Andean Countries at a Crossroads:
Evaluating Pro-Poor Trade Integration Options[1]

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Abstract

Andean countries are at a crossroads in external strategies and in a critical moment to re-evaluate trade and integration agendas as well as their impact on poverty. These twin ingredients are the centerpieces of development agendas today. Trade and integration continue to be an engine for growth and global competitiveness. Meanwhile, despite visible economic growth over decades, the bloc continues to face high and persistent poverty, and lags behind in Latin America in efforts to reduce poverty.

In this paper, we evaluate a wide set of Andean trade and integration options and the impact of the Andean-US bilateral agreements on poverty and inequality. To this end, we apply a two-step, top-down approach in sequence. The first step is undertaken with a newly developed global, multi-region CGE model incorporating several innovations in database and modeling. The second stage is carried out with the microsimulation analysis, applying outputs simulated by the CGE model to individual households for three countries (Bolivia, Colombia and Peru).

Simulation results indicate that the impact of trade agreements is unambiguously expansionary, although the gains are modest. While market opening will improve welfare, this policy instrument alone does not automatically guarantee export diversification, nor change the economic structure and reinforce technology-intensive industries. The impact of bilateral agreements is pro-poor, reducing poverty and narrowing inequality for signing countries. But the opposite is the case of non-signing country. The study shows that labor income gains via job creation particularly in rural areas are the primary sources of poverty reduction and inequality improvement. Trade and integration strategies are, however, not necessarily the panaceas to combat chronic poverty and reduce prevalent inequality. To tackle these issues, it is crucial to devise policy measures directly targeting the poor, in the combination with trade and integration approaches.

Key Words: CGE model, Microsimulation, Poverty, Andean Community

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1. Introduction

In recent years, trade and integration cum poverty have been increasingly important and received intense policy debates in Latin America and elsewhere. In the Andean countries, these twin ingredients are the centerpieces of development agendas today. Trade and integration continue to be an engine for growth, and the pillar in external policy front. In external agendas, the Andean countries face new challenges, which might influence the bloc's future in coming decades. At present, the most pressing and immediate integration agenda is the bilateral deal with the United States and the future of the Andean Trade Promotion and Drug Eradication Act (ATPDEA)—the centerpiece of trade policy between the Andean countries and the United States.[3] In May 2004, three countries of the bloc (Colombia, Peru and Ecuador) launched the negotiations to create an FTA with the United States, aiming to consolidate preferential access. Peru and Colombia have advanced, and already signed their bilateral agreements.[4] In response to these movements, Venezuela decided to withdraw from the Andean bloc to join Mercosur.[5] On the other hand, Chile announced its intention of rejoining the Andean Community. Presently the Andean countries have different trade and integration strategies, and an FTA with the European Union is increasingly an important agenda with high priority.

Poverty is also extremely important for the Andean countries. Despite visible economic growth over decades, the bloc continues to face high and persistent poverty, and lags behind in Latin America in efforts to reduce poverty. According to the ECLAC (2006), the recent average poverty rate of five Andean countries is 48.8 percent, ranging from the lowest 37.1 percent in Venezuela to the highest of 63.9 percent in Bolivia.[6] In the meantime, the average extreme poverty rate reaches 21.3 percent. It also shows while poverty and extreme poverty are on the declining path over decades, the speed of progress is quite slow, compared with economic growth.

Thus, the Andean countries are at a crossroads in external fronts and in a critical moment to re-evaluate trade and integration agendas as well as their impact on poverty. The key policy questions for trade integration agendas include: (i) what will be the impact of bilateral agreements with the United States for singing and non-signing countries? (ii) which sectors will gain and which will lose as a result of each agreement? (iii) what will be the economic costs, if the Andean countries lose the ATPDEA preferential treatment currently granted to them by the United States? Regarding poverty analysis, we primarily focus on bilateral trade agreements with the United States, the most important external initiative. Main questions are: (i) do the bilateral agreements with the United States reduce poverty and improve inequality? (ii) if so, what would be the magnitude of improvement? (iii) is rural poor better off or worse off? and (iv) do the agreements bring about different impact between singing and non-signing countries?

To answer these policy questions, we apply a two-step, top-down CGE cum microsimulation analysis in sequence. The first step is undertaken by a newly developed multi-region, comparative static CGE model with several features beyond the standard models. The second stage is carried out for the bilateral Andean-US agreements by applying the microsimulation analysis. The impact of trade agreements simulated by the CGE model are translated into individual households, allowing one to evaluate the

[3] ATPDEA expired in December 2006, and was extended for six months for the four Andean countries (Bolivia, Colombia, Ecuador and Peru).

[4] The agreements—the United States-Peru and the US-Colombia—were concluded in December 2005 and February 2006, respectively. The Peru's Congress has already approved the agreement in June 2006. However, these agreements have not been ratified yet in the United States and Colombia.

[5] In May 2006, the negotiations of Venezuela's accession to Mercosur were concluded and the Protocol of Accession was signed in July 2006.

[6] ECLAC (2006), Social Panorama of Latin America: Preliminary Version. Survey year is 2004 for Bolivia and Peru, and 2005 for Colombia, Ecuador and Venenzuela.

effects on poverty and inequality using household data disaggregated at regional and national levels. Target countries are Colombia and Peru as singing partners, and Bolivia as a non-singing country.

The preliminary CGE simulation results indicate that bilateral trade agreements with the United States generate divergent economic outcomes between singing and non-signing Andean countries. While traditional agricultural or resource-based sectors will be winners, capital-intensive manufacturing industries tend to be losers. The costs of losing the preferences are much larger than the negative effects incurred by exclusion from the agreement alone. The transatlantic agreement with the European Union greatly benefits agriculture and processed foods. In the hemispheric approaches, the Andean countries experience a strengthening of their pattern of comparative advantage, especially in traditional resource-based sectors. It is also revealed that most of the Andean's traditional resource-based industries appear to be clear winners, whereas the majority of capital-intensive heavy industries will be losers across the Andean bloc. While market opening will improve welfare, this policy instrument alone does not automatically guarantee export diversification, nor change the economic structure and reinforce technology-intensive industries. This is a caveat of the analysis.

The microsimulation analysis, on the other hand, shows the impact of the bilateral agreements on poverty is modest but pro-poor. It reduces both poverty in all regions and the positive effects are much greater on reducing extreme poverty. In general, income gains are greater for rural than urban households, the positive sign to improve inequality at the national level (being though modest), but the impact is mixed within each region. For non-signing Bolivia, poverty worsens particularly in capital and Santa Cruz; extreme poverty jumps by almost five percentage points in these regions. Income inequality also aggravates, although the magnitude is modest.

The rest of the paper is organized as follows. Section 2 briefly presents the analytical approaches-CGE model as applied in the first step, key extensions and innovations incorporated into the model, followed by the microsimulation in the second step. Section 3 presents the socio-economic statistics at the benchmark, to provide the foundation and background to understand the subsequent simulation results. The section analyzes the structure of trade and protection—tariffs—in some detail. Section 4 describes alternative scenarios for policy simulations, and reports macroeconomic and sectoral impacts on trade. This section also evaluates the sectoral winners and losers, based on shocks on production. Section 5 details the poverty and inequality outcomes of the bilateral Andean-US trade agreements generated by the microsimulation approach. Finally, Section 6 summarizes the main findings and conclusions.

