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Domestic Support Policies for Agriculture in Ecuador and the U.S.-Andean Countries Free Trade Agreement: An Applied General Equilibrium Assessment

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Abstract

For the past two years the United States and Colombia, Peru and Ecuador have being negotiating a Free Trade Agreement (FTA). One of the main concerns of Ecuador's farmers is the asymmetry that exists between U.S. and Ecuador agricultural sectors. U.S. agriculture is highly subsidies in products such as rice, corn, and soybeans, products that represent an important export and subsistence products for Ecuadorian farmers. To reduce any negative effect that the FTA may have, Ecuador's government is studying land-based payments for rice, corn, soybeans and livestock producers. This program would offer direct initial support to farmers' income after the FTA enters in full effect. The objectives of this paper were twofold. First, estimate the effects on the Ecuadorian economy, and especially on Ecuador's agriculture of the FTA. And second, study the viability of the domestic support program for agriculture proposed by the Ecuadorian government, as well as some alternative domestic support policies. We use a modified version of the GTAP global general equilibrium model specific for agriculture support, called GTAP-AGR. The results show that trade liberalization will negatively affect all agricultural sectors in Ecuador, except for the exporting sectors (bananas, coffee, cocoa, and flowers). Government subsidies are estimated to disproportionally help rice and soybeans producers, but they will not be enough for corn and livestock producers. Finally, we argue that government subsidies should be extended to other sector such as sugar cane and cotton.

JEL Classification: F13, C68, Q17, Q18
Key words: Free trade, Tariff liberalization, Ecuador, agriculture, subsidies

1. Introduction

In May 2004, the United States and the Andean Community nations of Colombia, Peru and Ecuador began negotiating an Andean Free Trade Agreement. The other two Andean Community nations, Bolivia and Venezuela have not been directly participating in the negotiations, but Bolivia has observer status. By April 2006, Colombia and Peru have already reached an agreement with the U.S., and only Ecuador remains in the negotiation table. As with other FTAs, the agricultural sector is one of the most sensitive, and one of the hardest to negotiate. In Ecuador, agriculture is the most important exporting sector after oil. This sector generates employment to around a third of the economic active population, and is an important part of GDP and exports. The principal agricultural export products from Ecuador are bananas, cacao, coffee, flowers, shrimp, and tuna, with a large share of these exports going to the US.

The main concern of Ecuador's farmers is the asymmetry that exists between agricultural sectors in the U.S. and Ecuador. U.S. agriculture is more productive than its Ecuadorian par, and receives subsidies from the U.S. government. Ecuador's government is studying a program of domestic economic support to farmers, to alleviate possible negative effects of the FTA on the Ecuadorian agricultural sector. The government has designed a support program that offers help to sectors directly exposed to competition from subsidized American products. According to government estimates, the agricultural products that would be most affected by the FTA are rice, corn, soybeans and livestock. For these sectors, the program will offer direct initial support to farmers' income after the FTA enters in full effect.

These payments would be based on land in production. Land in production would be estimated with data from the 2000 agricultural census. The government estimates to pay

farmers $26-100 for every hectare in production, a small number if we compare to payments that US farmers receive. The amount of the subsidy decreases as the size of the production unit increases. That is, farmers with 10 hectares or less would receive 100% of the subsidy, with farmers with more than 10 hectares receiving a lesser amount. With this measure, the government would try to benefit 260,000 production units, of a total of 820,000 that have been registered in the 2000 census. The program is expected to begin by 2007, the first year of the FTA. The budget assigned for this program is 100 million US dollars. However, critics argue that the amount should be 10 times larger.

The objectives of this paper are twofold. First, estimate the effects on the Ecuadorian economy of a Free Trade Agreement (FTA) between Ecuador, Colombia, Peru and the U.S. We analyze as well what would happen if Ecuador does not sign the agreement, given that Colombia and Peru have already signed it. Negotiations between the U.S. and Ecuador were suspended after nearly two weeks of street protests in March by indigenous groups in Ecuador opposed to such a pact. And second, study the viability of the domestic support program for agriculture proposed by the Ecuadorian government, as well as some alternative domestic support policies proposed here to mitigate negative effects of the FTA on Ecuadorian agricultural sectors.

To tackle these issues, we use a general equilibrium model. We use the GTAP-AGR computable general equilibrium (CGE) model and database to asses the effects of simultaneous bilateral FTA between Colombia, Ecuador and Peru and the United States. We use version 6.2 of the database, which includes Ecuador as a disaggregated region in the database. We perform first tariff liberalization scenarios. We then, in a second round of

simulations, apply the domestic support policy scenarios that might mitigate negative effects of the FTA on the Ecuadorian agricultural sectors.

1.1. Overview of the Ecuadorian Economy

Ecuador is a small, open, middle-income, agrarian, oil-exporting economy. Gross Domestic Product totaled US$ 30.3 billion in 2004 and about US$ 32 billion in 2005. Exports as a share of GDP reached 25.3% in 2004, whereas imports share in domestic demand were 28.1% the same year. GDP per capita reached US$ 2,325 dollar in 2004. Oil revenues represent an important share in total revenues for the central government (34% average for 2000-2004).

Since the early 1990s, Ecuador has embarked upon a process of opening up its economy. This process has reverted years of import substitution policies that by the mid-1980s were thought to be curtailing growth and development opportunities in this country. The changes in trade policies have included a tariff reform, important reductions in import restrictions, export promotion laws, the modernization of trade institutions and the simplification of trade procedures. For instance, tariff reform brought tariff rates down from a range of 29-290% in 1989 to a range of 0-40% (the upper level applying to vehicles) in 1994. The average nominal tariff rate was reduced from 29% in 1989 to 11% in 1994 (Tamayo 1997).

In 2004, Ecuador's total imports reached US$ 7,861 million, more than double of what they were in 1994. For the period 1994-2004, the annual average growth rate for total imports was 14 percent. It was in 1995, precisely, when the most important changes in tariffs aimed at reducing protectionism were finally concluded. During the last decade or so, imports in Ecuador have experienced a few changes. The U.S. used to have the biggest

import share in total Ecuadorian imports, with a share of over 30 percent. Since 2003 partner countries of the Andean Community have taken that place, with a 23 percent share and 25 percent import share in 2004. Asia is another region whose import share in total imports of Ecuador has increased since the late 1990s. The rest of the countries from Latin America and the world have also increased their participation, as a whole, in total imports in Ecuador.

The most important single export market for Ecuador is the U.S. It has represented 38 percent or more of Ecuador's total value of exports, every single year for almost a decade (see Table 2). However, the relative importance of the U.S. market has been challenged over the same period as Ecuadorian products have gained more access to the Andean markets as well as the rest of the world (excluding Asia and Europe).

A single indicator of openness, the share of imports plus exports as a percentage of gross domestic product, illustrates the increased trade openness experienced by the Ecuadorian economy since the early 1990s. As figure 1 indicates, the degree of openness of the Ecuadorian economy went from 37% in 1993 to 49% in 2004. What seem to have contributed to this greater openness are the consolidation of agreements such as CAN, the opening-up of new markets (for example Canada, Russia and China), and the continuation of trade preferences that Ecuador receives from the U.S. (ATPA and ATPDEA, see section 1.3 for detailed discussion on this preferential treatment).

Ecuador has been recipient of growing flows of foreign direct investment since 2000. Most of these flows have been directed towards the oil extraction industry. FDI increased from US$720 million in 2000 to US$1,330 million in 2001, reached an all-time peak of US$1,555 million in 2003, and fell to US$1,160 last year. The share of foreign direct investment from the U.S. in total foreign investment has decreased in the last twelve years,

from 77.6% in 1993 to 26.7% in 2004. In contrast, the share of FDI from Canada in total foreign direct investment increased noticeably in the same period from 0.3% in 1994 to 26.1 % in 2004.

Other more recent changes in the outlook of the Ecuadorian economy have been the adoption of the US dollar as the official currency of Ecuador since January 2000, and the phenomenon of high remittances. Dollarization was adopted in January 2000, as a way to halt inflation in the midst of a currency-debt-financial crisis. However, the inflation rate converged very slowly to levels close to those of the US. Inflation in Ecuador was 52.2% in 1999 and reached a peak of 96.1% in 2000. Prices increased at a slower pace in 2001 (37.7 %) and in 2002 (12.5%), to finally experience a one-digit inflation in 2003 with 7.9%, as well as in 2004 with only 2.7%. In 2005, the cumulative annual inflation rate reached 2.39%.

As a consequence of the sum-cum currency-debt-financial crisis that Ecuadorians endured in 1999 (that ended in the adoption of the U.S. dollar as its official currency in January 2000), and of the lack of employment, many Ecuadorians have emigrated. Ecuadorian migrants have been sending money to their families in Ecuador on a continuous basis. These remittances are an important source of U.S. dollars for the Ecuadorian economy. In 2004, Ecuador received US$1,604 million in total remittances. This is the second source of U.S. dollars for this dollarized economy, behind oil exports and ahead of banana exports. Total remittances represent 5 percent of the total GDP – although the participation of remittances in total GDP has fallen from 7 percent in 2001 to 5 percent in 2004. In 2004, more than 80 percent of total remittances originated in two countries: the U.S. (43 percent) and Spain (39 percent).

All the important changes in trade policy that have reduced trade barriers and have fostered export activities were adopted as a means to achieving higher economic growth and reduce poverty. However, despite of the economic policy changes, many Ecuadorians live in poverty, in particular those living in rural areas. According to a recent World Bank poverty note (see Sanchez-Paramo, 2005), 40% of the population in Ecuador lives in rural areas and 60% of them are poor.

The figures and indexes related to trade and foreign direct investment that we have shown suggest that, the U.S. constitutes an important export market and source of FDI for Ecuador. The figures also show that there have been changes in trade policy oriented to open the Ecuadorian economy to foreign markets. These changes in trade policy continue today as Ecuador negotiates its first comprehensive trade agreement with its major trade partners: the U.S. and the Andean countries of Colombia and Peru. This preferential trade agreement is expected to go beyond trade. The U.S.-Ecuador free trade agreement is expected to help Ecuador eliminate sources of inefficiencies (such as problems in customs, low industrial competitiveness, poor infrastructure and outdated technology) and distortions (such as subsidies or high tariffs in some sectors and products). It is expected to demand changes in many policy matters and institutions, and to give Ecuadorians opportunities to create more business and generate more jobs.

