects (FTA Chile-Korea, Mexico-Japan, Peru-China, and Peru-Korea). The FTA Peru-Japan indicates negative results. The FTA Chile-Japan and Chile-China show non-statistically significant results (table 3.6) and (table A.3.9 for OLS results).

At the sectoral level, results indicate that 15 out of 28 agricultural subsectors, of the seven FTAs, have positive effects and six out of 28 have negative ones. For Chile, PPML show positive effects for some agricultural subsectors of the FTAs studied. In regard to the FTA Chile-Korea, there is a positive impact for three subsectors (HS06-14), (HS15) and (HS16-24). FTA Chile-China shows positive impact for (HS 06-14) and (HS15). In the case of the FTA Chile-Japan, the subsector (HS 16-24) shows negative significant effects.

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it means that it has lower variance. If the test result shows that there are significant systematic differences between them, then both estimators are consistent and the correct to choose is the more efficient one (random effect), but if the test result shows that significant systematic differences actually exist, the one to choose is the consistent one (it means fix effects) (Montero, 2005), (Hausman, 1978).

[22] In order to make the GDP_i , GDP_j and Arable Land estimations converge, GM PPML results are expressed in billion and million respectively. Exports and imports data are expressed in thousands. It means those variables data series were rescaled.

[23] In the distance variable it is important to note, that its estimation only takes place when RE is run, otherwise it does not appear in the estimation´s results, which is the case of FE for Chile and Peru.

For Mexico, the four agricultural subsectors have positive and significant impact of the FTA with Japan. Finally, Peru's agricultural subsectors reflect positive influence of the agreements with EA. From the FTA Peru-China and Peru-Korea, three subsectors are positively and significantly impacted by both agreements: (HS01-05), (HS 06-14) and (HS16-24). The (HS15) show negative impacts. Some negative results are reflected in the case of FTA Peru-Japan for (HS01-05), (HS15) and for the (HS16-24) (See table 3.7) and (table A.3.10 for OLS results).

Table 3.6 GM estimation for Chile, Mexico and Peru's agricultural exports to Japan, China and Korea at aggregate level (2003-2015) PPML results.

	CHILE	PERU	MEXICO
PPML+	FE	FE	RE
GDPi	0.00453**	0.00734***	-0.00181**
	(0.0020)	(0.0013)	(0.0008)
GDPj	5.12E-05	-7.15e-05***	6.78e-05*
	(0.0000707)	(0.0000165)	(0.0000365)
agri_land	-0.591	-2.198**	1.716***
	(1.8140)	(0.8870)	(0.4060)
Dist			-0.000204***
			(0.0000172)
FTADummy	0.345*	-0.0361	0.584***
	(0.2000)	(0.1140)	(0.1120)
KORFTADummy	0.731***	0.597***	
	(0.2020)	(0.1280)	
JPNFTADummy	-0.234	-0.535***	2.032***
	(0.2040)	(0.1330)	(0.1760)
CHNFTADummy	0.42	0.388***	
	(0.4830)	(0.1500)	
Constant			15.95***
			(1.55)
Observations	195	195	208
R-squared			0.906
Number of id	15	15	
Hausman Test	0.0000	0.0000	0.1469

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors Estimation.

Considering the product level, tables 3.8, 3.9 and 3.10 show that the results are also diverse for LA. For Chile, agricultural exports of the most exported products to countries with large economies (GDP coefficient positive) are significant, except in the case of apples where the effects do not show relevant results. Peru demonstrates negative effects for exports of coffee to countries with large economies and positive effects for the asparagus. In relation to Mexico, it shows negative effects for the exports of avocados to countries with large economies. In addition, Chile, when its own GDP increases (coefficient negative and significant) decreases its exports of fish flour. For Peru, when Peruvian GDP increases, exports of coffee, fish oils and asparagus also go up. For Mexico, with an increase of Mexican GDP, the exports of tomatoes decline.

Table 3.7 GM estimation for Chile, Mexico and Peru's agricultural exports to Japan, China and Korea at sectoral level (2003-2015) PPML results.

	CHILE				PERU				MEXICO			
	HS01-05	HS06-14	HS15	HS16-24	HS01-05	HS06-14	HS15	HS16-24	HS01-05	HS06-14	HS15	HS16-24
PPML+	FE	FE	FE	FE	FE	FE	RE	FE	RE	RE	RE	RE
GDPi	0.00581	0.00283	0.0212***	0.00318**	0.00768***	0.00964***	0.0128**	0.00512**	-0.00125	-0.00188**	-0.00404***	-0.00181**
	(0.0038)	(0.0027)	(0.0053)	(0.0013)	(0.0015)	(0.0014)	(0.0050)	(0.0024)	(0.0009)	(0.0009)	(0.0009)	(0.0008)
GDPj	3.86E-05	0.000128	-0.000344***	-1.38E-05	-0.000104***	-6.86E-05	0.000200**	-5.74e-05***	0.000169***	7.30e-05*	0.000258***	2.04E-05
	(0.000090)	(0.000119)	(0.000069)	(0.000020)	(0.000038)	(0.000054)	(0.000081)	(0.000021)	(0.000055)	(0.000043)	(0.000049)	(0.000039)
agri_land	0.419	-2.606	-2.445	0.405	-2.417*	-0.888	-1.962**	-3.081**	0.81	1.835***	-0.696	2.040***
	(3.0670)	(2.2460)	(7.1480)	(1.0140)	(1.3100)	(1.2660)	(0.7740)	(1.4310)	(0.5900)	(0.4780)	(0.5500)	(0.4280)
Dist							-8.35E-06		-8.03e-05***	-0.000245***	-0.000164***	-0.000210***
							(0.000038)		(0.000027)	(0.000022)	(0.000034)	(0.000018)
FTADummy	0.352	0.228	0.437	0.525***	-0.146	-0.0441	-0.445	-0.0717	0.999***	0.342*	1.973***	0.673***
	(0.3130)	(0.1660)	(0.4420)	(0.1400)	(0.1160)	(0.1590)	(0.5930)	(0.2010)	(0.2260)	(0.1930)	(0.2760)	(0.1020)
KORFTADummy	0.474	1.438***	4.509***	0.544***	0.284***	0.716***	-2.777***	0.897***				
	(0.3140)	(0.1730)	(0.4270)	(0.1380)	(0.0521)	(0.1640)	(0.5470)	(0.1760)				
JPNFTADummy	-0.279	-0.0521	-0.337	-0.414***	-0.196***	-0.0561	-1.954***	-0.626***	2.566***	1.905***	0.828***	0.700***
	(0.3410)	(0.1910)	(0.4250)	(0.1330)	(0.0416)	(0.1620)	(0.6570)	(0.1800)	(0.2240)	(0.2390)	(0.2890)	(0.1620)
CHNFTADummy	0.446	1.505*	1.551**	0.0574	0.677**	1.976***	-1.308**	0.364*				
	(0.5570)	(0.8170)	(0.6360)	(0.1780)	(0.2630)	(0.3730)	(0.6620)	(0.2210)				
Constant							6.960***		11.75***	15.42***	14.44***	15.23***
							(1.0770)		(1.5720)	(1.7140)	(1.6720)	(1.4760)
Observations	195	195	195	195	195	195	195	195	208	208	208	208
R-squared							0.065		0.858	0.9	0.883	0.917
Number of id	15	15	15	15	15	15		15				
Hausman Test	0.0000	0.0000	0.0006	0.0006	0.0000	0.0000	0.5674	0.0003	0.6982	0.1900	0.3981	0.0507

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors Estimation.

The variable of agricultural land at product level is positive and significant for the four selected products in the case of Mexico and for asparagus in the case of Peru. For Chile, this variable does not show any important results. It means that the rise of arable land for Mexico and Peru will positively impact the exports of the four products selected for Mexico and the Peruvian asparagus.

The distance variable shows positive estimation results for some products such as wines and fish flour in the case of Chile and negative estimations results for avocados, tomatoes, and cucumbers in the case of Mexico.

The effects of the FTA dummies and FPM are different for the three LA countries. In the case of Chile, three of the most exported products to the world, have positive and significant effect of FTAs with the export major partners (wine, fish flour and apples). And specifically, the FTA Chile-Japan reveals positive and significant effects on the exports of apples (15.26 + 0.527=15.79), where the effect on apples is bigger in the case of the FTA with Japan when compared with other Chile's trading partners. Besides, despite the negative effect on fish flour in the context of the FTA with Japan, Chile's exports have a net positive effect (0.863 – 0.751=0.102) from the FTA with Japan.

The FTA Chile-Korea only shows a positive and significant results for the grapes (1.339) and despite the negative effect of the FTA Chile-Korea for the exports of wines, they have net positive effects from the Agreement (1.286-1.111=0.175). In contrast, the exports of fish flour have a significant net negative effect (-0.547) from the agreement. As apples where excluded from the FTA Chile-Korea, they not show any effect.

Unlike the FTA Chile-Korea, apples from Chile show some positive and significant effects in the context of the FTA Chile-China. However, the wines show a net negative and significant effect (-0.165).

The results from equation (2) show that in the case of Chile, the increase of an FPM of the major agricultural partners positively influence the wine export. More specifically, in the case of the FTA Chile-Japan, the results reflect that the growth of the FPM given by Japan to Chile positively impacts the exports of apples and grapes and negatively impacts the exports of fish flour.

Additionally, FPM results show that with the increase of one unit of the FPM given by Korea from its imports from Chile, only increased wine exports (0.0956) of this LA country. FPM results also show that the exports of apples and grapes have a positive benefit with an increment of the FPM given from China to Chile in (0.450) and (0.245) respectively. And a negative effect for the fish flour of -0.0182. Finally, among the selected products, exports of wines have a net positive effect of 0.0477 of the FTA Chile-China (See table 3.8) and (Table A.3.11 for OLS results).

With regards to Mexico, the four selected products have a positive and significant effect from the Agreement with its major agricultural partners. However, exports of avocados reflect net positive effect (5.463) of the FTA Mexico-Japan. Furthermore, the results also show a positive effect of the FPM given by major agricultural export partners to Mexico in products such as tequila, tomatoes and cucumbers and gherkins. More specifically, the results show a net positive effect for the avocados (1.641-0.272=1.369) and tomatoes (1.267+ 6.191=7.458) from the FPM given by Japan to Mexico (Table 3.9) and (Table A.3.11 for OLS results).

In the case of Peru, coffee and fish oils have a negative impact from the FTAs with major agricultural exports partners. Furthermore, in the FTA with Japan, exports of fresh asparagus have a negative impact of -0.838, and exports of coffee have a net negative effect of -0.935. From the FTA with Korea, the exports of coffee and fish oils have net positive significant impacts of 0.501 and 0.664 respectively from the agreement. The exports of fish flour also have a positive impact of the FTA Peru-Korea and finally, the exports of asparagus have a negative impact of the FTA Peru-Korea. From the FTA Peru-China, there is a negative significant effect for the Peruvian exports of asparagus and a net significant positive effect of 0.854 for the exports of fish oils.

The results for Peru including the FPM reflect that in general terms the increase of a PM of the major agricultural partners has negative effects on the export of coffee, fish oils and asparagus and a positive effect for the fish flour. To be more specific, in the case of the FTA Peru-Japan, the results show that the growth of the PM given by Japan to Peru has a positive effect for fresh asparagus (0.658) and a significant negative effect for the fish oils (0.561). Moreover, fish oils show a negative effect of the major FTA agreements and also from the FTA with Japan. As for the FTA Peru-Korea, is worth mentioning that, even though, fish oils show a net negative significant effect of the FPM given by Korea to Peru, the other three most exported products show net significant positive effects of the FPM: coffee (0.361), asparagus (0.0885) and fish flour (0.237). Although the FPM granted by Peru's main trading partners in agricultural products, is negative for the Peru, in the case of fish oils and asparagus, the net effect of the FTA Peru-China is positive for both products (0.328 and 0.0178 respectively) and negative for the case of the fish flour (-0.125) (Table 3.10) and (Table A.3.13 for OLS results).[24]

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[24] Although, tables 3.6, 3.7, 3.8, 3.9 and 3.10 demonstrate that GM parameters are not statistically significant in some instances, the R squared coefficient of their estimations, show the benefit of fit for the estimated equations as well as the OLS results at aggregate, sector and product level in tables from tables A3.8 to A3.12.

Table 3.8 GM estimation for Chile's agricultural exports to Japan, China and Korea at product level (2003-2015) PPML results.

CHILE

	FTA DUMMY					FPM			
	HS080610	HS220421	HS230120	HS080810		HS080610	HS220421	HS230120	HS080810
PPML+	FE	RE	RE	FE	PPML+	FE	FE	FE	FE
GDPi	-0.000858	0.0041	-0.0112***	0.00159	GDPi	-0.00302*	0.00278	0.00151	0.00389
	(0.0034)	(0.0028)	(0.0037)	(0.0028)		(0.0017)	(0.0017)	(0.0039)	(0.0029)
GDPj	0.000135**	8.86e-05***	0.000108***	2.50E-05	GDPj	-9.62E-05	0.000315***	0.000147***	-0.000211**
	(0.000066)	(0.000023)	(0.000027)	(0.000135)		(0.000082)	(0.000059)	(0.000044)	(0.000095)
agri_land	-1.555	0.151	-0.236	-0.187	agri_land	12.67	1.847	-11.70**	2.98
	(1.7460)	(0.2320)	(0.2480)	(2.6890)		(8.3350)	(4.6940)	(4.8630)	(2.5560)
Dist		4.98e-05***	0.000323***		Dist				
		(0.000019)	(0.000044)						
FTADummy	0.196	1.286***	0.863***	0.527***	FTA PM	0.026	0.0503**	0.0349	-0.0192
	(0.1290)	(0.2560)	(0.3080)	(0.1930)		(0.0200)	(0.0213)	(0.0603)	(0.0278)
KORFTADummy	1.339***	-1.111***	-1.410***		INTCHN	0.245***	-0.00275*	-0.0182***	0.450***
	(0.1370)	(0.2470)	(0.3140)			(0.0800)	(0.0016)	(0.0010)	(0.0958)
JPNFTADummy	0.129	-0.0935	-0.761***	15.26***	INTJPN	0.0607***		-0.0831***	0.0821***
	(0.1790)	(0.2540)	(0.2890)	(1.0150)		(0.0231)		(0.0175)	(0.0309)
CHNFTADummy	0.0911	-1.451***	-0.711	1.629*	INTKOR	0.0256	0.0453**	0.0191	
	(0.3990)	(0.2620)	(0.4720)	(0.8440)		(0.0198)	(0.0215)	(0.0707)	
Constant		7.505***	8.606***		Constant				
		(0.9990)	(1.3740)						
Observations	195	195	195	182	Observations	182	95	182	182
R-squared		0.456	0.802		R-squared				
Number of id	15			14	Number of id	14	8	14	14
Hausman Test	0.0144	0.5501	0.8341	0.0000	Hausman Test	0.0000	0.0000	0.0337	0.0000

Note: Standard errors in parenthesis, *** p<0.01, **p<0.05, *p<0.1.
Source: Authors estimation.

Table 3.9 GM estimation for Mexico's agricultural exports to Japan, China and Korea at product level (2003-2015) PPML results.

MEXICO

	FTA DUMMY					FPM			
	HS220890	HS080440	HS070700	HS070200		HS220890	HS080440	HS070700	HS070200
PPML+	RE	RE	RE	RE	PPML+	RE	RE	RE	RE
GDPi	-0.00132	-0.000612	-0.00112	-0.00185*	GDPi	0.000559	-0.00153	0.00568	0.00229
	(0.0009)	(0.0019)	(0.0018)	(0.0011)		(0.0011)	(0.0018)	(0.0044)	(0.0029)
GDPj	8.47E-05	-0.000160*	5.55E-05	-2.29E-05	GDPj	-3.39E-05	-2.48E-05	-0.0013	-0.00291***
	(0.000053)	(0.000097)	(0.000165)	(0.000120)		(0.000069)	(0.000110)	(0.000862)	(0.000881)
agri_land	2.267***	4.016***	3.431*	3.501***	agri_land	0.183	2.161*	5.161**	-11.14
	(0.6480)	(1.0400)	(1.8100)	(1.3300)		(0.8240)	(1.2570)	(2.5800)	(7.2440)
Dist	5.75E-05	-0.000247***	-0.000781***	-0.000461***	Dist	0.000128***	-0.000352***	0.000646**	0.00442
	(0.000054)	(0.000032)	(0.000194)	(0.000080)		(0.000031)	(0.000043)	(0.000261)	(0.003050)
FTADummy	3.163***	0.915**	8.024***	11.77***	FTA PM	0.0673***	-0.272***	0.416***	1.267*
	(0.4610)	(0.3780)	(1.1910)	(1.0710)		(0.0177)	(0.0716)	(0.1220)	(0.7540)
CHNFTADummy					INTKOR				
JPNFTADummy	-0.191	4.548***		-0.585	INTJPN		1.641***		6.191***
	(0.1720)	(0.5450)		(0.8270)			(0.1970)		(1.4400)
KORFTADummy					INTCHN				
Constant	7.528***	10.14***	2.437	1.775	Constant	5.162**	13.85***	-22.87***	-58.16
	(1.6040)	(3.5060)	(3.2710)	(2.2720)		(2.1060)	(3.3790)	(8.4710)	(38.7000)
Observations	208	208	197	208	Observations	106	197	158	169
R-squared	0.882	0.618	0.933	0.906	R-squared	0.067	0.637	0.033	0.714
Number of id					Number of id				
Hausman Test	0.7362	0.9942	0.1533	0.8429	Hausman Test	0.6758	0.4223	0.7206	0.8007

Note: Standard errors in parenthesis, *** p<0.01, **p<0.05, *p<0.1.
Source: Authors estimation.

Table 3.10 GM estimation for Peru's agricultural exports to Japan, China and Korea at product level (2003-2015) PPML results.

PERU									
	FTA DUMMY					FPM			
	HS090111	HS150420	HS070920	HS230120		HS230120	HS090111	HS150420	HS070920
PPML+	FE	FE	RE	FE	PPML+	FE	FE	RE	FE
GDPi	0.00726**	0.00735**	0.0127***	0.000606	GDPi	-0.00286*	0.00241**	0.00719***	0.00761***
	(0.0031)	(0.0034)	(0.0034)	(0.0027)		(0.0017)	(0.0011)	(0.0028)	(0.0010)
GDPj	0.000410**	-0.000115	0.000121**	1.56E-06	GDPj	0.000115***	-0.000372**	0.000263**	-5.14e-05**
	(0.000146)	(0.000094)	(0.000055)	(0.000037)		(0.000030)	(0.000156)	(0.000040)	(0.000025)
agri_land	0.711	-8.594***	0.917*	-0.807	agri_land	-1.217	2.13	2.218***	-0.264
	(1.6590)	(2.8940)	(0.5430)	(2.7250)		(2.2510)	(2.4700)	(0.3520)	(0.8040)
Dist			-2.98E-05		Dist			-0.000110***	
			(0.000025)					(0.000027)	
FTADummy	-0.559**	-0.334**	-0.153	-0.329	FTA PM	1.038***	-0.197***	-0.169***	-0.0155***
	(0.2560)	(0.1500)	(0.2730)	(0.3720)		(0.0871)	(0.0479)	(0.0351)	(0.0024)
KORFTADummy	1.016***	0.998***	-2.582***	0.833***	INTCHN	-1.163***		0.497***	0.0333***
	(0.1090)	(0.1710)	(0.3150)	(0.3010)		(0.0891)		(0.0684)	(0.0087)
JPNFTADummy	-0.376***	-0.0357	-0.838**	-0.154	INTJPN			0.221***	0.0813***
	(0.0645)	(0.2010)	(0.4170)	(0.2890)				(0.0766)	(0.0021)
CHNFTADummy		1.188**	-7.682***	0.595	INTKOR	-0.801***	0.558***	-0.392**	0.104***
		(0.5050)	(0.4600)	(0.3840)		(0.0571)	(0.0377)	(0.1930)	(0.0223)
Constant			5.219***		Constant			9.061***	
			(0.8400)					(0.7790)	
Observations	195	195	195	195	Observations	195	189	182	169
R-squared			0.857		R-squared			0.212	
Number of id	15	15		15	Number of id	15	15		13
Hausman Test	0.0009	0.0000	0.1593	0.0000	Hausman Test	0.0000	0.0122	0.0943	0.0000

Note: Standard errors in parenthesis, *** p<0.01, **p<0.05, *p<0.1.
Source: Authors estimation.

There are three reasons to explain the negative impact of the FTA Peru-Japan. First, because the agreement was enacted more recently (2012), and therefore the implementation period is still short in order to properly measure the effects. Second, agricultural trade between Peru and Japan is still low and limited, as Japan excludes a large amount of agricultural product from Peru. And third, the Peruvian exporters may be affected by the large agricultural product exclusion from Japan. According to UNIDO, Norad and IDS study, "Some of the reasons for Japanese food rejection of agricultural imports from Peru are food and feed additives, bacterial contamination, pesticide residues and mycotoxins" (2015, p.28).

Conducted interviews with government trade representatives in LA show that,[25] the low utilization of the FTAs in LA countries can explain the poor estimation results discussed above. This can be attributed to several factors, included the lack of knowledge in exporters about FTAs, the difficulty to achieve the high standards of SPS and TBT for LA agricultural products and the absence of effective export policies across the region.

[25] The author conducted several interviews with experts, including Julio Chan. Peru's APEC Director. (APEC ASCC, May 8, 2016, Peru); Diego Torres. Asia Pacific (DIRECON, October 9, 2016, Chile); Samantha Atayde. Mexico's Economic Secretariat (August 17, 2016, Mexico).

Additionally, tariffs are not the only obstacle to international trade, as there are other NTM such as quotas and subsidies difficult to quantify that also restrict market access for LA agricultural products in EA.

3.6.2 GM results for EA imports

Table 3.11 reflects the GM estimation results at aggregate level. According to PPML, Japan and Korea's agricultural imports from countries with large economies (GDP coefficient positive and significant) grow. In the case of Korea, its agricultural imports increase when Korean GDP is positive and significant.

The results also show that an increase of the Arable Land (coefficient positive and significant) of the Japanese and Chinese major agricultural partners, also leads to an increment of their agricultural imports.

The distance variable is negative and significant for Japan and Korea, it means that those countries import less agricultural products from geographically remote suppliers. For China, the distance is positive and significant, it implies that China imports agricultural products from countries far away from it.

The FTA generic dummies results are not significant, it means that it is difficult to determine the effect of Japan, Korea and China's FTA with their agricultural major partners.

The results of specific FTA dummies show that five out of seven FTAs have negative and significant effects for East Asian countries: FTA Japan-Peru, FTA Japan-Mexico, FTA Korea-Peru, FTA China-Peru and FTA China-Chile. The FTA Japan-Chile shows positive results and the FTA Korea-Chile show non-statistically significant effects.

At sectoral level, results show that in the case of Japan and Korea, the effect of the increase of their major agricultural partners GDPs is positive and significant in the surge of the imports of the four agricultural subsectors. In the case of China, the increase of its major agricultural import partners GDP is positive and significant for its imports from three of the agricultural subsectors and not significant for the HS01-05 live animal subsector.

Likewise, an increase of Korean GDP is positive and significant for the Korean agricultural imports of subsectors HS01-05 and HS06-14 and negative and significant for the imports of the HS15. For China, its own GDP growth (positive and significant) has a positive effect on China's imports from HS01-05.

The arable land results reflect that an increase of Japan and China's major agricultural import partners will generate an increase in the imports of subsectors HS01-05 and HS15 in the case of Japan, and an increase on the imports of subsector HS01-05 from China, and a decrease on the imports of the HS16-24 subsector in China.

The distance variable at sectoral level shows that its increase (coefficient negative and significant) generates decreases in the agricultural imports from subsectors HS16-24 in Japan and HS01-05 in Korea. On the other hand, an increase of distance (coefficient positive and significant) has an increase in the HS01-05 and HS16-24 agricultural subsectors in China.

For Japan, the FTA with its major agricultural partners have a positive and significant effect only on the imports of HS15 and a negative and significant impact on the imports of HS01-05 and HS06-14. In Korea, the FTA with its major agricultural partners has a positive and significant effect for the imports of subsectors from HS15 and HS16-24, and negative and significant on the imports of subsector HS06-14. Finally, for China, its FTA with major agricultural import partners have a positive and significant effect for the imports of subsectors HS01-05, HS06-14 and HS15 (see table 3.11) and (Table A.3.14 for OLS results).

Table 3.11 GM estimation for Japan, Korea and China's agricultural imports from Chile, Mexico and Peru at aggregate level (2003-2015) PPML results.

	JAPAN	KOREA	CHINA
	RE	RE	RE
GDPi	2.33E-05	0.000724***	0.00346
	(0.000041)	(0.000097)	(0.002490)
GDPj	0.000134***	0.000145***	7.88E-05
	(0.000012)	(0.000012)	(0.000054)
agri_land	0.185*	0.143	1.170**
	(0.1080)	(0.1180)	(0.5060)
Dist	-3.93e-05***	-4.35e-05***	0.000137***
	(0.000010)	(0.000015)	(0.000049)
FTADummy	-0.235	-0.102	0.302
	(0.1570)	(0.0870)	(0.2640)
PERFTADummy	-1.856***	-0.986***	-1.562***
	(0.1660)	(0.2030)	(0.3710)
MEXFTADummy	-0.929***		
	(0.0730)		
CHIFTADummy	0.304**	0.04	-1.775***
	(0.1310)	(0.2320)	(0.4570)
Constant	14.59***	12.44***	12.09***
	(0.2760)	(0.1800)	(1.3150)
Observations	202	209	209
R-squared	0.814	0.755	0.577
Hausman test	0.9004	0.2120	0.1486

Note: Standard errors in parenthesis, *** p<0.01, **p<0.05, *p<0.1.
Source: Authors estimation.

Sectoral level results also indicate that nine out of 28 subsectors, of the seven FTAs, have positive and significant effects and 15 out of 28 have negative and significant effects. For Japan, the FTA with Chile has a positive impact on the imports of HS01-05 and a negative one on the imports of HS06-14. The FTA Japan-Mexico shows negative effects on the imports of all four subsectors and with respect to the FTA Japan-Peru a negative impact on the imports of HS01-05, HS06-14, and HS16-24. For Korea, the FTA Korea-Chile have positive effects for subsectors HS01-05 and HS16-24 and a negative one for HS15. The FTA Korea-Peru has a negative impact for the imports of subsectors HS01-05, HS06-14, and HS15 and positive effects for HS16-24. Finally, for China, the FTA China-Chile has negative effects for subsectors HS01-05 and HS16-24 and positive one for HS06-14 and HS15. The FTA China-Peru has negative effects for HS01-05 and positive effects for the rest three subsectors (See table 3.12) and (table A.3.15 for OLS results).

At the product level, for Japan, the FTA with its major agricultural import partners[26] is positive and significant in the imports of grapes, fish flour, coffee and fish oils. And negative for wine, tequila and avocados. The FTA Japan-Chile is positive and significant for the imports of grapes and fish oils,[27] but negative and significant for the imports of wines, fish flour, asparagus, and avocados. The FTA Japan-Mexico has a positive and significant effect of the imports of grapes, fish flour, fish oils, asparagus, and tequila. It also has a negative impact on the wines, coffee and avocados' imports. The FTA Japan-Peru has a positive and significant impact on the imports of asparagus and avocados, and negative and significant for the imports of wines and fish flour.

For Japan, an increase of the preferential margin (PM) given to its major agricultural import partners has a positive effect on the imports of grapes and avocados, and a negative one in the imports of apples, asparagus, cucumbers and gherkins.

In the specific case of the FPM given from Japan to Chile, there are negative and significant effects for the imports of grapes, asparagus, and avocados. In the FTA Japan-Mexico, the imports of asparagus, tomatoes, and cucumbers have a positive and significant effect, and the imports of avocados and grapes have a negative and significant effect. In the FTA Japan-Peru, only the asparagus has a positive and significant effect (See tables 3.13a and 3.13b) and (table A.3.16 for OLS).

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[26] In the case of GM imports' estimation results the generic FTA dummy does not include the effect of Chile, Mexico and Peru's FTA with Japan, Korea and China because of the elimination of the possible collinearity, looking for the appropriate estimation results.
[27] In the case of GM imports' estimation results, the coefficients of the FTA generic dummy and the Chile, Mexico and Peru´s FTA are not added because of the previous reason highlighted in note 11, therefore they are independent.

Table 3.12 GM estimation for Japan, Korea and China's agricultural imports from Chile, Mexico, and Peru at sectoral level (2003-2015) PPML results.

	JAPAN				KOREA				CHINA			
	HS01-05	HS06-14	HS15	HS16-24	HS01-05	HS06-14	HS15	HS16-24	HS01-05	HS06-14	HS15	HS16-24
PPML+	RE	RE	RE	RE	RE	RE	RE	FE	RE	FE	FE	RE
GDPi	2.72E-05	-8.53E-05	-7.78E-05	9.49E-05	0.000906***	0.000686***	-0.000373*	0.000288	0.00494***	-0.00181	-0.00259	0.00253
	(0.000031)	(0.000070)	(0.000068)	(0.000065)	(0.000129)	(0.000147)	(0.000217)	(0.000469)	(0.001910)	(0.004470)	(0.002860)	(0.001570)
GDPj	6.27e-05***	0.000159***	8.46e-05***	0.000178***	0.000141***	0.000169***	8.89e-05***	4.31e-05**	1.09E-06	0.000663**	0.000776***	0.000187***
	(0.000009)	(0.000017)	(0.000016)	(0.000019)	(0.000015)	(0.000017)	(0.000021)	(0.000018)	(0.000024)	(0.000262)	(0.000278)	(0.000038)
agri_land	0.469***	0.231	0.259*	-0.136	9.78E-08	1.50E-07	2.09E-07	-2.50E-06	1.532***	0.663	-1.583	-0.819**
	(0.0782)	(0.1490)	(0.1420)	(0.1790)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.2680)	(5.3700)	(3.7010)	(0.4170)
Dist	-1.06E-05	-1.07E-05	-4.43E-06	-0.000105***	-0.000100***	-1.35E-05	1.35E-05		7.71e-05**			0.000101***
	(0.000008)	(0.000011)	(0.000011)	(0.000017)	(0.000014)	(0.000019)	(0.000026)		(0.000035)			(0.000020)
FTADummy	-0.548***	-0.393*	0.640***	0.108	-0.22	-0.259**	0.479***	0.223*	1.292***	0.987***	0.600***	0.305
	(0.1800)	(0.2090)	(0.2020)	(0.2660)	(0.1570)	(0.1030)	(0.1810)	(0.1200)	(0.4700)	(0.0788)	(0.0965)	(0.2330)
PERFTADummy	-2.978***	-2.202***	-0.109	-0.750***	-1.078***	-1.058***	-1.726***	1.030***	-2.168***	2.379***	1.071***	0.524***
	(0.1260)	(0.1630)	(0.3350)	(0.2630)	(0.2300)	(0.2310)	(0.4360)	(0.0243)	(0.2770)	(0.0953)	(0.0736)	(0.1720)
MEXFTADummy	-0.639***	-0.893***	-0.574**	-1.787***								
	(0.0835)	(0.1090)	(0.2790)	(0.1290)								
CHIFTADummy	0.668***	-1.231***	-0.098	0.252	1.070***	-0.396	-1.473***	1.026***	-0.804**	1.783***	0.815***	-0.857***
	(0.1280)	(0.1630)	(0.1660)	(0.2150)	(0.2380)	(0.3030)	(0.4200)	(0.0086)	(0.4000)	(0.0583)	(0.0497)	(0.1940)
Constant	13.41***	13.71***	10.10***	13.48***	11.40***	11.20***	9.899***		9.477***			10.67***
	(0.2490)	(0.4810)	(0.4760)	(0.4210)	(0.2550)	(0.2650)	(0.3390)		(0.9390)			(0.5590)
Observations	208	208	208	208	209	209	209	208	209	208	208	209
R-squared	0.629	0.839	0.404	0.57	0.587	0.763	0.245		0.323			0.466
Number of id								16		16	16	
Hausman test	0.5751	0.8296	0.8813	0.0569	0.5627	0.5800	0.6756	0.0026	0.8864	0.0134	0.0229	0.1815

Note: Standard errors in parenthesis, *** p<0.01, **p<0.05, *p<0.1.
Source: Authors estimation.