2. Analytical Approaches

For this study, we apply two-step, top-down approach in sequence. At the top tier or macroeconomic level, regional integration options for the Andean countries are evaluated by a multi-region CGE model. The Andean model follows the tradition of recent trade-focused, global multi-region models developed to analyze the impact of regional trade agreements amid the proliferation of regional initiatives in the last decade and the multilateral Doha Round negotiations, and shares many common features with other current models.

The second stage is designed to evaluate the impact of bilateral trade agreements with the United States on poverty and income distribution. In this stage, poverty and distributional impacts are measured by the microsimulation analysis for three Andean countries—Colombia, Peru and Bolivia. Following Ganuza et al (2006), top-down approach is used to translate the economy-wide impact to changes at the household level.[7] A major advantage of this approach is that the analysis on poverty and inequality based on

[7] In this framework, there is no rigorous channel to accomodate feedback effects from the household level to factor markets and to macroeconomic variables. However, as the CGE model includes several regional households, it

household survey data can be carried out separately from the top-tier CGE analysis, and technically it is better but not necessarily to reconcile the household data with the national data. In practice, what is required for the microsimulation analysis is the vector of changes in prices, factor returns and employment simulated by the CGE model.

2.1. IDB-INT Andean CGE Model

The IDB-INT Andean model is a brand-new global, multi-region, multi-sector, static general equilibrium model with several salient extensions and innovations beyond standard CGE models. The model comprises 18 regions and countries, identifying all four Andean countries[8] plus their key partners and 30 sectors, which are aggregates into 6 macro sectors. All regions are fully endogenized and linked only through trade. The model, thus, only deals with the real side of the economy and does not consider the financial or monetary markets. The model is built on individual Social Accounting Matrices (SAMs) for each region and country, benchmarked at base year 2001. Annex Table 1 shows regions and countries and Annex Table 2 lists sectors used in the model.

Each region in the model traces the circular flows of income through factor payments from producers to institutions—households, firms and government—and back to final demand for goods in commodity markets. These institutions represent the economic agents whose behaviors and interactions are explicitly specified in the model. Consumption, intermediates, government consumption and investment are the four components of domestic demand. Households in each region choose the optimal levels of commodity bundles for consumption by maximizing their utility, subject to the budget constraint and prices.[9] The government collects various taxes and receives foreign transfers, and purchases goods and services, allocates subsidies to domestic institutions, and amortizes payments to domestic and foreign lenders.

For each sector, the model explicitly specifies output-supply and input-demand equations. Production consists of intermediate inputs determined by the Leontief fixed coefficients, and primary factors, which are specified in a constant elasticity of substitution (CES) function with a constant returns-to-scale technology. Producers are assumed to maximize profits, implying that each factor is demanded in such a way that marginal value product exactly equals its corresponding marginal cost. However, factors do not necessarily receive a uniform returns (wages, capital rent and land prices) across sectors. Instead, the model incorporates factor market rigidities or distortions, which exogenously fix the ratios of the relative sectoral returns to the economy-wide average return for that factor at benchmark. Primary factors comprise labor, capital, land, and natural resources.

The treatment of international trade follows the standard specifications in common with other CGE models. The model specifies a set of export-supply and import-demand equations for traded sectors, allowing national product differentiation. Both exports and imports are modeled in a two-stage nested structure. Exports are modeled in a constant elasticity of transformation (CET) between domestic demand and the aggregate exports. The optimal allocation of supply is determined by revenue-maximization choice between domestic sales and aggregate export supply at the upper stage, and among exports destined to different markets at lower stage. At the lower stage, however, the specification of imperfect substitutes for some products in certain regions or countries can be partially or entirely turned off,

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implicitly captures feedback effects through income-expenditure linkages on factor returns and consumption behaviors on prices.

[8] Venezuela formally left the Andean group.

[9] Multiple regional households are modeled for the Andean countries (Bolivia, Colombia, Ecuador and Peru), whereas the single representative household is applied for other regions and countries. This aims to capture feedback effects and interactions between households and the rest of the economy, designed for the microsimulation analysis in the second stage.

permitting perfect substitutes. Imports are modeled by a constant elasticity of substitution (CES) function, following the "Armington" assumption. The optimal allocation of demand is determined by cost-minimization choice between domestic demand and aggregate import purchases at the upper level, and imports from different markets at lower stage.

In factor markets, the model applies different treatments, reflecting certain features of geographic differences. For labor, the model incorporates 6 categories in the Andean countries, disaggregated by gender (male and female) and level of skill (low, medium and high).[10] Labor is mobile across sectors within each region or country. In the Andean countries, labor supply for skilled categories is fixed, but the supply of low- and semi-skilled groups is endogenized, while fixing real wages. [11] In non-Andean regions, the supply of labor is endogenous for developing regions, whereas it is fixed for developed regions. No international labor migration is allowed in the model. Capital is mobile only within each region, and its aggregate supply is fixed at benchmark. Land is used only in agriculture, and sector-specific in developed regions, but mobile across sectors in developing regions. Natural resources are treated as fixed factors, and mainly used in resource-based energy sectors in both developed and developing regions.

In the model, there are three key macroeconomic closures or balances: government budget; saving-investment; and balance of external market. For this, there are a large number of different choices available. The key is which choice in each closure would be appropriate and realistic, taken into account the nature of the study for countries or regions under study. In this study, for government balance, government savings are determined residually as the gap between current revenues and expenditures, while all transfers are fixed. This treatment allows fiscal surplus or deficit to adjust to balance public finance.

For saving-investment, the current amount of (nominal) investment must be completely financed by the aggregate savings due to the static nature of the model and in the absence of international capital mobility. The model applies the neoclassical "saving-driven" closure, so that private saving rates are fixed. This assumes that investment demands are financed by whatever is saved in the economy, and practically to maintain consistent behaviors between regional households in CGE model and individual households at the microsimulation analysis. Moreover, to control possible welfare effects arising from variations in government spending and investment, demand for public consumption and investment demand is exogenously fixed in real term.

For external market closure, there are two options: (i) fixed trade balance, and (ii) fixed exchange rate. The choice depends on the objective of the study. The former enables us to evaluate the impact on (real) exchange rate, in addition to effects on trade, production and other variables. In other words, one can assess how the economy responds to maintain the initial trade position. Likewise, the latter closure measures the impact on trade, production and others, but altering trade balance position.[12] Considering that the Andean countries today have flexible economic structures sufficient to respond and absorb external shocks as proven in improved balances of trade and current account in recent years, we apply the

[10] This is important particularly for poverty and inequality analysis, because labor is the major source of income for the poor. It is important to disaggregate labor in order to clearly capture and determine how each household earns income. For non-Andean regions and countries, single labor market is applied.

[11] These different treatments are due largely to labor market characteristics in developing world including the Andean countries. Namely, the supply of skilled labor is relatively limited, because countries cannot increase workers with sufficient experience, whereas it is high and elastic for non-skilled groups thanks to high unemployment and underemployment.

[12] With the second closure, developing countries would be likely to undergo sharp deterioration in trade balance due to greater tariff elimination or reduction than their partners in developed world. Despite an increase in exports, imports would surpass, replacing domestic production. This in turn leads to the decline in national economy due to weak consumption demand arising from reduced factor income.

first closure.[13] Thus, trade is balanced for each region valued at world prices, and exchange rates in each region are equilibrating variables. In other words, initial balance of trade in goods and services remains constant.[14]

2.2. Extensions and Innovations of the CGE Model

A dozen of recent studies evaluate trade and integration policies as well as poverty impact for the Andean countries. Light (2003) evaluated the FTAA process, with focus on the US initiatives. Monteagudo, Rojas, Stabilito, and Watanuki (2004) analyzed three tracks of hemispheric approaches for each of the Andean countries. The Andean Secretariat (2004) assessed the FTAA for the countries in Latin America including Andean countries. These studies are based on 1997 benchmark, and thus require update in benchmark database.