1.2. Agriculture in Ecuador

Traditionally, Ecuador has been an agricultural based economy. The importance of agricultural and farm activities in this economy has been challenged since the earliest 1970s when oil became the main source of government revenue and exports. However, the importance of the agricultural sector, although diminishing, still holds. For the last 10 years,

the agricultural sector has contributed on average with 10 % of the GDP, only considering primary level (Table 3). It has generated on average 42% of total exports (64% excluding oil, Table 4), and it employs 28% of the economic active population. Its average GDP growth rate has been on average higher than that of the economy as a whole (3.9 versus 2.6%).

The main export product for Ecuador in the last 10 years has been agricultural products, with an average share of exports of 39.6%. Oil comes in second with 36.6%. Agriculture includes bananas, shrimp and flowers as the main export products. Banana exports make up for around 50% of total agricultural exports. Shrimp has decreased in importance in the last 10 years, due to disease outbreaks. Roses, which are labor intensive, now account for almost 20% of total agricultural exports. If we exclude crude oil, agriculture represents almost two thirds of total exports.

As for domestic production, Ecuador has three distinct production areas: the Coastal region, called *Costa*, the Andean region called *Sierra*, and the oriental region called *Oriente*. The subsidy program that the government plans to implement will be based on total area under production, based on figures from the 2000 Agriculture and Livestock census. In this section we analyze the composition of total land under production, and what sectors and regions could be more benefited by these subsidies.

In terms of area harvested, the main products are fruits (45%), sugar cane (37%), oilseeds (9%) and cereals and other grains (7%) (see Table 5). Other crops that are not extensive and require large amounts of land are coffee (2%) and potatoes and cassava (0.5%). Flowers, is not an extensive crops, and a total of less than 5,000 hectares are planted.

Within fruits, we have that 91% of area harvested corresponds to bananas and plantains. Within oilseeds, 86% of area harvested is oil palm and 8% soybeans. These crops

(and sugar cane) are tropical crops, and are mostly produced in the *Costa* region (95-98%). As for grains and cereals, corn and rice are the two most important crops. Corn is 42% and rice is 34% of total area harvested in grains and cereals. For corn (grain), 74% of area under production is in the *Costa* region and 23% in the *Sierra*. Of total rice production, 98% is produced in the *Costa* region.

Of these crops, banana (the most important export crop) already has free market access to the U.S. According to the Ministry of Agriculture, the most sensitive products in Ecuador would be rice, corn, and soybeans. For this reason, we next focus on the total number of producers and the area planted for these crops. We look at the distribution of total number of producers, their size and the total amount of land under production that is less than 10 hectares, which is the production unit size that the government has established as the threshold for giving 100% of the subsidy.

According to the 2000 Agricultural Census, there were a total of 75,814 Agricultural Production Units (APU) producing rice, with a total area of 343,936 hectares. Farmers with 10 hectares or less accounted for almost two thirds of total APUs, but only held one third of total land under production. Medium farmers, with farms between 10-50 hectares accounted for 28% of total APU, holding almost the same amount of land as small farmers. As for large farmers, they were only 7% of total production units, but with almost the same share of total land as small farmers. These numbers show that the proposed subsidy plan would help in its full form (100% of subsidy) to almost two thirds of rice producers. The total amount of subsidy for these farmers, would add up to almost US$ 8 million.

For corn, producers that would be directly affected by U.S. imports are the producers of dry grain quality corn. Ecuador has corn production as grain and on the cob, both for hard

and soft corn. We look at grain hard corn production only. The total number of APUs with corn production was 81,943, representing 240,201 hectares. Producers with less than 10 hectares accounted for more than half of total APUs, but only held a little bit more than a quarter of total land under production. Producers with APUs between 10-50 hectares were 36% of APUs, and accounted for almost half the land under production. Large producers with more than 50 hectares accounted for 12% of APUs, but held almost the same land under production as small producers.

A total of 4,226 APUs produced soybeans, representing 54,350 hectares. The majority (60%) are small producers, holding only 14% of land. APUs between 10-50 hectares are a third of producers and hold a proportional amount of land. Large producers with more than 50 hectares are only 10% of APUs, however, they hold more than half of the total land in production (55%).

As for livestock production, the main sectors are beef, milk, pigs and poultry. Half of beef and milk animal stock is in the *Sierra*, and a third in the coastal region. As for pigs, two thirds are produced in *Sierra*, and the rest in the other regions. Sheep are mostly produced in the *Sierra* and 75% of goats are in the *Sierra*. As for poultry, half is in the *Sierra* and 40% in the coastal region.

As we have mentioned, the livestock sector might be one of the beneficiaries of the government subsidies. We assume in this case that they will have the same scheme as crops, and will be based on amount of land under. Table 7 shows the number of producers (APUs) by size and the amount of land under production.

For bovine cattle for meat production, almost half of the land is held by only 9% of producers. Close to 70% of producers are small producers (less than 10 hectares), but they

hold only 25% of total land. For milk production, land is more equally distributed among producers with producers holding a proportionally equal amount of land, no matter what their size is. For pigs, three quarters of producers are small producers, holding 60% of land.

In poultry production we distinguish two types of producers: backyard producers and commercial producers. The first are characterized that the large majority (71%) are small producers, holding sixty percent of total poultry stock. As for commercial producers, the majority is also small producers, but they hold only a little bit more than a quarter of poultry stock. The majority of stock (73%) is held my medium and large producers, which account for only 30% of total producers. Finally, sheep and other cattle are mainly small producers, holding more than 70% of animal stock.

1.3. FTA between the U.S. and the Andean countries

In 2004, the U.S. and the Andean nations of Colombia, Ecuador and Peru began negotiations on a free trade agreement (FTA). These countries wanted to ensure access for their products to the U.S. market, especially since the Andean Trade Promotion and Drug Eradication Act (ATPDEA) was scheduled to expire by the end of 2006. In 2004, Colombia accounted for about half of the U.S. trade with the region, with Peru and Ecuador almost evenly splitting the other half, and Bolivia accounting for a very small share. The main exports from the region to the U.S. were crude petroleum oil (37% of all imports) mainly from Ecuador and Colombia. Other exports to the U.S. included gold, coal, cut flowers, coffee, articles of copper, and bananas. Major imports of the Andean countries from the U.S. were mining equipment, wheat, broadcasting equipment, and maize.

The U.S. currently gives duty-free treatment to exports from the Andean countries (excluding Venezuela) under a regional and unilateral trade preference program. The ATPA

granted duty-free treatment to certain products, and the Andean Trade Promotion and Drug Eradication Act (ATPDEA) reauthorized the ATPA program and added products that had been previously excluded. In 2004, over half of exports from the Andean countries to the U.S. entered under these preferences.

The ATPA program began in 1991. ATPA granted duty-free treatment to certain products that met domestic content and other requirements. The purpose of the program was to promote economic growth in the Andean region and to encourage a shift away from economic dependence on production of illegal drugs by supporting legitimate economic activities. ATPA was originally authorized for 10 years and expired in 2001.

On average, exports to the U.S. from 1993 to 2001 totaled US$ 1667 millions. Agricultural, fish, and agro-industrial products constituted about 70% of total value for that period. The remaining value was mostly explained by oil and oil related products exports. (See Table 8).

ATPDEA was enacted in 2002. ATPDEA reauthorized the ATPA preference program and expanded trade preferences to include additional products that were excluded under ATPA. The additional products under ATPDEA include petroleum and petroleum products, certain footwear, tuna in flexible containers, and certain watches and leather products. ATPDEA also grants duty-free treatment to certain apparel articles, if the articles met domestic content rules. Duty free benefits under ATPDEA are scheduled to end December 31, 2006.

In 2004, a major share (42%) of all exports from the four Andean countries to the U.S. entered duty-free under ATPDEA, and a smaller share (12%) entered duty-free under ATPA (Cárate and Fernández, 2004). A very small share (2%) entered duty-free under the

U.S. Generalized System of Preferences (GSP), which applies to most developing countries. Of the remaining 44% of exports, most entered duty-free under normal trade relations, which applies on a nondiscriminatory basis to almost all U.S. trading partners. Only 10% of the value of U.S. imports from the four countries was subject to duties in 2004. Thus, compared to the status quo, only a relatively small share of exports from the Andean countries would become duty-free under an FTA. That small share, however, might include products that are very important to the Andean countries or relatively import-sensitive in the U.S.

According to the Ecuador's Ministry of Agriculture, the objective of the agricultural negotiations is to consolidate the agro-industrial products that currently are exported through ATPDEA and GSP, representing 30% of total exports to the U.S. The remaining 70% already has duty-free status. The most important agricultural products included under the ATPDEA for Ecuador are cut flowers, frozen shrimp, canned tuna, mangos, sugar, passion fruit, pineapples, beans, cauliflower, and broccoli. These products represent around $300 million dollars. Bananas, coffee, cacao, tea, and other products already enter the US under duty-free status without the ATPDEA.

Ecuador's exports to the U.S. are greatly concentrated in a handful of products. Of a total of USD 2,387 millions exported to the U.S. in 2003, 54% were crude oil and refined products (Cárate and Fernández, 2004). When we account the top 10 export products (oil, bananas, cut roses, frozen shrimp, and tuna), they represented 85% of total exports to the U.S. and 947 products represented only 3%. Of 5,861 products under the ATPDEA, Ecuador exported in 2003 a total of 870 products of a total of 997 products exported in that year. The products under duty-free represented 95% of total products exported. Of these 870 products,

more than half were oil related products and 23% were traditional export products (like bananas, coffee, cacao).