For Korea, the FTA with its major agricultural import partners is positive and significant for the imports of asparagus and the cucumbers and gherkins, but negative for wines and avocados. The Korean FTA with Chile has a positive and significant effect on the imports of grapes and fish flour, and a negative for imports of wines, asparagus, and tequila. FTA Korea-Peru has a positive and significant effects for imports of grapes and coffee, and a negative for wine and fish flour.

For Korea, the FPM for the major agricultural import partners have a positive impact on the imports of grapes and a negative one for the imports of wines and fish oils. The specific FPM granted by Korea to Chile has a negative effect on the imports of grapes, wines, asparagus, and tequila. The FPM from Korea to Peru has a positive effect on the imports of coffee, and negative for the imports of grapes, wines, and fish flour (See tables 3.14a and 3.14b) and (table A3.17 for OLS).

In China, the FTA with its major agricultural partners has a positive and significant effect on the imports of coffee, fish oils, and asparagus and a negative effect on the imports of wines, fish flour, and tequila. Specifically considering Chinese FTA with Chile, there are positive effects on the imports of grapes, apples, and fish oils; and a negative on the imports of tequila. In the case of the FTA China- Peru there is a positive and significant effect on the imports of grapes, fish flour, and fish oils, and a negative effect for the imports of wine, tequila, and avocados.

The extension of China's PM to its major agricultural partners has a positive and significant effect on the imports of coffee, asparagus, and a negative effect for its imports of wines and tequila. In the specific FPM given by China to Chile, it has a positive effect for grapes, wines, and a negative impact for the fish flour, fish oils, and tequila. Finally, the FPM set by China to Peru has a positive and significant effect for the imports of grapes, and negative and significant for imports of wines and tequila (See tables 3.15a and 3.15b) and (table A.3.18 for OLS results).

It is important to note that in the case of the GM estimation for China's imports results at product level, the R squared for products such as avocados, tequila, and wine is very low, it means the independent variables cannot successfully explain the imports variation, so the GM results for those products are not accurate (See tables 3.15a and 3.15b) and (table A.3.18 for OLS results).

Table 3.13a GM estimation for Japan’s agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTA Dummy.

	FTA DUMMY										
	HS080610	HS220421	HS230120	HS080810	HS090111	HS150420	HS070920	HS220890	HS080440	HS070700	HS070200
PPML+	RE	RE	FE	RE	RE	FE	RE	RE	FE	RE	RE
GDPi	0.000169	-0.000700***	5.49E-05	-0.000382**	0.000149	8.59E-05	-2.70E-06	-4.65E-05	-0.000285***	0.00143	-0.000594***
	(0.0002)	(0.0003)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0010)	(0.0002)
GDPj	0.000832***	0.000839***	0.000608**	-0.000695***	-0.000298	0.000236	6.06e-05*	0.000145***	-0.000101	0.00116	0.000456***
	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0002)	(0.0016)	(0.0001)
agri_land	-4.386***	-8.364***	3.718	0.641**	-0.0578	6.977***	-0.845***	-1.476***	-20.44***	-8.225	-3.202***
	(0.9830)	(1.6650)	(4.6540)	(0.2940)	(0.1480)	(2.6850)	(0.2180)	(0.3340)	(1.9310)	(18.6300)	(0.5980)
Dist	0.000712***	0.000122***		-5.59e-05***	-0.000125***		-8.27E-06	-0.000539***		-0.00183	-0.000155***
	(0.0001)	(0.0000)		(0.0000)	(0.0000)		(0.0000)	(0.0001)		(0.0025)	(0.0000)
FTADummy	6.582***	-2.884***	0.684***		1.915***	1.448***	-0.185	-1.391***	-19.45***		
	(2.2250)	(0.7970)	(0.2640)		(0.5270)	(0.3670)	(0.3520)	(0.2520)	(1.0010)		
PERFTADummy		-8.359***	-0.469***		0.0558	0.209	0.812***		18.68***		
		(0.3300)	(0.0869)		(0.3740)	(0.1810)	(0.2450)		(1.0000)		
MEXFTADummy	2.660***	-5.953***	4.818***		-6.654***	3.091***	1.656***	3.623***	-0.0793**	12.9	0.275
	(0.8580)	(0.3050)	(0.1280)		0.2660	(0.2670)	(0.1810)	(0.4530)	(0.0385)	(19.8500)	(0.3770)
CHIFTADummy	0.922**	-1.286***	-0.397***			0.776***	-9.071***		-0.0731***		
	(0.3910)	(0.3260)	(0.1050)			(0.2200)	(0.9650)		(0.0281)		
Constant	-4.530*	14.30***		5.493***	9.918***		8.607***	12.04***		-1.732	11.56***
	(2.5500)	(1.5300)		(1.2150)	(1.1460)		(0.6290)	(0.3670)		(3.0590)	(1.2270)
Observations	204	208	169	150	186	195	208	195	78	161	161
R-squared	0.733	0.372		0.007	0.324		0.345	0.867		0.532	0.428
Number of id			13			15			6		
Hausman test	0.5429	0.7590	0.0000	0.9782	0.5275	0.0000	0.0727	0.4479	0.0000	0.8483	0.3459

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
In the case of products 080610, 080810, 230890, 070700 and 070200: There were no imports from Peru since the FTA Japan-Peru came into force.
In the case of products 080810, 090111, 220890, 070700 and 070200: There were no imports from Chile since the FTA Japan-Chile came into force.
In the case of product 080810: There were no imports from Mexico since the FTA Japan-Mexico came into force.
In the case of products 080810, 070700 and 070200: There were no imports in presence of an FTA with the major agricultural import partners different to Chile, Mexico, and Peru.
Source: Author's estimation.

Table 3.13b GM estimation for Japan's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTAPM.

	FPM										
	HS080610	HS220421	HS230120	HS080810	HS090111	HS150420	HS070920	HS220890	HS080440	HS070700	HS070200
	FE	RE	RE	FE	RE	FE	RE	RE	FE	RE	RE
GDPi	0.000254	-0.000255	-7.47E-05	-0.00114***	-0.000272***	6.44E-05	-2.70E-06	-0.000133*	-0.000285***	0.00143	-0.000157
	(0.0002)	(0.0002)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0010)	(0.0001)
GDPj	-4.47e-05**	0.00104***	0.000316***	-0.00418***	-0.00109***	0.000233	6.06e-05*	0.000140***	-0.000101	0.00116	0.000586***
	(0.0000)	(0.0002)	(0.0001)	(0.0007)	(0.0003)	(0.0002)	(0.0000)	(0.0000)	(0.0002)	(0.0016)	(0.0001)
agri_land	-10.66***	-10.10***	-3.921***	-12.62***	0.385***	7.040***	-0.845***	-1.778***	-20.44***	-8.225	-4.138***
	(1.3410)	(2.3710)	(0.5590)	(0.6720)	(0.1420)	(2.5770)	(0.2180)	(0.3490)	(1.9320)	(18.6200)	(0.9590)
Dist		7.91e-05***	0.000258***		-0.000218***		-8.27E-06	-0.000380***		-0.00183	-0.000156***
		(0.0000)	(0.0000)		(0.0000)		(0.0000)	(0.0000)		(0.0025)	(0.0000)
FTA PM	1.782***			-10.77***		0.263	-0.0618		1.051**	-28.50***	
	(0.5900)			(0.6220)		(0.1730)	(0.1170)		(0.5040)	(1.3810)	
INT PER						-0.236	0.333**				
						(0.1640)	(0.1320)				
INT MEX	-1.342**					0.174	0.614***		-1.077**	32.80***	0.287**
	(0.5670)					(0.1610)	(0.1110)		(0.5040)	(5.8400)	(0.1370)
INT CHI	-1.655***					-0.156	-2.962***		-1.075**		
	(0.5700)					(0.1620)	(0.3420)		(0.5040)		
Constant		11.77***	7.886***		14.19***		8.607***	12.38***		-1.732	8.574***
		(1.2610)	(0.8120)		(0.6430)		(0.6290)	(0.4270)		(3.0580)	(0.8850)
Observations	65	174	208	26	194	195	208	174	78	195	208
R-squared		0.288	0.657		0.222		0.345	0.817		0.534	0.372
Number of id	5			2		15			6		
Hausman test	0.0475	0.4568	0.9343	0.0409	0.9102	0.0000	0.0727	0.9995	0.0000	0.3906	0.9420

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
In the case of products 220421, 230120, 090111 and 220890 there were no PM because (220421 and 220890) have a quota, or because The FTA Tariff was equal to the MFN Tariff, so the FPM=0.
In the case of product 080810: it is excluded from Japan in the FTA Japan-Mexico.
Source: Author's estimation.

Table 3.14a GM estimation for Korea's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTA Dummy.

	FTA DUMMY								
	HS080610	HS220421	HS230120	HS090111	HS150420	HS070920	HS220890	HS080440	HS070700
PPML+	RE	RE	FE	RE	RE	RE	RE	RE	RE
GDPi	0.00262***	-0.00183***	0.000713*	-0.00504***	0.000919***	0.00145***	0.000763*	0.00182***	0.00670***
	(0.0009)	(0.0002)	(0.0004)	(0.0009)	(0.0002)	(0.0003)	(0.0004)	(0.0005)	(0.0022)
GDPj	0.000289***	0.000502***	2.17E-05	0.000163*	8.75e-05**	0.000182***	0.000411***	0.000587***	0.000119
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0018)
agri_land	-2.168**	-5.129***	-4.886	2.078***	-0.168	-2.195***	-2.593***	-3.309***	31.59
	(0.8720)	(0.4920)	(9.1500)	(0.6640)	(0.3350)	(0.3880)	(0.6760)	(0.7460)	(116.6000)
Dist	6.99E-05	2.51E-05		-0.000687***	-5.80e-05**	2.32E-05	4.17E-05	0.000200***	-0.00317
	(0.0001)	(0.0000)		(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0264)
FTADummy	1.037	-0.381***	0.259	-0.392	0.0141	0.574*	-0.0347	-0.414**	6.545*
	(0.6340)	(0.1480)	(0.5200)	(0.4610)	(0.2920)	(0.3060)	(0.3950)	(0.2080)	(3.7570)
PERFTADummy	4.117***	-3.695***	-3.743***	9.766***	0.541	0.586			
	(0.9250)	(0.6580)	(0.0299)	(2.4630)	(0.9580)	(0.6290)			
MEXFTADummy									
CHIFTADummy	3.256***	-2.091***	0.546***		0.556	-5.673***	-2.489*		
	(0.5770)	(0.3920)	(0.0118)		(0.8370)	(1.0040)	(1.4060)		
Constant	-4.088**	7.513***		12.42***	3.753***	2.570***	2.117***	-1.134**	-45.01
	(1.9240)	(0.2080)		(1.1070)	(0.4260)	(0.4940)	(0.4400)	(0.5780)	(52.2600)
Observations	209	209	195	197	209	209	204	191	192
R-squared	0.31	0.919		0.809	0.069	0.172	0.31	0.899	0.865
Number of id			15						
Hausman test	0.9926	0.2963	0.0167	0.8956	0.6409	0.6500	0.5220	0.5634	0.4742

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
In the case of products 220890, 080440 and 070700: There were no imports from Peru since the FTA Korea- Peru came into force.
In the case of products 090111, 080440 and 070700: There were no imports from Chile since the FTA Korea- Chile came into force.
There is not an estimation of the effect of an FTA between Korea-Mexico because of there is not FTA between them.
Source: Author's estimation.

Table 3.14b GM estimation for Korea's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTAPM.

	FTA PM								
	HS080610	HS220421	HS230120	HS090111	HS150420	HS070920	HS220890	HS080440	HS070700
PPML+	FE	RE	FE	RE	RE	RE	RE	RE	RE
GDPi	0.0271*	-0.00189***	0.000616	-0.00460***	0.000838***	0.00152***	0.000652	0.00166***	-0.0139***
	(0.0163)	(0.0002)	(0.0005)	(0.0006)	(0.0002)	(0.0003)	(0.0004)	(0.0006)	(0.0036)
GDPj	-0.00239**	0.000503***	5.20E-05	0.000141*	9.37e-05**	0.000201***	0.000357***	0.000529***	0.000780***
	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0003)
agri_land	3.557	-5.088***	-2.618	1.846***	-0.304	-2.421***	-1.956***	-2.398***	95.66***
	(13.7400)	(0.4920)	(9.1990)	(0.4700)	(0.3620)	(0.4630)	(0.7510)	(0.7530)	(33.1400)
Dist		2.91E-05		-0.000628***	-5.78e-05**	1.56E-05	2.88E-05	0.000152***	-0.0138***
		(0.0000)		(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0050)
FTA PM	0.0785**	-0.0210***	-0.0216	-0.00577	-0.259*	0.0173	0.018	-0.0108	
	(0.0380)	(0.0079)	(0.0823)	(0.1640)	(0.1490)	(0.0137)	(0.0282)	(0.0095)	
INT PER	-0.0929***	-0.377**	-1.402***	4.377***	-0.078	-0.0139			
	(0.0334)	(0.1760)	(0.0830)	(1.0170)	(0.4680)	(0.0335)			
INT MEX									
INT CHI	-0.0622	-0.128***	0.0622		0.368	-0.497**	-0.233*		
	(0.0534)	(0.0339)	(0.0818)		(0.3700)	(0.1940)	(0.1280)		
Constant		7.469***		11.86***	4.073***	2.730***	2.089***	-0.968	-57.80**
		(0.1890)		(0.8670)	(0.4740)	(0.4750)	(0.3760)	(0.5990)	(23.2600)
Observations	64	209	195	197	209	202	203	202	202
R-squared		0.923		0.744	0.08	0.138	0.281	0.893	0.925
Number of id	5		15						
Hausman test	0.0037	0.5427	0.0171	0.8877	0.4057	0.3246	0.8021	0.8388	0.5835

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
In the case of product 070700: Among Korea's FTAs partners, there are only imports from India and those imports have a quota.
Source: Author's estimation.

Table 3.15a GM estimation for China's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTA Dummy.

	FTA DUMMY								
	HS080610	HS220421	HS230120	HS080810	HS090111	HS150420	HS070920	HS220890	HS080440
	RE	RE	RE	FE	RE	FE	RE	RE	RE
GDPi	0.0103***	0.00521**	-0.00392	0.0284**	-0.00456	-0.00653*	-0.00332	-0.00127	0.000607
	(0.0034)	(0.0025)	(0.0043)	(0.0142)	(0.0056)	(0.0035)	(0.0040)	(0.0019)	(0.0021)
GDPj	0.000392***	0.000368***	0.000166**	-0.000408*	-0.000877**	0.00102**	0.000102	-2.00E-05	-4.41E-05
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0004)	(0.0004)	(0.0001)	(0.0000)	(0.0001)
agri_land	-1.457	-3.596***	-1.131	1.823	0.282	4.819	-0.361	-0.950**	-1.840***
	(0.8990)	(1.0880)	(0.8210)	(2.4830)	(0.5690)	(5.6500)	(0.8800)	(0.4160)	(0.4440)
Dist	0.000345***	-5.21e-05*	0.000233***		-0.000174***		-0.000258	4.80e-05*	0.000130***
	(0.0001)	(0.0000)	(0.0000)		(0.0001)		(0.0002)	(0.0000)	(0.0000)
FTADummy	1.12	-1.656*	-0.0202	0.112	1.555***	2.468**	1.972**	-2.038***	
	(1.1300)	(0.8770)	(0.3070)	(0.4670)	(0.4160)	(0.9880)	(0.9020)	(0.3530)	
PERFTADummy	2.308***	-6.455***	1.550***			1.120***		-6.575***	-3.396***
	(0.4610)	(0.4860)	(0.3750)			(0.0790)		(0.6720)	(1.1910)
MEXFTADummy									
CHIFTADummy	1.713***	0.519	-0.522	0.786***		0.808***		-3.891***	-1.148
	(0.5390)	(0.4770)	(0.4840)	(0.2080)		(0.0476)		(0.8740)	(1.1900)
Constant	-0.223	9.700***	9.487***		10.17***		1.848	6.180***	4.820***
	(1.6410)	(0.9180)	(1.4600)		(1.8860)		(2.4040)	(0.7330)	(1.3340)
Observations	209	209	209	91	199	182	193	209	160
R-squared	0.765	0.092	0.693		0.383		0.128	0.074	0.004
Number of id				7		14			
Hausman test	0.4511	0.6244	0.4477	0.0000	0.3557	0.0008	0.5853	0.7237	0.5578

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
In the case of products 080810 and 070920: There were no imports from Peru since the FTA China- Peru came into force.
In the case of products 090111 and 070920: There were no imports from Chile since the FTA China-Chile came into force.
In the case of product 080440: There were no imports from any country different to Peru and Chile.
There is not an estimation of the effect of an FTA between China-Mexico because of its inexistence.
Source: Author's estimation.

Table 3.15b GM estimation for China's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) PPML results FTAPM.

	FPM								
	HS080610	HS220421	HS230120	HS080810	HS090111	HS150420	HS070920	HS220890	HS080440
	RE	RE	FE	FE	RE	FE	RE	RE	RE
GDPi	0.00314	0.00433*	0.00087	0.0226	-0.00297	0.00407	-0.00481	-0.00114	-0.000842
	(0.0044)	(0.0026)	(0.0025)	(0.0164)	(0.0046)	(0.0091)	(0.0030)	(0.0019)	0.0000
GDPj	0.000438***	0.000349***	5.00E-05	-0.000303	-0.000938**	0.000988*	8.70E-05	-2.43E-05	-7.97E-05
	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0006)	(0.0002)	(0.0000)	0.0000
agri_land	-2.157***	-3.422***	-5.394**	0.858	0.146	8.22	-0.906	-0.984**	-1.466
	(0.7040)	(0.9760)	(2.3800)	(2.9440)	(0.5360)	(7.1640)	(0.5580)	(0.3980)	0.0000
Dist	0.000325***	-0.000105***			-0.000201***		-0.000353**	3.59E-05	8.33E-05
	(0.0001)	(0.0000)			(0.0001)		(0.0002)	(0.0000)	0.0000
FTA PM	-0.0561	-0.247***	0.293	0.0808	0.223***	0.312	0.0474*	-0.247***	-5.776
	(0.0657)	(0.0465)	(0.1940)	(0.0706)	(0.0525)	(0.1920)	(0.0276)	(0.0417)	0.0000
INT PER	0.288***	-3.069***	-0.222			-0.234		-0.893***	5.615
	(0.0699)	(1.0720)	(0.1950)			(0.2130)		(0.1780)	0.0000
INT MEX									
INT CHI	0.226***	0.374***	-0.370*	-0.0304		-0.351*		-0.290*	5.773
	(0.0672)	(0.0582)	(0.1940)	(0.0320)		(0.2080)		(0.1640)	0.0000
Constant	2.815**	10.54***			10.07***		3.870***	6.303***	5.719
	(1.3560)	(0.9270)			(1.4600)		(1.4310)	(0.7360)	0.0000
Observations	209	207	169	91	192	182	203	209	209
R-squared	0.902	0.098			0.409		0.113	0.08	0.009
Number of id			13	7		14			
Hausman test	0.2119	0.6244	0.0000	0.0000	0.6132	0.000	0.9661	0.789	0.4112

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

The GM results for EA show that FTAs between both regions not necessary positively impact the EA imports of agricultural products from LA. Only the FTA Japan-Chile has a positive impact for Japan agricultural imports. However, only the sector of live animals (HS01-05) boosts its development or has a positive impact on the agreement. Furthermore, from the products selected, only two show a positive impact: the grapes and fish oils. And Japan imports of those products from LA in the period studied were only US$18 million and US$23 million respectively (see table 3.5).

The negative effect for wines from the FTA Japan-Chile can be explained by the fact that Japan imposes strict quotas for the import of wines, therefore restricting wines imports from Chile. In the case of Japan's imports of apples from Chile, it should be noted that although they have a positive preferential margin to enter to the Japanese market, Japan´s apple imports are insignificant due to the domestic support granted by the Japanese government to specific sectors and products in order to encourage internal agricultural production (see section 2.4.3.1 Japan import policies for agricultural products). Apples are precisely one of the products in which Japan promotes domestic production. In addition, Japan's imports of fish flour from Chile are not relevant as this country mainly imports fish flour from Peru and Mexico. Furthermore, as fish flour from Chile does not have preferential margin to enter the Japanese market, this can negatively affect its exports.

In spite of the above, EA agricultural imports from LA started growing in the period between 2003 to 2015, led in part by China's rising demand for food products. The most exported LA products to the world do not represent a large amount of EA agricultural imports, because only a few of those products represent slightly more than 1% of EA world agricultural imports, which is the case of coffee and wine for Japan, coffee for Korea, and fish flour and wine for China. Furthermore, GM results show that those products only show positive and significant results for Chile in its FTA with China for wines, and for Peru in its FTA with Korea for coffee. The negative impact of Peruvian coffee in Japan and China, can be explained by the fact that Japan coffee imports from Peru are not significant because major origins of Japan's coffee imports from LA are Brazil and Colombia. As these countries started penetrating the Japanese market fifty years ago, it has been difficult for Peruvian coffee to compete in such market. In contrast, the lack of China's coffee imports from Peru can be explained by the exclusion of this product from the FTA China-Peru. The positive effect of wine from the FTA between Chile and China can be explained by the fact that unlike Japan, China does not impose any quotas on wine imports (see table A.3.19).

3.7 Some trade restrictions for agricultural imports in East Asia[28]

Although unlike China agriculture still represents a relatively small part of the economy and employment for Japan and Korea, it nonetheless play an important role for these countries from an historical, cultural and food security perspective. While these three countries are net importers of agricultural products, they also seek to protect their domestic market from imports. Generally, their import duties on agricultural products are higher than those applied to non-agricultural products. For Japan and China (2015), the simple average tariff for agricultural products was 14.9% and 14.8% respectively, compared with 3.7% and 9.5% for non-agricultural products. For Korea, the simple average tariff for agricultural products (60%) remained much higher than the tariff rate for non-agricultural products at 6.6% (WTO, 2016).

The success of Latin American products within the Japanese market can facilitate its competitiveness in other EA markets. The Japanese system of food import control (article 27 of the Japanese Food Sanitation Law -Act No. 233 of 1947) requires importers to submit an import notification to the Ministry of Health, Labor and Welfare of Japan (MHLW) Quarantine Station previously to importation. Subsequently, the MHLW carries out different types of inspection. Furthermore, article 8 encourages importers to provide education and guidance on Japanese food hygiene regulations, even sending technicians abroad to ensure the accomplishment of such regulations (UNIDO-IDE-JETRO, 2013). Seafood, fruits, and vegetables represent the largest proportions of Japanese import rejections. Coffee, cocoa beans, rice, wheat, and other grains are the common products to be rejected due to improper hygiene conditions (UNIDO-IDE-JETRO, 2013).

Among the most exported agricultural products from LA to the world selected for the analysis, Japan imposes restrictive SPS and TBT measures for all, especially for the fruits and vegetables subsector. The Japanese Basic Policy for Fruit Industry promotion revised in 2015, aims to increase the domestic production and consumption of profitable fruits or highly valued varieties, promoting economic assistance to local farmers to transform their production. Fruits such as peaches, oranges, mangoes, and apples are included in this program (WTO, 2016). This explains the low amount of imports of apples from the world and from LA countries. In the case of grapes, even though Japan imposes a stationary tariff for its imports, there are some imports from LA, specifically from Chile and some from Peru.

In Korea, direct export subsidies are maintained in order to reduce marketing costs for certain agricultural products. Additionally, Korea also imposes some seasonal

[28] Those trade restrictions were also mentioned in chapter 2. However, they are highlighted in this chapter because they can explain the GM estimation results.

preferential tariff on grapes and oranges imported from Chile and Peru (WTO, 2016). However, Chilean and Peruvian exports of grapes have an important Preferential Margin that helps to increase their participation in the Korean market.

In 2010, the Korean Ministry of food and drug safety (MFDS) modified the regulation for agrochemicals and animal drugs in agricultural and livestock products. As a consequence of this, regular Chilean products that used agrochemicals not registered in Korea were rejected. Such was the case of some meats, fruits, and vegetables. Moreover, the certification process and phytosanitary authorization for the entry of agricultural products is excessively long and complex. Korea admits the phytosanitary authorization processing of one product at a time. This, can take several years before the accessibility of next product begins, which makes the process considerably long. Such system impairs the benefit of FTAs for LA countries (DIRECON, 2015).

China also protects its most important agricultural products such as cereals, sugar, and fertilizers. However, China did not apply import quotas to LA. In contrast, China imposes strict SPS and TBT to its agricultural imports from LA. As examples of TBT, since 2014, Individual Quick Freezing (IQF) products have been banned from China. Moreover, in the case of wines, some customs offices in China do not allow the ink jet system used to print the bottling date on the counter labels of the wines, and the Chinese customs authority only allows two bottles of wine shipment as samples without commercial value from Chile to a potential buyer in China (DIRECON, 2017).

In October 2015, a new food regulation was implemented in China, generating additional requirements. As an example, at its Northern ports such as Tianjin, Dalian, and Qingdao, China inspections are conducted in almost all containers coming from Chile, and therefore, it takes several days to release shipments of Chilean fruit. This has resulted in importers preference to transport their fruit by land from Shanghai and Guangzhou, thereby making products more expensive (DIRECON, 2015).

In the case of Mexican avocados exports to EA, there are TBT measures implemented in Japan, Korea, and China. In Japan, local authorities do not accept avocados produced in the State of Chiapas. In Korea, the avocados have to have a Nectria galligena free certificate and also be produced in Michoacán. In China, the avocados exporters also have to certify that they are produced in Michoacán (Secretaría de Economía, 2017).

3.8 Concluding remarks

The fact that agricultural exports from LA to EA are still low can be regarded as an important challenge. Among the three analyzed countries in LA, Chile is the one with the largest value of agricultural exports to the region, however, Japan, Korea and China's agricultural imports from Chile only represent less than 2.5% for each of their world agricultural imports. Also, the seven FTA considered in the analysis have excluded several products from LA countries. Among EA countries, Japan has more agricultural products excluded in the agreements with LA and imposes more complex quotas to its agricultural imports.

The regression analysis shows diverse results at an aggregate, sectoral and product level. Even though the study of the seven FTAs evidences a decline in tariff for some agricultural products, the results suggest that despite the overall reduction in tariff, LA countries have not been able to substantially increase their agricultural exports to East Asian markets. Potential gains from tariff reductions have not been enough due to the use of NTB to trade and the low utilization of the FTAs in LA countries.

Insofar as the results presented in the GM include tariff information as an independent variable combined with FTA's specific dummies they can be considered a different application of a standard methodology used in the revised literature. However, some precisions and clarifications need to be highlighted at this point. First, the scholarly literature has suggested endogeneity between exports and agreement dummies (Bureau and Jean, 2013), (Piermartini and Teh, 2005). Although this might be the case for total exports, where a large trade increases the probability of agreement, it is not the case for agricultural exports. Because a large trade in agricultural products might not be enough for countries to have FTA, making the endogeneity between these kinds of exports and the probability of having an FTA weaker than the one between total exports and FTA dummy variables. Second, as the results presented here at the product level apply only for selected products, this may cause a bias in the results. In this context, future research can further explore the results of this study by implementing a change in the product selection criteria in order to overcome the possible bias. Finally, the GM could be run in other sectors including agriculture and comprise trade flows (export and imports) as dependent variable in order to analyze the impact in overall trade.

Appendices

Table A.3.1 Literature review of GM studies

Papers	***FTAs and policies in Analysis***	***Model/Database used for analysis***	***Aggregation of regions and sectors***	***Structure of Model***
Ando and Urata (2011)	Japan-Mexico EPA.	-Gravity Model. -From 2004 to 2008 for both countries. -United Nations Commodity Trade Statistics Database (UN-COMTRADE). -World Bank Development Indicators 2009. - CEPII Database.	Countries/Regions: 41 for Japan and 23 for Mexico. Sectors: 28	-Ordinary Least Squares (OLS) (fixed effects/random effects). -The Hausman specification test and the Breusch and Pagan Lagrange multiplier (ML) test were used. -Tariff information-disaggregated product level. -FTA dummy variables to capture the impacts of FTAs on trade.
Ando and Urata (2015)	Japan-Malaysia, Thailand and Indonesia FTA.	- Gravity Model. -From 2002 to 2010. -UN COMTRADE. -WB 2009. -CEPII Database.	Countries/regions:40 Sectors: 21	-Using disaggregated product level trade data, considering the tariff levels. -FTA dummy variables are used to capture the impacts of FTAs on trade. - OLS and PPML+FE.