With some update on database and protection for 2004, Duran, de Miguel and Schuschny (2005) analyze the US-centered scenarios for the Andean countries. Some country studies, focusing on bilateral trade agreements with the United States include: Gracia and Zuleta (1997), Martìn and Ramìrez (2005) and Botero (2005) for Colombia; Carrasco, Reinoso and Hoyle (2004) and Tello (2005) for Peru; and Morales, Parada and Torres (2005) for Ecuador, using partial equilibrium agricultural trade policy model. With the combination of CGE model and microsimulation, Bussolo and Lay (2003) examine globalization and poverty in Colombia, and Padro et al (2005) evaluate the bilateral agreement of Colombia-US FTA on poverty. Luduena and Wong (2006) present the analysis of the Andean-US FTA and domestic policy for agriculture for Ecuador.

But few studies have rigorously evaluated the present Andean trade policies in comprehensive manners, taking into account the recent developments in the Western Hemisphere in the medium- to long-term perspectives. To fill this void and beyond the standard modeling approaches used for many previous trade policy studies, the IDB-INT model is extended in several ways in order to reflect economic reality for the Andean countries at greater accuracy. This is carried out by accommodating specific aspects of the economic activities and structures in each Andean country observed historically and in particular at base year.

First, the model accommodates a large number of agriculture-related sectors: 10 agricultural sectors, and 5 food industries, as already shown in Table 2. This is because agriculture is extremely important in economic terms, and thereby politically very sensitive for the Andean countries (Bolivia, Colombia, Ecuador, Peru). Regarding sectoral production, agriculture accounts for 15 percent in Bolivia and Ecuador, and around 10 percent for Colombia and Peru. On the other hand, food industries account for 17-18 percent in Bolivia and Peru, and 12 percent in Colombia and Ecuador. The figures of employment are more pronounced. Agriculture occupies 54 percent of the national workforce in Bolivia, 42 percent in Ecuador, and 33 percent in Peru. As a result, the significant portion of the individuals and households relies on agriculture, particularly in rural areas. This is why the IDB-INT model incorporates many agricultural sectors intended to measure the impact of policy shocks as precisely as possible for key and sensitive agriculture sectors.

[13] In particular, the Andean countries managed their trade positions incurred by Latin American economic crisis, quickly recovering from huge trade deficit to a surplus, which is expanding further in each country recently. Because the model treats other external transactions as exogenous accounts, it is appropriate to adopt flexible exchange rates.

[14] There is a functional relationship between (real) exchange rate and the balance of trade in goods and non-factor services. Fixing nominal exchange rate is effectively to fix real exchange rate, deflated by *numeraire*. Refer to Devarajan, Lewis and Robinson (1993) for theoretical discussions on real exchange rate.

Second, the model includes multiple labor categories and household groups. The impact of trade policy affects households largely through two transmitting channels. One is income channel; among factor income, wages are by far dominant factor for many households. The other is price channel; trade policy affects commodity prices, which in turn change demand for consumption by households. The ultimate impact on individual households is highly heterogeneous, as each household considerably differs in family structure, income sources, and consumption patterns. To capture this heterogeneity particularly in income channel, it is extremely important to identify labor income source and mechanism at greater detail. To serve for this, the model accommodates six labor categories, decomposed by gender and skills. On the other hand, households are grouped by location or geographic origin, divided by metropolitan, urban and rural plus coastal–mountain divisions: eight groups in Bolivia, seven in Colombia and Peru, and five in Ecuador.

Third, the model incorporates trade-induced productivity that lead to efficiency gains in the production process as a result of increased trade. It is widely acknowledged that trade liberalization or trade openness has dynamic effects on productivity, or total factor productivity (TFP), resulting from economies of scale, externalities, technological spillovers, specialization increased investment and so on. Empirical studies show that developing countries can boost domestic productivity through technological spillovers by importing a variety of intermediate inputs and capital goods that embody foreign knowledge.

Cross-country studies include: Coe and Helpman (1995); Coe, Helpman and Hoffmaister (1997); Nicita and Olarreaga (2001); and Schiff, Wang and Olarreaga (2002). County-specific studies include: Karacaovali (2006) for Colombia; Trybout and Westbrook (1995) for Mexico; Moreira (2000), Muendler (2004), and Schor (2004) for Brazil; Lopez-Cordoba and Moreira (2002) for Mexico and Brazil respectively; and Roberts (2001) and Stiroh (2001) for the United States. Some studies apply the endogenous link into the CGE models. They include: de Melo and Robinson (1992); Lewis, Robinson and Wang (1995); Hinojosa-Ojeda, Lewis and Robinson (1997); Monteagudo, Stabilito, and Watanuki (2004); and Polaski (2006).

This is a crucial element in Latin America, where trade is one of major driving forces for growth and foreign currency earnings, while enhancing global competitiveness in production and exports. In order to capture these dynamic effects, we follow the structure by Polaski (2006). Technically TFP is modeled as an increasing function of the aggregate imports of capital goods and technology-intensive products, multiplied by the share of intermediate inputs in sectoral imports.[15]

Fourth, the model is constructed on the basis of FTAA tariff database, which updates and accommodates key regional trade agreements and preferential treatments in place in the Western Hemisphere and European Union. They include seven regional trade agreements: the North American Free Trade Agreement (NAFTA), the Central America Common Market (CACM), the Caribbean Community and Common Market (CARICOM), the Andean Community (AC), the Southern Common Market (Mercosur), the G-3 (Mexico, Colombia and Venezuela), and the new European Union (EU25). It covers four bilateral agreements (Mercosur-Bolivia, Mercosur-Chile, Canada-Chile, and Mexico-Chile). In addition to the MFN tariffs, the database also includes three important US preferential treatments: Caribbean Basin Initiative (CBI) for Central America and the Caribbean; Andean Trade Promotion and

[15] While acknowledging the importance and applied empirical works, some modelers argue this concept from two grounds. First, the applications to the CGE models are based on ad *hoc* methodology. Second, direct linkage between trade openness and productivity is not based on microeconomic theory. Yet Karacaovali (2006), for instance, demonstrates the endogeneity of trade liberalization on productivity from the theoretical background, using a standard political economy model. Our idea in this respect is to estimate policy impact as precisely and realistically as possible, based on numerous empirical studies and following the new trade theory paradigm. Dismissing productivity in an applied modeling framework only estimates traditional gains from resource allocation, but not dynamic ones from an increased efficiency gains.

Drug Eradication Act (ATPDEA) for four Andean countries (Bolivia, Colombia, Ecuador, and Peru), which replaced the former Andean Trade Promotion Act (ATPA); and Generalized System of Preference (GSP) for countries in the rest of Latin America. To serve for this study, our FTAA database updates the ATPDEA for the year 2004. Tariff includes *ad valorem*, *ad valorem* equivalents of specific and compound tariffs plus TRQs, estimated from the HTS 8 digit.