According to Cárate and Fernández (2004), non-traditional products represented 20% of exports under ATPDEA (807 products). From these, 44% were cut flowers, 10% wood and wood related products, with the remaining 46% including 760 products. Of non-oil exports, the first three products (bananas, shrimp and flowers) were 64% of total exports to the U.S. Of those exports excluded by the ATPDEA, the main two products are tuna and sugar (91% of total products excluded) and in lesser amount textiles.

ATPA and ATPDEA are unilateral trade preferences given by the U.S. to the Andean economies (except Venezuela). Andean countries protect their markets from U.S. products competition. One of the main concerns of Andean countries is the lower competitiveness of their agricultural sectors in comparison with those from the U.S. Most worrisome for agricultural sector is the level of subsidies that the US government gives to US farmers, specially for rice, sugar, dairy, corn, wheat and soybeans, which are in some cases either important export commodities (rice), or are import subsistence commodities of Ecuador's farmers (corn, wheat). However, U.S. negotiators have refused to talk about rules for agricultural subsidies, saying that subsidies should be dealt with in the on-going multilateral trade negotiations in the WTO. Table 9 shows some figures that highlight the asymmetries between the Ecuadorian and the U.S. economy.

Nevertheless, an important goal for the U.S. in the FTA talks has been elimination of a practice called the "price-band mechanism." Under this mechanism, a fluctuating tariff is imposed on an import for the purpose of keeping the import's price within a specific range. If prices for wheat, corn, or rice fell below certain levels, variable tariffs of up to 100 percent

can be applied to imports of these commodities to restore prices. Import tariffs fall when prices increase to certain levels. The band addresses changes in world commodity prices. Colombia and Ecuador have these variable duties on over 150 items, including corn, rice, soybeans, and powdered milk. This mechanism has helped domestic producers to isolate them from the variability of international commodity prices. Andean negotiators have said that the price-band mechanism is necessary to protect their farmers, especially small farmers, against subsidized imports. However, Peru would eliminate this system of price bands upon the entry in effect of its FTA with the U.S.; only in a few cases Peru would replace price bands with a Special Agricultural Safeguard (El Comercio, 01/22/2006).

As this paper is written Peru and Colombia already finished negotiations. Ecuador is still negotiating, and agriculture has been left as the last sector in negotiations. Ecuador wants to maintain the market access gained with the ATPDEA. This market access would become permanent and without conditions, which will help minimize uncertainty, and let local industry invest. Peru's negotiations can be summarized as short terms of tariff reduction and with large import volumes for U.S. products. This reflects Peru's condition as a net food importer of corn, soybeans, powdered milk, meat, etc.

Rice production in Ecuador satisfies local consumption and surplus production is exported to neighbors such as Colombia and Peru. Ecuador's government is worried that rice, corn and soybean exports to Peru and Colombia will be harmed by cheap imports from the U.S. Producers don't want large import volumes, and would like to limit the total import quotas to 3,000 annual tons. They also want extended exclusion periods of 25 years to protect local farmers. On the contrary, the U.S. has asked for 28000 annual tm quota of rice to be sold in Ecuador.

For corn, Ecuador's wants to allow no more than 200,000 annual tons. However, the U.S. wants market access that would double that amount. Ecuador has allowed wheat and oats for beer production to enter duty free. In exchange, some Andean cereals such as quinoa will have zero tariffs in the U.S. For oilseeds, a special issue is the access to soybean oil, which is a substitute of local palm oil. According to press news, as of the beginning of April 2006, the oil and fats sector in Ecuador reached an agreement that, according to industry representatives, would mean 120,000 jobs and investment for 800 million dollars.

For meat and milk, Ecuador wants a tariff reduction within 20 years, with technical exclusions for powdered milk. For beef, livestock producers want Ecuador's government to allow a quota of no more than 170 annual tons, which represents less than 1% of local production. Powdered milk is a sensitive product for Ecuador, which is not the case for Peru or Colombia. Ecuador's position is to allow no more than 240 annual tons of powdered milk imports, which is a manageable for local milk producers. In contrast, Peru and Colombia agreed to 10 times that volume. For chicken parts, Ecuador's position is to allow free market access to 7,000 tons per year, with tariff deregulation done in 18 years, with the first 6 years still with old tariffs, making the FTA effective for this product by 2013. For tuna, which is included in ATPDEA, Ecuador is looking for free market access.

Other food products, such as sugar confectionery products, expect to export an additional 25,000 tons than the 11,000 that they export now. They would like to include under this quota, products with high content of sugar, like sweets and cookies. Same as Colombia did with their products. In exchange, Ecuador would allow free market access of glucose and fructose, an important input to that industry. In the case of glucose, there would be full access and for fructose, only partial, since it competes with local sugar production. In

exchange, Ecuador would like to export more refined sugar to the U.S. However, U.S. sugar producers are concerned about increased sugar imports from the Andean countries.

2. Model and Data

2.1 A General Equilibrium Approach: GTAP-AGR

The framework of analysis of trade liberalization and agricultural subsidies in this paper is a computable general equilibrium model, with special features for the analysis of agricultural issues. We use the Global Trade Analysis Project (GTAP) model of global trade (Hertel, 1997), version 6.2 with a base year of 2001, and which includes for the first time Ecuador and Bolivia as individual countries in this database. The GTAP model is a standard, multi-region, multi-sector model which includes explicitly treatment of international trade and transport margins, global savings and investment, and price and income responsiveness across countries. It assumes perfect competition, constant returns to scale, and an Armington specification for bilateral trade flows that differentiates trade by origin.

However, critiques argue that the standard GTAP model does not capture some of the important characteristics of the agricultural economy. To include these special features of agriculture, there is a modified version of the GTAP model and database called GTAP-AGR (Keeney and Hertel, 2005). The GTAP-AGR model captures certain structural features of world agricultural markets that are not well reflected in the standard GTAP model.

GTAP-AGR provides a more realistic representation of the farm and food system. It explicitly identifies farm households as entities that earn income from both farm and non farm activities, pay taxes, and consume both food and non food products. The model tries to characterize the degree of factor market segmentation between agriculture and other sectors

of the economy, as well as improve the representation of input substitution possibilities in farm production.

In terms of primary factor supply and its market segmentation, the GTAP-AGR model specifies a constant elasticity of transformation (CET) function that "transforms" labor in agriculture into labor for other economic sectors. That is, increased supplies of labor to manufacturing and services must be drawn from agriculture, and vice versa. This model specification allows for wages to diverge between agriculture and other sectors. Capital segmentation is modeled in the same way.

Another special feature of GTAP-AGR is the treatment of factor demand. GTAP-AGR uses a nested constant elasticity of substitution (CES) production function, using two types of inputs: farm-owned and purchased inputs. The latter is a feature that distinguishes the GTAP-AGR from the standard GTAP model. Given their limited availability, the supply and substitution elasticities values for developing countries (including Ecuador and the other Andean nations) are taken from Mexico. The GTAP-AGR also accounts for the substitution possibilities among feedstuffs used in livestock production, included as a nested CES within the purchased inputs aggregate.

Consumer demand assumes separability of food and non-food commodities. It includes income and price elasticities for 1 non-food category and 8 food commodity groups: breads and cereals (rice, wheat, etc.), fruits and vegetables, meats, fish, dairy, fats and oils, beverages and tobacco, and other foods (sugar, coffee, etc.). As noted by Keeney and Hertel, this specification is adequate for most agricultural liberalization scenarios, but it might present some problems when impacts of non-food liberalization are important to the analysis. We should take this into account when we analyze our results.

As described before, farm household income in GTAP-AGR accounts for on-farm and off-farm income generation and assumes that all endowments employed in primary agriculture are farm-owned endowments. Agricultural households are identified as entities that earn income from both farm and non-farm activities, pay taxes, and consume both food and non-food products.

As mentioned by Keeney and Hertel, the GTAP version that serves as the base for GTAP-AGR is version 6 of the database, is not as readily flexible with respect to commodity and region aggregation. For commodity aggregation, the database works well for us, since we have the full disaggregation of farm and food sectors. However, for regional disaggregation, we need to modify the database to fit our needs.

This version does not include Ecuador (or Bolivia) in it (later included in version 6.2). For this reason we needed to expand the parameters of GTAP-AGR from 87 to 92 regions (commodities were the same number). Due to lack of information, we are unable to supplement the parameter estimates for Ecuador. For that reason, we let the disaggregated regions inherit the parameters from the parent regions, in the case of Ecuador, the aggregated "Rest of Andean Pact" from version 6, which included both Ecuador and Bolivia. These parameters are the same for all developing countries, with Mexico being the source of these parameters.

As for the database aggregation we used FlexAGG, a GTAP utility that allows for custom aggregations of the database. We modified the parameter aggregation module, given additional parameters in GTAP-AGR and other parameters from the standard GTAP model, now with different dimension specification. Specifically, two key parameters are now indexed also by region. The CET elasticity of transformation for sluggish factor endowments

(ETRAE) and the CES elasticity of substitution between primary factors in production of value added (ESUBVA).

We aggregate the GTAP database version 6.2 into 13 regions and 24 commodities. Our regional aggregation tries to focus on the Western Hemisphere, especially on the Andean countries and its neighbors. As for our commodity aggregation, our focus is on agricultural products, the emphasis of this paper (Tables A1 and A2 in the appendix). There are 5 factors of production: skilled labor, unskilled labor, capital, land, and natural resources.

2.2 Free Trade Agreement Simulations

We consider a total of four liberalization scenarios. The first scenario is where Ecuador signs the FTA agreement with the U.S. at the same time as Colombia and Peru. We assume that full market access is allowed for all goods across the U.S. and the Andean nations, with no exclusions from free markets access. That is, all tariff barriers are eliminated for agriculture and manufacturing sectors. Obviously, the model can also be run with sectors exempted in different degrees from full market access (such as sugar or rice), including the permanence of some tariff rate quotas.