Bureau and Jean (2013)	78 Agreements	-Gravity Model. -From 1998 to 2009. -CEPII Database. -UN COMTRADE. -MAcMap-HS6. -IDB Database.	Countries/regions: 2 Sectors: N/A	-Based on difference-in-differences panel estimations. -To measure the incidence of preferential tariffs on the extensive margin through a lineal model. -Products where tariff quotas are ignored. -Product level.
Fulponi and Engler (2012)	Chile FTAs	-Gravity Model. -From 2002-2009. -Access Market Department (DIRECON). -Central Bank of Chile Statistical Databases -ODEPA 2011 Statistical Database.	Countries/regions: 42 Sectors: 1	-The method accounts only for a tariff reduction and does not consider changes in other trade measures such as tariff-quotas or SPS measures among others. It isolates the change in trade. -To avoid selection bias, the impacts of the preferential tariffs on the intensive margin are measured by limiting the estimation to importer-exporter-product triplets for which the flow of trade is not zero during any year of the sample.
Pöyhonen (1963)	No FTAs or TPAs analyzed.	-Simultaneous application of a structural and	Countries/regions: 10 Sectors: N/A	- Non-linear and static model.

		explanatory model resembling an input - output model. Calibrated for 1958. -Statistical Office of the United Nation		-Transportation cost function is substituted for the distance variable. -
Sun and Reed (2010)	1. ASEAN− China. 2. Common Market for Eastern and Southern Africa (COMESA). 3. EU−15. 4. EU−25. 5. NAFTA 6. Southern African Development Community (SADC).	-Gravity Model -From 1993 to 2007. -UN COMTRADE Database. -WB indicators -CEPII. -WTO Regional Trade Agreements Database.	Countries/regions: 81 Sectors: 2	-Trade creation and diversion effects are estimated using a PPML + FE to deal with heteroscedasticity and zero trade observations.
Urata and Obake (2013)	1. EU. 2. NAFTA. 3. Mercosur 4. ASEAN FTA (AFTA).	-Gravity Model. -From 1980 to 2006.	Countries/regions: 67 Sectors: 20	-PPML + FE -Construction of a gravity model under monopolistically competitive firms.

	5. COMESA 6. Pan-Arab FTA.	-UN COMTRADE Database. -World Bank Development Indicators. -STATA10.		-The model considers technology and preferences. -Dummy variables for common border and official languages. -Regarding the effects of RTAs on trade cost, two types of dummy variables are adopted. The first equals unity if both importer and exporter belong to the same RTA, and the second equals unity if the importer is a member of the RTA, but the exporter is not. These dummies are used to examine trade creation and diversion effects, respectively.

Note: Kepaptsoglou et al (2010): reviewed empirical literature review on GM from 1999 to 2009. Tinbergen (1962), Pöyhönen (1963), Anderson (1979) and Santos Silva and Teneyro (2006) were used for theoretical support. Source: table made by the author.

Table A3.2 Mexico's main agricultural export partners (2003 and 2015) (US$000)

Mexico Main Partners	Average (2003-2015)	Exported value in 2003	Share 2003	Exported value in 2015	Share 2015	Change (2003-2015)
US	13,868,319	7,741,734	84.07%	20,907,246	78.54%	170%
Japan	553,009	235,359	2.56%	754,781	2.84%	221%
Canada	440,808	105,479	1.15%	562,040	2.11%	433%
Guatemala	205,849	80,719	0.88%	341,598	1.28%	323%
Venezuela	176,264	23,169	0.25%	298,120	1.12%	1187%
Spain	138,241	66,950	0.73%	217,140	0.82%	224%
Australia	101,734	21,210	0.23%	194,594	0.73%	817%
Netherlands	124,811	43,130	0.47%	183,901	0.69%	326%
United Kingdom	123,424	65,766	0.71%	177,928	0.67%	171%
Germany	123,438	80,291	0.87%	177,150	0.67%	121%
Hong Kong	88,589	15,324	0.17%	155,762	0.59%	916%
Algeria	135,933	83,084	0.90%	154,583	0.58%	86%
Colombia	78,357	27,820	0.30%	141,448	0.53%	408%
China	57,336	20,002	0.22%	132,949	0.50%	565%
Chile	68,912	11,823	0.13%	129,718	0.49%	997%
Korea	48,729	27,604	0.30%	81,652	0.03%	196%

Note: Korea is the 26th agricultural export partner for Mexico. It is included for the sake of the analysis.
Data source: ITC Trade Map (2016).

Table A3.3 Peru's main agricultural export partners (2003 and 2015) (US$000)

Peru Main Partners	Average (2003-2015)	Exported value in 2003	Share 2003	Exported value in 2015	Share 2015	Change (2003-2015)
US	1,036,254	318,515	17.15%	1,874,833	25.30%	489%
China	827,093	287,484	15.48%	1,134,670	15.31%	295%
Netherlands	313,527	57,238	3.08%	693,316	9.36%	1111%
Spain	345,998	176,913	9.52%	401,357	5.42%	127%
Germany	439,417	178,103	9.59%	348,386	4.70%	96%
United Kingdom	147,690	57,828	3.11%	263,051	3.55%	355%
Ecuador	131,312	25,217	1.36%	250,767	3.38%	894%
Chile	155,505	49,406	2.66%	210,278	2.84%	326%
Canada	123,388	50,710	2.73%	194,996	2.63%	285%
France	146,698	60,304	3.25%	170,830	2.31%	183%
Belgium	161,961	30,568	1.65%	160,966	2.17%	427%
Korea	79,694	17,311	0.93%	155,486	2.10%	798%
Colombia	119,560	27,923	1.50%	135,860	1.83%	387%
Japan	197,096	125,684	6.77%	128,294	1.73%	2%
Denmark	70,651	5,346	0.29%	121,397	1.64%	2171%

Data source: ITC Trade Map (2016).

Table A.3.4 Selected products with FPM for Chile, Mexico and Peru’s in major export partners

Exporter	HS Code	Description	Exports average (2003-2015) to the world (000)	Product share of total agricultural exports to the world (2003-2015)	Export average (2003-2015) to EA (000)	Product share of total agricultural exports to EA (2003-2015)	FTA Preferential Margin (FPM) 2015																	
							China	Japan	Korea	US	Brazil	EU	Russia	Mexico	Peru	Colombia	Canada	Ecuador	Chile	Guatemala	Venezuela	Australia	Hong Kong	Algeria
							2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015
Chile	080610	Fresh grapes	1,218,475	10.01%	121,685	5.49%	13.00	7.97	45.00	N.A	10.00	12.85	0.00	0.00	1.80	15.00	2.00	-	-	-	-	-	-	-
Chile	220421	Wine of fresh grapes	1,155,679	9.49%	121,358	5.48%	14.00	N.A	15.00	N.A	27.00	N.A	0.00	0.00	2.63	20.00	N.A	-	-	-	-	-	-	-
Chile	080810	Fresh apples	581,266	4.77%	9,122	0.41%	10.00	9.56	N.A	0.00	10.00	10.00	0.00	20.00	1.80	15.00	4.25	-	-	-	-	-	-	-
Chile	230120	Fish flour	460,543	3.78%	256,769	11.59%	3.50	0.00	5.00	0.00	6.00	0.00	0.00	10.88	0.00	7.50	1.00	-	-	-	-	-	-	-
Peru	230120	Fish flour	1,325,197	25.38%	808,719	73.28%	2.78	0.00	5.00	0.00	-	0.00	-	-	-	8.00	0.00	10.00	6.00	-	-	-	-	-
Peru	090111	Coffee beans	651,069	12.47%	32,161	2.91%	N.A	0.00	2.00	2.25	-	0.00	-	-	-	10.00	2.25	N.A	6.00	-	-	-	-	-
Peru	150420	Fish oils	280,944	5.38%	25,568	2.32%	9.00	7.00	3.00	10.00	-	0.00	-	-	-	15.00	N.A	N.A	6.00	-	-	-	-	-
Peru	070920	Fresh or chilled asparagus	265,847	5.09%	3,277	0.30%	13.00	3.00	27.00	0.00	-	0.00	-	-	-	15.00	0.00	15.00	0.26	-	-	-	-	-
Mexico	220890	Ethyl alcohol (Tequila)	789,967	4.47%	13,400	2.04%	0.00	N.A	0.00	N.A	-	15.69	-	-	-	13.20	N.A	-	6.00	3.00	0.00	0.00	N.A	0.00
Mexico	080440	Fresh or dried avocados	720,672	4.08%	69,608	10.58%	0.00	3.00	0.00	N.A	-	N.A	-	-	-	17.60	N.A	-	6.00	N.A	0.00	0.00	0.00	0.00
Mexico	070200	Tomatoes, fresh or chilled	1,388,897	7.86%	78	0.01%	0.00	3.00	0.00	0.00	-	3.50	-	-	-	13.20	0.00	-	6.00	N.A	0.00	0.00	0.00	0.00
Mexico	070700	Cucumbers and gherkins	312,492	1.76%	0	0.00%	0.00	3.00	0.00	N.A	-	15.30	-	-	-	13.20	N.A	-	6.00	N.A	0.00	0.00	0.00	0.00

Note: this table is a summary of the 11 selected products with PM in each FTA in year 2015. The PM was analyzed for each product in the 15-16 major agricultural partners in the period (2003-2015). Import tariff from European countries are included in the Chile, Mexico and Peru’s FTAs with the EU.
"Detailed information is available from the author on request".
Data source: Chile, Mexico, and Peru´s tariff information in the main agricultural export partners was taken from each FTAs annex at SICE-OEA (2016a), U.S Customs and Borders Protection (2016), Ministerio de Comercio Industria y Turismo de la República de Colombia (2016), EUR-LEX (2017) and from WITS (2016).

Table A3.5 Korea's main agricultural import partners (2003 and 2015) (US$000)

Country	Average (2003-2015)	Imported value in 2003	Share 2003	Imported value in 2015	Share 2015	Change (2003-2015)
US	4,663,573	2,711,035	26.47%	6,363,170	23.74%	134.71%
China	3,139,079	2,528,842	24.69%	3,507,460	13.08%	38.70%
Australia	1,812,231	733,920	7.17%	2,366,058	8.83%	222.39%
Brazil	1,139,501	461,850	4.51%	1,834,681	6.84%	297.25%
Vietnam	545,726	184,754	1.80%	934,948	3.49%	406.05%
Russia	530,657	318,740	3.11%	883,018	3.29%	177.07%
Thailand	528,859	292,263	2.85%	772,459	2.88%	164.30%
Argentina	483,992	101,215	0.99%	614,926	2.29%	507.54%
Germany	242,305	81,201	0.79%	596,633	2.23%	634.76%
Chile	343,563	85,060	0.83%	594,109	2.22%	598.46%
Philippines	423,050	200,692	1.96%	592,687	2.21%	195.32%
Ukraine	175,410	25,250	0.25%	538,829	2.01%	2033.98%
India	440,573	160,121	1.56%	493,946	1.84%	208.48%
Indonesia	320,367	129,802	1.27%	472,268	1.76%	263.84%
Canada	471,841	193,253	1.89%	470,150	1.75%	143.28%
Peru	90,037	16,561	0.16%	200,415	0.75%	1110.16%
Mexico	58,760	27,261	0.27%	85,394	0.32%	213.25%

Data source: ITC Trademap (2016).

Table A3.6 China's main agricultural import partners (2003 and 2015) (US$000)

Country	**Average (2003-2015)**	**Imported value in 2003**	**Share 2003**	**Imported value in 2015**	**Share 2015**	**Change (2003-2015)**
US	13,627,575	3,762,728	24.26%	22,161,362	21.05%	488.97%
Brazil	10,764,020	2,095,866	13.51%	19,610,155	18.62%	835.66%
Australia	2,051,462	421,282	2.72%	5,340,194	5.07%	1167.61%
Argentina	4,439,109	2,251,882	14.52%	5,020,094	4.77%	122.93%
Canada	2,709,362	439,197	2.83%	4,919,730	4.67%	1020.16%
Thailand	2,340,668	488,744	3.15%	4,847,953	4.60%	891.92%
Indonesia	2,548,746	530,254	3.42%	4,031,501	3.83%	660.30%
New Zeland	2,102,577	399,065	2.57%	3,850,505	3.66%	864.88%
France	1,495,219	275,251	1.77%	3,530,476	3.35%	1182.64%
Vietnam	1,053,457	186,346	1.20%	2,682,107	2.55%	1339.32%
Malasia	2,922,238	1,143,869	7.37%	2,494,192	2.37%	118.05%
Chile	798,861	181,576	1.17%	1,834,863	1.74%	910.52%
Germany	497,077	82,319	0.53%	1,741,870	1.65%	2016.00%
Ukraine	254,987	900	0.01%	1,717,203	1.63%	190700.33%
Russia	1,343,308	711,706	4.59%	1,703,675	1.62%	139.38%
Peru	934,474	288,392	1.86%	1,410,044	1.34%	388.93%
Mexico	82,102	27,592	0.18%	190,768	0.18%	591.39%

Data source: ITC Trademap (2016).

Table A3.7 List of the FTAs tariff schedules used in econometric estimations

Agricultural exports estimations	Agricultural imports estimation
Chile: Chile-US (2004), Chile- Japan (2007), Chile-China(2006), Chile-Brazil (1996), Chile-Mexico (1999), Chile-Korea (2004), Chile-Peru (2009), Chile-Colombia (2009), Chile-Canada (1997), Chile-EU (2003) (Members of the EU as major agricultural export partners: Netherlands, UK, Germany, Spain and Italy).	**Japan:** Japan-Chile (2007), Japan-Peru (2012), Japan-Australia (2014), Japan-ASEAN (2008) (Members of ASEAN with FTA with Japan: Thailand, Philippines, Indonesia, Vietnam as agricultural import major partners).
Mexico: Mexico-US (1994), Mexico-Japan (2005), Mexico-Canada (1994), Mexico-Guatemala (2013), Mexico-Colombia (1995), Mexico-Chile (1999), Mexico-EU (2000) (Members of the EU as major agricultural export partners: Netherlands, UK, Germany, Spain).	**Korea:** Korea-US (2012), Korea-China (2015), Korea-Australia (2014), Korea-Canada (2015), Korea-India (2010), Korea-Chile (2004), Korea-Peru (2011), Korea-EU (2011), Korea-ASEAN (2006) (Members of ASEAN with FTA with Korea: Vietnam, Thailand, Philippines as agricultural import major partners).
Peru: Peru-US (2009), Peru-China (2010), Peru-Ecuador (1997), Peru-Chile (2009), Peru-Canada (2009), Peru-Colombia (1997), Peru-Japan(2012), Peru-Korea (2011), Peru-EU (2012) (Members of the EU as major agricultural export partners: Netherland, Spain, Germany, US, France, Belgium and Denmark.	**China**: China-New Zealand (2008), China-Australia (2015), China-Peru (2010), China-Chile (2006), China-ASEAN (2005). (Members of ASEAN with FTA with China: Malaysia, Indonesia, Thailand, Vietnam as agricultural import major partners)

Source: SICE-OAS (2016a) and ADB (2016).

Table A3.8 Selected products and their FPM with Japan, China and Korea major agricultural import partners

Importer	HS Code	Description	Imports Average (2003 - 2015) from the world	Product share of total agricultural imports from the world	Imports Average (2003 - 2015) from LA	Chile, Mexico and Peru's share in total agricultural imports from the world	Product share of total agricultural imports from LA	FTA PREFERENTIAL MARGIN															
								Chile 2015	Peru 2015	Mexico 2015	ASEAN 2015	Russia 2015	New Zealand 2015	EU 2015	Korea 2015	Brazil 2015	Canada 2015	Australia 2015	China 2015	United States 2015	Argentina 2015	India2015	Ukraine 2015
Japan	HS080610	Fresh grapes	33,785	0.05%	17,760	52.57%	0.69%	7.97	3.54	8.40	9.01	0.00	0.00	0.00	0.00	0.00	0.00	2.52	0.00	0.00	-	-	-
Japan	HS220421	Wine of fresh grapes	868,432	1.34%	69,102	7.96%	2.68%	N.A	N.A	N.A	N.A	0.00	0.00	0.00	0.00	0.00	0.00	N.A	0.00	0.00	-	-	-
Japan	HS230120	Fish flour	341,395	0.53%	210,117	61.55%	8.14%	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	-	-	-
Japan	HS080810	Fresh apples	1,477	0.00%	0	0.00%	0.00%	9.56	4.53	N.A	12.36	0.00	0.00	0.00	0.00	0.00	0.00	3.09	0.00	0.00	-	-	-
Japan	HS090111	Coffee	1,189,422	1.84%	19,802	1.66%	0.77%	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	-	-	-
Japan	HS150420	Fish oils	40,288	0.06%	23,137	57.43%	0.90%	7.00	7.00	7.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	-	-	-
Japan	HS070920	Fresh or chilled asparagus	73,227	0.11%	29,944	40.89%	1.16%	3.00	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	-	-	-
Japan	HS220890	Ethyl alcohol	144,097	0.22%	11,412	7.92%	0.44%	N.A	N.A	N.A	N.A	0.00	0.00	0.00	0.00	0.00	0.00	N.A	0.00	0.00	-	-	-
Japan	HS070200	Tomatoes	16,963	0.03%	602	3.55%	0.02%	3.00	1.20	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	-	-	-
Japan	HS080440	Fresh or dried avocados	103,939	0.16%	96,244	92.60%	3.73%	3.00	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	-	-	-
Japan	HS070700	Cucumbers and gherkins	641	0.00%	1	0.12%	0.00%	3.00	3.00	3.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	-	-	-
Korea	HS080610	Fresh grapes	90,958	0.47%	80,197	88.17%	16.29%	45.00	22.50	0.00	45.00	0.00	-	25.75	-	0.00	N.A	N.A	N.A	18.00	0.00	N.A	0.00
Korea	HS220421	Wine of fresh grapes	108,764	0.56%	23,808	21.89%	4.84%	15.00	15.00	0.00	14.25	0.00	-	15.00	-	0.00	3.00	15.00	1.50	15.00	0.00	5.67	0.00
Korea	HS230120	Fish flour	58,296	0.30%	36,854	63.22%	7.49%	5.00	5.00	0.00	4.75	0.00	-	5.00	-	0.00	1.50	5.00	1.00	4.00	0.00	5.00	0.00
Korea	HS080810	Fresh apples	42	0.00%	0	0.00%	0.00%	N.A	N.A	0.00	45.00	0.00	-	0.00	-	0.00	2.25	N.A	N.A	18.00	0.00	N.A	0.00
Korea	HS090111	Coffee	266,839	1.37%	26,947	10.10%	5.47%	2.00	2.00	0.00	2.00	0.00	-	2.00	-	0.00	2.00	2.00	1.60	2.00	0.00	1.50	0.00
Korea	HS150420	Fish oils	14,468	0.07%	4,422	30.56%	0.90%	3.00	3.00	0.00	3.00	0.00	-	3.00	-	0.00	1.00	1.80	0.15	2.40	0.00	3.00	0.00
Korea	HS070920	Fresh or chilled asparagus	1,769	0.01%	768	43.41%	0.16%	27.00	27.00	0.00	26.85	0.00	-	27.00	-	0.00	2.70	18.00	N.A	27.00	0.00	N.A	0.00
Korea	HS220890	Ethyl alcohol	7,745	0.04%	2,086	26.93%	0.42%	26.00	26.00	0.00	25.70	0.00	-	26.00	-	0.00	10.00	11.00	1.50	20.40	0.00	N.A	0.00
Korea	HS070200	Tomatoes	0	0.00%	0	0.00%	0.00%	45.00	32.14	0.00	28.00	0.00	-	45.00	-	0.00	2.00	9.00	4.50	45.00	0.00	N.A	0.00
Korea	HS080440	Fresh or dried avocados	2,439	0.01%	235	9.63%	0.05%	30.00	30.00	0.00	30.00	0.00	-	30.00	-	0.00	3.00	4.00	1.50	30.00	0.00	N.A	0.00
Korea	HS070700	Cucumbers and gherkins	50	0.00%	0	0.00%	0.05%	27.00	13.50	0.00	27.00	0.00	-	27.00	-	0.00	2.70	3.60	N.A	27.00	0.00	N.A	0.00
China	HS080610	Fresh grapes	245,513	0.42%	169,118	68.88%	8.78%	13.00	11.70	0.00	13.00	0.00	13.00	0.00	-	0.00	0.00	2.60	-	0.00	-	0.00	0.00
China	HS220421	Wine of fresh grapes	686,362	1.18%	49,415	7.20%	2.6%	14.00	5.60	0.00	14.00	0.00	14.00	0.00	-	0.00	0.00	2.80	-	0.00	-	0.00	0.00
China	HS230120	Fish flour	1,320,955	2.27%	945,640	71.59%	49.1%	3.50	2.78	0.00	2.00	0.00	2.00	0.00	-	0.00	0.00	2.00	-	0.00	-	0.00	0.00
China	HS080810	Fresh apples	60,239	0.10%	28,406	47.16%	1.5%	10.00	6.00	0.00	10.00	0.00	10.00	0.00	-	0.00	0.00	2.00	-	0.00	-	0.00	0.00
China	HS090111	Coffee	60,544	0.10%	74	0.12%	0.0%	8.00	N.A	0.00	7.30	0.00	8.00	0.00	-	0.00	0.00	1.60	-	0.00	-	0.00	0.00
China	HS150420	Fish oils	57,922	0.10%	26,435	45.64%	1.4%	12.00	9.00	0.00	12.00	0.00	12.00	0.00	-	0.00	0.00	2.40	-	0.00	-	0.00	0.00
China	HS070920	Fresh or chilled asparagus	25	0.00%	0	0.00%	0.0%	13.00	13.00	0.00	13.00	0.00	13.00	0.00	-	0.00	0.00	2.60	-	0.00	-	0.00	0.00
China	HS220890	Ethyl alcohol	33,194	0.06%	2,215	6.67%	0.1%	10.00	9.33	0.00	10.00	0.00	10.00	0.00	-	0.00	0.00	2.00	-	0.00	-	0.00	0.00
China	HS070200	Tomatoes	0	0.00%	0	0.00%	0.0%	13.00	13.00	0.00	13.00	0.00	13.00	0.00	-	0.00	0.00	2.60	-	0.00	-	0.00	0.00
China	HS080440	Fresh or dried avocados	4,696	0.01%	4,688	99.82%	0.2%	25.00	25.00	0.00	25.00	0.00	25.00	0.00	-	0.00	0.00	3.20	-	0.00	-	0.00	0.00
	HS070700	Cucumbers and gherkins	4	0.00%	0	0.00%	0.0%	13.00	13.00	0.00	13.00	0.00	13.00	0.00	-	0.00	0.00	2.60	-	0.00	-	0.00	0.00

Note: this table is a summary of the 11 selected products with PM in each of the selected FTAs in year 2015. The PM was analyzed for each product in the 16-17 major agricultural partners in the period (2003-2015). "More detailed information is available from the author on request".

For 080610 in the case of Japan imports from:

• Chile: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 17% for 16 years. Imports from August 1 to March 31 the MFN is 7.8% for 11 years. It means: the PM is an average of two tariff: in 2007: 0.88%, 2008: 1.77%, 2009: 2.65%, 2010: 3.54%, 2011: 4.4%, 2012:5.3%, 2013: 6.12%, 2014:7.08% and 2015: 7.97%.

• Peru: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 17% for 16 years. Imports from August 1 to March 31 the MFN is 7.8% for 11 years. It means: the PM is an average of two tariff: in 2012: 0.88%, 2013: 1.77%, 2014: 2.65%, and 2015: 3.54%.

• Mexico: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 17% for 5 years. Imports from August 1 to March 31 the MFN is 7.8% and it's excluded from duty elimination. It means: the PM is an average of two tariff: in 2005: 1.7%, 2006: 3.4%, 2007: 5.1%, 2008: 6.8%, and from 2009 onwards: 8.4%.

• ASEAN: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 17% for 11 years. Imports from August 1 to March 31 the MFN is 7.8% for 11 years. It means: the PM is an average of two tariff: in 2008: 1.12%, 2009: 2.25%, 2010: 3.38%, 2011: 4.5%, 2012: 5.6%, 2013: 6.7%, 2014: 7.89%, 2015: 9.01%.

• Australia: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 17% for 11 years. Imports from August 1 to March 31 the MFN is 7.8% for 8 years. It means: the PM is an average of two tariff: in 2014: 1.26% and 2015: 3.52%.

For 080810 in the case of Japan imports from Mexico, there are an exclusion from duty elimination or reduction.

For 080610 in the case of Korea's imports from:

• Chile: there are seasonal tariff which is eliminated in a period of 11 years according to the following schedule: 2004: 9.11%, 2005: 18.22%, 2006: 27.33%, 2007: 36.44%, 2008: 45.55%, 2009: 64.66%, 2010: 73.77%, 2011: 81.88%, 2012: 90.99%, 2013: 100%.
• Peru: there are seasonal tariff as: imports from April 1 to July 31 are liberalized from duty treatment in a period of 5 years. Imports from August 1 to March 31 the MFN are excluded from liberalized form duty treatment: 2011: 4.5%, 2012: 9.0%, 2013: 13.5%, 2014: 18%, 2015: 22.5%.
• Canada, Australia, China and India: there are an exclusion form duty elimination or reduction.
For 080810 in the case of Korea's imports from:
• Canada: there are seasonal tariff as: imports from April 1 to July 31 the MFN is 45% for 10 years. Imports from August 1 to March 31 the MFN are excluded from duty elimination. It means: the PM is an average of two tariff: in 2015: 2.25%.
For 220421 in the case of Korea's imports from:
• Chile: three lines 220421 In containers holding 2ℓ or less: 15% 2204211000 Red wine in 5 years, 15% 2204212000 White wine in 5 years, 15% 2204219000 other in 5 years. It means: the PM is an average of three tariff: 2004: 3%, 2005: 6%, 2006: 9%, 2007: 12%, and from 2008 onwards: 15%.
• Peru: three lines 220421 In containers holding 2ℓ or less: 15% 2204211000 Red wine 5 years, 15% 2204212000 White wine 5 years, 15% 2204219000 other in 5 years. It means: the PM is an average of three tariff: 2011: 3%, 2012: 6%, 2013: 9%, 2014: 12%, 2015: 15%.
• Canada: three lines 220421 In containers holding 2ℓ or less: 15% 2204211000 Red wine in 5 years, 15% 2204212000 White wine in 5 years, 15% 2204219000 other in 5 years. It means: the PM is an average of three tariff: 2015: 3%.
• Australia: three lines 220421 In containers holding 2ℓ or less: 15% 2204211000 Red wine immediate tariff reduction, 15% 2204212000 White wine immediate tariff reduction, 15% 2204219000 Other immediate tariff reduction. It means: the PM is an average of three tariff: 2014: 15%, 2015:15%.
• India: three lines 220421 In containers holding 2ℓ or less: MFN: 15% from 2204211000 Red wine, MFN: 15% from 2204212000 White wine, MFN: 15% from 2204219000 other. All of them restricted the following duty elimination schedule: 2010: 6.3%, 2011: 12.5%, 2012: 18.8%, 2013: 25%, 2014: 31.3%, and 2015: 37.5%. It means: the PM is an average of three tariff: 2010: 0.95%, 2011: 1.9%, 2012: 2.9%, 2013: 3.8%, 2014: 4.7%, 2015: 5.67%
For 220890 in the case of China's imports from:
• Chile: there are two different tariffs from two different type of similar products: tequila and spirituous and beverages, es. Both of them have a MFN of 10%, and are restricted by a duty elimination of 2 and 10 years respectively. It means, the PM is an average of two tariff: 2006: 3%, 2007: 6%, 2008: 6.5%, 2009: 7%, 2010: 7.5%, 2011: 8%, 2012: 8.5%, 2013: 9%, 2014: 9.5%, 2015: 10%.
For 230120 in the case of China's imports form:
• Chile: two lines: 23012010 MFN: 2% in 10 years and 23012090 MFN: 5% in 10 years. It means, the PM is an average of two tariffs: 2006: 0.35%, 2007: 0.7%, 2008: 1.05%, 2009: 1.4%, 2010: 1.75%, 2011: 2.1%, 2012: 2.45%, 2013: 2.8%, 2014: 3.1%, and 2015: 3.5%.
• Peru: two lines: 23012090 MFN: 5% in 8 years and 23012010 MFN: 2% tariff elimination schedule: 2010: 50%, 2011: 60%, 2012: 70%, 2013: 80%, 2014: 90% y 2015: 100%. It means, the PM is an average of two tariff: 2006: 0.81%, 2011: 1.2%, 2012: 1.63%, 2013: 2.05%, 2014: 2.46% and 2015: 2.8%
Data source: Japan, Korea, and China´s tariff information in the main agricultural export partners was taken from each FTAs annex at SICE-OEA (2016a), Asia Regional Integration Center, ADB (2016), MOFA Japan (2016), China FTA Network (2016), Korea's FTA PORTAL (2016), Office of the United States Trade Representative (2017), ASEAN-Korea Free Trade Area. Official Page (2017) and from WITS (2016).