2.2. Microsimulation Analysis

The microsimulation analysis in this study focuses on factor market in particular labor as the main channel to transmit the impact of trade policy changes on poverty and income distribution. What we undertake in the microsimulation is to analyze the process of income generation at the household level. Households' income comprises various sources of factor incomes including wages, capital and land rents, as well as government subsidies such as food coupons and remittance etc. But household is heterogeneous in income generation process, depending on family structure, occupation, education, gender, marital status, age, location and so on. Among these income categories, however, labor income (wages) is by far the main source for the majority. Important determinants of labor income are skill and gender. To capture these characteristics, labor market is decomposed into six categories in this study. Thus, the microsimulation approach enables us to deal with this household heterogeneity in their income generation process.

In principle, we follow "top-down" approach carried out by Ganuza et al (2006). In this methodology, new vectors of factor returns (wages, capital returns and land rent) measured by the CGE model are applied to each factor to estimate new factor income. In this process, there is one key methodological issue. As a result of policy reform, external shocks or structural adjustment, labor would change its position. Workers shift from one sector to another, may change occupation or lose their jobs. New entrants, who are previously unemployed, may find jobs in booming sectors. To tackle this issue, we employ a random approach in labor demand within the segmented labor market. In the process, it is further assumed that labor moves across sectors but cannot shift positions over skills; namely, unskilled workers remain in the same labor market, and cannot enter semi-skilled or skilled labor market categories.

Based on price indices of consumption bundles, poverty and extreme poverty lines are adjusted.[16] Poverty is measured by the familiar Foster-Greer-Thorbecke (FGT) indices,[17] which is expressed as:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^\alpha \qquad (1)$$

where n is the population size, q is the number of people below (extreme) poverty line, y_i is income of the i th households. The poverty aversion parameter α takes three values. The headcount index of poverty is expressed with $\alpha = 0$. The poverty gap has $\alpha = 1$, measuring the distance from the (extreme) poverty line. The severity of poverty is measured in $\alpha = 2$.

Income inequality is measured by two most popular indicators, Theil and Gini indices, which are given in the following formulas:

[16] Both poverty and extreme poverty lines are taken from the official sources, adjusted following the annual variations in prices. Other approach is to estimate a basket of commodities reflecting basic needs, derived from the Frisch parameters and income elasticity. See, for instance, Dervis, de Melo and Robinson (1982).
[17] Foster, Greer, and Thorbecke (1984).

$$Theil\ index = \frac{1}{n}\sum_i \frac{y_i}{\mu}\log\left(\frac{y_i}{\mu}\right) \quad (2)$$

$$Gini\ index = \frac{1}{\mu n(n-1)}\sum_{i>j}\sum_j \left|y_i - y_j\right| \quad (3)$$

where n is the population size, μ is the mean income, and y_i is income of the i th households.

3. The Andean Economies at Benchmark

The IDB-INT Andean model is built on the country SAMs benchmarked in 2001 with the structure of 18 regions, 30 sectors, and 9-factors of production. This section briefly outlines the structures of the Andean countries at benchmark to provide an overview with a focus on the economic structures of trade flows and protection, and to lay the ground for better understanding of the simulation results.

3.1. Macroeconomic Indicators of the Andean Countries

Table 1 presents key macroeconomic statistics for the Andean countries, based on the benchmark SAMs. It shows considerable differences in economic size. In terms of GDP, Venezuela accounts for some 40 percent of the Andean bloc, while Bolivia sharing less than 3 percent. Regarding trade openness, the Andean countries are all only moderate. Ecuador is the most open economy, representing more than 20 percent of trade openness on both exports and imports relative to its GDP. Peru is the least open, followed by Colombia.

Table 1. Comparative Macroeconomic Statistics of the Andean Countries

	Bolivia	Colombia	Ecuador	Peru	Venezuela
GDP and Trade Flows/1 ($billion)					
Exports	1.3	11.8	4.9	7.0	22.1
Imports	1.6	11.9	5.6	6.8	17.0
GDP	8.1	82.1	21.8	54.2	124.8
Trade Openness (Trade/GDP in percent)					
Exports/GDP	16.6	14.4	22.5	13.0	17.7
Imports/GDP	19.4	14.6	25.8	12.6	13.7
Factor Share in Value-Added (percent)					
Land	4.9	5.1	2.3	3.6	2.0
Natural Resources	1.6	2.9	3.7	0.8	4.3
Labor	61.9	50.0	62.2	59.1	39.9
Capital	31.6	42.0	31.8	36.5	53.9
Value Added	100.0	100.0	100.0	100.0	100.0
Labor Proportions/3 (percent)					
Low-skilled Female	32.8	12.8	20.9	15.0	
Mid-skilled Female	7.0	16.9	10.4	12.9	
High-skilled Female	4.6	13.5	6.5	8.9	
Low-skilled Male	36.9	21.8	37.4	24.5	
Mid-skilled Male	12.6	21.3	17.6	26.1	
High-skilled Male	6.1	13.7	7.2	12.7	
Total	100.0	100.0	100.0	100.0	
Labor: (1,000 workers)/4	3,824.9	17,466.9	3,531.2	8,020.6	9,404.6

Notes /1: Merchandise trade only.
/2: Intra-bloc trade is eliminated.
/3: Based on household surveys: 2001 for Bolivia, 2003 for Colombia, Ecuador and Peru.
/4: ILO: Labor Statistics Database.
Sources: IDB-INT model database, 2001.

Based on the national household surveys,[18] Table 1 also presents labor proportions in worker force, classified by 6 labor categories, for the 4 Andean countries (Bolivia, Colombia, Ecuador and Peru). It reveals several salient, yet heterogeneous features inherent to each country. First, lower the national income, higher the share of low-skilled labor participation. In Bolivia, low-skilled category accounts for 70 percent of the national labor force. This class also shares the majority in Ecuador with 58 percent. Second, female participation is high in Bolivia and Colombia (43-44 percent of the national workforce). On the other hand, in Ecuador and Peru, male workers account for nearly two-thirds of the employment. Third, Colombia is featured with the least heterogeneous distribution of labor participation over skill categories, followed by Peru. The opposite is Bolivia, with the highest concentration in low-skilled category.

3.2. Trade Flows and Barriers in Trade

Trade flows and barriers in trade are the most important variables to examine the trade policy changes. The former is the key agent to transmit policy shocks among partners arising from changes in prices. This is because the model only deals with the real side of the economy without financial or monetary accounts. The latter, on the other hand, serves as policy instrument relevant to the analysis on trade and integration. In this study, we consider tariffs as the main protection instrument in trade.

Market Share by Major Market

Table 2 presents market share for the Andean trade by major partner. Regarding exports, the United States is by far the main destination for the Andean bloc, absorbing 40 percent of its total exports. The market dependency on the United States, however, varies greatly by country. Venezuela has the highest dependency of 49 percent due primarily to crude oil, followed by Colombia and Ecuador at around 40 percent each. In contrast, Peru's reliance is low at 25 percent, and Bolivia has the least dependency of 14 percent. The intra-regional market is the third largest, with a share of 12 percent. But Bolivia and Colombia have high intra-bloc dependency, while Peru and Venezuela do not much rely on the intra-bloc market. Reliance on Mercosur is fairly low for the Andean group (3 percent), but it is an important market for Bolivia (22 percent dependency), as the country enjoys preferences due to associate member status. As to extra-hemispheric markets, the EU25 is the main destination with a share of 15 percent and in fact the second largest exceeding the intra-bloc market. Yet the countries' export dependency is fairly asymmetric. For Peru, the EU25 is actually the largest partner with the market share of 26 percent, above the United States. On the other hand, Venezuela's dependency is a small 9 percent.