A second scenario assumes that Ecuador does not sign a FTA with the U.S., but Peru and Colombia do. This scenario is a political possibility under the current circumstances in Ecuador. Indigenous organizations and grass roots groups oppose very strongly to any agreement between the U.S. and Ecuador. These groups have expressed concern over the impact that opening domestic markets to U.S. products might have. They point out the case of Mexico and the experience of their agricultural sector under NAFTA. They argue that employment in the agricultural sector decreased due to cheap subsidized corn imports from the U.S. that disrupted domestic markets (Another obstacle in the way of an FTA between

Ecuador and the U.S. is a host of disputes that the Ecuadorian government maintains with some U.S. companies).

A third scenario takes the first liberalization scenario and incorporates the free trade agreement between the Andean Community – including all 5 Andean countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) – and MERCOSUR (Argentina Brazil and Uruguay).[1] A fourth scenario incorporates the CAN-MERCOSUR free trade agreement and combines it with our second scenario. In other words, Ecuador does not sign an FTA with the U.S., but it does sign with the MERCOSUR countries.

The tariff data is a central feature of the GTAP 6 Data Base. For the GTAP database v6.2, the main source of the initial 2001 levels of tariff rates for the countries and regions in the model are from the Market Access Maps (MAcMap) contributed by the Centre d'Etudes Prospectives et d'Information Internationales (CEPII). The MAcMap database is compiled from UNCTAD TRAINS data, country notifications to the WTO, AMAD, and from national customs information.

In the GTAP 6 Data Base, trade restrictions are measured as *ad valorem* tariff equivalents. It uses trade-weighted *preferential rates* data on *ad valorem* tariffs (including tariff rate quotas) plus the *ad valorem* equivalents (AVEs) of specific tariffs. The data is aggregated to the GTAP regional classification using GTAP's reconciled bilateral trade data as weights. That is, tariff rates are weighted applied rates for each individual country and region in the database, and the weights are sectoral import shares for countries/regions in the model.

[1] Paraguay is included in the GTAP database as an aggregate region called Rest of South America along with Guyana, Suriname and Falklands Islands.

There have been worries from Ecuador producers about the level of subsidies that U.S. producers receive, especially for such products such as rice, corn, soybeans, sugar, etc. We have assumed that the U.S. will not eliminate support to their agricultural producers in the regional trade agreements considered here. The U.S. has already indicated that they are prepared to negotiate domestic support only within multilateral negotiations in the WTO. Therefore, the distorting effects of producer subsidies remain.

Another aspect of the FTA is that it will allow local production to modernize for better competition in world markets. Some aspects that are expected to improve are sanitary and phytosanitary conditions, port management efficiency, etc. However, it is worth noticing that the GTAP database does not account for phytosanitary barriers, quotas, and voluntary export restraint agreements that may affect certain agricultural products (such as some fruits and vegetables). These barriers do not show up on the tariff equivalent data included in the GTAP database. For this reason, the potential impact of the full market accession may be underestimated in the model.

2.3 Domestic Support Simulations

As discussed before, the government is planning cash support payments for Ecuadorian farmers based on the amount of land in production. The government is going to target three specific crops: rice, corn and soybeans, which according to government sources are the agricultural sectors that will be most affected by the FTA with the U.S. Rice production in Ecuador satisfies local consumption and surplus production is exported to neighbors such as Colombia and Peru. Ecuador's government is worried that rice exports to Peru and Colombia, as well us local production of corn and soybean will be harmed by cheap imports from the U.S.

The government has developed a subsidy scheme where they make distinctions by size of production unit (APU). On this scheme, small farmers with less than 20 hectares receive 100% of the land-based payment, farmers with APUs between 20-50 hectares receive 70% of the subsidy and farmers with more than 50 hectares receive half of the subsidy. For example, in corn, small farmers will $110/Ha., medium size farmers $77/Ha., and large farmers $55/Ha. (Table 10). Also, bovine livestock producers would receive cash payments based on APUs' size (Table 11).

We implement the government plan in GTAP-AGR, taking the total value of subsidy payments by sector, and transforming them to percent shocks. The size of the shock for each sector is based on the size of the subsidy payments relative to the value of land in each sector (at agent prices) in each sector. That is, we assume that subsidy payments are direct subsidies to the cost of land.

For our alternative subsidy scheme, we base our subsidy payments of the results of the first scenario, the FTA between U.S and the three Andean countries. We consider land-based subsidy payments for those sectors in Ecuador negatively affected by the FTA (which, as we later are going to discuss, are farm sectors except for fruits and vegetables (bananas), and other crops (coffee, cacao, roses)). We estimate the size of the subsidy payments that would leave farm welfare unchanged for those sectors with welfare losses with the FTA. We estimate this by making farm income endogenous and land subsidies exogenous.

It is important to note that we estimate the size of the subsidies needed by the agricultural sectors, but we don't estimate how Ecuador's government is going to finance them. As discussed before, the government plans to finance these subsidy payments by

reducing subsidies to domestic gas. They plan to provide the gas subsidy – which now is allocated to all consumers – to specific consumers that need these subsidies the most.

3. Results

3.1 Effects of the FTA on the Ecuadorian agricultural sector

Scenario 1a. FTA signed by all Andean countries (Colombia, Peru, and Ecuador, vis-à-vis the U.S.)

An FTA between Colombia, Peru, Ecuador and the U.S. by which these Andean countries give free access to their markets to U.S., and keep in exchange the trade preferences that the U.S. gives them would increase Ecuadorian total imports by 2%. This is expected as tariffs reductions would bring about a change in relative prices in favor of U.S. products. Exports would also increase, although less than imports (1.4%) which would contribute to deterioration in Ecuador's trade balance. Private consumption would decrease by -1.5%, similar to the expected fall in GDP. GDP in all Andean countries would fall, only U.S. gross domestic product would increase (by 0.05%) as a result of the U.S.-Andean countries FTA. See Table 12.

In general, given that the FTA implies a unilateral tariff concession from the Andean countries to the U.S., the agreement would lead, on impact, to a fall in economic welfare in the Andean countries. Andean countries already receive tariff preferential treatment from the U.S. which has reduced tariffs to zero or almost zero for most goods that the U.S. imports from these Andean countries (Table 12).

On the income side, the FTA would imply a fall in factor income as well in farm income in all Andean countries. But real farm income in Ecuador would increase. This implies that the fall in prices would more than compensate a fall in nominal farm income.

Table 13 presents these results. But a key feature of the GTAP-AGR model is that allows us to distinguish the sources of farm income between 'on' and 'off' farm income, according to the origin of the farm employed endowments. Table 14 shows that, it is the real farm income from on-farm employed endowment that is contributing to the increase in real farm income in Ecuador. By sectors, only the sectors that include traditional export goods (such as banana, cocoa, coffee, other fruits, and vegetables) and flowers (one of the sectors that benefits from ATPDEA preferences) show an increase on real farm income. See Table 15.

Under the FTA almost all sectors in Ecuador show a negative impact on value added (Table 16). Exceptions are, again, export oriented sectors, both traditional (fruits and vegetables, coffee, cocoa, oil, fish, processed rice) and nontraditional (roses, other food products). In contrast, both total imports and total exports increase. The biggest increase in imports would come from the meat sectors and dairy products (bovine meat products grow by 23.8%, other meat products by 36.4%, and dairy products by 8.3%). See Table 17. These are precisely some of the currently most protected sectors in Ecuador. On the export side (Table 18), the sectors with the biggest falls include, not surprisingly, paddy rice (-31.7%), cereal grains (-16.7%), soybeans (-11.1%), meat products (pork, poultry meat; -20.3%), and sugar (-10.1%).[2] Other sectors, including bovine cattle, other animals, vegetable oils and fats, and processed rice, experience a reduction in exports, although to a lesser extent (-0.4%, -1.1%, -2%, and -3.4%, respectively). The export performance of traditional exports is lackluster with vegetables and fruits growing by 1.3%, other crops (cocoa, coffee, and roses) by 1.6%, forestry by 4.5%, and, surprisingly, wheat exports growing 33%.

[2] We have not considered, in any of the FTA scenarios, an increase in the sugar annual quota that the U.S. gives to sugar imports from Andean countries. We would do so, in a later version.

Term of trade receive a negative impact from the FTA. For all Andean countries in the FTA, terms of trade fall (Table 19).

Scenario 1b. FTA (Colombia and Peru vis-à-vis the U.S.) with no FTA signed by Ecuador.

If Ecuador does not enter the free trade agreement, but Colombia and Peru do, and assuming Ecuador loses ATPDEA preferences from the U.S. (whereas for Colombia and Peru those preferences become permanent), Ecuador's GDP fall (-0.4%). As Table 12 indicates, falls in consumption (-0.41%) and exports (-0.36%) contribute to the decrease in GDP. Imports also fall (-0.46%). The somewhat bigger fall in imports than that of exports contributes to a slight improvement in Ecuador's trade balance. Despite the fall in all main macroeconomic indicators, welfare rises, albeit slightly in Ecuador (US$ 8.74 million).

Imports in all sectors fall (except wheat and sugar). Exports of Ecuadorian products that benefit from ATPDEA, that would lose these preferences if Ecuador does not sign the trade agreement would lose. That is the case of the sector that includes export of roses (-0.4%), but also of sectors that seek protection from an FTA such as paddy rice (-34%), processed rice (5.2%), cereal grains (-17%), soybeans (-12%), meat products (-23%), dairy products (-6%). Other sectors that would see a reduction in exports under this scenario of no FTA for Ecuador are beverage and tobacco products (-7.3%) and manufacturing (-3%). See Tables 17 and 18.

Perhaps the most striking result under this scenario is that real farm income falls (as opposed to the increase it experience when Ecuador joins the FTA). This fall comes from the fall in real farm income of off-farm employed endowments (See Table 14).

Scenario 2a. FTA signed by all Andean countries (Colombia, Peru, and Ecuador, vis-à-vis the U.S.). Includes MERCOSUR-CAN foreign trade agreement.

If we account for the foreign trade agreement between MERCOSUR and Andean countries at the same time that we include free access to markets of Colombia, Peru and Ecuador for U.S. products the impacts on GDP are similar to those when the US-CAN FTA alone is considered. Although Ecuadorian exports and imports experience a bigger percentage increase, with imports growing more than exports, and thus contributing to trade balance deterioration. Under this scenario, Ecuador shows the biggest fall in welfare among the four scenarios of trade liberalization (US$73 million). See Table 12.