Table A3.9 GM estimation for Chile, Mexico and Peru's agricultural exports to Japan, China and Korea at aggregate level (2003-2015) OLS results

	CHILE	PERU	MEXICO
GDPi	0.4221**	0.1296***	-0.2183***
	(0.18)	(0.18)	(0.59)
GDPj	0.176***	0.157***	0.0414
	(0.01)	(0.03)	(0.03)
agri_land	-0.247**	-0.078	1.485***
	(0.12)	(0.29)	(0.35)
Dist	-7.64E-06	-9.96E-06	-0.000142***
	(0.000009)	(0.000014)	(0.000017)
FTADummy	0.359***	-0.306**	0.343**
	(0.10)	(0.15)	(0.14)
KORFTADummy	-0.0679	-0.388	
	(0.16)	(0.31)	
JPNFTADummy	1.022***	-0.511	1.933***
	(0.18)	(0.34)	(0.30)
CHNFTADummy	-0.995***	-0.147	
	(0.19)	(0.31)	
Constant	10.80***	8.268***	16.42***
	(0.62)	(0.46)	(1.13)
Observations	195	195	208
R-squared	0.694	0.607	0.663

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.10 GM estimation for Chile, Mexico and Peru's agricultural exports to Japan, China and Korea at sectoral level (2003-2015) OLS results

	CHILE				PERU				MEXICO			
	HS0105	HS0614	HS15	HS1624	HS0105	HS0614	HS15	HS1624	HS0105	HS0614	HS15	HS1624
GDPi	3.135	0.631***	0.184***	1.95	0.9117**	0.233***	0.277***	0.810**	-1.299	-2.185**	-0.3449	-2.196
	(3.37)	(2.41)	(0.49)	(0.75)	(0.55)	(0.37)	(6.34)	(0.30)	(1.38)	(0.91)	(1.39)	(0.75)
GDPj	0.186***	0.182***	0.219***	0.136***	0.315***	0.344***	-0.0855	0.279***	0.556***	0.0718	0.266***	-0.0114
	(0.03)	(0.02)	(0.04)	(0.01)	(0.08)	(0.06)	(0.11)	(0.06)	(0.09)	(0.05)	(0.08)	(0.04)
agri_land	0.18	-0.186	-1.402***	-0.381***	-1.133	-1.717***	1.536	-1.128**	-2.861***	1.293**	-0.992	2.164***
	(0.23)	(0.16)	(0.34)	(0.12)	(0.72)	(0.60)	(1.00)	(0.53)	(0.87)	(0.55)	(0.79)	(0.46)
Dist	-2.30E-05	-1.10E-05	-0.000148***	-2.78e-05***	-2.86E-05	-5.40e-05*	-5.81E-06	-6.17e-05**	1.06E-05	-0.000197***	-0.000185***	-0.000183***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
FTADummy	0.229	0.686***	0.233	0.297***	0.136	-0.679**	-1.110**	-0.276	0.0784	0.417**	1.433***	0.936***
	(0.18)	(0.13)	(0.27)	(0.09)	(0.37)	(0.31)	(0.52)	(0.27)	(0.31)	(0.21)	(0.32)	(0.18)
KORFTADummy	1.124***	-0.531**	1.674***	-0.213	1.311*	0.202	-1.116	0.0322				
	(0.30)	(0.22)	(0.44)	(0.16)	(0.76)	(0.63)	(1.06)	(0.55)				
JPNFTADummy	2.578***	-0.514**	2.477***	0.584***	0.254	-1.006	0.122	0.217	2.165***	2.008***	1.515**	0.776**
	(0.33)	(0.24)	(0.49)	(0.17)	(0.83)	(0.69)	(1.15)	(0.61)	(0.68)	(0.47)	(0.67)	(0.39)
CHNFTADummy	-1.386***	-1.443***	1.833***	0.0935	-1.731**	-2.029***	0.741	0.914*				
	(0.35)	(0.25)	(0.51)	(0.18)	(0.76)	(0.63)	(1.05)	(0.55)				
Constant	9.653***	8.841***	2.186	10.75***	6.074***	4.381***	1.556	8.777***	10.57***	15.30***	13.16***	15.44***
	(1.14)	(0.81)	(1.67)	(0.59)	(1.13)	(0.93)	(1.57)	(0.82)	(2.66)	(1.75)	(2.68)	(1.45)
Observations	195	195	194	195	195	195	192	195	189	208	184	205
R-squared	0.565	0.591	0.414	0.585	0.302	0.357	0.132	0.399	0.448	0.526	0.432	0.642

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.11 GM estimation for Chile's agricultural exports to Japan, China and Korea at product level (2003-2015) OLS results

CHILE

	FTA DUMMY					FPM			
	HS080610	HS220421	HS230120	HS080810		HS080610	HS220421	HS230120	HS080810
GDPi	3.858	3.892	-1.031	1.162	GDPi	4.605	6.588	5.347	4.164
	(4.60)	(4.87)	(5.91)	(4.01)		(5.12)	(4.72)	(6.60)	(4.33)
GDPj	0.192***	0.0874**	0.0164	0.116***	GDPj	0.0823	0.0413	0.054	0.0886***
	(0.04)	(0.04)	(0.05)	(0.03)		(0.06)	(0.04)	(0.06)	(0.03)
agri_land	0.652**	0.630*	0.568	-0.315	agri_land	0.679**	0.617**	0.279	-0.281
	(0.31)	(0.33)	(0.48)	(0.28)		(0.33)	(0.25)	(0.53)	(0.28)
Dist	0.000117***	-1.84E-05	0.000331***	-4.19e-05**	Dist	0.000110***	-4.18e-05*	0.000303***	-7.16e-05***
	(0.000023)	(0.000024)	(0.000031)	(0.000019)		(0.000024)	(0.000022)	(0.000031)	(0.000021)
FTADummy	1.179***	0.951***	1.632***	-0.0346	FTA PM	0.0647***	0.0296***	0.00954	-0.0247
	(0.25)	(0.26)	(0.33)	(0.23)		(0.02)	(0.01)	(0.05)	(0.02)
KORFTADummy	0.258	0.237	-1.326***		KORFTAPM	-0.0268	0.0618**	-0.227	
	(0.41)	(0.44)	(0.49)			(0.02)	(0.03)	(0.15)	
JPNFTADummy	-1.291***	1.164**	-0.508	-6.660***	JPNFTAPM	-0.0864		-0.0562	-1.173***
	(0.45)	(0.48)	(0.52)	(0.70)		(0.09)		(0.09)	(0.16)
CHNFTADummy	-1.954***	-0.926*	-0.501	-1.111***	CHNFTAPM	-0.0406	0.00755	-0.00603	-0.0467
	(0.48)	(0.51)	(0.55)	(0.40)		(0.08)	(0.00)	(0.01)	(0.07)
Constant	5.669***	7.731***	4.336**	9.555***	Constant	6.148***	7.354***	3.821*	9.011***
	(1.55)	(1.65)	(1.99)	(1.35)		(1.73)	(1.60)	(2.25)	(1.47)
Observations	195	195	162	171	Observations	183	96	162	171
R-squared	0.536	0.254	0.628	0.446	R-squared	0.353	0.386	0.569	0.361

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.12 GM estimation for Mexico's agricultural exports to Japan, China and Korea at product level (2003-2015) OLS results

MEXICO

FTA DUMMY				FPM			
	HS220890	HS080440	HS070200		HS220890	HS080440	HS070200
GDPi	0.506	2.075	-8.531***	GDPi	-0.467	0.484	-2.31
	(0.83)	(1.57)	(2.54)		(0.99)	(1.65)	(4.32)
GDPj	0.0774	-0.0995	0.69	GDPj	-0.0398	-0.00507	0.0948
	(0.05)	(0.08)	(0.47)		(0.05)	(0.09)	(0.76)
agri_land	1.689***	2.576***	-6.046	agri_land	0.0466	0.595	-20.19
	(0.49)	(0.89)	(6.43)		(0.58)	(1.03)	(12.06)
Dist	5.62e-05**	-0.000418***	-0.00167***	Dist	7.83e-05**	-0.000518***	0.00649***
	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
FTADummy	1.907***	-0.216	-0.106	FTA PM	0.0451**	-0.387***	0.333**
	(0.21)	(0.51)	(2.67)		(0.02)	(0.13)	(0.12)
KORFTADummy				KORFTAPM			
JPNFTADummy	0.263	5.784***	3.209***	JPNFTAPM		1.898***	-2.37
	(0.41)	(0.71)	(0.97)			(0.23)	(1.60)
CHNFTADummy				CHNFTAPM			
Constant	4.980***	6.686**	33.06***	Constant	7.459***	11.46***	-56.56**
	(1.62)	(3.21)	(9.64)		(1.91)	(3.37)	(18.82)
Observations	194	154	44	Observations	92	143	18
R-squared	0.587	0.573	0.941	R-squared	0.085	0.606	0.818

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.13 GM estimation for Peru's agricultural exports to Japan, China and Korea at product level (2003-2015) OLS results

PERU

	FTA DUMMY					FPM			
	HS090111	HS150420	HS070920	HS230120		HS230120	HS090111	HS150420	HS070920
GDPi	0.157***	0.262***	0.477***	-5.321	GDPi	-5.379	0.282***	0.854	2.413***
	(0.73)	(0.73)	(0.74)	(6.01)		(0.44)	(0.31)	(0.52)	(0.52)
GDPj	-0.0263	-0.477***	0.342***	0.181*	GDPj	0.230**	0.229***	-0.401***	0.406***
	(0.10)	(0.12)	(0.12)	(0.10)		(0.10)	(0.08)	(0.11)	(0.14)
agri_land	1.405	4.716***	-0.98	-1.171	agri_land	-1.668*	-0.826	3.595***	-1.511
	(0.99)	(1.09)	(1.13)	(0.96)		(0.98)	(0.78)	(1.03)	(1.33)
Dist	-2.37E-05	1.35E-06	-0.000131**	9.41e-05**	Dist	7.03E-05	-3.55E-05	-8.67E-05	-0.000318***
	(0.00004)	(0.00005)	(0.00005)	(0.00004)		(0.00005)	(0.00004)	(0.00005)	(0.00005)
FTADummy	-1.900***	-1.860***	-2.273***	-0.104	FTA PM	-0.0473	-0.318***	-0.181**	-0.329***
	(0.44)	(0.56)	(0.59)	(0.49)		(0.04)	(0.05)	(0.07)	(0.05)
KORFTADummy	2.153**	0.0667	-0.0649	-1.025	KORFTAPM	-0.193	0.751**	0.000768	0.308***
	(0.94)	(1.11)	(1.13)	(1.01)		(0.29)	(0.34)	(0.49)	(0.07)
JPNFTADummy	0.398	2.701*	0.924	1.374	JPNFTAPM			0.451**	0.44
	(1.02)	(1.37)	(1.25)	(1.11)				(0.19)	(0.38)
CHNFTADummy		3.676***	-6.071***	2.803***	CHNFTAPM	1.314**		0.726***	-0.189*
		(1.16)	(1.18)	(1.05)		(0.54)		(0.19)	(0.10)
Constant	4.766***	1.557	-2.71	9.583***	Constant	9.885***	7.224***	7.554***	3.649**
	(1.44)	(1.85)	(1.89)	(1.52)		(1.44)	(0.93)	(1.58)	(1.59)
Observations	185	171	180	188	Observations	188	182	164	162
R-squared	0.166	0.182	0.346	0.251	R-squared	0.238	0.425	0.164	0.454

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.14 GM estimation for Japan, Korea and China's agricultural imports from Chile, Mexico and Peru at aggregate level (2003-2015) OLS results

	JAPAN	KOREA	CHINA
GDPi	0.902***	0.703***	-3.328***
	(0.30)	(0.11)	(0.92)
GDPj	0.614***	0.471***	0.0829
	(0.05)	(0.07)	(0.12)
agri_land	-0.193*	0.373**	2.129***
	(0.11)	(0.18)	(0.37)
Dist	-2.84e-05***	-5.50e-05***	6.11e-05**
	(0.00001)	(0.00002)	(0.00003)
FTADummy	0.381**	0.596***	1.147***
	(0.15)	(0.16)	(0.33)
PERFTADummy	-1.057***	0.254	0.297
	(0.32)	(0.44)	(0.73)
MEXFTADummy	-1.058***		
	(0.19)		
CHIFTADummy	0.929***	1.208***	0.291
	(0.25)	(0.33)	(0.63)
Constant	2.855	4.902***	31.42***
	(2.80)	(0.91)	(5.58)
Observations	202	209	209
R-squared	0.679	0.536	0.299

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Author's estimation.

Table A3.15 GM estimation for Japan, Korea and China's agricultural imports from Chile, Mexico and Peru at sectoral level (2003-2015) OLS results

	JAPAN				KOREA				CHINA			
	HS01-05	HS06-14	HS-15	HS16-24	HS01-05	HS06-14	HS-15	HS16-24	HS01-05	HS06-14	HS-15	HS16-24
GDPi	0.602	0.59	1.834***	1.621***	1.639***	0.571***	-0.013	1.308***	0.494	-2.192**	-3.009	-2.088**
	(0.44)	(0.71)	(0.69)	(0.60)	(0.15)	(0.21)	(0.28)	(0.18)	(0.81)	(1.10)	(1.94)	(0.82)
GDPj	0.309***	0.798***	0.548***	0.914***	0.972***	0.468***	0.816***	0.911***	0.613***	0.458***	-0.054	0.760***
	(0.07)	(0.11)	(0.10)	(0.09)	(0.09)	(0.12)	(0.16)	(0.10)	(0.11)	(0.14)	(0.21)	(0.10)
agri_land	0.548***	-0.717***	-0.442*	-1.165***	-8.29e-07***	2.11E-07	-5.82E-08	-7.15e-07**	1.031***	2.000***	1.398**	-0.273
	(0.16)	(0.26)	(0.24)	(0.22)	(0.00)	(0.00)	(0.00)	(0.00)	(0.32)	(0.44)	(0.66)	(0.30)
Dist	-4.47e-05***	3.22E-05	7.92e-05***	2.58E-05	-0.000114***	7.54E-06	-4.50E-06	1.95E-06	4.17e-05*	8.78e-05**	6.22E-05	0.000156***
	(0.00001)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00004)	(0.00002)	(0.00003)	(0.00003)	(0.00005)	(0.00002)
FTADummy	-0.233	0.978***	2.026***	1.199***	0.325	0.826***	1.996***	1.836***	1.281***	2.241***	2.783***	1.945***
	(0.22)	(0.35)	(0.33)	(0.30)	(0.21)	(0.29)	(0.38)	(0.25)	(0.29)	(0.40)	(0.59)	(0.28)
PERFTADummy	-1.885***	-1.061	0.359	-0.463	0.531	0.304	1.146	0.751	-0.201	0.836	0.468	2.236***
	(0.46)	(0.74)	(0.68)	(0.62)	(0.59)	(0.82)	(1.07)	(0.70)	(0.65)	(0.88)	(1.28)	(0.61)
MEXFTADummy	-0.272	-0.806*	-0.706*	-2.244***								
	(0.28)	(0.45)	(0.41)	(0.37)								
CHIFTADummy	1.732***	-0.427	0.17	0.098	2.566***	0.664	1.328*	0.967*	0.857	1.542**	-0.87	0.518
	(0.33)	(0.54)	(0.49)	(0.45)	(0.44)	(0.61)	(0.79)	(0.52)	(0.55)	(0.75)	(1.09)	(0.52)
Constant	6.231	2.355	-10.85*	-6.952	-5.583***	3.949**	2.477	-17.91***	3.773	19.69***	26.43**	17.15***
	(4.07)	(6.59)	(6.34)	(5.51)	(1.22)	(1.69)	(2.26)	(1.44)	(4.93)	(6.71)	(11.48)	(4.95)
Observations	208	208	203	208	209	209	204	209	209	209	200	207
R-squared	0.5	0.292	0.229	0.411	0.606	0.202	0.262	0.495	0.377	0.333	0.143	0.467

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation.

Table A3.16 GM estimation for Japan’s agricultural imports from Chile, Mexico and Peru at product level (2003-2015) OLS results FTA Dummy and FTA PM

FTA DUMMY

	HS080610_rea	HS220421_rea	HS230120_rea	HS080810_rea	HS090111_rea	HS150420_rea	HS070920_rea	HS220890_rea	HS080440_rea	HS070700_rea	HS070200_rea
GDPi	-5.629***	-0.76	-0.455	-6.244	5.716***	3.179*	0.845	4.479***	-1.206	20.02***	-5.239**
	(1.44)	(1.71)	(0.83)	(8.25)	(1.56)	(1.79)	(1.70)	(1.06)	(1.53)	(3.45)	(1.99)
GDPj	-1.009**	1.595***	-0.161	-2.034	-0.843***	0.0216	-0.739***	1.345***	2.187***	-5.354**	0.953***
	(0.44)	(0.30)	(0.15)	(2.58)	(0.25)	(0.23)	(0.20)	(0.17)	(0.31)	(2.24)	(0.29)
agri_land	5.311***	-2.979***	-0.0173	-1.281	1.966***	0.972*	1.914***	-3.871***	-6.496***	15.76***	-1.540*
	(1.28)	(0.86)	(0.32)	(16.72)	(0.55)	(0.54)	(0.58)	(0.34)	(0.88)	(4.96)	(0.82)
Dist	0.000635***	0.000226***	0.000238***	-0.000147	0.000105*	0.000318***	0.000105**	-0.000259***	-9.67E-05	-0.000926***	-3.11E-05
	(0.00007)	(0.00006)	(0.00003)	(0.00044)	(0.00006)	(0.00005)	(0.00004)	(0.00004)	(0.00007)	(0.00022)	(0.00008)
FTADummy	3.293***	-0.397	0.791*		4.775***	1.389**	0.821	1.105**			
	(0.77)	(0.92)	(0.40)		(0.73)	(0.66)	(0.53)	(0.53)			
PERFTADummy		-3.235**	0.873		1.841	1.998*	0.274		-3.453***		
		(1.56)	(0.80)		(1.49)	(1.16)	(0.87)		(1.20)		
MEXFTADummy	0.593	-3.808***	-0.148		-3.518***	0.319	2.436***	2.453***	0.946*	5.967***	-1.508**
	(0.65)	(0.95)	(0.52)		(0.90)	(0.69)	(0.52)	(0.58)	(0.54)	(1.56)	(0.58)
CHIFTADummy	-0.378	3.274***	0.0619			1.214	-7.267***		-0.891		
	(0.64)	(1.13)	(0.61)			(0.78)	(1.58)		(0.65)		
Constant	53.03***	2.083	11.55	74.83	-39.43***	-24.95	3.791	-37.63***	8.252	-131.3***	47.22**
	(12.34)	(15.80)	(7.75)	(87.46)	(14.52)	(16.19)	(15.49)	(9.86)	(14.00)	(40.83)	(18.71)
Observations	54	170	150	9	153	127	119	152	53	19	63
R-squared	0.868	0.369	0.443	0.835	0.532	0.481	0.384	0.609	0.837	0.889	0.549

FPM

	HS080610_rea	HS220421_rea	HS230120_rea	HS080810_rea	HS090111_rea	HS150420_rea	HS070920_rea	HS220890_rea	HS080440_rea	HS070700_rea	HS070200_rea
GDPi	-5.295**	-1.325	-1.491**	-6.244	-0.462	2.633	0.845	6.286***	-1.206	20.02***	-5.239**
	(2.12)	(2.05)	(0.68)	(8.25)	(1.47)	(1.80)	(1.70)	(1.11)	(1.53)	(3.45)	(1.99)
GDPj	-0.376	1.220***	-0.328***	-2.034	-1.958***	-0.136	-0.739***	1.681***	2.187***	-5.354**	0.953***
	(0.47)	(0.34)	(0.12)	(2.58)	(0.23)	(0.20)	(0.20)	(0.18)	(0.31)	(2.24)	(0.29)
agri_land	3.405**	-2.094**	0.224	-1.281	3.786***	1.276**	1.914***	-4.755***	-6.496***	15.76***	-1.540*
	(1.36)	(0.97)	(0.28)	(16.72)	(0.58)	(0.51)	(0.58)	(0.37)	(0.88)	(4.96)	(0.82)
Dist	0.000550***	0.000228***	0.000221***	-0.000147	-9.27E-05	0.000290***	0.000105**	-0.000221***	-9.67E-05	-0.000926***	-3.11E-05
	(0.00007)	(0.00006)	(0.00003)	(0.00044)	(0.00006)	(0.00004)	(0.00004)	(0.00003)	(0.00007)	(0.00022)	(0.00008)
FTA PM	0.179					0.242	0.274		-1.151***	1.989***	
	(0.16)					(0.17)	(0.18)		(0.40)	(0.52)	
FTAPMPER						0.0343	-0.182				
						(0.23)	(0.32)				
FTAPMMEX	-0.189		-0.0733			-0.183	0.538**		1.466***		-0.503**
	(0.14)		(0.23)			(0.20)	(0.25)		(0.44)		(0.19)
FTAPMCHI	-0.205					-0.0613	-2.696***		0.854**		
	(0.17)					(0.20)	(0.56)		(0.38)		
Constant	48.01**	8.993	21.83***	74.83	22.96*	-18.97	3.791	-55.41***	8.252	-131.3***	47.22**
	(18.19)	(19.02)	(6.12)	(87.46)	(13.11)	(16.18)	(15.49)	(10.34)	(14.00)	(40.83)	(18.71)
Observations	54	152	150	9	153	127	119	123	53	19	63
R-squared	0.821	0.18	0.424	0.835	0.338	0.471	0.384	0.657	0.837	0.889	0.549

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation

Table A3.17 GM estimation for Korea’s agricultural imports from Chile, Mexico and Peru at product level (2003-2015) OLS results FTA Dummy and FTA PM

FTA DUMMY

	HS080610_rea	IS220421_rea	IS230120_rea	IS090111_rea	IS150420_rea	IS070920_rea	IS220890_rea	IS080440_rea	IS070700_rea
GDPi	11.49*	-1.431***	0.331	-2.330***	0.246	2.883***	-0.911*	29.24**	9.761
	(6.69)	(0.43)	(0.43)	(0.34)	(0.53)	(0.77)	(0.53)	(13.76)	(34.57)
GDPj	0.291	1.442***	0.362*	-0.841***	0.24	0.186	-0.554*	-5.711	8.914
	(0.64)	(0.26)	(0.19)	(0.19)	(0.22)	(0.28)	(0.30)	(4.67)	(13.42)
agri_land	-1.331	-3.982***	-1.980***	2.550***	-0.96	-0.855	2.821***	13.12	38.89
	(1.78)	(0.73)	(0.50)	(0.49)	(0.59)	(0.84)	(0.81)	(9.62)	(574.70)
Dist	-2.72E-05	2.98E-05	-0.000202***	-8.90E-06	-0.000112*	0.000100**	0.000146***	-0.000215	-0.0023
	(0.00010)	(0.00004)	(0.00004)	(0.00004)	(0.00006)	(0.00004)	(0.00005)	(0.01740)	(0.09420)
FTADummy	-0.888	-0.698*	-1.149***	-0.175	-0.829*	0.722*	2.337***	-0.243	2.238
	(0.85)	(0.40)	(0.41)	(0.44)	(0.47)	(0.43)	(0.42)	(0.83)	(2.51)
ERFTADumr	-0.027	-0.275	-1.068	0.552	-1.236	-2.522***			
	(0.99)	(1.13)	(0.95)	(1.00)	(1.17)	(0.81)			
EXFTADummy									
HIFTADumn	0.941	0.197	1.19		-0.919	-3.468**	0.877		
	(1.06)	(0.72)	(0.75)		(0.97)	(1.63)	(1.79)		
Constant	-81.68*	5.298	1.724	24.47***	1.955	-18.29***	9.834*	-169.4	-183.5
	(47.92)	(4.20)	(3.45)	(3.01)	(4.64)	(6.41)	(5.15)	(244.70)	(288.60)
Observations	36	91	130	139	135	90	83	22	7
R-squared	0.495	0.675	0.245	0.314	0.121	0.262	0.4	0.657	0.919

FPM

	HS080610_rea	IS220421_rea	IS230120_rea	IS090111_rea	IS150420_rea	IS070920_rea	IS220890_rea	IS080440_rea	IS070700_rea
GDPi	11.70**	-1.477***	0.34	-2.305***	0.237	2.884***	-0.799	27.63*	
	(5.65)	(0.43)	(0.42)	(0.33)	(0.51)	(0.74)	(0.52)	(13.92)	
GDPj	0.0499	1.428***	0.272	-0.824***	0.205	0.0563	-0.527*	-5.511	3.096
	(0.61)	(0.26)	(0.19)	(0.18)	(0.22)	(0.27)	(0.29)	(4.66)	0.00
agri_land	-1.294	-3.897***	-1.794***	2.529***	-0.938	-0.672	2.781***	13.11	
	(1.60)	(0.74)	(0.49)	(0.49)	(0.58)	(0.81)	(0.79)	(9.65)	
Dist	-0.000117	3.35E-05	-0.000202***	-4.17E-06	-9.45e-05*	8.00e-05**	0.000134***	0.000577	0.00188
	(0.00009)	(0.00004)	(0.00004)	(0.00004)	(0.00005)	(0.00004)	(0.00005)	(0.01730)	0.00000
FTA PM	-0.0402	-0.0388	-0.449***	-0.0411	-0.505***	9.18E-05	0.129***	3.64E-06	
	(0.05)	(0.03)	(0.12)	(0.22)	(0.19)	(0.02)	(0.02)	(0.03)	
FTAPMPER	-0.00943	0.0236	0.17	0.326	-0.532	-0.152***			
	(0.05)	(0.09)	(0.29)	(0.54)	(0.57)	(0.04)			
FTAPMMEX							0.129***	3.64E-06	
							(0.02)	(0.03)	
FTAPMCHI	0.0699	0.059	0.724***		0.00125	-0.329**	0.0558		
	(0.05)	(0.06)	(0.22)		(0.38)	(0.14)	(0.33)		
Constant	-80.07**	5.596	2.226	24.11***	2.164	-17.07***	9.034*	-168.1	-28.65
	(38.63)	(4.26)	(3.36)	(2.84)	(4.40)	(6.15)	(5.04)	(246.20)	0.00
Observations	34	91	130	139	135	90	83	22	3
R-squared	0.722	0.67	0.276	0.313	0.165	0.317	0.43	0.655	1

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Author's estimation

Table A3.18 GM estimation for China's agricultural imports from Chile, Mexico and Peru at product level (2003-2015) OLS results FTA Dummy and FTA PM

				FTA DUMMY					
	HS080610_rea	HS220421_rea	HS230120_rea	HS080810_rea	HS090111_rea	HS150420_rea	HS070920_rea	HS220890_rea	HS080440_rea
GDPi	3.371	1.969	0.256	2.741	8.193***	0.234	6.726	2.870*	-23.87
	(3.46)	(2.57)	(1.61)	(2.68)	(2.36)	(1.86)	(7.23)	(1.52)	(64.71)
GDPj	0.389	1.596***	-1.360***	0.0923	-0.857***	-0.889***	-4.207**	0.173	-11.93
	(0.34)	(0.25)	(0.24)	(0.26)	(0.32)	(0.21)	(1.90)	(0.18)	(18.06)
agri_land	1.43	-3.166***	4.923***	0.981	2.980***	3.433***	-9.251	-1.668***	-672.2*
	(0.97)	(0.71)	(0.68)	(0.69)	(0.95)	(0.62)	(5.34)	(0.42)	(309.90)
Dist	0.000409***	3.40E-05	0.000250***	0.000413***	8.11E-05	0.000169***	0.00177**	0.000103**	-0.763*
	(0.000061)	(0.000066)	(0.000036)	(0.000076)	(0.000066)	(0.000047)	(0.000784)	(0.000047)	(0.331000)
FTADummy	3.864***	0.473	1.241***	0.895	6.065***	1.670***	2.420**	-1.457***	
	(1.30)	(0.92)	(0.44)	(0.62)	(0.91)	(0.53)	(0.97)	(0.50)	
PERFTADummy	1.981***	-1.936	2.427***			3.222***		-5.184***	3,067*
	(0.65)	(1.60)	(0.75)			(0.89)		(1.33)	(1341.00)
MEXFTADummy									
CHIFTADummy	1.306**	3.737***	0.777	-0.554		1.837**		-3.397***	5,021*
	(0.63)	(1.21)	(0.66)	(0.81)		(0.80)		(1.17)	(2184.00)
Constant	-19.46	-13.84	12.24	-13.69	-40.26***	7.136	-17.16	-13.07	10,161*
	(20.02)	(15.00)	(9.60)	(16.14)	(14.60)	(11.00)	(36.05)	(8.74)	(4254.00)
Observations	55	132	113	50	90	125	19	121	13
R-squared	0.746	0.317	0.567	0.641	0.592	0.483	0.457	0.305	0.645
				FPM					
	HS080610_rea	HS220421_rea	HS230120_rea	HS080810_rea	HS090111_rea	HS150420_rea	HS070920_rea	HS220890_rea	HS080440_rea
GDPi	2.275	2.009	0.19	2.318	14.32***	0.756	8.818	2.824*	-40.65
	(3.36)	(2.60)	(1.65)	(2.69)	(2.40)	(1.92)	(7.85)	(1.52)	(88.18)
GDPj	0.375	1.509***	-1.373***	0.0771	-0.909***	-0.930***	-4.571*	0.205	-18.25
	(0.33)	(0.25)	(0.24)	(0.25)	(0.29)	(0.21)	(2.24)	(0.17)	(25.87)
agri_land	1.451	-3.214***	4.776***	1.077	2.820***	3.388***	-8.36	-1.685***	35.81
	(0.93)	(0.72)	(0.68)	(0.68)	(0.85)	(0.64)	(5.85)	(0.42)	(49.66)
Dist	0.000405***	3.65E-05	0.000243***	0.000384***	0.000202***	0.000211***	0.00195*	9.21e-05*	-0.00319
	(0.000055)	(0.000064)	(0.000032)	(0.000067)	(0.000064)	(0.000047)	(0.000986)	(0.000048)	(0.007670)
FTA PM	1.506***	-0.0322	0.564**	0.116	1.380***	0.163***	0.213*	-0.151***	0.0818
	(0.48)	(0.08)	(0.22)	(0.07)	(0.16)	(0.05)	(0.12)	(0.05)	(2.15)
FTAPMPER	-1.262**	-0.548				0.242		-0.702***	-0.672
	(0.48)	(0.42)				(0.16)		(0.23)	(1.01)
FTAPMMEX									
FTAPMCHI	-1.328***	0.458***	-0.339	-0.137		-0.0521		-0.231	
	(0.49)	(0.17)	(0.35)	(0.13)		(0.12)		(0.15)	
Constant	-12.95	-13.33	13.01	-10.89	-76.70***	4.124	-28.08	-12.96	402.6
	(19.49)	(15.17)	(9.83)	(16.19)	(14.96)	(11.39)	(38.68)	(8.76)	(395.80)
Observations	55	130	113	50	84	125	19	121	13
R-squared	0.766	0.303	0.553	0.642	0.682	0.453	0.363	0.303	0.332

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

Source: Author's estimation.

Table A 3.19 Summary of tables 3.13a, 3.13b, 3.14a, 3,14b, 315a and 3.15b GM results for Japan, Korea and China's imports from Chile, Mexico and Peru al product level (2003-2015) PPML results for FTA Dummy and FTA PM

FTA	FTA (+)	FTA (-)	FPM (+)	FPM (-)
Japan-Chile	GRAPES - FISH OIL	WINE - ASPARAGUS - AVOCADOS - FISH FLOUR	-	GRAPES - ASPARAGUS - AVOCADOS
Korea-Chile	GRAPES - FISH FLOUR	WINE - ASPARAGUS - TEQUILA	-	GRAPES - WINE - TEQUILA - ASPARAGUS
China-Chile	GRAPES - APPLES - FISH OIL	TEQUILA	GRAPES - WINE	FISH FLOUR - FISH OIL - TEQUILA
Japan-Mexico	GRAPES - FISH OIL - FISH FLOUR - ASPARAGUS - TEQUILA	WINE - COFFEE - AVOCADOS	ASPARAGUS - TOMATOES CUCUMBERS	GRAPES - AVOCADOS
Japan-Peru	ASPARAGUS - AVOCADOS	WINE - FISH FLOUR	ASPARAGUS	-
Korea-Peru	GRAPES - COFFEE	WINE - FISH FLOUR	COFFEE	GRAPES - WINE - FISH FLOUR
China-Peru	GRAPES - FISH FLOUR - FISH OIL	WINE - TEQUILA - AVOCADOS	GRAPES	WINE - TEQUILA

Source: Authors Estimation.