Import patterns reveal a similar regional reliance. The United States is the leading supplier for most Andean countries. Venezuela and Colombia equally have the highest market dependency rate at 33 percent, and 21 percent for Peru. As with exports, Bolivia is the least dependent on the United States. For Ecuador, the bloc is the leading supplier, accounting for 21 percent of the country's imports. Due to the associate membership, Mercosur is Bolivia's main source of imports with the market share of 39 percent. The EU market is the second largest source of imports after the United States for the Andean bloc, but the market reliance on imports is three percentage points higher than exports. Interestingly, Venezuela has the highest dependency on the EU market (22 percent), whereas Bolivia the least with only 11 percent.

[18] The national household surverys are: Encuesta Nacional de Hogares (2002) for Bolivia; Encuesta Nacional de Calidad de Vida (2003) for Colombia; and Encuesta Nacional de Hogares (2003) for Peru. Sources are based on the Program Improving the Surveys of Living Conditions in Latin America and the Caribbean (MECOVI).

Table 2. Market Share of the Andean Trade by Major Partner

(%)

	United States	Andean Community	Mercosur	Rest of WH	Western Hemisphere	EU 25	Asia	Rest of World	World
Exports									
Bolivia	13.6	28.9	22.1	5.3	69.9	12.0	4.5	13.6	100.0
Colombia	39.1	22.4	2.0	13.6	77.0	17.5	2.8	2.7	100.0
Ecuador	38.4	16.1	1.9	11.3	67.6	18.2	8.4	5.8	100.0
Peru	24.9	7.0	3.8	9.9	45.5	26.4	18.5	9.5	100.0
Venezuela	49.1	5.6	2.4	15.3	72.4	8.7	2.3	16.6	100.0
Andean Community	40.9	11.8	3.0	13.4	69.0	14.6	5.5	10.8	100.0
Imports									
Bolivia	14.3	10.3	38.6	15.1	78.3	11.5	8.4	1.8	100.0
Colombia	32.5	11.9	7.1	12.1	63.5	17.9	14.1	4.4	100.0
Ecuador	24.4	21.0	5.8	13.3	64.5	14.6	15.9	4.9	100.0
Peru	21.2	13.6	12.1	15.9	62.8	14.8	15.9	6.5	100.0
Venezuela	31.2	12.6	7.6	14.0	65.5	19.1	11.8	3.6	100.0
Andean Community	28.5	13.6	9.1	13.7	64.9	17.3	13.5	4.4	100.0

Note: Merchandise Trade.
Sources: IDB-INT model database, 2001.

Sectoral Composition of Trade with Major Partners

The sectoral composition of the Andean trade with major partners is highly heterogeneous. In the US market, energy products are the leading exports for resource-based Colombia, Ecuador and Venezuela. Crude oil and gas alone have the share of more than 40 percent for Colombia and Ecuador. For Venezuela, crude oil combined with petroleum account for 85 percent of the country's exports to the United States. In sharp contrast, heavy manufactures with the share of 46 percent, represented by metal products, are the leading exports from Peru. For Bolivia, light manufactures (59 percent) comprising lumber and labor-intensive products are the major exports. Agriculture is also important exports for Ecuador (25 percent share) and Colombia (19 percent). The sectoral composition of the Andean trade is presented in Annex Table 3.

In the Andean intra-regional market, the major products are intra-industry trade in capital-intensive goods: 54 percent for Colombia, 55 percent for Peru and 67 percent for Venezuela. While crude oil is the leading exports for Ecuador, Bolivia concentrates on labor-intensive food exports. On the other hand, exports to Mercosur are featured by high proportion of resource-based products. For Bolivia, gas alone accounts for three-quarters of the country's exports to Mercosur, and energy products have nearly 70 percent share for Venezuela. For Peru, minerals and metal products have the share of 77 percent. Ecuador is an exception in this respect; its main exports are labor-intensive food products (52 percent) and agriculture (45 percent).

In the EU market, the Andean countries largely concentrate on resource-based exports. Energy products (crude oil and minerals) are the leading exports (66 percent share), and to lesser extent for Colombia (38 percent). For Peru, metal products alone account for the majority of the country's exports. For Bolivia, exports of mineral products constitute two-thirds of its exports. Ecuador is again an exception; agriculture and agro-products account for nearly 90 percent share of exports to the EU market.

We use only tariffs as barriers in trade in this study. Tariffs are estimated, based on the FTAA database, which accommodates and update key regional trade agreements and preferential treatments, in particular the ATPDEA.[19] The sectoral tariffs are estimated as a simple average for countries with no peak tariffs,

[19] Refer to 2.2 "Extensions and Innovations of the Model" for more detail.

whereas trade-weighted tariffs are applied for countries with peak tariffs such as the United States and Canada.[20] The TRAINS is the source for the EU25 region as well as for the Asian partners.[21] Protection for services is set to zero at benchmark, as applied in many CGE models. This is because there is no reliable estimation of *ad valorem* equivalents.

Table 3 displays the Andean sectoral tariffs applied to major partners. The Andean Community is still an incomplete customs union, as each member has differentiated applies MFN tariffs. While Bolivia has nearly uniform tariff structure at 10 percent across the board, other four countries maintain different protection across commodities. For these countries, labor-intensive industries (processed foods and light manufactures) are heavily protected with high tariffs. Trade-weighted tariffs on processed foods, for example, are around 18 percent, with the highest rate of 23 percent for dairy products in Peru. In sharp contrast, intra-bloc trade is almost completely liberalized. Four Andean countries—Bolivia, Colombia, Ecuador, and Venezuela—have completely eliminated trade barriers among them, and trade between these four countries and Peru faces lower protection on bilateral basis. The Andean countries impose preferential tariffs against Mercosur on bilateral basis. As an associate member, Bolivia applies much lower preferences for Mercosur, and reciprocally faces lower tariffs on its exports.

Table 3. Andean MFN Sectoral Tariffs by Member Country

(%)