Factor income in Ecuador falls, but by less than the fall it experiences in the FTA alone scenario. However, real factor income increases. The growth coming from an increase in real farm income of on-farm employed endowment that surpasses a fall in real farm income that includes off-farm employed endowments (Table 13 and 14). The sectors that show increase real farm income include vegetables and fruits (2.4%), other crops (coffee, cocoa, and roses, with 1.1%), and wheat (1.1%). (Table 15)

Just a few sectors show a fall in imports. These sectors include: paddy rice (-0.25), sugar cane (-1.5%), raw milk (-3.2%), and processed rice (2.3%). Again, the biggest increments in imports are shown by sectors that have been traditionally well protected (bovine meat products, other meat products, dairy, cereal grains). A sector that only when we include the CAN-MERCOSUR trade agreement shows big increase in imports is vegetable oils and fats (30%). See Table 17. As seen above, when we summarized the results of the first scenario (U.S.-Andean FTA), a few sectors experience a big fall in exports. These sectors include, again: paddy rice (-34%), cereal grains (-18%), soybeans (-15%), meat

products (-23%), and sugar (-11%). To these products is added vegetable oils and fats (-17%).

Scenario 2b. FTA (Colombia and Peru vis-à-vis the U.S.) with no FTA signed by Ecuador-U.S.. Includes MERCOSUR-CAN foreign trade agreement.

In the final trade liberalization scenario analyzed, Ecuador enters the FTA with MERCOSUR (as well as the other four Andean countries), but does not sign the FTA with the U.S. (although Colombia and Peru do). We assume that Ecuador loses ATPDEA preferences from the U.S. and the U.S. imposes to Ecuador similar tariffs as those they impose to Venezuela. Still is the case that Ecuadorian GDP falls (-0.6%). Private consumption contributes to this fall (-0.6%), but exports do not, as they increase (0.5%). Imports increase slightly (0.7%). (See Table 12).

Factor income falls in Ecuador (-0.21%), but farm income rises in both nominal (0.1%) and real terms (0.52%). Real farm income that includes on farm income (on-farm employed endowments) contributes to this increase in real farm income. The sectors that show an increase in real farm income include (as in previous scenarios): wheat (2.2%), vegetables and fruits (1.8%), and plant based fibers (cotton; 0.65%). (Tables 13, 14, and 15).

Under this no-FTA but CAN-MERCOSUR scenario, the only sector that experiences an import boom are vegetable oils and fats (28%). Other sectors show a modest increase in imports or a fall (Table 17). On the export side, sectors with big fall in exports include: paddy rice, cereal grains, soybeans, meat products, vegetable oils and fats, sugar, and wool (Table 18).

3.2 Support scenarios comparison

The effect of the FTA and the help that government subsidies give to farmers' income are shown in table 20. As discussed previously, the FTA has negative effects on all agricultural sectors, except for the export sectors (bananas, coffee, cacao and flowers). As discussed before, government subsidies are only directed to three crop production sectors (rice, corn and soybeans) and four livestock sectors.

Table 21 shows the size of land subsidy payments for each agricultural sector in Ecuador under the FTA between U.S. and the Andean countries relative to the value of land. The first two columns show subsidies under the assumption that all livestock sectors (including pigs and poultry production) receive subsidies. The last two columns show the size of subsidies, with pigs and poultry excluded from subsidies to the livestock sector.

The sector that receives the largest subsidy is rice with a subsidy 215% the cost of land in the GTAP database. Corn receives a 176% subsidy, soybeans 59%, and all four livestock sectors 35%. For the scenario where we exclude pigs and poultry, the subsidy increases to 54% the value of land in livestock production (Table 21). These government subsidies are estimated to disproportionally help rice and soybeans producers, but they will not be enough for corn and livestock producers (second column in table 21).

Farmers' income for rice and soybeans producers increases by 149% and 14%, respectively. For corn and other grain producers, farmers' income decreases by 126%. For livestock producers, income decreases between 2-6%. Subsidies do help livestock producers, when we eliminate pigs and poultry producers from the subsidy plan. Livestock producers increase their income by 1-5 percent. As noted by Keeney and Hertel (2005), the factor supply elasticities in the GTAP-AGR model are less than one. This means that commodity

supply will be less price responsive, and most of the benefits of farm subsidies will accrue to farm households, as opposed to consumers of the farm products.

As a result of the FTA, and with subsidies at hand, rice farmers decrease their production. by 0.36%. As production decreases, the rice sector starts demanding fewer resources (especially land). This drives up the price of land under rice production by 250%. One of the reasons that rice farmers benefit so much by the program is that the price of land – which is a cost of production, but also part of farmers' income – increases. Rice farmers benefit from this relative increase in land prices of land under rice production. For comparison, price of land in all other agricultural sectors fall between 40-200%. As we eliminate pigs and poultry producers from subsidies, livestock, but also corn producers benefit. Rice producers' income jumps from 149% to 156%. Corn producers on the other hand loose more than before (income decreases 128 vs. 126%). Soybean producers remain the same.

As explained before, we estimated the amount of land subsidy payments that would leave farmers income unchanged. These subsidies are shown in the second and fourth columns of table X. According to our results, Ecuador's government should extend these subsidies payments to other sectors such as sugar cane and cotton. Also, the size of subsidy payments should be less than the government's plan. These values denote an optimal plan that would have leave farmers as well off as they were before the FTA.

4. Conclusion

If we compare the results of the four trade liberalization scenarios included in this paper we observe a few surprises and some expected results. Given that the FTA would imply that only Andean countries would reduce tariffs (Andean countries already receive

zero or close to zero tariffs from the U.S.) an FTA with the U.S. implies, on impact, and as a whole, welfare loses. But an FTA with the U.S. does not necessarily imply a fall in farm income. In fact, the only scenario in which real farm income falls is that of no-FTA for Ecuador. Sectors that win from an FTA in term of effects on exports, factor income, and real farm income include those sectors that benefit from current ATPDEA preferences (roses), traditional export sectors (fruit and vegetables, cocoa, coffee). The same sectors that benefit from the ATPDEA preferences would be the sectors harmed if the FTA is not signed by Ecuador. When the CAN-MERCOSUR FTA is added, a sector that receives big impacts (in terms of imports and exports) is vegetable oils and fats.

In summary, the results show that trade liberalization will negatively affect all agricultural sectors in Ecuador, except for the two exporting sectors (fruits and vegetables and other crops, including coffee, cocoa, and flowers). Government subsidies are planned to help only 4 sectors: rice, corn, soybeans and livestock. According to our results, these subsidies should be extended to other sector such as sugar cane and cotton. Government subsidies are also estimated to disproportionally help rice and soybeans producers, but they will not be enough for corn and livestock producers.

Future Research

The government expects to attract direct foreign investments for agricultural production with more added value and technological innovation, and generate market opportunities for new agricultural exports. As some authors have noted (see Diao et al., 2002), trade liberalization affects country productivity through the access to new technology, scale effects of increased exports, and better efficiency due to increased in competition in previously protected domestic markets. There are also technological spillovers from

developed countries (in this case the U.S.) due to greater availability of better capital and intermediate goods for production.

To incorporate these technological improvements, Diao et al. (2002) include an endogenously determined TFP variable for each sector's value-added function. Within each country, the sectoral TFP is augmented with the increase in the volume of total trade normalized by country's total labor supply. By assuming a labor augmenting technological change, the elasticity in the sectoral TFP function is calibrated from the factor intensity at sector's level for each country.

Limitations

One of the limitations of this study is that the parameters used are not specific for Ecuador. As noted by Keeney and Hertel, all parameters for developing countries in GTAP-AGR were borrowed from Mexico. Another limitation is that it does not include phytosanitary barriers, quotas, and voluntary export restraint agreements that may affect certain agricultural products (such as some fruits and vegetables). As for out subsidy estimates, we have pointed out that we not estimate how this would be financed. We assume that they come directly from Ecuador's government and ads up to its deficit.

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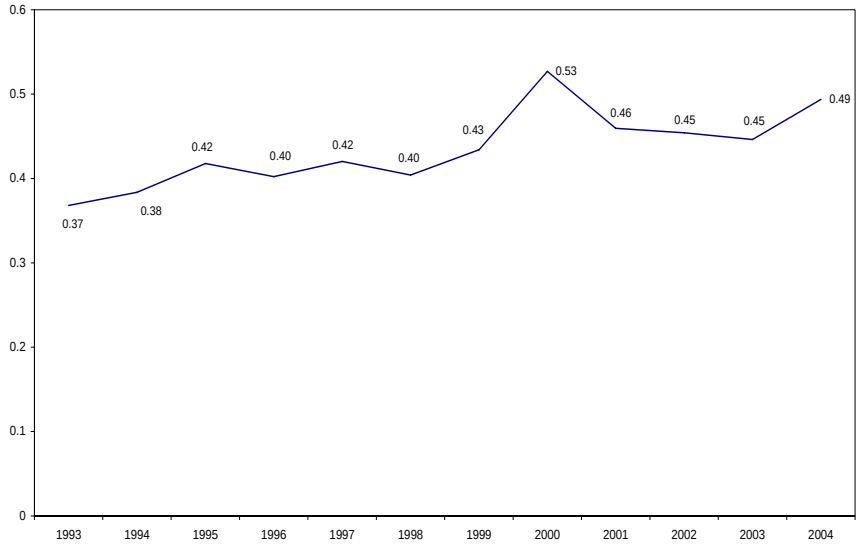
FIGURES

Figure 1. Ecuador: Trade Openness Index, 1993 - 2004



Source: Trade Statistics, Central Bank of Ecuador. Authors' construction.