Chapter 4. The Impacts of Colombia-China and Colombia-Japan FTAs on Colombia's agricultural exports: A Computable General Equilibrium Analysis

4.1 Introduction

In comparison with its Latin-American partners from the Pacific Alliance (PA), Colombia is considerably lagging behind in terms of commercial integration with the Asia Pacific. Out of the several Free Trade Agreements (FTAs) that Colombia has negotiated, only one has been signed with an Asian country, that is the case of the FTA with the Republic of Korea (Korea). This particular FTA was signed on February 21th, 2013, and entered into effect on July 15th, 2016. Although in December of 2012 also started negotiating an Economic Partnership Agreement (EPA) with Japan, these negotiations are yet to be concluded.

On the other hand, on multiple occasions China has proposed to Colombia the negotiations of an FTA. However, the possibility to conduct such negotiation has been halted. During the visit of President Santos to China in 2012, the Colombian government expressed its intention to concentrate its efforts on the ongoing peace negotiations with the country's main guerrilla group. President Santos also expressed the need to evaluate and improve the utilization rate of Colombia's current FTAs before engaging in new negotiations. Another reason to postpone FTA negotiations with China relates to the productive structure of Colombia. It should be noted that the Colombian manufacture sector largely competes with Chinese imports. In fact, the National Business Association of Colombia (ANDI in Spanish) has repeatedly expressed its concerns to the Colombian government, arguing that Colombian manufacture sector is not competitive enough in order to compete against the Asian country (Dinero, 2015), (Peña, 2012).

In spite of the above, it seems possible that Colombia will follow the steps of its regional partners in the PA. This new scheme of Latin-American integration that brings together Chile, Mexico, Peru, and Colombia, aims to accomplish a higher participation in international trade, especially within the Asia Pacific region. The participation in the PA can motivate this country to pursue a strategy similar to that of its neighboring countries (Chile and Peru) who already have FTAs with the three main countries of the Asian region: China, Japan, and Korea.

Traditionally, East Asia (EA) has imported primary products from Latin America (LA), oil and minerals holding the first place, followed by food. China, Japan, and Korea see in LA a significant food supplier, and Colombia is not the exception.

In Colombia, agricultural exports represented around 13% of its total exports on average during the last five years (2011 – 2015), equivalent to US$ 6,826 million. However, Colombian agricultural exports to EA were only US$ 454 million, equivalent to 7% of its agricultural exports to the world. The main market in EA for Colombian agricultural exports is Japan, followed by China and by Korea. In 2014[29], Colombia sold to Japan mostly coffee beans (75%), flowers (17%), coffee extracts (6%), and bananas (0.6%). In the case of China, Colombia exported mainly glycerol (oils) (45%), coffee beans (37 %), coffee extracts (5%), flowers (5%), and some fruits (1.4%) (ITC-Trademap, 2017). Colombian export supply is poorly diversified and with a low added value. This is the reason why Colombia, should take advantage of the needs of Japan and China in order to diversify its agricultural offer. This is a key issue, if Colombia wants to become more competitive and to increase its presence inside these important EA markets.

The Colombian agricultural sector is expected to benefit from FTAs with Japan and China. However, it is important to take into account that although the negotiation of the FTAs generally leads to a tariff reduction, there are other types of Non-Tariff Barriers (NTB) that limits the access of Colombian products into these markets. Such is the case of quotas and the Sanitary and Phytosanitary Measures (SPS) imposed by Japan and China.

This chapter implements a CGE model that evaluates the effects on the agricultural exports under the reduction of tariff and NTBs that Colombian economy can face under potential FTA negotiations with Japan and China. The chapter analyzes the short-term impacts such as the reassignment of the productive factor labor.[30]

The chapter is structured as follows: section two analyzes previous studies that have implemented CGE models in order to measure impacts on international trade, starting from the origin of these models' application through the ones used in Asia, LA and Colombia. Section three describes the methodology of the CGE model applied in the present chapter. Section four shows the Colombian agricultural exports to Japan and China and the tariff and NTBs imposed by these countries to products from the Colombian agricultural sector. Section five describes five simulation scenarios. Section six discusses the result of the simulation scenarios, and finally, section seven presents the conclusions of the chapter.

4.2 Literature review of CGE

CGE models are a mathematical representation of the economy as a whole which aggregates decisions of economic agents (households, enterprises, government, and external sector) following microeconomic principles.

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[29] Trade data is taken from year 2014 because the CGE model is calibrated for year 2014.

[30] The model assumes labor is variable in the short term. Other productive factors such as land and capital are immovable sectorally.

These models incorporate optimization processes (in general nonlinear) of the sectoral production functions and utility of the different economic agents to add to the modeling. In that sense, the work dynamics of the CGE models are developed from comparative static exercises that allow evaluating different exogenous shocks of international economic policy interventions (fiscal, commercial, monetary) inside a general equilibrium system (Dervis et al.,1982), (Schuschny et al., 2007).

In this direction, the quantitative development in the trade policy measurement has remarked different theoretical and empirical aspects that can be addressed by implementing equilibrium models and in general, to different econometric and computational methodologies. Goldberg and Pavcnik (2016) illustrate the methodological changes in recent literature and the research challenges that could be faced in the measurement of international economic policy: aggregation and heterogeneity, endogeneity of trade policy, inclusion of uncertainty and anticipation of agents, and particularly, the need to advance in the measurement and incorporation of non-tariff policy into the analysis.

After the challenging processes of removing tariff and non-tariff during the Uruguay Round, the evolution of agricultural policy accomplished a tipping point in which the protection of the sector reached its lower trade restrictions in the entire history. Due to this event, the implementation of CGE models became stronger as a political economy instrument that enables the evaluation of the several economic blocks integration impacts, Hertel et al (1996), Harrison et al (1997), Francois et al (1996), Brown et al (1996) and Goldin et al (1996). The main results found in these studies illustrate the increases in the sectoral agricultural production among the sectors analyzed, improvements in social welfare, and higher commercial flows with the removal of these trade barrier. However, when analyzing trade blocks altogether it is not possible to evaluate the effects on the Colombian economy.

In the implementation of CGE models based on Asian economies, the global effects of tariff liberalization have been studied considering different scenarios of economic integration, also evaluating on the various economic integration blocks that have been created throughout the past two decades. These include:: The Association of Southeast Asian Nations (ASEAN), the Free Trade Area of the Asia-Pacific (FTAAP), Asia-Pacific Economic Cooperation (APEC) and the Trans-Pacific Partnership (TPP). The research conducted by Petri (1997), Petri et al (2011), Urata and Kiyota, (2003), Kim et al (2013), Scollay and Gilbert (2000), Lee and Plummer (2011) show improvements in the growth and economic welfare due to the commercial liberalization processes, especially in the service sector (financial flows facilitation) and agricultural sector (economies of scale). Nonetheless, there are other elements that should be considered including trade diversion such as technology transfer and labor mobility, and the inclusion of the analysis on an enterprise level.

Petri (1997) contributes to the scholar literature in the field by bringing Foreign Direct Investment (FDI) into the CGE framework, distinguishing between the activities of domestic and foreign companies in both production and demand. The implemented model analyzes trade effects on APEC members simulating different scenarios with time trajectories until 2020. The main results illustrate improvements in social welfare generated by the liberalization of FDI, as well as in terms of amplification of the economic response to the trade liberalization. Petri (2011) also applies a dynamic CGE model in order to study the impact of the ASEAN Economic Community (AEC) on economic welfare, trade flows and sectoral output of the member states. This author analyzes48 current and proposed Asia Pacific trade agreements and models on variables that include sectorial trade, production, and employment changes in 24 regions in the world. The results suggest that decreases in administrative and technical barriers and lowering the trade, whereas transport margins are important and increase the AEC benefits.

In contrast, Urata and Kiyota (2003) examine the impact of the FTAs in EA on different regional trade patterns by implementing a multi-sector CGE model. These authors find positive impacts on economic growth and economic welfare. Regarding the effects on trade patterns, they suggest low effects on intra-industry trade. However, these authors highlight the need to model FDI, technology transfer associated with FDI and, international labor mobility in order to identify trade flows patterns.

Following a qualitative approach, Kim et al (2013) evaluate using a CGE model whether the proposed Free Trade Area of Asia Pacific (FTAAP) can be considered as a desirable policy option for APEC member economies and the global economy in general. These authors argue that the gains of this mechanism could improve welfare and economic growth, particularly through technologies transfer and, more connection with sectors that generate global value chains.

Other authors such as Scollay and Gilbert, (2000) measure the gain of the APEC trade liberalization using a CGE model. They conclude that the ASEAN economies are not all net winners of APEC liberalization. Additionally, these authors include in the analysis different simulations of the food trade liberalization in the APEC Food System concluding about potential benefits in the liberalization of agricultural trade.

Lee and Plummer (2011), assess the consequences of the AEC by implementing a dynamic CGE. The CGE simulates exercises on the elimination of trade barriers (administrative and technical barriers and a decrease in trade and transport margins). According to the results, there is a decline in customs procedures, competition increases and improvements in infrastructure bringing the AEC substantial economic gains and benefits.

The studies to measure the impacts on LA trade policy implementing CGE models are led by the Economic Commission for Latin American and the Caribbean (ECLAC). This organization has addressed the effects of trade liberalization through the analysis of the economic blocks integration on economic growth, poverty, employment, and sector analysis (Durán et al, 2007). It is important to remark that the literature is broad when examining the economic effects of trade liberalization in some countries, especially Mexico, Brazil, Chile, Ecuador, and Colombia. Gurgel (2007) implements a GTAP model evaluating the impacts of different trade agreements on the family agriculture in Brazil. He concludes that the family farmers advance with the agreements and the income gap between rural and urban household decreases in Brazil. Additionally, the income distribution among rural households is weakened because rural employees, deprived of land and education, are being hurt.

Similarly, Wong and Arguello (2010) and Vos and De Jong (2003) use a CGE model for the Ecuadorian economy in order to evaluate the impacts of fiscal policy variations on trade liberalization in this country and on poverty. In general terms, they find that changes in fiscal and trade policies generate minor effects on the Ecuadorian economy.

Morley and Diaz-Bonilla (2003) also study the effects of trade liberalization on poverty and income distribution in Mexico. They believe that economic openness measured by the reduction of tariff rates, the capital inflows and the increase of exports was expansive. They observe that although the Mexican GDP and income improved, and the poverty was contracted, there was an increase of income disparity and extreme poverty.

De Boyrie and Kreinin (2016), evaluate the welfare effects of integration in LA. The authors estimate trade creation and diversion, initially analyzing the integration of the four Mercosur countries (Brazil, Argentina, Paraguay and Uruguay) and, then the merger of Mercosur with the Andean group (Bolivia, Colombia, Ecuador, and Peru). The main results suggest that integration in LA is beneficial for the welfare of the countries because trade creation exceeds trade diversion.

It should be noted that in the context of the scholarly literature focused on the Colombian economy, Hernandez (2014) analyzed 11 comprehensive studies evaluating the impacts of trade policy through the implementation of a CGE model. He found that these studies have been mainly concentrated on the analysis of the FTA with the United

States, the possible effects of the failed Free Trade Area of the Americas (FTAA)[31] and the renovation of the Andean Trade Preferences Act (ATPA) that was later denominated as the Andean Trade Promotion and Drug Eradication Act (ATPDEA), granted unilaterally by the U.S. to Colombia (Hernández, 2014). In general terms, these studies found a growth in the economy, employment creation, and strengthening, as well as, a slowdown in the agricultural sector, without the order of the results changing dramatically.

Finally, there is a cautionary note about a certain loss of competitiveness inside the Colombian economy by not entering these trade agreements in the way in which the competitors may acquire revenues derived from trade diversion and the absorption of technology and labor force. Regarding the trade deficit, the increase in exports is highlighted as a result of the stimulus from the decrease in tariffs with a proper follow up on the reduction of poverty (rural, urban and national) resulting from greater wage increases via improvements on the levels of employment. An also, short-term effects illustrate increases in the short-term and long-term production.

Botero (2005) specifically discussed the general impact of trade agreements such as the FTAA and the FTA with U.S. on the Colombian economy and on employment. This author comes to the conclusion that both agreements benefit some productive sectors and affect others, creating, however, a positive global impact. For instance, the FTA with the U.S. would generate an increase in GDP of around 4%, while the FTAA would represent an increase of 5.7%. With this, employment would increase, respectively, by 1.7% and 2.4%. In terms of employment, Botero's main conclusion is treaties will not solve the unemployment situation that is faced by the Colombian economy. The most favored sectors will have unskilled workers in the urban area, both formal and informal, and an increase in the income particularly of skilled workers derived from gains in productivity (Botero, 2005).

On the other hand, Light (2004) analyzes the FTAA and services liberalization in Colombia using a CGE model that includes imperfect competition in order to see the effects in competitiveness and productivity. He concludes that the FTAA will bring service liberalization and FDI increasing factor productivity and lowering cost of production in the Colombian economy. The work of Pardo et al (2005) also examines the effects of the Colombian FTA with the U.S. on income distribution and poverty, they develop a microsimulation model linked to a CGE. Their results show a positive but small improvement in economic growth and poverty in Colombia.

[31] ALCA in Spanish.

Martin and Ramirez (2005) also examine the economic impact of a partial agreement of the Colombian economy with the U.S. They conclude that the gains of the FTA with the U.S. for the Colombian economy will depend on the reduction of NTBs imposed by this partner to Colombia. The NTBs elimination will bring benefits for the poor and will also generate progressive positive effects on income distribution in Colombia. If the agreement does not efficiently eliminate the NTBs in the agricultural sector, it will create adverse effects on the income and rural consumption.

Taking into account these findings, this study contributes to the scholarly literature to the extent that this CGE is one country model that makes a first approximation of the effect that possible FTAs negotiation leading to the removal of tariff and NTBs with Japan and China, could have on Colombian agricultural exports at detailed sectoral level. As Table A.4.1 shows several CGE studies using variations of the Global Trade Analysis Project (GTAP). Even though GTAP is a very complete and used database, it is associated with standardized programs that allow solving general equilibrium models for several countries or regions. In this thesis, a Generalized Algebraic Model System (GAMS), an optimization software also widely used in CGE model analysis, was chosen due to the following reasons: first, because the author wants to capture specificities of the Colombian economy, which are not well captured in the general GTAP model, and second, because the author want to use data from 2014, which to date is not available in GTAP, due to the fact that the last agricultural census was conducted in Colombia precisely in 2014 , and it is necessary for the calibration of the model. The use of GAMS allows to build a specific model adapted to the particularities of the Colombian economy.

4.3 Methodology

The methodology of this research is based on Botero et al (2017). This study is a CGE model for the Colombian economy that aims to implement equations that incorporate different branches of the economy. The model is calibrated considering the year 2014 as a base one. It tries to implement a CGE model[32] that evaluates the effects on the agricultural exports under the reduction of tariff and NTBs that the Colombian economy will face under possible Free Trade Agreements with Japan and China. It will

[32] This model uses a Social Accountability Matrix (SAM) based on Colombian national accounts codes and its equivalents in the HS. This is an input and output matrix that includes specific calculation for each subsector in Colombia such as: intermediate purchases, income, and unskilled and skilled wage labor. A Generalized Algebraic Model System (GAMS) was used because it can solve simultaneous systems of equations and deal with CGE models. The use of GAMS is appropriate for the analysis of the agricultural sector, because it allows to disaggregate variables of interest in the model for the Colombian economy such as: employment, income distribution and others. This model specifically considers the reduction of tariff and non-tariff barriers from Japan and China to Colombian agricultural exports.

also analyze the short-term impacts such as the reassignment of labor as a productive factor.

The structure of this model classifies the Colombian agricultural sector in 16 subsectors.[33] Six are agricultural subsectors and ten correspond to the agroindustry subsectors. Those agricultural and agroindustry subsectors are composed by products from the Colombian National Account Code and they are equivalent to the chapters from 01 to 24 from the Harmonized System (HS), the classification also considers some other few specific products from different chapters and from the HS (see table 4.1 and table A.4.2).

For the disaggregation of the agricultural subsectors, the following classification is established[34]:

Table 4.1. Classification of the agricultural sector.

6 Agricultural subsector	Definition	Main products
Intensive exports	Traditional products exported by Colombia	Coffee beans, banana, roses, carnations, tobacco, sugar cane, cane plantations.
Potential Exports	New products exported by Colombia	Plantain, other fruits and nuts (grape, pineapple, mango, passion fruit, cantaloupe, cherries, strawberries, apples, etc.), cocoa beans, avocado, fish, tuna, trout, salmon and honey.
Bovine Livestock	Cattle	Live Cattle
Importables	Products imported by Colombia. They do not have exports tradition.	Corn, wheat, rice, sorghum, palm fruit, soy, forests and sub products, barley, legumes (beans, etc.), other leguminous fruits and seeds, alive plants, other plants and spices.
Non tradables	Products that have not been exported or imported. They are produced for the domestic consumption.	Potato, tomato, legumes (onion, garlic, mushrooms, manioc, other legumes and tubers (yam, arracacha, etc.),milk, cattle, wood, orange and other citrus, fruity trees plantations, birds, eggs, protected forests, shellfishes and other aquatic products.
Other agricultural products and services	Products used in the agricultural sector	
10 Agro-Industry subsector	**Definition**	**Main products**
Coffee and threshing products	Industrial coffee different from coffee beans	Roasted coffee, instant and coffee extracts.
Sugar and Panela	Sugar in differnt forms	Sugar
Cocoa, chocolate and confectionery products	Products made from cocoa and cholcolate.	Confectionary products, cocoa and chocolates.
Vegetable and animal oils and fats	Oils from vegetables and animals	Oils
Beverages	Beverages with alcohol and non alcohol	Malta, bear, sodas and juices.
Meats and fish	Parts of meat frozen or chilled	Frozen meat of bovine, pork. Live fish and different kind of frzen or chilled fish
Food products n.c.p	Food preparations	Vegetables and animal preparation, fish flour.
Mill products and starches		Starch or carbohydrates
Dairy products	Milk derivates.	Milk, cheese and milk derivates
Tobacco products		Tobacco and products

Source: table made by the author based on the Colombian National Account Code.

[33] The model considers 26 productive subsectors, but the simulations are focused on analyzing possible tariff and NTBs reduction under possible FTAs with Japan and China, specifically in the six agricultural subsectors and 10 agro-industry subsector considered in the CGE model.

[34] For more detail see Table A. 4.2. It shows the classification of the 16 agricultural subsectors considering the national account code classification in Colombia with their equivalent at HS 6-digit level. See also Appendix 4.3 CGE model: variables, parameters and equations. In Appendix 4.3 the most important equation in the model are 27, 28 and 25. The equation 28 shows country's exports destination price: the change of AVE of NTBs affect the purchasing price in the destination country, so when the price change, the demand of Colombian exports also change.

The model considers two types of markets: perfect competition (agriculture and some services) and monopolistic competition (the industrial and mining sectors and in most services). In perfect competition, the price balances the markets, while in the latter, and given that the entrepreneurs produce differentiated goods to which they can apply fixed profit margins, they are balanced by adjusting the supply to the quantity demanded.

Regarding the supply modeling, the capital and the land are aggregated in order to obtain the total capital through a Constant Elasticity of Substitution (CES) function. The unskilled labor includes both the waged and non-waged labor, which is later added to the skilled labor in order to obtain total labor, also from a CES function.

After adding up the capital and the total labor, the added value is obtained and aggregated to the intermediary purchases through a fixed coefficients function that results in the production of the fields without taxes. Through a fixed coefficients function, taxes are added to the production on the fields, resulting in different products for each type of sector.

Finally, national products are distributed through a Constant Elasticity Transformation (CET) production possibility frontier between exports to Japan, China and the rest of the world and domestic sales. The demand for exports products in the selected countries is modelled by the Armington elasticities, according to which the products exported by Colombia are imperfect substitutes for products exported from other countries, and their demand depends on the final price of the product in the country of destination, including tariff and ad-valorem equivalents of NTBs (see Appendix 4.1. CGE model structure).

Consequently, the model contemplates five productive factors: land, capital, unskilled waged labor, unskilled non-waged labor and skilled labor; considering labor force of the different types of jobs, is exogenous, while the market of unskilled waged labor consists of rigid prices (endogenous unemployment) contrary to the unskilled non-waged labor and skilled labor market which consists of flexible prices (Frictional unemployment – exogenous).

In the context of the analysis of the demand, 23 institutions have been considered: 20 households (rural and urban, disaggregated by revenue deciles) enterprises, government and trade partners. Households may receive different types of revenues: work related, capital, incomes, transfers, social security that will be destined on a fixed proportion to savings, tax payment, and consumption through an almost ideal demand system (Deaton and Muellbauer, 1980).

The commercial protection mechanism stated inside the model considers two types of restrictions: tariffs and NTBs. In order to analyze the effect of the previously mentioned policies on social welfare, it is necessary to express these indicators in a comparable way denominated inside the literature as an ad-valorem tax, equivalent to the NTBs (AVE). The estimations were obtained from Kee et al. (2009)[35], they were considered as a point of reference, adapting them to the model sectioning. The analysis also contemplates different trade scenarios considering the removal of tariff and NTBs from Japan and China to Colombian exports.

4.4 Colombian agricultural trade with Japan and China

Colombia was one of the last countries in South America to establish diplomatic relations with the People's Republic of China, back on February 7th, 1980. However, during 80s and 90s trade relations between both countries were limited. Their trade relations only expanded years after, during the period between 2001 – 2014 when China's commercial exchange with LA and the Caribbean grew and consolidate. The economic growth in the Asian giant and the expansion of its multinational enterprises across the globe, led to an increasing demand for minerals, natural resources, and food, of which LA became a strategic source.

LA countries found in China a major market for their products. Colombia was not the exception, with its total exports to China increasing from US$ 1.1 million in 2003 to US$ 5,755 million in 2014. However, Colombia's total exports decreased considerably during 2015 to US$ 2,264 million. In 2015 a contraction of Colombian exports to China and the world can be explained by the reduction in oil prices worldwide. This trend in fact started in the middle of 2014, driven by an unexpected weaker demand. Oil exports are important for Colombian total exports, representing 36% in 2015 of total exports to the world and accounting for 81% of Colombian total exports to China. Contrary to the decrease in the total exports, Colombian agricultural exports slightly increased in 2015

[35] According to Kee et al (2009) there exists no attempt to estimate the incidence of NTBs measures in a consistent way for a wide variety of countries at the tariff line level. However, the literature has estimated the incidence of NTBs on imports using different methodologies and data (see Deardorff and Stern, 1997). Kee et al (2009), classify the NTBs according to UNCTAD (2013) in Technical Measures and Non-Technical Measures. Technical measures are: SPS, TBT, pre-shipment inspection and other formalities.
Non-Technical measures are: contingent trade-protective measures, non-automatic licensing, quotas, prohibitions and quantity control measures other than for SPS or TBT reason, price control measures, including additional taxes and charges, finance measures, measures affecting competition, trade-related investment measures, distribution restrictions, restrictions on post sales services, subsidies, government procurement restrictions, intellectual property and rules of origin.

but, they barely reached a total of US$ 17, 3 million. The main agricultural exports of Colombia to China are coffee, glycerol, flowers, banana, and alive fish (ITC Trademap, 2017).

Throughout its history, Colombian trade relations with Japan have been different from those with China. Japan has a longstanding tradition as an important trading partner, lender, investor and donor of LA, being overshadowed only recently by China and the expansion of its economic relations with the region during the last decade. However, Latin America has returned to Japan´s list of foreign policy priorities in the current years. The recent official visit of the Prime Minister Shinzo Abe to LA in May 2014, was the first visit performed by a Japanese head of state in more than ten years, and reinforced the bilateral relations, based on the public-private partnership (PPP) between the biggest countries in LA and Japan. The official working visit of the Prime Minister Abe was accompanied by a delegation of 250 Japanese business representatives, including 70 CEOs.[36]

Main motivations behind Japan's re-emerging interest in LA can be explained by several reasons, including the Latin America's high and stable economic growth, domestic market expansion, its significant improvements in employment and poverty indicators from 2011 to 2014, and a fast and sustained recovery between the 2008-09 financial crisis. The region's rich endowment of natural resources is also a key factor in the sense that Japan looks in LA major players a reliable source for natural resources. LA is also endowed with a third of the world's potential farming areas and freshwater reserves, and 20% of the surface area of natural forests and abundant biodiversity. Another important reason is that Japan shares with most of LA countries key values such those related to market-economy, democracy, human rights and the rule of law (Kuwayama, 2015).

Colombia is the fourth country of the PA to negotiate an EPA with Japan, and this locates Colombia inside the Asian country's list of priorities. Colombia established diplomatic relations with Japan in 1908 with the Friendship, Commerce and Negotiation Treaty. Although after the World War II, the diplomatic ties between Japan and Colombia were severed, they became re-established in 1954 (Roldán, 2009). During the 1980s and 1990s, trade relations with Japan were stronger than those with China, and Japan was the main trade partner of Colombia in Asia. After 2001, China started to gain more presence in the region and strengthening its trade relations with Colombia. In spite of the above,

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36 Toshiro Suzuki, Ambassador at Large for International Economic Issues, Japan. Intervention about the Asian perspectives on the Pacific Alliance. The IISS Cartagena Dialogue: The Trans-Pacific Summit. 6th-8th March 2015. Cartagena, Colombia.

Japan remains as the main EA market for Colombian agricultural products. In 2003, Colombia's total exports to Japan were US$202 million, of which only agricultural exports accounted for US$147 million, representing 73%. Subsequently, during 2014 the total exports from Colombia to Japan reached a total of US$ 421 million and the agricultural exports - US$ 315 million. In 2015 food exports to Japan slightly increased reaching U$$345 million. In sum, even though the total exports from Colombia to Japan are smaller than the ones to China, food exports from Colombia to Japan are bigger, placing Japan as the largest destination of Colombian agricultural products in EA. However, Colombian food supply to Japan is scarcely diversified; Colombian coffee and its extracts represent almost 80% of the food exports to this East Asian country, followed by flowers and fruits like banana representing a far more limited share (ITC Trademap, 2017).

Before analyzing the Colombian agricultural exports to China and Japan by each agricultural subsector considering the tariff and NTBs imposed by China and Japan's markets, it is important to analyze the trade restrictiveness indices on the agricultural sector for Japan, China and Colombia as well.

Kee et al. (2009) estimate the trade restrictiveness indices for several countries. For this study, the restrictive indices from the agricultural sector for China, Japan, and Colombia were specifically considered. Table 4.2 compares the indices based on applied tariff (negotiated under FTAs) and the indices based on the MFN tariff. It is important to consider the small difference between both for Japan and China. This means that China and Japan reductions on the agricultural sectors after their negotiations of FTAs with the world are not significant. This could be contrasted against Colombia, where the difference is slightly larger compared with the East Asian countries. Additionally, the table 4.2 also shows that between the two East Asian countries, China imposes lower tariff and non-tariff measures to the world.

In terms of tariff and NTBs, Japan imposes higher measures than China to the world. The Overall Trade Restrictiveness Index (OTRI) in Japan is 38.3%, while in China is 14.4%. Moreover, the average on tariff measures of the Tariff-only Overall Trade Restrictiveness Index (OTRI T) is also higher in Japan, it charges 14.7% and China charges 8.3%, on average (see table 4.2 and Appendix 4.3 Description of variables of trade restrictiveness index).

Table 4.2. Trade Restrictiveness Indices on the agricultural sector for China, Japan and Colombia 2014.

Country	Indices based on applied tariffs				Indices based on MFN tariffs	
	OTRI	OTRI_T	MAOTRI	MAOTRI_T	OTRI	OTRI_T
China	14.4%	8.3%	29.6%	12.3%	16.4%	10.3%
Japan	38.3%	14.7%	22.5%	9.5%	38.7%	15.1%
Colombia	39.0%	8.5%	27.3%	5.1%	46.0%	15.5%

Source: Kee et al, (2009). Table and data compiled by the author.

In order to deepen the analysis for the agricultural sector, it is also important to analyze the tariff measures and NTBs imposed by China and Japan to the 16 Colombian agricultural subsectors.

Table 4.3 shows, the main subsectors of Colombian agricultural exports to China during 2014 were the potential exports with US$ 11, 2 million, followed by coffee products and threshing with US$ 6, 8 million and meats and fish with US$ 7,4 million. Amongst these subsectors the exports of meat and fish present the highest AVE of NTBs to enter China, equivalent to 66%. Colombian Intensive exports and potential exports, in contrast, are less protected in China 40.54% and 2% respectively. This indicates that Colombia has a potential to increase the intensive export and even more the potential exports to the Chinese market. The agricultural subsectors with the highest level of NTBs imposed by China are vegetables and animal oils, mill products and starches, sugar and panela, meats and fishes, and dairy products.

Table 4.3 also demonstrates that the main exports of agricultural subsectors from Colombia to Japan are coffee and threshing products followed by Intensive exports from Colombia are subject to a very high percentage of NTBs imposed by Japan (62.6%). This percentage is relatively high compared to what China charges. Likewise, coffee and threshing products have an equivalent of 48.4% NTBs in their access to the Japanese market

Among the agricultural subsectors with the highest level of NTBs imposed by Japan are: dairy products, cocoa, chocolate, confectionery products, and the intensive exports. As it was mentioned in chapter 2 and 3, the previous subsectors are highly protected by Japanese government, mainly due to the Food, Agriculture and Rural Areas Basic Plan established by the MAFF. One of the objectives of such policy to double incomes in agriculture and rural areas by improving productivity (see chapter 2 section 2.4.3.1 Japan's import policies for agricultural products).

Table 4.3 AVE of NTBs for the agricultural subsector in the CGE model (2014)

Model Classification	Colombia Exports (US$ 000)			Japan and China Imports		AVE of NTBs*	
	Japan	China	ROW	Japan	China	China	Japan
Intensive Exports	55,516	327	4,374,898	2,854,459	2,608,917	*40.54%* *	62.6%
Potential Exports	1,045	11,240	209,211	3,682,500	18,834,269	2.0%	44.7%
Bovine Livestock	-	-	54,508	19,484	621,452	*40.54%* *	58.9%
Importables	310	13	55,794	13,155,250	60,776,121	28.0%	27.7%
Non Tradable	-	-	20,793	2,675,986	4,203,626	8.0%	40.1%
Other agricultural products and services	-	-	21,858	228,236	170,805	0.0%	0.0%
Coffee products and threshing	254,563	6,782	245,137	290,232	216,974	*40.54%* *	48.4%
Sugar and Panela	21	113	398,444	652,267	1,494,817	71.0%	59.6%
Cocoa, chocolate and confectionery products	474	992	534,517	1,091,485	877,236	*40.54%* *	72.9%
Vegetable and animal oils and fats	444	135	336,183	2,643,418	9,003,660	87.6%	54.3%
Beverages	-	2	32,201	3,876,172	2,971,550	38.0%	29.6%
Meats and fish	1,231	7,450	283,315	26,759,251	15,648,372	66.0%	41.8%
Food Products	875	17	163,136	7,490,992	4,417,181	*40.54%* *	51.8%
Mill products and starches	8	7	228,613	3,247,841	3,545,990	81.0%	61.0%
Dairy products	-	-	14,147	1,813,049	6,641,836	59.0%	76.9%
Tobacco products	-	-	6,565	3,404,866	151,996	45.9%	*42.10%* *
Rest of products	106,415	5,728,051	41,639,441	736,637,498	1,822,926,266	36.4%	34.5%
All products	420,904	5,755,135	48,618,773	812,184,752	1,958,021,300		

Note: * for non-estimated observation the average of AVE on NTBs for the other agricultural sectors was taken: 40.54% for China and 42.10% for Japan.
Source: Kee et al, (2009), ITC-Trademap (2017). Table and data compiled by the author.