	Bolivia			Colombia			Ecuador			Peru			Venezuela		
	Intra	Mercosur	MFN	Intra	Mercosur	MFN	Intra	Mercosur	MFN	Intra[/1]	Mercosur	MFN	Peru[/2]	Mercosur	MFN
Paddy rice		9.83	10.00		13.33	13.33		11.67	13.33	13.33	6.67	16.67	9.92	13.33	13.33
Wheat		9.17	10.00		11.67	11.67		5.52	8.00			9.20	2.40	11.00	11.00
Cereal grains		5.58	10.00		10.76	11.84		5.96	11.39	3.60	3.27	10.45	3.54	10.61	11.67
Vegetables/ fruits		4.96	10.00		12.88	14.07		11.87	14.06	0.77	11.35	19.65		13.21	13.99
Oil seeds/ Soybeans		4.10	10.00		9.79	10.52		6.38	8.79		2.06	6.08		9.53	10.52
Sugar cane		3.00	10.00		10.00	10.00		9.20	10.00		12.00	12.00		10.00	10.00
Coffee/ cocoa		3.22	10.00		8.01	8.84		6.92	8.38		7.07	9.21		8.87	9.25
Livestock		3.11	9.88		7.46	8.23		7.11	8.25		7.97	10.10		7.55	8.29
Other agricultural products		4.14	10.00		7.74	8.25		6.79	7.24		8.32	10.40		8.18	8.33
Fishing		2.26	10.00		16.33	16.46		16.23	16.46		10.78	11.84		16.33	16.46
Agricuture		**5.90**	**10.00**		**9.17**	**11.37**		**5.71**	**8.71**	**0.00**	**1.90**	**10.18**	**0.00**	**10.47**	**11.21**
Coal, crude oil and gas		3.73	10.00		4.91	5.91		4.31	5.50	3.20	10.17	8.80	1.20	5.05	6.00
Minerals		3.41	10.00		9.57	10.32		8.67	9.62		7.80	8.11	0.21	9.65	10.48
Petroleum		1.68	10.00		6.69	8.72		4.96	5.22	5.69	8.75	5.60	2.24	6.16	8.66
Energy		**2.30**	**10.00**		**9.03**	**10.00**		**7.43**	**7.54**	**3.50**	**8.53**	**7.69**	**0.01**	**9.65**	**10.48**
Bovine meat		6.30	10.00		17.20	18.86		15.96	17.71	2.29	13.27	18.97		17.07	18.86
Pork/ poultry meat		6.15	10.00		17.46	18.43		17.63	18.53	1.45	17.14	21.00	2.27	17.94	18.33
Dairy products		7.06	10.00		18.70	18.85		17.39	17.95	5.12	18.38	22.93	5.87	18.70	18.85
Processed sugar		9.50	10.00		18.13	18.13		16.23	16.88	6.58	14.67	16.33	7.13	18.13	18.33
Other food products		5.82	10.00		16.74	18.26		16.38	18.10	5.06	13.28	15.42	0.41	16.96	18.28
Procesed Foods		**5.87**	**10.00**		**16.96**	**18.35**		**16.38**	**18.11**	**5.14**	**13.47**	**17.45**	**0.41**	**17.14**	**18.44**
Textiles		3.43	10.00		16.91	17.59		16.94	17.29		15.16	16.31		17.37	17.62
Wearing apparel		3.25	10.00		19.42	19.67		19.55	19.67		17.90	19.25		19.61	19.67
Leather products/ footwear		5.25	10.00		15.62	15.84		15.54	16.17		14.73	16.22		15.96	16.17
Other light manufactures		3.62	10.00		13.29	13.98		13.32	14.37		10.08	10.91		13.29	14.27
Light Manufactures		**3.91**	**10.00**		**15.80**	**15.72**		**14.24**	**15.39**	**0.00**	**11.76**	**13.58**	**0.00**	**15.08**	**15.89**
Chemical/ plastic products		3.63	10.00		7.15	7.81		6.31	7.44		6.07	7.10	0.02	7.67	8.29
Metals/ metal products		3.62	9.90		9.60	10.26		8.34	9.41		7.36	8.11		10.14	10.59
Motor vehicles		4.06	8.90		12.06	12.44		10.10	11.19	1.01	5.64	5.83	0.09	12.10	12.60
Machinery/ electric equipment		3.07	9.14		8.53	9.23		7.65	9.04		6.15	6.63		9.18	9.97
Heavy Manufactures		**3.47**	**9.43**		**9.19**	**9.47**		**7.93**	**9.03**	**0.00**	**6.28**	**6.81**	**0.01**	**10.16**	**10.20**
Total		**3.97**	**9.60**		**10.56**	**10.83**		**8.83**	**9.94**	**2.01**	**6.98**	**8.47**	**0.05**	**11.14**	**11.46**

Note: /1: For Bolivia, tariffs are zero in all sectors.
/2: For Bolivia, Colombia and Ecuador, tariffs are zero in all sectors.
Tariffs for macrosectors are estimated as trade-weighted rates.
Source: IDB-INT model database, 2001.

[20] With no peak tariffs, there are little differences between simple and trade-weighed averages. On the other hand, there are significant differences at sectoral tariffs in the presence of peak tariffs, particularly in high disaggregation in agriculture. For instance, simple average tariff of oilseeds and soybeans in the United States is more than 4 percentage higher than trade-weighted tariffs despite free entry of 18 tariff lines under the ATPDEA, but 2 lines (peanuts) have 132 and 164 percent *ad valorem* equivalent tariffs. This is also the case with coffee and cocoa, and dairy products, due to peak tariffs.

[21] Due to data availability, GTAP database is used for other regions.

Table 4 reports the applied tariffs imposed by major partners on the Andean countries. The Andean-4 countries—Bolivia, Colombia, Ecuador and Peru—are beneficiaries of the US unilateral preferential treatment under the ATPDEA, and therefore face substantially low trade barriers (1.1 percent) in the US market. Yet, these countries still face moderate protection at 4 percent on their agricultural exports. Among commodities, coffee and cocoa, the Andean's leading agricultural exports, face 7 percent tariffs, second highest after oilseeds and soybeans (10.6 percent).[22]

The United States still maintains high protection on sensitive foods products, specially dairy and processed sugar with 10 percent of tariffs. With the ATPDEA enactment, the noticeable benefits for the Andean beneficiaries are the substantially lowered protection on their exports of labor-intensive light manufacturing products. In particular, textiles and wearing apparel are the largest beneficiaries, facing modest tariffs at 3 percent and 1.2 percent, respectively. Today the tariff differentials between GSP (Generalized System of Preference) and ATPDEA are 10 percentage points for wearing apparel, leather and footwear, while they are 7 percentage points for textiles. Venezuela is the only country, which faces GSP preferences. Trade-weighted total tariff, however, is a tiny 0.75 percent, because oil and petroleum, which faces nearly zero tariffs in the US market, are the main exports, with 80 percent share.

Table 4. Applied Tariffs imposed by Major Partners on the Andean Countries

(%)

	United States		Argentina		Brazil		
	ATPDEA/1	GSP/2	Bolivia	Other Andean Countries	Bolivia	Other Andean Countries	EU25
Paddy rice		2.60	1.25	10.00	1.25	10.00	53.22
Wheat		2.13	1.88	6.25	1.88	6.25	56.82
Cereal grains		0.01	1.51	6.29	1.51	6.22	49.75
Vegetables/ fruits		2.12	1.93	8.48	2.04	8.03	16.27
Oil seeds/ Soybeans	10.58	12.75	1.03	5.40	1.03	5.42	
Sugar cane		9.36	3.15	10.50	3.15	10.50	5.74
Coffee/ cocoa	7.06	9.04	2.12	7.16	2.11	6.41	1.71
Livestock	0.01	0.39	1.91	5.99	1.90	5.97	1.01
Other agricultural products	0.02	0.54	1.94	6.71	1.94	6.51	0.04
Fishing		0.54	2.47	8.61	2.45	8.31	5.12
Agricuture	**4.16**	**5.94**	**1.93**	**8.29**	**2.04**	**6.41**	**9.58**
Coal, crude oil and gas		0.39					0.15
Minerals	0.02	4.22	2.85	8.63	2.89	8.47	0.71
Petroleum			0.19	0.57	0.19	0.42	0.77
Energy	**0.00**	**0.48**	**2.85**	**2.69**	**0.04**	**2.34**	**0.34**
Bovine meat		7.14	4.07	11.48	4.07	11.48	66.76
Pork/ poultry meat		1.52	3.56	12.79	3.56	11.62	25.56
Dairy products		15.64	3.94	17.73	4.28	18.95	47.82
Processed sugar	9.31	12.20	7.80	18.50	7.80	18.50	54.14
Other food products	0.68	3.16	3.80	11.78	3.66	10.58	10.77
Procesed Foods	**1.31**	**3.16**	**3.80**	**11.78**	**4.67**	**10.58**	**11.89**
Textiles	3.11	10.25	5.86	16.66	5.82	16.87	7.93
Wearing apparel	1.25	12.30	7.11	20.37	6.91	20.23	9.65
Leather products/ footwear	1.82	12.62	5.37	16.05	5.22	15.44	4.97
Other light manufactures	0.00	1.21	4.21	13.29	4.28	12.94	0.40
Light Manufactures	**1.05**	**2.88**	**4.81**	**14.40**	**5.23**	**14.75**	**5.72**
Chemical/ plastic products	0.01	2.87	3.11	8.93	3.02	8.52	1.50
Metals/ metal products		2.05	4.25	12.55	4.23	12.08	1.37
Motor vehicles		1.83	12.24	18.44	10.84	15.73	2.79
Machinery/ electric equipment		0.95	5.90	12.59	5.99	11.75	0.53
Heavy Manufactures	**0.00**	**2.27**	**6.50**	**9.91**	**5.33**	**10.33**	**1.33**
Total	**1.08**	**0.75**	**5.78**	**10.15**	**0.40**	**6.25**	**4.29**