TABLES

Table 1. Total Imports by region in Ecuador
(Millions of U.S. Dollars, CIF) [1]

Region	1996	1997	1998	1999	2000	2001	2002	2003	2004
U.S.A[2]	1222	1516	1680	919	932	1326	1481	1401	1623
Andean Community	653	918	976	611	847	1173	1416	1490	1929
European Union	700	807	820	427	412	665	890	812	814
Asia	413	572	804	329	545	835	967	985	1221
Rest of the World	944	1141	1295	732	986	1364	1678	1846	2272
Total Imports	3932	4955	5576	3017	3721	5363	6431	6534	7861
Share of Imports (%)									
U.S.A	31	31	30	30	25	25	23	21	21
Andean Community	17	19	18	20	23	22	22	23	25
European Union	18	16	15	14	11	12	14	12	10
Asia	11	12	14	11	15	16	15	15	16
Rest of the World	24	23	23	25	26	26	26	29	28
Total	100	100	100	100	100	100	100	100	100

Source: Trade Statistics, Central Bank of Ecuador, and own construction.
1/. For years 2003-2004, figures are provisional. 2/. U.S. import data includes Puerto Rico.

Table 2. Total Exports by region of destination in Ecuador
(Millions of U.S. Dollars, FOB)

Region	1996	1997	1998	1999	2000	2001	2002	2003	2004
U.S.A	1859	2032	1637	1708	1875	1790	2052	2452	3286
Andean Community	428	636	548	483	687	837	805	1055	1026
European Union	943	1017	872	818	611	665	793	1037	1012
Asia	603	575	345	492	579	446	545	384	374
Rest of the World	1067	1004	741	951	1176	941	938	1111	1959
Total Imports	4873	5264	4203	4451	4927	4678	5036	6039	7655
Share of Exports (%)									
U.S.A	38	39	39	38	38	38	41	41	43
Andean Community	9	12	13	11	14	18	16	17	13
European Union	19	19	21	18	12	14	16	17	13
Asia	12	11	8	11	12	10	9	6	5
Rest of the World	22	19	19	22	24	20	18	19	26
Total	100	100	100	100	100	100	100	100	100

Source: Trade Statistics, Central Bank of Ecuador, and own construction.

Table 3. Ecuador: Gross Domestic Product, 1994-2005

Year	Total GDP		Agriculture, livestock and forestry GDP		
	Millions of U.S. dollars	Annual growth rate (%)	Millions of U.S. dollars	Annual growth rate (%)	Share in Total GDP (%)
1994	18,573		2,460		13.2
1995	20,196	1.7	2,597	2.6	12.9
1996	21,268	2.4	2,606	8.3	12.3
1997	23,636	4.1	2,802	9.1	11.9
1998	23,255	2.1	2,307	-5.0	9.9
1999	16,674	-6.3	1,653	13.0	9.9
2000	15,934	2.8	1,466	4.3	9.2
2001*	21,024	5.1	1,647	0.4	7.8
2002*	24,311	3.4	1,917	7.5	7.9
2003*	27,201	2.7	1,829	0.9	6.7
2004*	30,282	6.6	1,935	0.3	6.4
2005**	31,722	3.9	2,020	1.6	6.4
Average 1995-2005		2.6		3.9	

Source: Central Bank of Ecuador
* = Provisional, ** = Projected

Table 4. Exports Shares (%) by Main Export Product in Ecuador, 1993-2005.

Year	Bananas and Plantains	Shrimp	Tuna	Flowers	Other Agriculture[1]	Total Agriculture	Crude Oil	Other Industrial[2]
1994	18	14	1	2	17	52	31	18
1995	20	15	2	2	11	50	32	19
1996	20	13	1	2	11	47	31	22
1997	25	17	1	2	8	53	27	19
1998	25	21	1	4	6	56	19	24
1999	21	14	1	4	7	47	29	24
2000	17	6	1	4	4	32	44	25
2001	18	6	1	5	6	36	37	27
2002	19	5	1	6	6	37	37	26
2003	18	5	1	5	6	34	39	26
2004	13	4	1	5	5	27	51	22
2005	13	5	0	5	4	27	52	22
Average 1995-2005						39.6	36.6	23.7

Source: Central Bank of Ecuador
1/ Other Agriculture exports include: coffee, cocoa, abaca, wood, fish, and others non-industrial.
2/ Other Industrial exports include: coffee products, cocoa products, fish flour, other sea products, chemicals and pharmaceuticals, manufactured metal, hats, apparel, and other industrial.

Table 5. Total Area Harvested (hectares) and Shares by Product and Region (2004)

Product	Total Area (Share in total area)	Sierra	Costa	Oriente Galapagos	Total
1. Cereal Grains	979,448 (6.5)				
Rice	34	2	98	0	100
Corn	42	23	74	3	100
Other grains	24	91	8	1	100
2. Roots and Tubers	72,782 (0.5)	76	12	12	100
3. Vegetables	32,153 (0.2)	68	32	0	100
4. Fruits	6,720,080 (44.8)				
Bananas/plantains	91	1	98	1	100
Other Fruits	9	6	91	3	100
5. Oil Seeds	1,406,340 (9.4)				
Oil palm	86	4	66	30	100
Soybeans	8	0	100	0	100
Other oil crops	6	19	52	29	100
6. Fibers	34,436 (0.2)	27	73	0	100
7. Beverages	288,557 (1.9)	36	60	4	100
8. Other Crops	5,481,578 (36.5)				
Sugar Cane	99	1	95	4	100
TOTAL	15,015,374	895,050	13,362,469	757,855	

Source: Ministry of Agriculture, SICA Project

Table 6. Land tenure for Selected Crops in Ecuador (2000)

Crop		Less than 10 Ha (Share, %)	10-50 Ha (Share, %)	More than 50 Ha (Share, %)	Total
Rice	APUs	49,595 (65)	21,164 (28)	5,054 (7)	75,814
	Hectares	113,868 (33)	120,094 (35)	109,974 (32)	343,936
Corn	APUs	42,313 (52)	29,587 (36)	10,044 (12)	81,943
	Hectares	64,777 (27)	111,426 (46)	63,998 (27)	240,201
Soybeans	APUs	2,496 (59)	1,296 (31)	433 (10)	4,226
	Hectares	7,724 (14)	16,749 (31)	29,877 (55)	54,350

Source: 2000 Agricultural Census

Table 7. Livestock Ownership Distribution by Type of Cattle in Ecuador (2000)

Type of Cattle		Less than 10 Ha (Share, %)	10-50 Ha (Share, %)	More than 50 Ha (Share, %)	Total
Bovine (Meat)	APUs	291,598 (68)	96,227 (23)	39,690 (9)	427,514
	Heads	1,132,184 (25)	1,293,048 (29)	2,060,787 (46)	4,486,020
Bovine (Milk)	APUs	272,116 (34)	239,018 (30)	297,722 (37)	808,856
	Heads	1,131,274 (32)	989,936 (28)	1,403,816 (40)	3,525,027
Pigs	APUs	332,171 (75)	81,616 (19)	26,687 (6)	440,475
	Heads	898,111 (59)	405,860 (27)	223,142 (15)	1,527,114
Poultry (backyard)	APUs	489,648 (71)	147,110 (21)	50,973 (7)	687,732
	Number	5,711,340 (59)	2,780,822 (29)	1,202,462 (12)	9,694,623
Poultry (commercial)	APUs	3,548 (70)	1,000 (20)	496 (10)	5,066
	Number	8,633,048 (27)	11,976,316 (37)	11,288,673 (35)	32,305,495
Sheep	APUs	157,399 (88)	18,102 (10)	3,494 (2)	178,995
	Heads	816,141 (72)	172,520 (15)	138,807 (12)	1,127,468
Other Cattle	APUs	579,825 (70)	176,062 (21)	68,479 (8)	824,384
	Number	5,120,937 (79)	883,578 (14)	462,605 (7)	6,467,152

Source: 2000 Agricultural Census

Table 8. Ecuador: Tariff Structure of Main Agricultural and Agro-Industry Exports to the U.S., 1993-2001

Categories		Agricultural Products included	Farm Sector Average 1993 - 2001 Thousands of Dollars	Percent of Total
Free Import (0% Tariff)		bananas, coffee, cocoa, albacores, prawns, tea, pepper, ricin oil, extracts, essences and concentrates, tobacco, fish flour, etc.	875,543	75%
Tariff Preference "Andean Trade Promotion Act" (ATPA)	and also GSP	broccoli, other flowers (except roses), beans, other vegetables, yucca roots, mangoes, melons, watermelon and other fruits, strawberries, meat preparations and conserves, other fruits, passion fruit juice, shrimp, sardines, sharks, other 'salmónidos', fresh and frozen fish (cuts), species and condiments, etc.	173,498	15%
	No included in GSP	roses, pineapples, chocolats, candies, purée, pastas, other fruit preserves, etc.		
Tariff Preference Generalized System of Preferences (GSP)			98,759	8%
Exports without benefits			14,508	1%
Total Agricultural Exports			1,162,308	100%
Total Exports to the U.S. (50 products or 95%)			1,666,977	
Main Farm Exports (% of Total Main Exports)			70%	

Source: Project SICA-World Bank, Central Bank of Ecuador; own construction.

Table 9. Ecuador and the U.S.: A Comparison in the Agricultural Sector

Variables	U.S.	Ecuador
Population	284 million	13 million
Economically Active Population in Agriculture	2 million	3.3 million
Average annual income per farmer	US$ 3,5000	less than US$ 2,000
Annual Subsidies	about US$ 30,000 million	None
R&D (as percentage of GDP)	2.8%	0.08%
Agricultural Exports (2004)	US$ 59,000 million	US$ 1,700 million

Source: El Comercio, and the Central Bank of Ecuador, USDA, FAO, SICA, OMC (as noted by El Comercio, January 19, 2005).