Additionally, table 4.4, reviews the average tariffs charged by China and Japan on agricultural imports from the world. These average tariffs are based on the Colombian 16 agricultural subsectors. In table 4.4, we can see the subsectors that pay a higher tariff in order to enter the Chinese market are tobacco products, and sugar and panela, subsectors that nowadays do not represent an important source of exports from Colombia to China. In the case of, subsectors that show a higher average tariff for Colombian agricultural products are: dairy, mill products and starches. Even though Colombia is not currently exporting products belonging to these subsectors to Japan, they nonetheless have an important export potential in that particular market.

Table 4.4 Tariff rate based on the tariff profile related to the number of imports from Colombia (2014)

Model Classification	China	Japan
Intensive exports	12%	3%
Potential exports	11%	5%
Bovine Livestock	5%	30%
Importables	11%	34%
Non-tradable	10%	7%
Other agricultural products and services	6%	2%
Coffee products and threshing	20%	34%
Sugar and Panela	40%	26%
Cocoa, chocolate and confectionery products	17%	30%
Vegetable and animal oils and fats	12%	4%
Beverages	19%	13%
Meats and fish	12%	11%
Food Products	19%	21%
Mill products and starches	26%	53%
Dairy products	12%	143%
Tabacco products	43%	10%
Average tariff rate	**17%**	**27%**

Source: ITC-Macmap, 2017. Table and data compiled by the author.

4.5 Simulation scenarios

This section contains the description of five commercial policies scenarios that involve possible Free Trade Agreements between Colombia and Japan and Colombia and China, in order to analyze the short-term impacts[37] on Colombian agricultural exports to those markets and the main economic aggregates.

The simulations scenarios will be described as follows:

Scenario A: This scenario considers tariff and NTBs reduction of Colombian agricultural exports to China. It shows the maximum and minimal tariff reduction reached in average for agricultural products by the others PA members such as Chile and Peru on their tariffs applied to their previous negotiated FTAs with China. In addition, this scenario also includes 50% NTBs reduction of Colombian agricultural exports to China.

[37] The CGE results are generally of long-term nature. However, this CGE model determines the short-term effects because it incorporates only the effects of relocation of variable resources such as labor and intermediate inputs. It does not include effects on capital and land allocation between sectors, nor does it include development effects of new export products that may occur as a result of FTAs.

As it was already mentioned in previous chapters, Chile has FTA with China ratified since (2006) and with Japan since (2007). Similarly, Peru has an FTA with China since (2010) and Japan since (2012). The maximum tariff reduction for agricultural products reached in average by both Chile and Peru from China was the same (14.4%). However, the minimal tariff reduction reached by Peru from China was (4.8%), and the minimal tariff reduction reached by Chile from China was (1.5%). For this scenario, the maximum tariff reduction applied is (14.4%) and the minimal tariff reduction applied is (1.5%), the minimal reached by Chile because this country got better conditions (see table 4.5).

Scenario B: This scenario considers tariff and NTBs reduction of Colombian agricultural exports to Japan. It shows the maximum and minimal tariff reduction reached in average for agricultural products by the others PA members such as Chile, Mexico, and Peru on their tariffs applied for their previous negotiated FTAs with Japan and China. In addition, this scenario also includes 50% NTBs of Colombian agricultural exports to Japan. Different from China, Japan not only has FTA with Chile (ratified in 2007) and Peru (ratified in 2012), it also has an FTA with Mexico since (2005). The maximum tariff reduction for agricultural products reached by both Chile and Peru from Japan was the same (13.6%), whilst the one gotten by Mexico was (14%), so the maximum tariff reached by Chile and Peru is taken in this scenario as the maximum tariff reached by the PA countries. Similarly, the minimal tariff reduction gotten by Peru from Japan was (11.3%), the minimal tariff reduction reached by Chile from Japan was (11%) and the one reached for Mexico was (10.9%); so, the minimal tariff reduction applied is (10.9%), as the minimal tariff reduction reached by PA countries (see table 4.5).

Scenario C: This one contemplates scenario A and B simultaneously, to see the total effect for Colombian agricultural exports to China and Japan reaching similar tariff reductions in average for the agricultural products to the other Pacific Alliance members. As well as, 50% NTBs reduction of Colombian agricultural exports to China and Japan.

To understand scenarios A, B and C, table 4.5 shows the minimum and maximum tariff applied on average to agricultural exports from Chile, Mexico and Peru to China and Japan considering the 24 agricultural chapters of the HS. The maximum tariff applied by China to Chile and Peru is the same 14.4% and the lowest tariff applied by China to Chile is 1.5%. In the case of Japan, the best maximum tariff applied was for Chile and Peru (13.6%) and the minimum tariff reduction was reached for Mexico (10.9%).

Table 4.5. Applied Tariff (including tariff preferences) - AVE based on the World Tariff Profile (WTP). HS6 (01-24), 2016.

Partner	Mexico		Chile		Peru	
	Min	Max	Min	Max	Min	Max
China	-	-	1.5%	14.4%	4.8%	14.4%
Japan	10.9%	14%	11.0%	13.6%	11.3%	13.6%

Source: MACMAP-ITC, 2017. Table and data compiled by the author.

Scenario D: This scenario considers 100% tariff reduction and 50% NTBs reduction of Colombian agricultural exports to China and Japan.

Scenario E: This scenario includes 100% tariff and NTBs reduction of Colombian agricultural exports to China and Japan.

4.6 Simulation scenarios results

Before analyzing the results, it is important to underline that the model only shows results for ten subsectors among the 16 subsectors considered in this study. This is due to the lack of exports from Colombia in those subsectors to China and Japan. The model does not demonstrate results for bovine livestock, other agricultural products, non-tradable products, beverages, dairy products, and tobacco.

Table 4.6 describes that among the five simulations scenarios, the one with the highest impact for Colombia is scenario E, with the elimination of 100% of tariff and NTBs of Colombian agricultural exports to China and Japan. Colombian agricultural exports to Japan would increase 133.1% (from US$ 307 million to US$ 717 million). Exports to China would also grow, but to a lesser extent up to 71.4% (from US$ 28 million to US$ 47 million). The Colombian agricultural subsectors with high benefits due to the reduction of tariff and NTBs from Japan will be mill products and startches (213%), cocoa, chocolates and confectionery products (187%), sugar and panela (152%), and coffee products and threshing (138%). For China, sugar and panela (204 %), mill products and starches (197%) and vegetables and animal oils (85%). Coffee products and threshing will also benefit from scenario E growing 96%.

Scenario D will be also beneficial for Colombia with 100% tariff reduction and 50% of NTBs reduction of Colombian exports to Japan would increase by 69% and those to China by 73%. With the tariff reduction from Japan, exports such as mill products and starches, importable products, coffee products, cocoa, sugar, and panela will grow more than the average. Coffee products, which are the largest Colombian agricultural export sector to Japan, will grow by 75%. In the case of China, the subsectors with higher benefits will be meats and fish, sugar and panela, and mill products, and starches. However, scenarios D and E are idealistic because in general terms is impossible to achieve such high levels of tariff and NTBs in the negotiations of FTAs.

The results of scenarios A, B and C are more realistic. They demonstrate the effects for Colombian agricultural exports to China and Japan reaching similar tariff reductions in average for the agricultural products to the other PA countries such as Mexico, Chile and Peru in the negotiated FTAs and also the reduction of non-tariff barriers by 50%. Colombia will beneficiate more from scenario C with the tariff and NTBs reduction simultaneously from Japan and China, increasing its exports by 48% while with the reduction from China, the growth of Colombian agricultural exports will be 28%.

It is interesting to note that among the most exported subsectors from Colombia to Japan such as intensive exports and coffee products; the coffee products will have major effects from scenario B and C, because they grow more than the total agricultural exports average. The intensive exports will also beneficiate from those scenarios. However, the increase will be less than the agricultural exports average. Similarly, the most exported agricultural subsectors from Colombia to China: potential exports, coffee products, and meat and fish, they will beneficiate from scenario A and C. Noticeably, the potential exports will grow less than the average.

Among the five scenarios, the scenario C is the most realistic, and it will be more beneficial for Colombian economy than scenarios A and B independently. The trade diversion effect will be minimal when there is a tariff and NTBs reduction in both East Asian markets. Nonetheless, the main benefits will be derived from the reduction made by Japan. One of the reasons for explaining the major benefits from Japan is because the tariff and non-tariff applied by Japan are comparatively higher than those applied by China. Additionally, Colombian agricultural exports to Japan are also bigger.

With regards to China, it is important to consider the effect of the five scenarios on the most exported agricultural subsector exported by Colombia to China, as was shown in table 4.6, which is the potential exports. The Colombian potential exports will have a major benefit from scenario E and D, however any scenario show a sustainable growth since this subsector grow less than the average. It means that the removal of the tariff and NTBs in this subsector by China will not generate an important effect on Colombian exports to China. In the case of coffee products, the most exported subsector by Colombia to Japan, the growth of exports will be significant in scenarios E, D, B and C, increasing exports more than the average growth.

One important factor that is worth mentioning relates to the relocation of Colombian exports to new destinations. It means that while the exports to China and Japan tend to increase with the tariff and NTBs reductions, the exports to the rest of the world decrease in all the five scenarios. In consequence, the trade diversion effects are lower than the trade creation effects. In scenario C, for example, exports to China and Japan grow to US$ 154,464, while exports to the ROW decrease to US$ 37,787. It means that trade diversion is 24.46% and the trade creation is 75.54%. Therefore, according to these results, with the reduction of tariff and NTBs from China and Japan to Colombian agricultural exports, the Colombian agricultural exports will benefit from important trade creation effects.

As it was mentioned in chapter 2, Colombia has a comparative advantage in flowers and coffee (both green coffee beans and instant coffee and extracts). Flowers are part of the intensive exports in the current classification, and coffee products (included coffee beans, instant coffee and extracts), belong to the coffee products and threshing category. From the simulation scenarios, it can be inferred that both, intensive exports and coffee products and threshing will obtain the major benefit from scenario E, meaning that not only tariff but also NTBs are affecting the market access of Colombian agricultural exports to Japan and China. The Colombian government should keep promoting traditional exports of products where the country already has a comparative advantage in comparison to the one of Chile, Mexico and Peru. This can be the case of Colombian flowers and coffee in the Japanese and Chinese markets. Furthermore, The Colombian government should also encourage the export of agricultural with potential in these markets and products belonging to its food industry.

Finally, it can be also concluded that if Colombia obtains the tariff applied to other LA countries under their FTAs negotiated with EA, the Colombian exports will increase their participation in to the Japanese market. In contrast, exports to China will not have a significant growth. This is due to the fact that the number Colombian agricultural exports to China is still small, in addition, such products are concentrated in agricultural subsectors with a low level of tariff and NTBs.

Table 4.6 Scenarios A - E for the agricultural subsectors.

Subsector	Country	Colombian Exports in US$ (000) Base year 2014	A	B	C	D	E	Change % A	B	C	D	E
Potential exports	China	12,405	14,299	12,387	14,278	14,579	14,757	15.3%	-0.1%	15.1%	17.5%	19.0%
	Japan	1,153	1,149	1,467	1,461	1,554	2,098	-0.4%	27.2%	26.7%	34.8%	81.9%
	ROW	228,592	227,685	228,264	227,360	227,084	226,480	-0.4%	-0.1%	-0.5%	-0.7%	-0.9%
Intensive exports	China	293	411	292	409	417	546	40.4%	-0.4%	39.9%	42.5%	86.5%
	Japan	49,671	49,669	67,708	67,706	70,358	105,065	0.0%	36.3%	36.3%	41.6%	111.5%
	ROW	1,915,643	1,915,573	1,908,848	1,908,781	1,908,326	1,894,140	0.0%	-0.4%	-0.4%	-0.4%	-1.1%
Importables	China	13	17	13	17	17	21	32.3%	-0.1%	32.2%	34.7%	63.7%
	Japan	307	307	438	438	519	629	0.0%	43.0%	43.0%	69.2%	105.3%
	ROW	55,161	55,159	55,086	55,083	55,039	54,967	0.0%	-0.1%	-0.1%	-0.2%	-0.4%
Meats and Fish	China	6,862	10,395	6,856	10,386	20,489	16,001	51.5%	-0.1%	51.4%	198.6%	133.2%
	Japan	1,134	1,126	1,418	1,408	1,602	2,105	-0.7%	25.0%	24.2%	41.3%	85.6%
	ROW	260,961	259,267	260,736	259,045	258,831	255,878	-0.6%	-0.1%	-0.7%	-0.8%	-1.9%
Vegetables and animals oils and fats	China	117	188	117	188	191	330	60.9%	0.0%	60.9%	63.4%	181.6%
	Japan	385	385	510	510	534	765	0.0%	32.6%	32.6%	38.8%	98.8%
	ROW	291,422	291,389	291,368	291,335	291,324	291,160	0.0%	0.0%	0.0%	0.0%	-0.1%
Mill product and startches	China	7	11	7	11	13	21	54.0%	0.0%	54.0%	78.4%	197.2%
	Japan	8	8	15	15	17	26	0.0%	80.5%	80.5%	109.5%	212.5%
	Resto del mundo	235,446	235,451	235,544	235,549	235,593	235,733	0.0%	0.0%	0.0%	0.1%	0.1%
Coffee products and threshing	China	6,744	8,735	6,670	8,639	10,180	13,241	29.5%	-1.1%	28.1%	50.9%	96.3%
	Japan	253,129	253,076	380,302	380,226	441,748	602,374	0.0%	50.2%	50.2%	74.5%	138.0%
	ROW	2,380,916	2,380,431	2,355,231	2,354,769	2,342,193	2,310,479	0.0%	-1.1%	-1.1%	-1.6%	-3.0%
Sugar and panela	China	113	188	113	188	219	344	66.5%	-0.2%	66.2%	93.2%	204.0%
	Japan	21	21	31	31	36	53	0.0%	47.4%	47.4%	71.0%	152.3%
	ROW	396,540	396,499	395,839	395,798	395,436	394,488	0.0%	-0.2%	-0.2%	-0.3%	-0.5%
Cocoa,chocolates and confectionery products	China	1,000	1,262	999	1,261	1,493	1,966	26.1%	-0.1%	26.0%	49.3%	96.6%
	Japan	478	478	748	748	862	1,373	0.0%	56.6%	56.5%	80.4%	187.2%
	ROW	537,803	537,706	537,390	537,293	537,023	536,255	0.0%	-0.1%	-0.1%	-0.1%	-0.3%
Food products	China	23	29	23	29	29	38	26.3%	-0.1%	26.1%	26.1%	65.9%
	Japan	1,168	1,168	1,544	1,544	1,544	2,176	0.0%	32.2%	32.2%	32.2%	86.3%
	ROW	216,140	216,133	215,831	215,824	215,759	215,275	0.0%	-0.1%	-0.1%	-0.2%	-0.4%
Total Agroindustry	China	27,577	35,534	27,476	35,406	47,626	47,264	28.9%	-0.4%	28.4%	72.7%	71.4%
	Japan	307,453	307,387	454,182	454,088	518,774	716,663	0.0%	47.7%	47.7%	68.7%	133.1%
	ROW	6,518,624	6,515,293	6,484,137	6,480,837	6,466,610	6,414,857	-0.1%	-0.5%	-0.6%	-0.8%	-1.6%

Source: Results compiled by the author

It is worth noting that the CGE model also allows obtaining short-term results in other economic indicators considering scenario C as the most realistic scenario since it covers the reduction of tariff and NTBs in both markets simultaneously. The model reflects that the agriculture will have a total increase of 0.33%, whilst other sectors of the Colombian economy such as industry, mining, and services will slightly decrease. This can be explained by the combined effect of the reallocation of resources and the small effect that is produced on the exchange rate. Also, while the agricultural sector grows due to the FTAs with China and Japan, other sectors will have a small decline. Likewise, the Colombian total exports and imports will grow by 0.37% and 0.24% respectively, showing a higher increase in exports. The total consumption will also increase by 0.03% (see table A.4.3 Scenario C results: effects on other economic indicators).

Table A.4.3 also shows that among the agricultural and agroindustry subsectors analized, the total effect from scenario C will be positive for coffee and threshing products of 3.26%, potential exports (0.29%) and intensive exports (1.27%), being those the most exported agricultural subsectors by Colombia to Japan and China. Other agricultural subsectors will have a total negative effect of the FTAs. Finally, the model also reveals the impact on welfare, measured through the equivalent variation, showing a small benefit of 0.03%.

4.7 Conclusions

The above discussed findings leads to the conclusion that in the negotiations with Japan and China, Colombia should emphasize the importance of reducing NTBs such as SPS and TBT. As the simulations demonstrate, the FTAs with Japan and China, which include not only tariff reductions, but also reductions of NTBs, would have a significant impact on Colombian exports (although, to date, Colombian exports to these markets are small). However, there are at least two additional effects that need be taken into account, and that are not captured by the CGE model: the first relates to the development of new productive sectors for the new Asian markets. This can increase the exportable offer of Colombia, supported by potential competitive advantages that have not been developed due to a lack of access to these large and deep markets. The second deals with the synergies that can be achieved in new FTAs with regards to tariff and NTBs, and agreements related to investment and trade in services, which can further the integration of national companies into the value chains. This can improve market access in both China and Japan, but also in those markets already reached by Colombian agricultural products.

Colombia has paid little attention to EA by focusing more on the American and European markets. Undoubtedly, this situation has limited Colombia’s potential to new markets. Market access in China and Japan benefits the Colombian agricultural export sector, and may also lead to transformations in Colombian public policies related to productive transformation, allowing an efficient reallocation of resources. One may think that this is the right moment for Colombia to move towards EA, where trade, innovation, and economic development have experienced a vigorous boost.

Although CGE model is based on the real productive structure of the Colombian economy, and the way in which the opportunities that are generated in the FTAs are currently used, they do not say anything about the structural changes that can take place in the economy (e.g, access to new markets). This is a noticeable limitation in the use of CGE models. One interesting issue that should be addressed in the future research relates to the question of how to analyze the emergence of new export sectors under new FTAs? With the negotiation of new FTAs, it is possible that emerging subsectors will benefit from the new concessions on market access. Future research can also analyse how those changes can be measured in the export basket.

Appendices

Table A.4.1 Literature review of CGM studies.

Papers	*FTAs and policies in Analysis*	*Model/Database used for analysis*	*Aggregation of regions and sectors*	*Structure of Model*	*Method and Characteristics of simulation*
Botero (205)	1. Free Trade Area of the Americas (FTAA). 2. U.S. – Colombia FTA.	-CGE Model for Colombia. - GAMS. -National account of Colombia (2000). -National Survey of households (2000).	Countries/regions: 1 Sectors: 52	-Static Model. -CES model functions with multiple levels. -Mainly tradable sectors. -Three theories: Neoclassic, Keynesian, and with externalities. -Exports and imports are disaggregated by its origin and destination.	-Three scenarios. -Estimating the impact in Colombia of the FTAA and USA- Colombia FTA over labor market and macroeconomics indicators. -100% Tariffs reduction in U.S., and FTAA members.
Durán, de Miguel and Schuschny (2007)	1. Colombia, Ecuador, Peru (AC3) U.S. trade agreement. 2. Andean Trade Promotion and Drug	-CGE Model. -Global Trade Analysis Project (GTAP) Version 6.1 Database.	Countries/regions: 3 Sectors: 31	-Perfect competition and constant returns to scale. -Uses an "aggregate regional household" that collects income and taxes, pays subsidies, via Cobb-	-Three scenarios: full liberalization, excluding sensitive products and No FTA/end, and ATPDEA. -Analyzes the direct and indirect effects of Colombia, Ecuador and Peru, concluding bilateral FTAs with the U.S.

	Eradication Act (ATPDEA).			Douglas-type per capita utility function.	
Francois, McDonald and Nordstrom (1996)	1. Uruguay Round Agreement.	-CGE Model. -1992 GTAP Database.	Countries/regions:13 Sectors: 19	-Two models, the first one with perfect competition and constant returns to scale, and the second one increasing returns to scale with monopolistic competition.	-Particular attention to the Uruguay Round on developing regions. -Emphasize on how model structure influences in results.
Goldin and Mensbrugghe (1995)	1. Uruguay Round Agreement.	-Rural/Urban North/South (RUNS) Model. -General Agreement on Tariffs and Trade (GAAT) integrated Database.	Countries/regions:22 Sectors:20	-Constant returns to scale and perfect competition. -Manufactured products differentiated by its origin. -Dynamic structure with separate static and dynamic relations.	-Five different scenarios regarding measurement of benchmark protection, whether input subsidies are reduced and whether unemployment is allowed or not. -Impact of agriculture tariffication, an aggregated level and, manufacturing.
Gurgel (2007)	1. Doha Round Agreement. 2. FTAA 3. Brazil-EU Trade Agreement.	-GTAPinGAMS -GTAP version 6 database.	Countries/regions:13 Sectors: 26	-Static, multiregional and multi-sectorial model. -Three types of conditions to assure database consistence: market clearance in all	-Ten scenarios considering trade barriers reductions, exceptions to the liberalization of some agriculture sectors, and

	4. Brazil-Mercosur Trade Agreement.			markets of commodities and factors, zero profits in all sectors, and income balance for representative agent and government.	the creation of new Trade Agreements. -Simulating agreements to measure the different impacts of trade policies on groups of familiar farmers, commercial farmers and rural employees.
Harrison, Rutherford and Tarr (1997)	1. Uruguay Round Agreement.	-Multiregional Trade (MRT) Model. -1992 GTAP Database. -World Bank Database.	Countries/regions: 24 Sectors: 22	-Two Models: 1. with constant returns to scale, perfect competition and products differentiated by its origin (Armington). 2. with monopolistic intraregional competition, hybrid Armington based in trade. - Saving rate endogenous.	-Four scenarios: tariff reductions in manufactured products, tariffication of NTBs in agriculture and binding commitments to reduce the level of agricultural protection, export and product agricultural subsidies reduction and the elimination of the Multifiber Agreement (MFA).
Hertel, Martin, Yanagishima and Dimaranan (1996)	1. Uruguay Round Agreement.	-GTAP Model. -World Bank database.	Countries/regions:15 Sectors: 10	-Constant returns to scale and perfect competition. -Products differentiated by its origin (Armington).	-Five scenarios. -Estimating the results on the implications of reductions in manufacturing protection, and from the abolition of the MFA.

Kim, Park and Park (2013)	1. ASEAN + 6 FTA. 2. ASEAN +3 FTA. 3. APEC.	-CGE Model -GTAP version 7 database.	Countries/regions: 21 Sectors: 15	-Static and capital accumulation model. -The standard GTAP model has been modified in order to identify medium-run growth effects of trade liberalization. -Brunei Darussalam and Papua New Guinea are excluded from the study.	-Three scenarios: tariff elimination, trade in services liberalization, trade facilitation. -Quantitatively investigates whether the FTAAP satisfies conditions for a trade bloc to generate positive and enough net trade creation effect.
Lee and Plummer (2011)	1. ASEAN. 2. ASEAN +6.	-Modified version of the LINKAGE model developed by Mensbrugghe (2005). -GTAP version 7 database.	Countries/regions:14 Sectors: 20	-Domestic output is supplied homogeneously from all markets, with the law of one price holding.	-Three scenarios related to trade policy. -Evaluating the potential effects of the AEC on economic welfare, trade flows and sectoral output of the member states.
Light (2004)	1. U.S. – Colombia FTA. 2. FTAA.	-CGE model. -Colombia's National Accounts (1997).	Countries/regions:1 Sectors: 17	-Imperfect competition in order to highlight the pro-competitive effects as well as productivity effects. -Incorporates productivity effects in both goods services markets endogenously,	-No scenarios analyzed.

				through a Dixit-Stiglitz framewok.	
Martin and Ramírez (2005)	1. U.S. – Colombia FTA. 2. ATPDEA	-CGE Model. -Colombia's National Accounts (1997)	Countries/regions: 1 Sectors: 19	-Imperfect substitution conditions between domestic products, and imported and exported products, rigid wages in labor market and imperfect competition in manufacturing sectors.	-Four scenarios, all of them maintaining the current protection to the rest of the world. -Estimating the possible effects of a FTA with U.S. in Colombian economy.
Morley and Díaz Bonilla (2003)	1. NAFTA.	-Micro-simulation and CGE Model.	Countries/regions: 1 Sectors: 19	-Three modifications: informal sector, maquila and the labor market.	-Estimating the impact of trade liberalization and a major opening in Mexico on the product, poverty, and income distribution.
Pardo, Perdomo, Delgado and Lozano (2005)	1. United States of America – Colombia FTA.	-Micro-simulation and CGE Model, based GTAPinGAMS model structure exposed in Rutherford (1998) and Rutherford y Paltsev (2000).	Countries/regions: 1 Sectors: N/A	-Static, multiregional Model. -Labor disaggregation and Harrison-Todaro mechanism added to Colombian economy.	-Estimating the effects of FTAs between U.S. and Colombia on inequality and poverty.

		-GAMS. -GTAP 20. -Quality of life survey (2003). -Continuous Household Survey (2001).			
Petri (1997)	1. APEC.	-A basic multiregional CGE model. -GAMS and GTAP. 1992 database..	Countries/regions: 6 Sectors: N/A	-FDI activity by region	-Three experiments: APEC trade policy. The importance of FDI using the model to evaluate trade liberalization and investment.
Petri, Plummer and Zhai (2011)	1. APEC Trans-Pacific Partnership (TPP). 2. ASEAN-Australia-New Zealand. 3. FTA ASEAN China, Japan and South Korea.	-CGE model. -GTAP version 8 database.	countries/regions: 24 -Sectors: 18	-Agriculture, mining and government services sectors are assumed to exhibit perfect competition with constant return to scale technology. -Trade is modeled using the Armington assumption for import demand. -Manufacturing and private services are characterized by monopolistic competition.	-Nine scenarios. -Analyzes the possibility of TPP being a path to a Free Trade Area of the Asia-Pacific. The simulation contains how the tracks might progress.

				-A household maximize utility using Extended Linear Expenditure System (ELES).	
Scollay and Gilbert (2000)	1. APEC FTA.	-Multi-regional CGE Model. -GTAP version 4 Database.	Countries/regions: 15. Sectors: 15	-Static Model. -Constant returns to scale technology and perfect competition. -Excludes AFTA effect in the analysis of APEC liberalization, what shows that not all the ASEAN members states have benefits.	-Two scenarios. -Simulating food products trade liberalization under the food system proposed by APEC.
Urata and Kiyota (2003)	1. EA FTA. 2. AFTA. 3. Japan-Singapore FTA.	-GTAP Model. -GTAP Version 5 database.	Countries/regions:20 Sectors: 21	-Constant returns to scale technology and perfect competition. -Imported intermediate inputs are distinguished by import partner country (Armington) intra-industry trade.	-Three scenarios. -Estimating the impact of the East Asian FTAs on trade.
Vos and de Jong (2003)	1. Ecuador	-Micro-simulation and single country CGE Model.	Countries/regions: 1 Sectors: 17	- Heterogeneity of households in calculating poverty and inequality.	-Four trade liberalization scenarios: impacts on macroeconomics aggregates, sectoral employment and factor income differentials.

		-WTO simulations using GTAP. -Calibrated for 1993. -Living Standard Measurement Study (LSMS) household survey (1995).		-The CGE communicates with the microsimulation model through a vector of prices, wages, and employment levels, which is passed from the macro to the micro level without a further feedback effect.	-Simulating effects of trade liberalization on poverty and income distribution in Ecuador.
Wong and Arguello (2010)	1. Ecuador Fiscal policy. 2. FTA U.S. – Ecuador.	Microsimulation and single country CGE Model. -Calibrated for 2004. - Survey of Urban and Rural households' living standards (2005-2006).	Countries/regions:1 Sectors: 27	-Static Model. -Links fiscal and trade policy changes to poverty effects. -Technology is modelled at the top by a Leontief function of value added and aggregate intermediate input.	-Tree scenarios: possible effects on poverty. -Estimating the impact on poverty from changes in fiscal policy in response to trade openness in Ecuador.

Source: table made by the author.

Table A.4.2 Equivalent for National Account Code and Harmonized System (HS) for the agricultural sector.