Note: See note in Table 3.
Tariffs in "macrosectors" and "total" are trade-weighted.
/1: ATPDEA is updated for 2004, and applies to the 4 Andean countries (Bolivia, Colombia, Ecuador and Peru).
/2: GSP applies only to Venezuela among the Andean countries.
Source: FTAA Database for Hemispheric countries, USITC for ATPDEA, and TRAINS for the EU25.

[22] Coffee and cocoa are Colombia's main agricultural exports, sharing 77 percent of the agricultural exports to the United States. These products are also important for Ecuador and Peru, with the corresponding share of 38 percent and 30 percent, respectively.

Mercosur, another important partner, applies preferential tariffs for the Andean countries, but has high protection against labor-intensive products such as foods and light manufacturing products.[23] At sectoral levels, wearing apparel faces the highest applied tariffs at 20 percent, followed by dairy and processed sugar with 18 percent each. Tariffs on heavy manufacturing products are around 10 percent, yet sensitive automobiles face much higher protection. In contrast, Bolivia, the associate member of Mercosur, enjoys lower protection than the other Andean members. But the country still faces high protection on capital-intensive heavy manufacturing products, particularly on automobiles (11-12 percent).

In the EU25, protection is considerably distorted in favor of agriculture and processed foods. The aggregate tariff on agriculture is 10 percent, but sensitive products are heavily protected: 57 percent for wheat; 53 percent for paddy rice; and 50 percent for cereal grains. Processed foods are more heavily protected: 67 percent for bovine meat; 54 percent for processed sugar; and 48 percent for dairy products. Due to high tariffs on agriculture and food products, the aggregate total trade-weighted tariff is 4.3 percent, 4 times higher than that of the United States.

4. CGE Simulations: Macro and Sectoral Results

4.1. Policy Scenarios

To assess the potential costs and gains from trade agreements, we examine seven alternative scenarios. Our policy variable is tariffs, applied only on merchandise trade, excluding protection in services.[24] We consider the complete tariff elimination in all scenarios, to examine the potential effects in long-run perspectives.[25] Table 5 summarizes these alternative policy scenarios.

Scenario 1 examines bilateral trade agreements, already concluded between Colombia and Peru, and the United States.[26] In fact, both agreements are comprehensive, covering tariffs and other barriers to goods and services. Two Andean countries (Colombia and Peru) and the United States reciprocally eliminate all tariffs only on merchandise trade on bilateral basis. Under the ATPDEA, more than 6,000 products from Colombia and Peru already enter the United States duty-free. True gain for the Andean countries is that the agreement will make duty-free preferential treatment permanent, without the periodic US congressional ratification.

Scenario 2 evaluates the effects of bilateral agreements between four Andean countries (Bolivia, Colombia, Ecuador and Peru) and the United States. Thus, this scenario is an extension of the scenario 1,

[23] Mercosur applies preferential treatments for each of the Andean countries, based on the Economic Complementary Agreements. But differentials over the Andean partners are marginal for each sector, except Bolivia.

[24] Other than tarirffs, polciy measures for market access also include, non-tariff measures (NTBs) such as quotas, sanitary and phytosanitary (SPS), import licensing, certificates of origin, as well as safeguards, rules of origin, and so on. But due largely to difficulties and lack of methodological consensus in quantifying *ad valorem* equivalents of these measures, we do not deal with them in the simulations.

[25] In the case of US-Andean bilateral agreements, the Andean partners (Colombia and Peru) eliminate over 80 percent of tariffs immediately upon entry into force of the agreements, followed by an additional 7 percent within 5 years, and the rest within 10 years. At 10-year phase-out, the vast majority of the products will be reciprocally duty-free, except some sensitive agricultural products. But our variant simulations with 10-year phase-out confirm that the macro and most sectoral impacts are not quite different from the full liberalization.

[26] See footnote 3.

and covers two more Andean countries (Bolivia and Ecuador).[27] In effect, these Andean countries and the United States liberalize trade, by eliminating bilateral tariffs reciprocally.

Table 5. Alternative Policy Scenarios for the Andean Countries

Scenarios	Code	Description
1	AC*-US "2+1" FTA	2 Andean countries (Colombia and Peru) and the United States completely eliminate tariffs on bilateral basis.
2	AC-US "4+1" FTA	4 Andean countries (Bolivia, Colombia, Ecuador and Peru) and the United States completely eliminate tariffs on bilateral basis.
3-A	No ATPDEA	Bolivia and Ecuador lose ATPDEA, and instead face MFN protection in the United States.
3-B	AC-US "2+1" FTA plus No ATPDEA	Combination of scenarios 1 and 3-A.
4	AC-Mercosur FTA	All 5 Andean countries and Mercosur completely eliminate tariffs.
5-A	AC-EU full FTA	All 5 Andean countries and the EU25 completely eliminate tariffs.
5-B	AC-EU Partial FTA	All 5 Andean countries and the EU25 eliminate tariffs, excluding sensitive agricultural products in the EU market.

Note: * AC stands for the Andean countries.

Scenario 3 is designed to evaluate the benefits of the ATPDEA, which was provisionally extended for six month after expiring in December 2006 to assess the costs of not negotiating with the United States. Under scenario 3-A, Bolivia and Ecuador lose the ATPDEA preferences, and face the MFN protection. This scenario measures real costs in the case of losing the ATPDEA preferences. Scenario 3-B combines scenario 1 and scenario 3-A. The United States applies two completely differentiated trade regimes to the Andean countries: bilateral FTAs with Colombia and Peru, and MFN tariffs for Bolivia and Ecuador.

Scenario 4 measures a biregional FTA between the Andean Community and Mercosur. Since 1997, Bolivia has been already an associate member of Mercosur. In August 2003, Mercosur and Peru signed an agreement, while Mercosur and other Andean countries completed the negotiations in April 2004, and an FTA is in the phase out stage. The agreement leads to materialize the creation of a South America community comprising 350 million people.

Finally scenario 5 simulates the Andean-EU FTA with two alternatives. Scenario 5-A hypothetically measures the full FTA, completely eliminating barriers in both blocs. Given the EU reluctant once to liberalize agriculture in regional agreements, scenario 5-B assumes tariff elimination in both groups, but excluding sensitive agricultural products only in the EU market.[28]

[27] In November 2003, the United States announced its intention to begin free trade negotiations with Colombia, Peru, Ecuador and Bolivia, the ATPDEA beneficiary countries. The negotiations between the United States and Ecuador were suspended at the end of March 2006, while Bolivia has not entered the negotiations.