Table 10. Government Transfers by size of APU ($/Ha.) for Selected Crops

Commodity	APUs < 20 Ha.	APUs 20-50 Ha.	APUs > 50 Ha.	Total Transfers ($US Millions)
Corn	110	77	55	24
Soybean	53	37	26	2
Rice	162	113	81	44

Source: Ministry of Agriculture, El Comercio

Table 11. Government Transfers to Livestock Sectors

Size	Size of APU (Ha.)	Percent of Total Transfers	Total Transfers ($US Millions)
Small	1-10	68	17
Medium	10-50	23	6
Large	> 50	9	2
Total		100	25

Source: Ministry of Agriculture, El Comercio

Table 12.- FTA impacts on production, consumption, trade, and welfare.
(Percentage changes, unless otherwise indicated)

Scenario 1a.	**FTA for all Andean countries considered** [1.]				
	Consumption	Exports	Imports	GDP	EV [4.]
Ecuador	-1.52	1.41	2.03	-1.53	-53
Colombia	-1.55	3.20	3.79	-1.55	-240
Peru	-1.29	4.35	4.93	-1.26	-109
U.S.	0.05	0.16	0.13	0.05	802
MERCOSUR	-0.08	-0.09	-0.14	-0.08	-79
Escenario 1b.	**FTA for all Andean countries considered, except Ecuador** [2.]				
	Consumption	Exports	Imports	GDP	EV
Ecuador	-0.41	-0.36	-0.46	-0.40	9
Colombia	-1.39	3.45	4.09	-1.39	-115
Peru	-1.25	4.39	4.99	-1.22	-57
U.S.	0.04	0.13	0.11	0.04	-264
MERCOSUR	-0.07	-0.08	-0.12	-0.07	44
Scenario 2a.	**FTA for all Andean countries considered** [1.] **This scenario includes de FTA between CAN and MERCOSUR** [3.]				
	Consumption	Exports	Imports	GDP	EV
Ecuador	-1.58	2.12	3.01	-1.60	-73
Colombia	-1.87	4.52	5.28	-1.86	-140
Peru	-1.50	7.08	8.02	-1.44	-89
U.S.	0.02	0.12	0.08	0.02	66
MERCOSUR	0.78	1.32	1.83	0.77	-552
Scenario 2b.	**FTA for all Andean countries considered, except Ecuador** [2.] **This scenario includes de FTA between CAN and MERCOSUR** [3.]				-
	Consumption	Exports	Imports	GDP	EV
Ecuador	-0.60	0.49	0.70	-0.60	-15
Colombia	-1.72	4.76	5.56	-1.71	-256
Peru	-1.47	7.12	8.07	-1.41	-104
U.S.	0.01	0.09	0.06	0.01	411
MERCOSUR	0.81	1.34	1.87	0.79	788

Source: Authors' construction.
Notes:
1. Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S. become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their good markets.
2. All current trade preferences that Colombia and Peru receive from the U.S. become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.
3. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brazil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.
4. In US$ million. Welfare is measured as the Equivalent Variation which measures the change in income needed to bring people back to their original utility level.

Table 13.- FTA Impacts on Factor income and farm income, by country [1.]
Percentage change

Factor income at market prices net of depreciation				
Country	**Scenario 1a**	**Scenario 1b.**	**Scenario 2a.**	**Scenario 2b.**
Ecuador	-0.45	-0.38	-0.23	-0.21
Colombia	-0.81	-0.64	-0.91	-0.76
Peru	-0.66	-0.63	-0.59	-0.56
U.S.	0.05	0.04	0.02	0.01
Farm income				
Country	**Scenario 1a**	**Scenario 1b.**	**Scenario 2a.**	**Scenario 2b.**
Ecuador	-0.86	-0.33	-0.46	0.01
Colombia	-1.86	-1.8	-2.4	-2.35
Peru	-1.63	-1.62	-2.85	-2.83
U.S.	0.06	0.05	0.03	0.02
Real farm income				
Country	**Scenario 1a**	**Scenario 1b.**	**Scenario 2a.**	**Scenario 2b.**
Ecuador	0.36	-0.01	0.88	0.52
Colombia	-0.63	-0.71	-0.9	-0.98
Peru	-0.58	-0.6	-1.6	-1.61
U.S.	0.02	0.01	0.01	0.01

Source: Authors' construction.
Notes:
1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.
Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S.become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.
Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.
Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table 14.- Ecuador: FTA Impacts on real farm income [1.]

Scenarios	Real farm income	Real farm income, includes off farm income (off-farm employed endowments)	Real farm income, includes on farm income (on-farm employed endowments)
Scenario 1a	0.36	-0.51	0.40
Scenario 1b.	-0.01	-0.16	0.00
Scenario 2a.	0.88	-0.48	0.94
Scenario 2b.	0.52	-0.22	0.55

Source: Authors' construction.

Notes:

1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.

Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S.become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.

Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.

Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table 15. Ecuador: FTA Impacts on Real Farm Income,[1.]
Selected agricultural sectors

Sector	Scenario 1a	Scenario 1b.	Scenario 2a.	Scenario 2b.
1 Paddy rice	-0.32%	-0.29%	-0.06%	-0.08%
2 Wheat	-0.63%	0.46%	1.05%	2.19%
3 Cereal grains	-1.74%	-1.30%	-0.59%	-0.16%
4 Vegetables, fruits and nuts (bananas)	1.24%	0.55%	2.44%	1.80%
5 Oil Seeds (soybeans)	-5.20%	-4.53%	-7.76%	-7.18%
6 Sugar Cane	-0.80%	-0.22%	-0.70%	-0.20%
7 Plant-based fibers (cotton)	-2.09%	0.49%	-1.94%	0.65%
8 Crops nec. (coffee, cocoa, roses)	1.17%	-0.10%	1.07%	-0.16%
9 Bovine Cattle, sheep, goat, horses	-0.90%	-0.06%	-0.83%	-0.07%
10 Animal Products Nec (Pigs, poultry)	-2.43%	-1.27%	-2.60%	-1.53%
11 Raw milk	-0.67%	-0.12%	-0.46%	0.00%
12 Wool, silk-worm cocoons	-1.98%	-0.41%	-4.07%	-2.60%

Source: Authors' construction.

Notes:

1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.

Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S.become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.

Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.

Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table16. FTA Impacts on Value Added, by sector [1.]

Sector	Scenario 1a	Scenario 1b.	Scenario 2a.	Scenario 2b.
1 Paddy rice	-0.3%	-0.2%	-0.4%	-0.3%
2 Wheat	-0.5%	0.4%	0.4%	1.3%
3 Cereal grains	-1.3%	-0.9%	-0.8%	-0.3%
4 Vegetables, fruits and nuts (bananas)	0.8%	0.4%	1.4%	1.1%
5 Oil Seeds (soybeans)	-3.8%	-3.2%	-5.9%	-5.4%
6 Sugar Cane	-0.6%	-0.1%	-0.8%	-0.4%
7 Plant-based fibers (cotton)	-1.6%	0.4%	-1.7%	0.2%
8 Crops nec. (coffee, cocoa, roses)	0.8%	0.0%	0.4%	-0.3%
9 Bovine Cattle, sheep, goat, horses	-0.7%	0.0%	-0.9%	-0.3%
10 Animal Products Nec (Pigs, poultry)	-1.8%	-0.9%	-2.2%	-1.3%
11 Raw milk	-0.5%	-0.1%	-0.7%	-0.2%
12 Wool, silk-worm cocoons	-1.5%	-0.3%	-3.3%	-2.1%
13 Forestry	-1.3%	-0.2%	-1.9%	-0.8%
14 Fish (Shrimp, Tuna)	0.3%	0.1%	0.7%	0.5%
15 Oil and Mining	0.3%	0.2%	0.2%	0.1%
16 Bovine meat products	-0.5%	0.0%	-0.6%	-0.1%
17 Meat products nec (pork, poultry meat)	-2.0%	-1.2%	-2.3%	-1.5%
18 Vegetable oils and fats	-0.8%	-0.1%	-5.8%	-5.5%
19 Dairy products (milk, cheese, etc.)	-0.5%	-0.1%	-0.8%	-0.5%
20 Processed rice	0.0%	-0.3%	0.2%	0.0%
21 Sugar	-1.2%	-1.2%	-1.2%	-1.2%
22 Food Products Nec	1.1%	0.3%	3.0%	2.2%
23 Beverages and tobacco products	-0.3%	-0.1%	-0.2%	-0.1%
24 Manufacturing	-2.1%	-0.4%	-3.1%	-1.4%

Source: Authors' construction.

Notes:

1. *Scenario 1a*: FTA for all Andean countries considered (all current trade preferences that Andean countries receive from the U.S. become permanent). Andean countries grant the U.S. free access to their good markets. *Scenario 1b*: Same as scenario 1a, except that Ecuador does not sign the FTA. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those the U.S. imposes on Venezuela. *Scenario 2a*: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. *Scenario 2b*. Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariffs levels as those the U.S. imposes on Venezuela.

Table 17. FTA Impacts on total imports, by sector [1.]

Sector	Scenario 1a	Scenario 1b.	Scenario 2a.	Scenario 2b.
1 Paddy rice	-0.6%	-1.9%	-0.2%	-1.7%
2 Wheat	1.3%	0.1%	2.2%	1.2%
3 Cereal grains	7.1%	-0.4%	9.1%	2.7%
4 Vegetables, fruits and nuts (bananas)	2.1%	-0.5%	2.4%	-0.4%
5 Oil Seeds (soybeans)	2.9%	-1.1%	2.9%	-0.9%
6 Sugar Cane	-2.0%	-1.1%	-1.5%	-0.7%
7 Plant-based fibers (cotton)	4.6%	-0.6%	4.9%	-0.4%
8 Crops nec. (coffee, cocoa, roses)	0.4%	-1.0%	1.9%	0.5%
9 Bovine Cattle, sheep, goat, horses	-1.6%	-0.4%	1.2%	2.3%
10 Animal Products Nec (Pigs, poultry)	-0.2%	-0.8%	0.0%	-0.7%
11 Raw milk	-3.8%	-1.5%	-3.2%	-1.1%
12 Wool, silk-worm cocoons	-2.2%	-0.7%	3.2%	4.9%
13 Forestry	6.4%	-1.5%	5.4%	-2.6%
14 Fish (Shrimp, Tuna)	0.9%	-0.1%	3.1%	2.0%
15 Oil and Mining	5.3%	-0.7%	5.0%	-0.8%
16 Bovine meat products	23.8%	-1.4%	24.7%	-0.5%
17 Meat products nec (pork, poultry meat)	36.4%	-0.9%	39.8%	3.8%
18 Vegetable oils and fats	4.5%	-0.5%	30.1%	28.0%
19 Dairy products (milk, cheese, etc.)	8.3%	-0.5%	17.5%	9.8%
20 Processed rice	-2.2%	-0.8%	-2.3%	-1.2%
21 Sugar	1.5%	0.6%	2.1%	1.0%
22 Food Products Nec	3.6%	-0.3%	4.9%	1.1%
23 Beverages and tobacco products	0.0%	-0.4%	1.0%	0.6%
24 Manufacturing	2.6%	-0.4%	3.5%	0.7%

Source: Authors' construction.