Subsectors	National Account Code	Harmonized System (HS) 6 digit level
Intensive Exports Main Products: coffee, banana, roses, carnations, tobacco, sugar cane, cane plantations.	030303, 040001, 050101, 020299, 020302, 020399, 020601, 021099, 050102	060310, 060311, 060312, 060312, 060313 ,060319, 060390, 080300, 060314, 060315 ,080390, 090111, 121293, 240110, 240120
Potential Exports Main Products: Plantain, other fruits and nuts (grape, pineapple, mango, passion fruit, cantaloupe, cherries, strawberries, apples, etc.), cocoa beans, avocado, fish, tuna, trout, salmon and honey.	010001,010002, 020301, 020501 ,020502 ,020503, 020700, 020800, 021102	010600, 010611, 010612, 010613, 010614, 010619, 010620, 010631, 010632, 010633, 010639, 010641, 010649, 010690, 010690, 010690, 020820, 030110, 030111, 030119, 030190, 030190, 030191, 030191, 030191, 030192, 030193, 030194, 030195, 030199, 030200, 030211, 030212, 030213, 030214, 030219, 030221, 030222, 030223, 030224, 030229, 030231, 030232, 03023,3 030234, 030235, 030236, 030239, 030240, 030241, 030242, 030243, 030244, 030245, 030246, 030247, 030250, 030251, 030252, 030253, 030254, 030255, 030256, 030259, 030261, 030262, 030263, 030264, 030265, 030266, 030267, 030268, 030269, 030269, 030269, 030271, 030272, 030273, 030274, 030279, 030281, 030282, 030283, 030284, 030285, 030289, 030760, 040900, 040900, 040900, 041000, 050210, 050290, 050300, 050710, 050790, 051000, 051110, 051199, 051199, 051199, 051199, 051199, 051199, 071420, 071430, 071440, 071450, 071490, 080110, 080111, 080119, 080120, 080121, 080122, 080130, 080131, 080132, 080211, 080212, 080212, 080221, 080222, 080231, 080232, 080240, 080241, 080242, 080250, 080251, 080252, 080260, 080261, 080262, 080270, 080280, 080290, 080300, 080300, 080310, 080390, 080410, 080420, 080430, 080440, 080450, 080450, 080450, 080610, 080620, 080710, 080711, 080719, 080720, 080810, 080820, 080820, 080830, 080840, 080910, 080920, 080921, 080929, 080930, 080940, 081010, 081020, 081030, 081040, 081050, 081060 ,081070, 081090, 081090, 081090, 081310, 081320, 081330, 081340, 081350, 121010, 121020, 121110, 121120, 121140, 121190, 121210, 130211, 152000, 152190, 180100, 410320, 430100, 430110, 430130, 430140, 430150, 430160, 430170, 430180, 430190, 440320, 440331, 440332, 440333, 440334, 440335, 440341, 440349, 440391, 440392 ,440399, 440410, 440420, 500100,510111, 510119, 510210,510211, 510219, 510220. Reptile skins, wood and wool.
Importables Main Products: corn, wheat, rice, sorghum, palm fruit, soy, forests and sub products, barley, legumes (beans, etc.), other leguminous fruits and seeds, alive plants, other plants and spices.	020101, 020102, 020103, 020199, 020401, 020403, 021101, 040003, 020104, 020202, 020499, 020599, 020699, 020901	060110, 060120, 060210, 060210, 060220, 060230, 060240, 060290, 060290, 060291, 060299, 060410, 060420, 060490, 060491, 060499, 070810, 070820, 071310, 071320, 071330,071331,071332,071333,071334,071335,071339,071340, 071350, 071360, 071390, 090300, 090411, 090412, 090420, 090421, 090422, 090500, 090510, 090520, 090610, 090611, 090619, 090620, 090700, 090710, 090720, 090810, 090811, 090812, 090820, 090821, 090822, 090830, 090831, 090832, 090910, 090920, 090921, 090922, 090930, 090931, 090932, 090940, 090950, 090961, 090962, 091010, 091011, 091012, 091020, 091030, 091040, 091050, 091091, 091099, 100110, 100111, 100119, 100190, 100191, 100199, 100200, 100210, 100290, 100300, 100310, 100390, 100400, 100410, 100490, 100510, 100590, 100610, 100700, 100710, 100790, 100810, 100820, 100821, 100829, 100830, 100840, 100850, 100860, 100890, 120100, 120100, 120110, 120190, 120210, 120210, 120220, 120230,120241, 120242, 120300, 120400, 120500, 120510, 120590, 120600, 120710, 120720, 120721, 120729, 120730, 120740, 120750, 120760, 120770, 120790, 120791, 120792, 120799, 120910, 120911, 120919, 120920, 120921, 120922, 120923, 120924, 120925, 120926, 120929, 120930, 120991, 120999, 121292, 121294, 121299, 130110, 130120, 130190, 130211, 130212, 130213, 130214, 130219, 130220, 130231, 130232, 140110, 140120, 140190, 140200, 140210, 140290, 140291, 140299, 140300, 140310, 140390, 140410, 140490, 400110, 400121, 400122, 400129, 400130, 450110, 450190, 520100, rubber and cotton.
Non tradable Main products: potato, tomato, legumes (onion, garlic, mushrooms, manioc, other legumes and tubers (yam, arracacha, etc.), milk, cattle, wood, orange and other citrus, fruity trees plantations, birds, eggs, protected forests, shellfishes and other aquatic products.	020303, 021103, 030201, 030202, 030301, 040004, 050200, 020201, 020204, 020205, 020207, 020999, 030102, 030302, 040002.	010110, 010111, 010119, 010120, 010121, 010129, 010129, 010130, 010190, 010190, 010190, 010190, 010310, 010391, 010391, 010391, 010392, 010392, 010392, 010410, 010410, 010410, 010410, 010420, 010511, 010512, 010513, 010514, 010515, 010519, 010591, 10592, 10593, 10594, 10599, 030622, 030623, 030624, 030625, 030626, 030627, 030629, 030700, 030710, 030711, 030721, 030731, 030741, 030751,030771, 030781, 030791, 040700, 040711, 040719, 040721, 040729, 040790, 050800, 050900, 051199, 070110, 070190, 070200, 070310, 070320, 070390, 070410, 070420, 070490, 070511, 070519, 070521, 070529, 070610, 070690, 070700, 070890, 070910, 070920, 070930, 070940, 070951, 070952, 070959, 070960, 070970, 070990, 070991, 070992, 070993, 070999, 070999, 071410, 080510, 080520, 080550, 080590, 121220, 121221, 121229, 121291, 121300, 121410, 121490, 440110, 530110, 530210, 530310, 530410, 530500, 530511, 530521, 530590, 530591 wood and fiber.
Other agricultural products and services	021001, 021002, 021099, 021104, 021199, 030304, 040005, 050300,	121130, 121190
Vegetable and animal oils and fats	11	020900, 020910, 020990, 120810, 120890, 140420, 150100, 150110, 150120, 150190, 150200, 150210, 150290, 150290, 150300, 150400, 150420, 150430, 150500, 150510, 150590, 150600, 150710, 150790, 150810, 150890, 150910, 150990, 151000, 151110, 151190, 151211, 151219, 151221, 151311, 151319, 151321, 151329, 151410, 151411, 151419, 151490, 151491, 151499, 151511, 151519, 151521, 151529, 151530, 151540, 151560, 151590, 151610, 151620, 151710, 151790, 152110, 152200, 230400, 230500, 230610, 230620, 230630, 230640, 230641, 230649, 230650, 230660, 230670, 230690
Sugar and Panela	15	170111, 170111, 170112, 170113, 170114, 170191, 170199, 170199, 170199, 170220, 170220, 170220, 170310, 170390
Beverages	18	110710, 110720, 220110, 220190, 220210, 220290, 220300, 220410, 220421, 220429, 220430, 220510, 220590, 220600, 220710, 220720, 220810, 220820, 220830, 220840, 220850, 220860, 220870, 220890
Cocoa, chocolate and confectionery products	16	170410,170490,180310, 180320,180400,180500, 180610,180620,180631,180632, 180690,200600,210500

Subsectors	National Account Code	Harmonized System (HS) 6 digit level
Meats and fish	10	020110, 020120, 020130, 020210, 020220, 020230, 020311, 020312, 020321, 020322, 020410, 020421, 020422, 020423, 020430, 020441, 020442, 020443, 020450, 020500, 020610, 020621, 020622, 020629, 020630, 020641, 020649, 020680, 020690, 020710, 020711, 020712 , 020713, 020714, 020721, 020722, 020723, 020724, 020725, 020726, 020727, 020731, 020732, 020733, 020734, 020735, 020736, 020739, 020741, 020742, 020743, 020744, 020745, 020750, 020751, 020752, 020753, 020754, 020755, 020760, 020810, 020830, 020840, 020850, 020860, 020890, 021011, 021012, 021019, 021020, 021090, 021091, 021092, 021093, 021099, 030270, 030290, 030300, 030310, 030311, 030312, 030313, 030314, 030319, 030321, 030322, 030323, 030324, 030325, 030326, 030329, 030331, 030332, 030333, 030334, 030339, 030341, 030342, 030343, 030344, 030345, 030346, 030349, 030350, 030351, 030352, 030353, 030354, 030355, 030356, 030357, 030360, 030361, 030362, 030363, 030364, 030365 ,030366, 030367, 030368, 030369, 030371, 030372, 030373, 030374, 030375, 030376, 030377, 030378, 030379, 030379, 030379, 030380, 030381, 030382, 030383, 030384, 030389, 030390, 030410, 030411, 030412, 030419, 030419, 030419, 030420, 030420, 030420, 030421, 030422, 030429, 030429, 030429, 030429, 030431, 030432, 030432, 030433, 030439, 030441, 030442, 030443, 030444, 030445, 030446, 030449, 030451, 030451, 030452, 030453, 030454, 030455, 030459, 030461, 030462, 030462, 030463, 030469, 030471, 030472, 030473, 030474, 030475, 030479, 030481, 030482, 030483, 030484, 030485, 030486, 030487, 030489, 030490, 030491, 030492, 030493, 030493, 030494, 030495, 030499, 030510, 030520, 030520, 030530, 030531, 030532, 030539, 030540, 030541, 030542, 030543, 030544, 030549, 030551, 030559, 030561, 030562, 030563, 030564, 030569, 030571, 030572, 030579, 030579, 030611, 030612, 030613, 030613, 030613, 030614, 030615, 030616, 030617, 030619, 030621, 030719, 030729, 030739, 030749, 030759, 030779, 030789, 030799, 030811, 030819, 030821, 030829, 030830, 030890, 050400, 050510, 050590, 050610, 050690, 051000, 051191, 051191, 160100, 160220, 160231, 160232, 160239, 160239, 160241, 160242, 160249, 160250, 160290, 160411, 160412, 160413, 160414, 160415, 160416, 160417, 160419, 160420, 160430, 160431, 160432, 160510, 160520, 160521, 160529, 160530, 160540, 160551, 160552, 160553, 160554, 160555, 160556, 160557, 160558, 160559, 160561, 160562, 160563, 160569, 160590, 230110, 230120, 410110, 410120, 410121, 410122, 410129, 410130, 410140, 410150, 410190, 410210, 410221, 410229, 410310, 410330, 410390
Bovine Livestock	30101	010210, 010221, 010229, 010231, 010239, 010290
Food products n.c.p	17	040811, 040819, 040891, 040899, 071010, 071021, 071022, 071029, 071030, 071040, 071080, 071090, 071110, 071120, 071130, 071140, 071151, 071159, 071190, 071210, 071220, 071230, 071231, 071232, 071233, 071239, 071290, 080111, 080112, 080300, 081110, 081120, 081190, 081210, 081220, 081290, 081400, 090210, 090220, 090230, 090240, 110510, 110520, 121230, 160210, 160300, 190110, 190190, 200110, 200120, 200190, 200210, 200290, 200310, 200320, 200390, 200410, 200490, 200510, 200520, 200530, 200540, 200551, 200559, 200560, 200570, 200580, 200590, 200591, 200599, 200710, 200791, 200799, 200811, 200819, 200819, 200820, 200830, 200840, 200850, 200860, 200870, 200880, 200891, 200892, 200893, 200897, 200899, 200911, 200912, 200919, 200920, 200921, 200929, 200930, 200931, 200939, 200940, 200941, 200949, 200950, 200960, 200961, 200969, 200970, 200971, 200979, 200980, 200981, 200989, 200990, 210120, 210210, 210220, 210230, 210310, 210320, 210390, 210410,
Coffee and threshing products Roasted Coffee, Instant Coffee and Coffee extracts.	14	090112, 090121, 090122, 090140, 210110, 210111, 210112, 210130
Mill products and starches	13	100620, 100630, 100640, 110100, 110210, 110220, 110230, 110290, 110290, 110290, 110311, 110312, 110313, 110314, 110319, 110320, 110321, 110329, 110411, 110412, 110419, 110421, 110422, 110423, 110429, 110429, 110429, 110430, 110610, 110620, 110620, 110620, 110630, 110630, 110630, 110811, 110812, 110813, 110814, 110819, 110820, 110900, 170230, 170230, 170230, 170240, 170240, 170250, 170260, 170260, 170260, 170290, 170290, 170290, 170290, 170290, 170290, 170290, 190120, 190211, 190219, 190220, 190230, 190240, 190300, 190410, 190420, 190430, 190490, 190500, 190510, 190520, 190530, 190531, 190532, 190540, 230210, 230220, 230230, 230240, 230250, 230310, 230800, 230810, 230890, 230910, 230990, 350510, glue.
Tobacco products	19	240210, 240220, 240290, 240310, 240311, 240319, 240391, 240399
Dairy products	12	040110, 040120, 040130, 040140, 040150, 040210, 040210, 040210, 040210, 040210, 040221, 040229, 040291, 040291, 040299, 040310, 040390, 040410, 040490, 040500, 040510, 040520, 040590, 040610, 040620, 040630, 040640, 040690, 170210, 170211, 170219, 210500, 350110, glue.

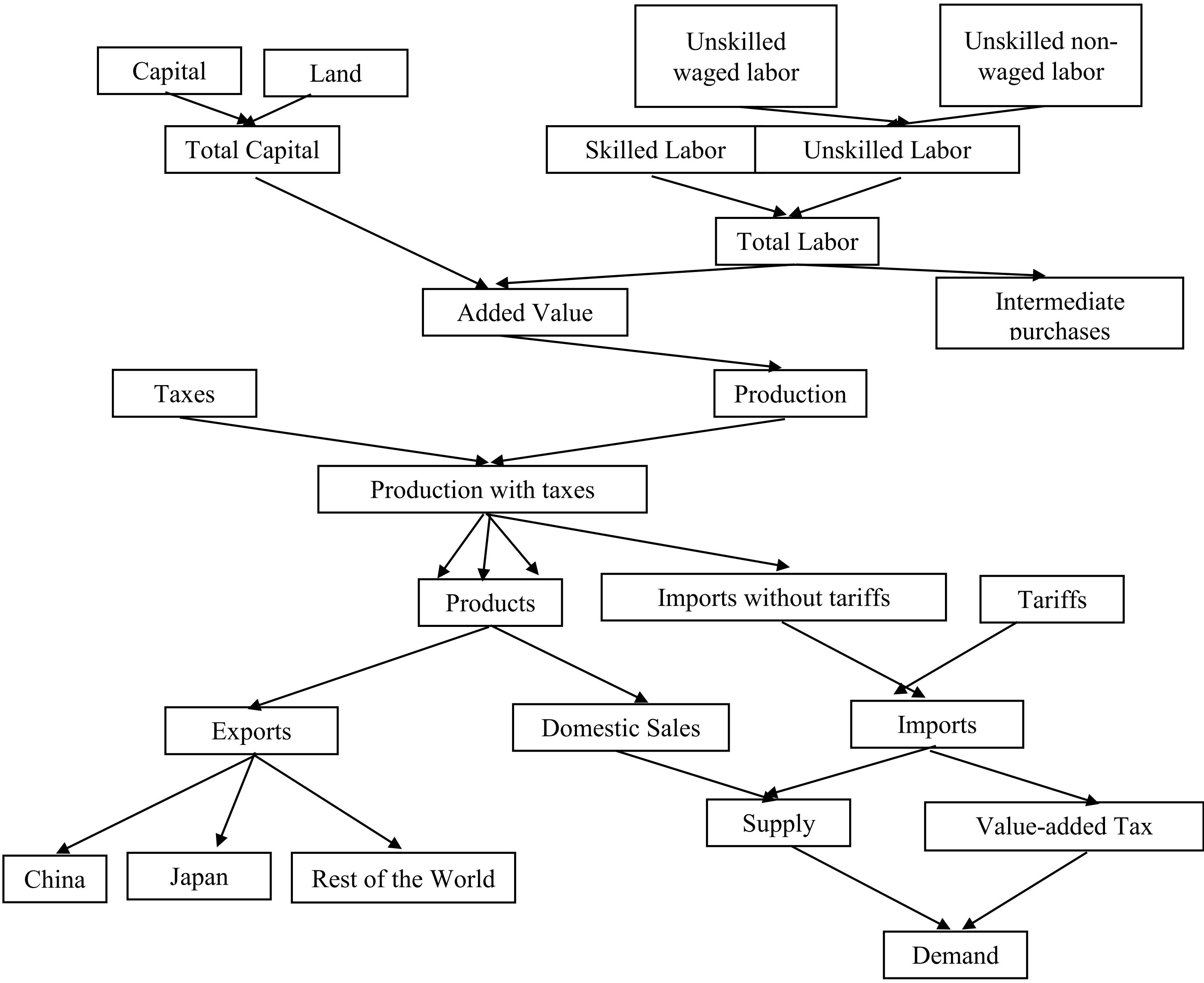
Source: Dane (2017).

Table A.4.3 Scenario C results: effects on other economic indicators

Indicator	**Change (%)**
Total exports	0.37%
Total imports	0.24%
Agriculture	0.33%
Mining	-0.03%
Industry	-0.06%
Services	-0.03%
Indirect tax	0.00%
Consumption	0.03%
Public expenses	0.00%
Investment	-0.02%
Total GDP	-0.01%
Equivalent variation (% income)	0.03%
Intensive exports	1.27%
Potential exports	0.29%
Bovine livestock	-0.01%
Importable	-0.15%
Non-tradable	0.01%
Other agricultural products and services	-0.10%
Coffee products and threshing	3.26%
Sugar and panela	-0.03%
Cocoa, chocolate and confectionary	-0.04%
Vegetables and animal oils	-0.10%
Beverages	-0.02%
Meats and fish	-0.01%
Food products	-0.09%
Mill products and starches	-0.01%
Dairy products	0.00%
Tobacco products	-0.03%

Note: The impacts on welfare are measured through the "equivalent variation": defined as the change in the income level. Given the initial conditions, it would take households to the same level of utility they achieve when simulated changes occur. The procedure works as follows: the model evaluates the changes in equilibrium, when tariff and non-tariff barriers are eliminated or reduced in Japan and China. The model calculates the new level of household utility, given that balance. Finally, it evaluates which change in household income would have produced, in the initial conditions, the same change in utility, which is called "equivalent variation" in the welfare analysis. In the results, the average equivalent variation is reported as a percentage of the original income.
Source: Table made by the author based on the results of CGE model.

Appendix 4.1. CGE model structure



Source: by the author based on Botero et al (2017)

Appendix 4.2 Description of variables of trade restrictiveness index

Definitions:

Overall Trade Restrictiveness Index (OTRI): The OTRI captures the trade policy distortions that each country imposes on its import bundle. It measures the uniform tariff equivalent to the country tariff and non-tariff barriers (NTB) that would generate the same level of import value for the country in a given year. Tariffs can be based on the MFN tariffs which is applied to all trading partners, or the applied tariffs, which takes into account the bilateral trade preferences. The ad valorem equivalents of NTB were estimated by Kee, Nicita and Olarreaga (2009).

Tariff-only Overall Trade Restrictiveness Index (OTRI_T): The OTRI_T is the OTRI that only focuses on tariffs of each country. No NTBs are considered in the calculation of OTRI_T. Similar to OTRI, tariffs can be based on both MFN and Applied tariffs.

Market Access Overall Trade Restrictiveness Index (MAOTRI): The MAOTRI captures the trade policy distortions imposed by the trading partners of each country on its export bundle. It measures the uniform tariff equivalent to the partner country tariff and non-tariff barriers (NTB) that would generate the same level of export value for the country in a given year. Tariffs can be based on the MFN tariffs which are applied to all trading partners, or the applied tariffs, which takes into account the bilateral trade preferences. The ad valorem equivalent of NTB was estimated by Kee, Nicita and Olarreaga (2009).

Tariff-only Market Access Overall Trade Restrictiveness Index (MAOTRI_T): The MAOTRI_T is the MAOTRI that only focuses on the tariffs of the trading partners of each country. No NTBs are considered in the calculation of MAOTRI_T. Similarly to MAOTRI, tariffs can be based on both MFN and Applied tariffs.

Kee, Hiau Looi, Alessandro Nicita and Marcelo Olarreaga. "Estimating trade restrictiveness indices", Economic Journal, 2009, vol. 119, p. 172--199.

Appendix 4.3 CGE MODEL: Variables, parameters and equations

1.1. Variables, parameters and equations of the economic model.

This section aims to describe the parameters, the variables and the equations use in the Matrix (SAM) model. It denotes the different terms as follows: i for the line of each brand, j for the product, k for the institutions, which in turns is composed by: h for household, g for government, r for the rest of the world, and e for enterprises. Furthermore, the product with endogenous exports are indicated by n and the exogenous exports by s. The line of business with a monopoly position are named with m and in perfect competition with l.

In the other hand, it considers several set of business and products, being the first, the one composed by food, manufacturing and services business denote by *a*, the second composed by 6 agricultural sectors, mining, oil, and agro-industrial excluding tobacco, denote by *b*. The third group denote by *c* convenes the tobacco products, light and intermediate industry products, capital goods and the others manufacturing industries. Finally, the group *d* is composed by the rest of business, meaning, all the ones that are not included in the *b* and *c* sets.

1.1. Parameters

STOCK	Capital stock	*δ*	Share on aggregation of works
STOCKL	Land Stock	*B*	Scales on aggregations of works
σTN	Elasticity of substitution in formal and informal non-qualified work	*σV*	Elasticity on value added
δTN	Parameter of relation between formal and informal non-qualified work	*δV*	Share on value added
BTN	Parameter of scale on the aggregation function of non-qualified work	*BV*	Scales on value added
σKL	Elasticity of substitution in capital and work	*σM*	Elasticity on compound goods
δKL	Parameter of relation between capital and land	*δM*	Share on compound goods
BKL	Parameter of scale on the aggregation function of capital and land	*BM*	Scales on compound goods
σ	Elasticity on aggregation of works	*σC*	Elasticity CET
IO	Coefficient of input product	*δC*	Share CET
IMPR	Tariff rate of the business	*BC*	Scale CET
MP	Production Matrix	*σE*	Demand elasticity of exports
IVA	Value added tax	*δE*	Demand share of exports
ARAN	Tariff rate	*RM*	Level of import restrictions to the non-tariff measures
PWM	Imports prices	*AVE*	Ad Valorem equivalent
PW	World exports prices	*TSSNC*	Contribution rate to social security of non-qualified work to the institution
PARTXXT	Country's share on total exports	*TSSC*	Contribution rate to social security of qualified work to the institution
XXT	Exports from the rest of the world	*TRENTA*	Government share on petroleum rent
CSS	Contribution rate to social security	*TDIVIG*	Government dividend rate of the petroleum sector

TDIV	Dividend rate	*PREST*	Welfare benefits
TINT	Tariff rate of properties	*TDIVI*	Dividends
TIMP	Tax rate	*REM*	Household outside remittance
PSS	Social security's provision	*ASIST*	Government transfer to household
SHAREK	Capital gross operating surplus	*DEUDA*	Government Debt
SHAREL	Labor gross operating surplus	*REXT*	Government interest rate for external credits
MSAVEX	Saving rate	*KFX*	Net loans from the rest of the world (capital account)
GPX	Exogenous public spending	*WMANCX*	Non-qualified employee medium wage
INVX	Gross fixed capital formation [FBKF]	*SHARETNC*	Participation rate from of the household non-qualified work
SHAREG	Sectoral share on public spending	*SHARETC*	Participation of the household qualified work
SHAREI	Sectoral share on investment	*SHARETI*	Participation of the household informal work
SHAREIPC	Weighting of Consumer Price Index (IPC)	*ELASTY*	Sector income elasticity IS in the ideal system of demand
PINV	Investment share accumulated on stock	*ELASTP*	Sector price elasticity IS in the ideal sys-tem of demand
PEACX	Offer of qualified work	*POB*	Population
PEANFX	Offer of non-qualified work	*TIMPD*	Direct tax rate
PEANIX	Offer of informal non-qualified work	*WHDISNC*	Relation between the household non-qua-lified wage compared to the economy average
DESEMCX	Qualified Unemployment rate	*WHDISI*	Relation between the household informal wage compared to the economy average
WMNCX	Exogenous non-qualified wage	*WHDISC*	Share between the household qualified salary and the average economy
WDISTNC	Scale of non-qualified salary	*ALFA*	Function parameters SCID
WDISTC	Scale of qualified wage	*BETA*	Functions parameters SCID
WDISTI	Scale of informal wage	*GAMA*	Functions parameters SCID
DEPR	Sectoral depreciation rate	*ALFAI*	Parameters second level share function of profit
ER0	Initial exchange rate	*MARKUP*	Markup of the branch I
MILEGAL	Illegal imports share	*SHARELG*	Share of land used in livestock
KCT	Technical change in the production function	*SHARELA*	Share of land used in support activities or other uses
KTT	Technical change in the labor aggregation function	*A*	Parameters of the portfolio function of land
RCM	Capital factor remuneration in the mono-polistic competitive sector	*RLK*	Reference profitability of the land in the branch I
TRANS	Transfers that household I receives	*AK*	Parameters of portfolio function of capital
EXO	Sector exports with exogenous exports	*SIGMAK*	Substitution elasticity in the function of capital portfolio
PEXO	Exogenous export prices for sectors with not endogenous exports	*INVD*	Investment by destiny
SIGMAL	Elasticity of the land allocation to the pro-fitability of each sector	*RKSK*	Reference profitability of capital in the branch I
TOTALL	Total land		
TOTALLU	Land used productively in agriculture		
SHARELU	Share of the land used productively in agriculture		

1.2. Variables

TC	Qualified work	*D*	Domestic sales
TNC	Non-qualified work	*M*	Imports
TANC	Employee qualified work	*PVA*	Ad valorem price
TNNC	Independent qualified work	*PY*	Production's price
TT	Total work	*PD*	Domestic sales price
KS	Capital	*C*	Consumption
L	Land	*G*	Public expense
K	Stock of capital	*V*	Intermediate purchases
RKS	Remuneration for capital unit	*FBKF*	Gross formation of fixed price
RL	Remuneration for unity of land	*PM*	Imports prices
R	Remuneration for land unity, capital's	*PXC*	Composite good price
VA	Value added	*PX*	Exports' price
WC	Qualified wage	*PWX*	Exports external price
WNC	Non-qualified wage	*XT*	Rest of the world exports
WANC	Employee qualified wage	*YFACT*	Factorial income
WNNC	Independent qualified wage	*YDISP*	Disposable income
W	*Total wage*	*MC*	Share of the sectoral expense on consumption
R	Remuneration to capital	*P*	Aggregated price consumption
Y	Production	*ER*	Exchange rate
YIMP	production plus taxes	*DESEM*	Unemployment rate
PYIMP	imports prices	*WMC*	Qualified medium wage
YY	Production of each good	*WMI*	Informal medium wage
PYY	Price of the production of each good	*FBKFT*	Total investment
X	Exports	*CAGR*	Consumption for the aggregated goods in the almost ideal demand system
MH	Share on consumption of each household	*ER*	Exchange rate
MSAVE	Saving rate of each household	*YDISP*	Disposable income of each institution
KF	Net loans from the rest of the world	*SAVE*	Institution's savings
IPC	Consumption price index	*PEAC*	PEA Qualified of the household
CH	Consumption in each type of good for each household type	*PEAN*	PEA non-qualified of the household
WMANC	Non-qualified employee medium wage	*PEANF*	PEANF PEA non-qualified employee of the household
THANC	Household non-qualified employee total employment	*PEAN I*	PEA non-qualified independent of household
THNNC	Household non-qualified non-employee total employment	*DESEMC*	Household qualified unemployment
THC	Household Qualified total employment	*DESEMT*	Global unemployment rate
WHANC	Household average wage of the non-qualified employee IHOG	*PCH*	Price of each consumption good of the household
WHNNC	Household average wage of the non-qualified unemployed	*l*	Unitary cost in the branch I
WHC	Average remuneration of the household qualified work	*GAN*	Earning by monopolistic competence
IMPU	IPaid taxes by the institution	*RPU*	Earning for unit capital
VAT	Total value added	*INV*	Sectoral investment

1.3. Equations

Aggregation informal and formal non-qualified work:

$$TNC_i = TANC_i + TNNC \qquad (1)$$

Expansion path aggregation informal and formal non-qualified work:

$$\frac{TNNCi}{TANCi} = \left(\frac{WANCi(1-\delta TNi)}{WNNCi(\delta TNi)}\right)^{\sigma TNi} \quad (2)$$

Accounting identity aggregation of non-qualified works:

$$TNC_i WNC_i = TANC_i \, WANC_i + TNNC_i \, WNNC_i \quad (3)$$

Land and capital aggregation:

$$K_i = KS_i + L_i \quad (4)$$

Expansion path land and capital aggregation:

$$\frac{Li}{KSi} = \left(\frac{RKSi(1-\delta KLi)}{RLi(\delta KLi)}\right)^{\sigma KLi} \quad (5)$$

Accounting identity land and capital aggregation:

$$K_i R_i = KSiRKSi + L_i RL_i \quad (6)$$

Aggregation qualified and non-qualified work:

$$TT_i = TNC_i + TC_i \quad (7)$$

Expansion path aggregation qualified and non-qualified work:

$$\frac{TNCi}{TCi} = KTTi \left(\frac{WCi(\delta i)}{(WNCi(1-\delta i))}\right)^{\sigma i} \quad (8)$$

Accounting identity of works:

$$TT_i W_i = TNC_i W\,NC_i + TC_i WC_i \quad (9)$$

Aggregation work and capital:

$$VAi = BVi \left(\delta ViTTi^{\frac{\sigma Vi-1}{\sigma Vi}} + (1-\delta Vi)Ki^{\frac{\sigma Vi-1}{\sigma Vi}}\right)^{\frac{\sigma Vi}{\sigma Vi-1}} \quad (10)$$

Value added expansion path:

$$\frac{TTi}{Ki} = KCTi \left(\frac{Ri\,\delta Vi}{Wi(1-\delta Vi)}\right)^{\sigma Vi} \quad (11)$$

Accounting identity value added:

$$PVA_i VA_i = TT_i W_i + K_i R_i \quad (12)$$

Total production of the branch:

$$VAi = Yi\,(1 - \textstyle\sum_j IOij) \quad (13)$$

Production value:

$$PY_l Y_l = PVA_l VA_l + \textstyle\sum_j PXC_j Y_l IO_{jl} \quad (14)$$

Production with taxes:

$$YIMP_i = Y_i(1 + IMPR_i) \quad (15)$$

Production value with taxes:

$$PYIMP_i \; YIMP_i = PY_i Y_i \,(1 + IMPR_i) \quad (16)$$

Product definition obtain in all branches:

$$YY_j = \sum_i YIMPiMPij \tag{17}$$

Determination of production price:

$$PYY_j\ YY_j = \sum PYIMPiYIMPiMPij \tag{18}$$

Aggregation of national production and imports:

$$Cj + Gj + FBKFj + INVj + Vj = BMj\left(\delta MjDj^{\frac{\sigma Mj-1}{\sigma Mj}} + (1-\delta Mj)Mj^{\frac{\sigma Mj-1}{\sigma Mj}}\right)^{\frac{\sigma Mj}{\sigma Mj-1}} \tag{19}$$

Expansion path national production and imports:

$$\frac{Mj}{Dj} = KTTi\left(\frac{PDj(1-\delta Mj)}{PMj(1+AVEj)\ \delta Mj)}\right)^{\sigma Mj} \tag{20}$$

Accounting identity composed good:

$$PXCj\ (Cj + Gj + FBKFj + INVj + Vj) = (1 + IVAj) + (PMjMj + PDjDj) \tag{21}$$

Aggregation CET:

$$Y_j = BC_j\left(\delta C_jDj^{\frac{\sigma Cj-1}{\sigma Cj}} + (1-\delta C_j)X_j^{\frac{\sigma Cj-1}{\sigma Cj}}\right)^{\frac{\sigma Cj}{\sigma Cj-1}} \tag{22}$$

Expansion path CET:

$$\frac{Xn}{Dn} = \left(\frac{PDn(1-\delta Cn)}{PXn\delta Cn}\right)^{\sigma Cn} \tag{23}$$

Accounting identity CET:

$$PYY_jYY_j = PX_jX_j + PD_jD_j \tag{24}$$

Exports world demand

$$XXT_{j,d} = X_{j,d} + XT_{j,d} \quad PX_jX_j \ , d= \text{Japan, China, rest of the world} \tag{25}$$

Product i's exports aggregations to different destinations:

$$X_j = \sum_d X_{j,d} \tag{26}$$

Exports demand (expansion path):

$$\frac{X_{n,d}}{XT_{n,d}} = \left(\frac{PW_{n,d}(1-DELTAE_{n,d})}{PWX_{n,d}\delta E_{n,d}}\right)^{\sigma E_{n,d}} \tag{27}$$

Country's exports destination price:

$$PWX_{n,d} = PX_{n,d}[1 + \mathrm{AVE}_{n,d} + \mathrm{ARAN}_{n,d}] \tag{28}$$

Household factorial income:

$$YFACT_h = THANC_h\ WHANC_h\left(1-\sum_e TSSNC_e - \sum_g TSSNC_g\right) + THNNC_h WHNNC_h \quad (29)$$

$$+ THC_h WHC_h (1-\sum_e TSSH_e - \sum_g TSSC_g) + SHAREK_h \sum_i KS_i RKS_i + \sum_i L_i RL_i$$

Enterprises factorial income:

$$YFACT_e = (\sum_h THANC_h\, WHANC_h) TSSNC_e + (\sum_h THC_h\, WHC_h) TSSC_e \quad (30)$$

$$+ SHAREK_e \sum_i KS_i RKS_i + SHAREL_e \sum_i L_i RL_i$$

Government factorial income:

$$YFACT_g = (\sum_h THANC_h\, WHANC_h) TSSNC_g + (\sum_h THC_h\, WHC_h) TSSC_g \quad (31)$$

$$+ SHAREK_g \sum_i KS_i RKS_i + SHAREL_g \sum_i L_i RL_i$$

Factorial income RM:

$$YFACT_r = SHAREK_r \sum_i KS_i\, RKS_i + SHAREL_r \sum_i L_i\, RL_i \quad (32)$$

Determination of the household income:

$$IMPU_h = TIMP_h(YFACT_h + TINT_h\,(\sum_e (SHAREK_e \sum_i KS_i RKS_i + SHAREL_e \sum_i L_i RL_i))) \quad (33)$$
$$+ TDIVI_h TIMPD_h \sum_e YDISP_e$$

Determination of the tax of the enterprises:

$$IMPU_e = TIMP_e(YFACT_e - (SHAREK_e \sum_i KS_i\, RKS_i + SHAREL_e \sum_i L_i\, RL_i) \sum_k TINT_k \quad (34)$$

$$- \sum_g TRENTA_g\, KS_p\, RKS_p - PREST_e (\sum_h THANC_h\, WHANC_h\,) TSSNC_e + TSSC_e \sum_h THC_h\, WHC_h\,)$$

Tax paid by the government:

$$IMPU_g = 0 \quad (35)$$

Tax paid by the rest of the world:

$$IMPU_r = 0 \quad (36)$$

Household disposable income:

$$YDISP_h = YFACT_h - IMPU_h + \sum_e YDISP_e TDIVI_h + \sum_e (PREST_e\,(THANC_h WHANC_h TSSNC_e + THC_h WHC_h TSSC_g))$$

$$+ \sum_g (THANC_h\, WHANC_h TSSNC_g + THC_h WHC_h TSSC_g) + TINT_h \sum_e (SHAREK_e \sum_i KS_i RKS_i$$

$$+ SHAREL_e \sum_i L_i RL_i\,) + REM_h\ ER + ASIST_h + TRANS_h \quad (37)$$

Enterprises disposable income:

$$YDISP_e = (1 - TIMP_e)(YFACT_e - SHAREK_e \sum_i KS_i\, RKS_i + SHAREL_e\, (\sum_i L_i\, RL_i)(\sum_k TINT_k) \quad (38)$$

$$- \sum_g TRENTA_g\, KS_p RKS_p - PREST_e((\sum_h THANC_h\, WHANC_h) TSSNC_e + (\sum_h THC_h WHC_h)\, TSSC_e))$$

Government disposable income:

$$YDISP_g = YFACT_g + \sum_k IMPU_k + \sum_j PWM_j M_j ARAN_j ER + \sum_j IVA_j PM_j M_j + PD_j D_j + \sum_i Y_i PY_i IMPR_i \quad (39)$$

$$- PREST_g\,((\sum_h THANC_h\, WHANC_h) TSSNC_g + (\sum_h THC_h\, WHC_h) TSSC_g) - \sum_h ASIST_h$$

$$+ (TRENTA_g + TDIVIG_g) KS_p RKS_p + TINT_g (\sum_e SHAREK_e\,(\sum_i KS_i RKS_i\,) + SHAREL_e (\sum_i L_i RL_i\,))$$

$$- DEUDA_g REXT_g ER$$

Disposable income of RM:

$$YDISP_r = YFACT_r + ER \sum_g REXTg\ DEUDAg - ER \sum_h REMh + \sum_e (SHAREKe \sum_i KSiRKSi + \sum_i Li\, RLi)\ TINTr \quad (40)$$

$$+TDIVIg \sum_e YDISPe$$

Household savings:

$$SAVE_h = MSAVE_h\ YDISP_h \quad (41)$$

Enterprises savings:

$$SAVE_e = YDISP_e (1\text{-}\sum_k TDIVIk) - \sum_g TDIVIGg\ KSpRKSp \quad (42)$$

Government savings:

$$SAVEe = YDISP_g - GPX_g \quad (43)$$

Rest of the world savings:

$$SAVE_r = KF.ER \quad (44)$$

Aggregated food price:

$$PCHa1h = \sum_b PXCb\alpha Iah \quad (45)$$

Aggregated prices of industrial goods:

$$PCHa2h = \sum_c PXCc\alpha Ich \quad (46)$$

Aggregated prices of services:

$$PCHa3h = \sum_d PXCd\alpha Idh \quad (47)$$

Index price of the almost ideal demand system:

$$log(P_h) = log(PCH_{ah}) \sum_a \alpha_{ah} + 0{,}5suma\ (\sum_a \gamma ah(\log(PCHah))^2) \quad (48)$$

Share of type of goods in the consumption:

$$MHah = \left(\alpha ah + \sum_a \gamma ah \log(PCHah) + \beta ah\ log\left(\frac{YDISPh(1- MSAVEh)}{Ph}\right)\right) \quad (49)$$

Demand by type of good:

$$CAGR_{ah}PCH_{ah} = MH_{ah}YDISP_h (1\text{-}\ MSAVE_h) \quad (50)$$

Disaggregation of food consumption by type of good:

$$CHbh = \left(\frac{\alpha Ibh}{\sum_a \alpha Iah}\right) CAGRa1h \quad (51)$$

Disaggregation of other manufactured goods consumption by type of good:

$$CHch = \left(\frac{\alpha Ich}{\sum_c \alpha Ich}\right) CAGRa2h \quad (52)$$

Disaggregation of services consumption by type of service:

$$CHdh = \left(\frac{\alpha Idh}{\sum_d \alpha Idh}\right) CAGRa3h \quad (53)$$

Consumption by sector:

$$C_j = \sum_h CH_{ij} \tag{54}$$

Public expense by sector:

$$G_j = \sum_g SHAREG_j \, GPX_g \tag{55}$$

Investment by sector:

$$INV_j = PINV_j \, YY_j \tag{56}$$

Stock by sector:

$$FBKF_j = SHAREI_j \, FBKFT \tag{57}$$

Intermediate purchases:

$$V_j = \sum_i Y_i \, IO_{ji} \tag{58}$$

Import prices in US dollars:

$$PM_j = PWM_j \, (1 + ARAN_j) \, ER \tag{59}$$

Export prices in US dollars:

$$PX_j = PWX_j \, ER \tag{60}$$

Equilibrium in the qualified labor market:

$$\sum_h PEACX_h \, (1 - DESEMC_h) = \sum_i TC_i \tag{61}$$

Qualified work remuneration by type of household:

$$WHC_h = WHDISC_h \frac{\sum_i TC_i WC_i}{\sum_i TC_i} \tag{62}$$

Qualified employment by type of household:

$$THC_h = SHARETC_h \sum_i TC_i \tag{63}$$

Employee Remuneration non-qualified by type of household:

$$DESEMC_h = DESEMCX_h \tag{64}$$

Unemployment in the non-qualified work market:

$$DESEM = \frac{\sum_h PEANFX_h - \sum_i TANC_i}{\sum_h PEANFX_h} \tag{65}$$

Salaried Remuneration non-qualified by type of household:

$$WHANC_h = WHDISNC_h \frac{\sum_i TANC_i \, WANC_i}{\sum_i TANC_i} \tag{66}$$

Non-qualified employment by type of household:

$$THANC_h = SHARETNC_h \sum_i TANC_i \tag{67}$$

Equilibrium of the salaried non-qualified market:

$$WMANC = WANCX \tag{68}$$

Equilibrium of the independent non-qualified market

$$\sum_h PEANIX_h = \sum_i TNNC_i \tag{69}$$

Independent non-qualified remuneration by type of household:

$$WHNNC_h = WHDISI_h \frac{\sum_i TNNC_i WNNC_i}{\sum_i TNNC_i} \tag{70}$$

Independent non-qualified employment by type of household:

$$THNNC_h = SHARETI_h \sum_i TNNC_i \tag{71}$$

Scale of qualified wage:

$$WC_i = WDISTC_i \; WMC \tag{72}$$

Scale of non-qualified wage:

$$WANC_i = WDISTNC_i \; WMNCX \tag{73}$$

Scale of the independent non-qualified remuneration:

$$WNNC_i = WDISTI_i \; WMI \tag{74}$$

Determination of Capital:

$$KS_l = STOCK_l \tag{75}$$

Determination of the sectoral land stock:

$$L_i = STOCKL_i \tag{76}$$

Balance savings and investment:

$$\sum_k SAVE_k = PXC_j \sum_j (INV_j + FBKF_j) \tag{77}$$

Exogenous price index (system number):

$$IPC = 1 \tag{78}$$

Ponderation of the IPC:

$$IPC = \sum_j SHAREIPC_j \, PXC_j \tag{79}$$

Exogenous saving rate in the household:

$$MSAVE_h = MSAVEX_h \tag{80}$$

Exogenous determination of the capital account of the payment account:

$$KF = KFX \tag{81}$$

Cost of the sector in monopolistic competition:

$$\lambda_m Y_m = RCM_m K_m + W_m \, TT_m + Y_m \sum_j IO_{jm} PXC_j \tag{82}$$

Export definition in monopolistic competition:

$$PY_m = (1+MARKUP_m)\,\lambda_m \tag{83}$$

GSector's profit in monopolistic competition:

$$GAN_m = (PY_m - \lambda_m)\,Y_m \tag{84}$$

Profit by capital unit:

$$RPU_m = \frac{GANm}{Km} \tag{85}$$

Total capital profit in monopolistic competition:

$$R_m = RCM_m + RPU_m \tag{86}$$

Exogenous exports:

$$X_s = EXO_s \tag{87}$$

Price of the exogenous exports:

$$PWX_s = PEXO_s \tag{88}$$

Chapter 5. Conclusions

5.1 Summary of findings

The impact of FTAs on trade can be measured by using the latest quantitative analytical techniques. Understanding the impacts of FTAs between PA countries (Chile, Mexico, Peru, and Colombia) and key countries in the EA region (Japan, China and Korea), specifically for agriculture is crucial for its policy implications. In this sense, the relevance of this thesis is inherently related to the great importance of widening the scholarly knowledge on the agricultural sector. As mentioned throughout this thesis, agriculture is one of the main sources of exports earning in LA countries. In the view of the above, this study has used two different methodologies: GM to evaluate the impacts on the seven active FTAs in the region, and the CGE model for estimating the effects of possible FTAs specifically for the Colombian agricultural sector. Chapter 2 has described the recent agricultural trade evolution between LA and EA occurring between 2011 to 2015. This particular chapter has answered the following questions. Due to the above, Chapter 2 describes the recent agricultural trade evolution between LA and EA from 2011 to 2015. This chapter answers the following questions.

- Are Latin American agricultural exports to East Asia increasing and are they concentrating in terms of products and countries?
- How different is the PA's agricultural product offer within each member to East Asia?
- How is the agricultural comparative advantage of the PA countries to East Asia?
- How important are the East Asian imports of agricultural products from the PA?
- Why do the import policies of Japan, Korea, and China hamper the increase of PA agricultural imports?

In spite of the historical dependence of LA agricultural exports on the U.S. and EU markets, in 2015, the EA region became the main recipient of LA agricultural exports. The four PA countries represent 15% of total region's agricultural exports to EA being China, Japan, and Korea their main markets. The PA food exports to China, Japan and Korea are concentrated in few products, such as salmon, pork, beef, wine, grapes, cherries, avocados, coffee, flowers, and fish flour. Although there are some similarities between the LA countries in terms of their export offer to EA (e.g., grapes, fish flour, and pork) each country has a different and specific comparative advantage in certain agricultural products. This is the case of coffee and flowers for Colombia, fruit such as cherries and grapes, wines and salmon for Chile, fruits and vegetables for Mexico, and fish flour and also coffee for Peru.

Although Japan, China and Korea's agricultural imports from the four PA countries have increased between 2003 and 2015, they still only represent a small proportion of their agricultural imports from the world. In 2015, among the three EA countries, China imported the largest value from the PA, However, China's PA agricultural imports only accounted for

3.3% of its total agricultural imports. For Japan, the PA agricultural imports only represented 4.9% and for Korea 3.7% from their total agricultural imports from the world. This suggest an important opportunity for the PA countries in terms of increasing their participation in EA agricultural market.

Among the four PA members, Chile is the country with the highest volume of exports and the largest agricultural diversification to EA. Its export-oriented agricultural policy combines flexible regulations with a low support of agricultural services and institutions that help it to improve sectoral competitiveness.

Agricultural protection in China, Japan and Korea remains as the most difficult challenge for PA exports. NTB measures such as quotas and the implementation of SPS and TBT measures are a source of tensions and increase difficulties for agricultural exports to EA originated in the PA. Furthermore, the agricultural support levels in major EA countries are higher than those paid by the PA and the OECD countries. China, Japan, and Korea strongly protect many of their own agricultural products in order to promote the competitiveness of domestic agriculture and to ensure their food self-sufficiency.

In consequence, by analyzing the agricultural trade evolution between EA and the PA, chapter 2 has elucidated the importance of the four PA countries in the context of EA agricultural imports. In doing so, it has identified key import agricultural policies in EA countries that can affect the PA agricultural exports to the Asian region.

Chapter 3 has discussed the impact of seven FTA between EA and LA on LA's agricultural exports at three different desegregation levels (aggregate, sectoral and product level). In this chapter the author implemented a GM methodology that proved to be very useful when demonstrating diverse results. The GM shows positive and significant outcomes for several agricultural sub-sectors and products, and negative and significant results for some others during the period 2003-2015. Therefore, this chapter sheds light on LA's poor utilization of existent FTAs with EA, and the low impact from those FTAs on LA agricultural exports to EA. In this sense, chapter 3 has successfully answered the following questions:

- Have the seven FTAs increased LA's agricultural exports to EA?
- How has the FPM given by Japan, Korea, and China to Chile, Mexico and Peru's agricultural exports to EA influenced the LA agricultural exports to EA?

The GM outcomes indicated at an aggregate, sectoral and product level that both LA countries have mixed results from their trade agreements with EA on their agricultural exports and at the same time, East Asian countries have also diverse results from the FTAs with LA on their agricultural imports precisely from this region. In general terms, while the LA's agricultural exports reflect mostly positive and significant effects from the FTAs with EA with four out of seven FTAs with positive effects, the EA agricultural imports from LA do not show the same results, with five out of seven FTAs with negative effects. Furthermore, in the GM results for EA agricultural imports, only the FTA Japan-Chile has a positive impact for Japan agricultural imports. However, only the sector of live animals (HS01-05) shows a positive impact from the agreement and only two products show positive impact: grapes and fish oils. Japan imports of those products from LA in the period studied were very limited.

At a product level, the FTAs have positively influenced only certain products among those selected in the sample as LA's major agricultural products exported to the world. Unexpectedly, some products also reveal negative effects of the FTAs with EA and from the FPM granted by EA countries to LA agricultural exports.

The positive and negative effect on EA agricultural imports, particularly on four of the world´s most exported products by Chile (grapes, wines, apples, and fish flour), Mexico (avocados, tequila, tomatoes and cucumbers, and gherkins) and Peru (coffee, asparagus, fish oils, and fish flour), can be explained by the following reasons.

The FTAs signed by Chile with Japan and Korea have a negative and significant impact for Chilean wines. In addition, the FTA preferential margin only has a significant and positive impact in the FTA China-Chile. This means that China's wine imports increase with a tariff reduction for Chilean wines. To date, Chile amounts as the third China's wine supplier, followed by France and Australia. However, China's imports of Chilean wines are also affected by TBTs measures such as China's customs office restriction, the restrictions on the use of ink jet system into the bottle and other restrictions related to the small number of bottles allowed as samples for commercial processes. Unlike the case of wines, the three above mentioned FTAs have a positive and significant impact on Chilean grapes. There is also a positive and significant impact of the FTA signed by Chile with China on grapes when the FPM is included. However, it should be noted that the seasonal tariff imposed by Japan and Korea can affect market access of Chilean grapes in these particular countries.

On the other hand, the positive and significant results on Chilean apples stemming from the FTA Chile-China are explained by the fact that China does not restrict the imports of apples. In contrast, the Japanese Basic Policy for Fruit Industry Promotion implemented in Japan harms Japan's imports of Chilean apples. Similarly, Korea has excluded apples from the FTA with Chile since it is a fruit highly protected by this Asian country. Finally, in the case of the Chilean fish flour, the negative and significant effect of the FTA with Japan can be explained by the fact that the fish flour has a low market share in Japan compared with the fish flour supplied by Peru.

The negative results for the Mexican avocados in the Mexico-Japan FTA seem to be difficult to explain provided that Mexican avocados currently enjoy a tariff reduction in order to facilitate their access to the Japanese market, and also that among the US$ 104 million imported by Japan in the period 2003-2015, Mexican avocados represented 91% of Japan total imports. However, one possible reason that explains the poor results for Mexican avocados in Japan relates to the low relevance that Japan's imports of avocados have among Japan agricultural imports from the world, representing only 0.16% of Japan total agricultural imports.

In the case of the Mexican tequila, even though there is a positive and significant result stemming from the FTA with Japan, the tariff reduction effect is very difficult to determine because Japan imposes import quotas on Mexican tequila.

In the case of the Peruvian asparagus, their positive and significant effect of the FPM in Japan can be possibly explained by the fact that their recent entry into the Japanese market. The Peruvian fish flour negative effect of the FTA with Japan and Korea can be interpreted by the fact that the fish flour has been losing market share in these markets. However, in the case of China, the Peruvian fish flour have a positive effect since is the main agricultural product imported by China from Peru and it has FPM.

Chapter 4 has demonstrated demonstrates that even though Colombian agricultural exports to Japan and China are small, the reduction of agricultural tariff and NTBs from both EA countries will increase Colombian agricultural exports to those markets. In this context, this particular chapter has answered the following questions:

- What are the effects on Colombian agricultural exports to Japan and China with the dismantling of tariff and non-tariff barriers under possible FTAs with those countries?
- What are the effects on the increase of Colombian agricultural exports to Japan and China on the Colombian economy?

The implemented CGE model has analyzed five commercial policies scenarios that involve possible FTA between Colombia and Japan and Colombia and China. The CGE results show that the one with the highest impact for Colombia is scenario E, considering the elimination of 100% of tariff and NTBs of Colombian agricultural exports to China and Japan. In this scenario, Colombian agricultural exports to Japan would increase 133%. Exports to China would also grow but to a lesser extent up to 71%. Although, the scenario D will be also beneficial for Colombia with the elimination of 100% tariff barriers and 50% of NTBs of Colombian agricultural exports to China and Japan, the increase of Colombian agricultural exports to China will be higher in scenario D, whilst the Colombian agricultural exports to Japan will increase in a less extent to Japan compared to scenario E. Both scenarios E and D, are idealistic scenarios, it is uncommon for countries involved in the negotiations of the FTAs, completely liberalize bilateral trade, this include tariff reduction on sensitive products and their right to regulate trade by the use of NTBs.

In contrast to scenarios D and E, scenarios A, B and C are more realistic. Scenario C and B results demonstrate that if Colombian agricultural exports receive the same conditions granted to the PA members in their previous negotiations with EA, Colombian agricultural exports will benefit more from the tariff and NTBs reduction from Japan, increasing its exports by 48% (scenarios B and C). Conversely, with similar reductions from China, the growth of Colombian agricultural exports will be around 28% (scenarios A and C). In this context, particularly scenario C is the most realistic, and demonstrating that Colombian agricultural exports will receive the main benefit from tariff and NTBs reduction from both countries, obtaining the greatest benefit from Japan. Subsectors such as mill products and starches, coffee products, cocoa, and sugar show that they will have higher trade gains in their exports to Japan. This also seems to be the case for several subsectors exported to China that will also increase more than the average. This include: sugar, mill product and starches, vegetables and animal oils, intensive exports, importable products, meat, and fish.

From the simulation scenarios discussed above, it can be inferred that both, intensive exports and coffee products and threshing, two of the most exported Colombian agricultural products to Japan and China will obtain the major benefit from scenario E, meaning that the NTBs are affecting their exports to East Asian countries.

Finally, it can be also concluded that if Colombia obtains the tariff applied to other PA countries under their FTAs negotiated with EA, its exports to the Japanese market will increase more. In contrast, exports to China will not experience a similar significant growth. One possible reason that explains why Colombian agricultural exports have experienced a less significant growth in the Chinese market, relates to the fact that the number of Colombian agricultural exports to China is still small and concentrated in some agricultural subsectors with a low level of tariff and NTBs such as Colombian agricultural potential exports.

5.2 Concluding remarks

This study aims to expand the scholarly research in the field of international trade by contributing to the analysis of the impact of FTAs on agricultural trade. The novel contribution of this doctoral thesis is the in-depth analysis of the impacts of FTA negotiated between two important growing regions: EA and LA. This study makes an especial emphasis on Latin America's agricultural exports to EA, specifically considering the incorporation of tariff and NTBs reduction when applying two quantitative analytical techniques such as GM and CGE model in the area of trade.

With the diverse outcomes form the GM analysis at three different levels, the author conclude, that although the study of the seven FTAs evidences a decline in tariff for some agricultural products, the results suggest that despite of the overall reduction in tariff, LA countries have not been able to substantially increase their agricultural exports to EA markets. However, the GM results also show that while LA agricultural exports have benefited from most of the FTAs between EA and LA, the EA agricultural imports have not had an important impact from those agreements. Potential gains from tariff reductions have not been enough due to the use of NTB such as quotas, agricultural subsidies, SPS and, TBT measures imposed by EA countries to LA imports.

The FTAs have positively influenced only certain products among those selected in the sample as LA's major agricultural products exported to the world. Some products also reveal negative effects stemming from the FTAs with EA and from the FPM given by EA countries to LA agricultural exports. This can be explained by factors such as the rigorous import policies of EA markets for agricultural products, and also by the low utilization of the FTAs in LA countries, which can also limit the increase of LA agricultural exports to East Asian markets. Moreover, LA should implement effective agricultural export policies across the region.

The study also finds an important impact of the five simulation scenarios for Colombian agricultural exports with the removal of tariff and NTBs in the possible new FTAs with Japan and China. The scenario C is the most realistic, showing more potential benefit for Colombian agricultural exports to Japan and China. In this scenario, the highest benefit for Colombian agricultural exports stems from the FTA with Japan.

CGE model results also show that the trade diversion effect will be minimal when there are a tariff and NTBs reduction in both EA markets. Furthermore, among the agricultural and agroindustry subsectors analyzed, the total effect from scenario C will be positive for coffee products and threshing, the potential exports and the intensive exports, being those the most exported agricultural subsectors by Colombia to Japan and China. Other agricultural subsectors will have a total negative effect of the FTAs. Finally, the CGE model results also reveal the impact on Colombian welfare, measured through the equivalent variation, showing a small benefit of 0.03%.

The study also concludes that while the Colombian agricultural exports to China and Japan tend to increase with the tariff and NTBs reduction, the Colombian exports to the ROW tend to decrease in all five scenarios. In addition, the trade diversion effects are lower than the trade creation effects. In scenario C, exports to China and Japan grow to US$154,464 million while exports to the ROW decrease to US$ 37,747 million. It means that the trade diversion is 24.46% and the trade creation is 75.54%. Therefore, these results show that with the reduction of tariff and NTBs from China and Japan to Colombian agricultural exports, the Colombian exports will have important trade creation effects. These findings lead the conclusion that Colombian FTAs negotiators should stress the importance of including the reduction of NTBs such as SPS and TBTs in the negotiation with Japan and China.

5.3 Limitations of the study

The author acknowledges the limitations of this research. First, regarding data collection. Even though, there are some tariff information data sources such as the Tariff Analysis Online (TAO) facility provided by the WTO and the World Integrated Trade Solution (WITS) by the World Bank, both sources do not have the same information for an specific product. This leads to possible inconsistency in terms of tariff information. However, between these data sources, WITS is perhaps the most accurate and efficient. In consequence, this research found that the most efficient way to find reliable tariff information is to consider the tariff elimination schedules included as an annex to the analyzed FTA. Furthermore, each FTA's annex contains information at different HS digit level, for Korea at HS (10-digit level), for China at HS (8 digit level) and for Japan at HS (6 digit level).Therefore, in order to have reliable results, tariff information for this study was mostly sourced from each FTA annex and in some few cases from WITS (2016) using the tariff information charged by the importers.

In addition, the product selection sample proved to be challenging due to the fact that trade data is available at HS-6 digit level from ITC-Trademap based on UN Comtrade information, while tariff information is sourced from WITS (2016) at HS 10 digit level. Therefore, tariff information was converted at HS 6 digit level using simple average to compare it with agricultural exports at the same disaggregation level. In addition, tariff information provided from WITS in few cases also showed some inconsistency with the tariff elimination schedules found in each FTA annex.

Second, despite some recent developments of databases that report NTBs such as the study made by the WB by Kee et al, the WTO database for SPS and TBT, and ITC-Market Access Map, a detailed requirements for NTB for a specific product at HS-6 digit level in one country of EA (e.g., of its imports from another country in LA) is not possible to obtain. This makes difficult not only to analyze trade, but also to access information for Latin American agricultural exporters. In the case of Chile, for example, the Chilean government publishes annually a complete report about NTBs such as TBT and SPS implemented in the world for imports of Chilean products. This report is called “National Record of NTBs on trade in goods” by the Chilean Ministry of Commerce (DIRECON) and it was considered in the present research. However, these kinds of reports are not available for other PA countries. Therefore, future work on NTBs should introduce new reliable ways to quantify NTBs information and to compare them between countries.

Third, regarding the GM estimators, this study applies two estimators: PPML and OLS. The research contributes to scholarly literature that argues that even though both estimators are suitable for the analysis, the GM becomes more appropriate when it is carried out in its functional multiplicative form, that is to say, without proceeding to its linearization. Together with this, Santos Silva and Teneyro (2006), affirm that the PPML estimator is preferred because it corrects the rejection of the variables that take zero value, as well as, solves the heteroscedasticity problem. However, this methodology has also been criticized by the authors such as Martin and Pham (2008) who call in to question its efficiency when estimating short time series with a high presence of zeros, which was precisely the case for some particular products in this analysis. Furthermore, when PPML+FE is run some variables such as distance, the variable does not appear in the estimation’s result.

Fourth, the CGE models provide a theoretically consistent framework for analyzing trade policy questions. They apply ex-ante simulations scenarios, however, in most of the cases, an ex-post validation of CGE models is needed to increase some reliability in the numerical results. Moreover, the model applied in this study only shows results for ten subsectors among the 16 subsectors considered in the study due to the lack of exports from Colombia in those subsectors to China and Japan. Therefore, the CGE model does not show results for bovine livestock, other agricultural products, non-tradable products, beverages, dairy products and tobacco subsectors.

Finally, the CGE model applied in this study is based on the real productive structure of the Colombian economy, and the way in which the opportunities that are generated in the FTAs are used, but they do not say anything about the structural changes that can take place in the economy such as access to new markets. This is an important limitation for the CGE models.

5.4 Future work

There are different ways of conducting further research in order to overcome the limitations of the present doctoral research. The results presented at the product level in this thesis are only for limited products. This may cause some bias in the results. Hence, future work can be focused on changing product selection criteria in order to overcome a possible bias. Furthermore, the GM could be run in other sectors including agriculture and comprise trade flow (export and imports) as the dependent variable, with the purpose, to analyze the impact in overall trade and even include a longer period and larger number of countries.

As the CGE model simulations demonstrate, FTAs with Japan and China, which include not only tariff reductions, but also NTBs reductions, would have a relevant impact on Colombian agricultural exports (however, currently the agricultural exports to those markets are small). But there are at least two additional effects that must be considered, and those are not captured by CGE model: the first, related to the development of new productive sectors due to the new markets in Asia. It can increase the exportable supply of Colombia, supported by potential competitive advantages that have not been developed due to the lack of access to sufficiently large and deep markets. The second, regarding the synergies that can be achieved in new FTAs, between tariff and NTBs, and agreements related to investment and trade in services, which can promote the integration of national companies into the value chains that access not only the markets of China and Japan, but also the markets that these countries have already reached.

The CGE model results do not show structural changes that can take place in the economy such as access to new markets. One interesting issue that should be addressed in the future research relates to the question of how to analyze the emergence of new export sectors under new FTAs? With the negotiation of new FTAs, it is possible that emerging subsectors will benefit from the new concessions on market access. Future research can also analyse how those changes can be measured in the export basket.

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