Notes:

1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.

Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S.become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.

Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.

Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table 18. FTA Impacts on total exports, by sector [1.]

Sector	Scenario 1a	Scenario 1b.	Scenario 2a.	Scenario 2b.
1 Paddy rice	-31.7%	-33.8%	-34.1%	-35.9%
2 Wheat	33.0%	0.3%	38.5%	5.7%
3 Cereal grains	-16.7%	-17.3%	-18.3%	-18.8%
4 Vegetables, fruits and nuts (bananas)	1.3%	0.4%	2.7%	1.9%
5 Oil Seeds (soybeans)	-11.1%	-12.1%	-14.8%	-15.6%
6 Sugar Cane	3.5%	1.5%	2.9%	1.1%
7 Plant-based fibers (cotton)	3.2%	1.0%	3.9%	1.9%
8 Crops nec. (coffee, cocoa, roses)	1.6%	-0.4%	1.5%	-0.4%
9 Bovine Cattle, sheep, goat, horses	-0.4%	-1.7%	-3.2%	-4.3%
10 Animal Products Nec (Pigs, poultry)	-1.1%	-1.9%	-2.3%	-3.1%
11 Raw milk	5.7%	2.1%	4.8%	1.5%
12 Wool, silk-worm cocoons	4.0%	-2.5%	-5.3%	-10.9%
13 Forestry	4.5%	1.6%	4.9%	2.3%
14 Fish (Shrimp, Tuna)	0.2%	0.1%	-1.1%	-1.1%
15 Oil and Mining	2.1%	0.4%	2.5%	1.0%
16 Bovine meat products	5.4%	1.9%	4.8%	1.7%
17 Meat products nec (pork, poultry meat)	-20.3%	-23.1%	-22.5%	-24.9%
18 Vegetable oils and fats	-2.0%	-5.4%	-16.6%	-19.2%
19 Dairy products (milk, cheese, etc.)	4.5%	-5.9%	1.1%	-8.9%
20 Processed rice	-3.4%	-5.2%	-4.6%	-6.2%
21 Sugar	-10.1%	-11.4%	-10.7%	-11.9%
22 Food Products Nec	1.8%	0.2%	5.2%	3.7%
23 Beverages and tobacco products	1.1%	-7.3%	1.6%	-6.6%
24 Manufacturing	1.0%	-3.0%	0.2%	-3.5%

Source: Authors' construction.

Notes:

1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.

Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S.become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.

Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay does appear in the GTAP database as a separate region) are set to zero.

Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table 19.- FTA Impacts on Terms of Trade, by country [1.]

Country	Scenario 1a	Scenario 1b.	Scenario 2a.	Scenario 2b.
Ecuador	-0.52	-0.11	-0.47	-0.10
Colombia	-0.87	-0.79	-1.07	-1.00
Peru	-0.93	-0.92	-1.13	-1.12
U.S.	0.07	0.05	0.05	0.04
MERCOSUR	-0.05	-0.05	0.52	0.53

Source: Authors' construction.

Notes:

1. *Scenario 1a.:* Ecuador, Colombia, and Peru sign a foreign trade agreement with the U.S. All current trade preferences that these Andean countries receive from the U.S.become permanent. Colombia, Peru, and Ecuador grant the U.S. free access to their goods markets.

Scenario 1b.: Colombia and Peru sign an FTA with the U.S., but Ecuador does not. All current trade preferences that Colombia and Peru receive from the U.S. become permanent. Colombia and Peru grant the U.S. free access to their goods markets. Ecuador loses ATPDEA preferences and receives from the U.S. similar tariffs as those U.S. imposed to Venezuela.

Scenario 2a.: Same as scenario 1a, plus we include the FTA already signed between the Andean Community of Nations and MERCOSUR countries. It is assumed that all bilateral tariffs between CAN countries (Bolivia, Colombia, Ecuador, Peru, and Venezuela) and MERCOSUR countries (Brasil, Argentina, Uruguay. Paraguay is in the GTAP database as a separate region) are set to zero.

Scenario 2b.: Same as scenario 2a, but Ecuador does not sign the FTA with the U.S., loses then ATPDEA and receives from the U.S. similar tariff levels as those the U.S. imposes on Venezuela.

Table 20. Percentage Change in Farmers Income by Sector

Sector	FTA	Government	Estimated	Government (excludes pigs and poultry)	Estimated (excludes pigs and poultry)
Rice	-0.3	149.0	0	155.6	0
Wheat	-0.6	-10.1	0	-10.1	0
Other Grains	-1.7	-126.1	0	-128.9	0
Fruits/Vegetables	1.2	0.9	1.2	0.9	1.2
Oilseeds	-5.2	14.2	0	14.1	0
Sugar Cane	-0.8	-8.4	0	-8.5	0
Plant based fibers	-2.1	-7.5	0	-7.6	0
Other Crops	1.2	7.6	1.1	7.6	1.1
Bovine Cattle	-0.9	-4.0	0	2.9	0
Pigs and Poultry	-2.4	-3.6	0	-10.6	-2.4
Dairy Cattle	-0.7	-2.8	0	4.4	0
Wool Production	-2.0	-5.7	0	1.4	0

Table 21. Size of Subsidy Relative to the Value of Land in each Agricultural Sector (%)

Sector	Government	Estimated	Government (excludes pigs and poultry)	Estimated (excludes pigs and poultry)
Rice	215	1.0	215	1.2
Wheat	0	2.3	0	2.3
Other Grains (corn)	176	7.2	176	7.3
Fruits/Vegetables	0	0	0	0
Oilseeds	59	17.1	59	17.1
Sugar Cane	0	3.3	0	3.4
Plant based fibers	0	7.6	0	7.6
Other Crops	0	0	0	0
Bovine Cattle	35	3.8	54	4.0
Pigs and Poultry	35	9.9	0	0
Dairy Cattle	35	2.7	54	2.8
Wool Production	35	8.2	54	8.3

ANNEX 1

Table A1. Commodity Aggregation

No.	Sector	Description
1	pdr	Paddy Rice
2	wht	Wheat
3	gro	Cereal Grains Nec. (corn, rye)
4	v_f	Vegetables, fruits and nuts (bananas)
5	osd	Oil Seeds (soybeans)
6	c_b	Sugar Cane
7	pfb	Plant-based fibers (cotton)
8	ocr	Crops nec. (coffee, cacao, roses)
9	ctl	Bovine Cattle, sheeps, goats horses
10	oap	Animal Products Nec (Pigs, poultry)
11	rmk	Raw Milk
12	wol	Wool, silk-worm cocoons
13	for	Forestry
14	fsh	Fishing (Shrimp, Tuna)
15	Oil and Mining	Oil and Mining
16	cmt	Bovine meat products
17	omt	Meat products nec (pork, poultry meat)
18	vol	Vegetable oils and fats
19	mil	Dairy products (milk, cheese, etc.)
20	pcr	Processed rice
21	sgr	Sugar
22	ofd	Food Products Nec
23	b_t	Beverages and tobacco products
24	Manufacturing	Manufacturing
25	Services	Services

Table A2. Regional Aggregation

No.	Region	Description
1	USA	U.S.
2	ECU	Ecuador
3	COL	Colombia
4	PER	Peru
5	BOL	Bolivia
6	VEN	Venezuela
7	MERCOSUR	Brazil, Argentina, Uruguay
8	CAFTA	Central America
9	ROA	Rest of FTAA
10	EU	European Union
11	CHN	China
12	ANZ	Australia and New Zealand
13	ROW	Rest of the World

Table A3. GTAP-AGR Parameters for Ecuador

No.	Sector	CDE Substitution Parameter SUBPAR	CDE Expansion Parameter INCPAR	CES Top Level Intermediates ESUBT	CES between Primary Factors – Value Added ESUBVA	CES Purchased Inputs ESUBT2
1	pdr	0.7	0.2	0.5	0.5	0.2
2	wht	0.7	0.2	0.5	0.5	0.2
3	gro	0.7	0.2	0.5	0.5	0.2
4	v_f	0.6	0.3	0.5	0.5	0.2
5	osd	0.7	0.3	0.5	0.5	0.2
6	c_b	0.5	0.4	0.5	0.5	0.2
7	pfb	0.6	0.3	0.5	0.5	0.2
8	ocr	0.7	0.2	0.5	0.5	0.2
9	ctl	0.5	0.4	0.5	0.5	0.2
10	oap	0.5	0.4	0.5	0.5	0.2
11	rmk	0.5	0.5	0.5	0.5	0.2
12	wol	1.0	1.2	0.5	0.5	0.2
13	frs	1.0	1.2	0	0.2	0
14	fsh	0.5	0.5	0	0.2	0
15	oil	1.0	1.2	0	0.2	0
16	cmt	0.5	0.4	0	1.1	0
17	omt	0.5	0.4	0	1.1	0
18	vol	0.7	0.3	0	1.1	0
19	mil	0.5	0.5	0	1.1	0
20	pcr	0.7	0.2	0	1.1	0
21	sgr	0.5	0.4	0	1.1	0
22	ofd	0.5	0.4	0	1.1	0
23	b_t	0.4	0.6	0	1.1	0
24	Mnfcs	1.0	1.2	0	1.3	0
25	Svces	1.0	1.2	0	1.5	0