[28] The sectors excluded from the agreement are seven agricultural products: paddy rice; wheat, cereal grains; bovine meat; pork and poultry meat; dairy products; and processed sugar.

4.2. Simulation Results

It is advised to interpret the simulation results below with caution. These results are controlled experiments rather than forecasts of the actual patterns. The actual growth patterns will be different, and result from many more factors, and the combination of comprehensive macroeconomics, external, and fiscal policies, not just trade policy. The CGE modeling simulations are indicative quantifications of the impact attributed to changes in a set of policy variables, tariffs in this study.

Macroeconomic Results

Table 6 shows the aggregate results on macroeconomic variables, which in general follow what international trade literature dictates. The impacts of regional agreements are unambiguously expansionary. When the Andean countries create an FTA with the United States under "2+1" formula (scenario-1), signing members benefit from the agreements, which expand exports, raise real GDP and improve national welfare.[29] The opposite is clear the case with non-signing members, excluded from the agreements. They suffer the negative, but small impact on all macroeconomic variables.

In scenario 2, where the Andean countries create an FTA with the United States on bilateral basis, Venezuela is the only country, which experiences the negative impact. As a result of stronger competition on penetrating into the US market, the positive impact on macroeconomic variables becomes smaller under this scenario for Colombia and Peru. Bolivia and Ecuador switch their position from loser to winner, with modest gains in trade, GDP, welfare and employment.

Scenario 3-A measures the effects for Bolivia and Ecuador of not reaching a deal the United States. The immediate impact is clearly the reduction of their exports to the United States. Although the negative impact is small at macro level, these trade effects lead to dampening domestic economy; production declines, income falls, and unemployment rise. Because Ecuador is more dependent on the United States than Bolivia, as shown in Table 4, the former experiences greater negative effects than the latter (approximately 25 percent larger). For other Andean countries, the impact is almost negligible. This result suggests that the policy decisions of signing FTAs by consolidating the current preferences into permanent agreements would be correct from the economic viewpoint.

The scenario 3-B amplifies the impact for both signing and non-signing countries. The aggregate effects on macroeconomic variables are nearly the sum of those in scenario 1 and scenario 3-A. In short, the signing increases their gains at the cost of non-signing members. For Colombia, this scenario is the best option, and the second best for Peru. On the contrary, this option is the worst for Bolivia and Ecuador. The aggregate impact on Venezuela, which is outside the bilateral agreements and preferential treatment, is insignificant, but roughly in the negative range, as the country suffers from the reduced intra-bloc trade.

In an FTA with Mercosur (scenario 4), Peru enjoys greater export growth, while Venezuela appears to be the largest beneficiary in terms of real GDP. In spite of preferences prior to the agreement, Bolivia experiences relatively higher export growth and economic gains, due to greater trade dependency on Mercosur. The clear opposite is the case with Colombia and Ecuador. For these countries, large tariff

[29] Regarding the impact of trade agreements with the United States, our aggregate results on trade are in accordance with other recent studies, for instance, Lima, de Miguel and Shuschny (2006). They find that the agreements generate unambiguous positive impacts on trade, but this does necessarily generate positive effects on other economic variables. Because they apply the standard external market closure of the GTAP model, in which current account balance is endogenized, so that the Andean countries aggravate their current account positions, as they undertake greater elimination than their partner does. This is probably one of the reasons why the positive trade effects do not necessarily translate into gains in other macroeconomic variables in their study.

elimination cannot overcome their disadvantage of low export penetration and large trade deficit with Mercosur.

Table 6. Impact on Welfare and Macroeconomic Variables

	Scenarios						
	1	2	3-A	3-B	4	5-A	5-B
	AC-US "2+1" FTA	AC-US "4+1" FTA	No ATPDEA	AC-US "2+1" FTA plus No ATPDEA	AC-MERC FTA	AC-EU Full FTA	AC-EU Partial FTA
Bolivia							
Exports[/1]	-0.28	0.58	-0.64	-0.92	1.70	1.01	0.98
Imports[/1]	-0.08	1.28	-0.29	-0.37	2.61	1.58	1.59
Exchange Rate[/2]	0.03	0.45	0.15	0.18	0.06	0.08	0.05
Real GDP (expenditure)	-0.05	0.23	-0.09	-0.15	0.20	0.21	0.20
Welfare (EV)[/3]	-0.07	0.37	-0.13	-0.21	0.43	0.36	0.33
Tariff Revenue	-0.19	-12.27	-0.21	-0.41	-13.26	-10.11	-10.15
Employment	-0.09	0.30	-0.17	-0.26	0.18	0.37	0.31
Colombia							
Exports	3.47	3.14	0.01	3.48	1.05	2.28	2.17
Imports	4.74	4.60	0.02	4.76	1.68	3.12	3.11
Exchange Rate	1.21	1.22	-0.01	1.20	-0.09	0.53	0.52
Real GDP (expenditure)	0.50	0.46	0.00	0.50	0.08	0.27	0.25
Welfare (EV)	0.82	0.77	0.00	0.82	0.18	0.48	0.46
Tariff Revenue	-23.04	-22.84	-0.02	-23.05	-5.79	-13.45	-13.48
Employment	0.84	0.78	0.00	0.84	0.17	0.49	0.46
Ecuador							
Exports	-0.28	1.67	-0.81	-1.10	0.84	4.42	4.47
Imports	-0.05	3.16	-0.36	-0.42	1.09	3.78	3.83
Exchange Rate	0.06	0.82	0.17	0.23	-0.23	-0.57	-0.61
Real GDP (expenditure)	-0.08	0.38	-0.17	-0.24	0.11	0.75	0.75
Welfare (EV)	-0.10	0.98	-0.25	-0.35	0.22	1.58	1.57
Tariff Revenue	-0.33	-21.33	-0.30	-0.62	-4.88	-12.22	-12.24
Employment	-0.11	0.92	-0.35	-0.46	0.26	1.66	1.66
Peru							
Exports	2.26	2.07	0.02	2.28	2.37	4.78	3.62
Imports	3.51	3.30	0.02	3.53	2.74	4.20	3.66
Exchange Rate	0.86	0.78	-0.01	0.84	-0.19	0.03	0.13
Real GDP (expenditure)	0.43	0.38	0.00	0.43	0.19	0.57	0.44
Welfare (EV)	0.62	0.57	0.00	0.62	0.30	0.76	0.60
Tariff Revenue	-11.12	-10.80	-0.01	-11.13	-5.28	-7.38	-7.63
Employment	0.40	0.37	0.00	0.41	0.15	0.65	0.44
Venezuela							
Exports	-0.07	-0.08	0.01	-0.06	1.35	1.82	1.87
Imports	0.07	0.08	0.01	0.08	1.28	2.78	2.85
Exchange Rate	-0.04	-0.05	-0.01	-0.05	0.42	1.36	1.32
Real GDP (expenditure)	-0.03	-0.04	0.00	-0.03	0.24	0.29	0.28
Welfare (EV)	-0.02	-0.02	0.00	-0.02	0.16	0.29	0.28
Tariff Revenue	-0.18	-0.22	-0.01	-0.18	-7.35	-17.83	-17.85
Employment	-0.05	-0.06	0.00	-0.05	0.33	0.53	0.52

Notes: /1: Exclude trade in services.
/2: Price-level-deflated exchange rate.
/3: Equivalent variations.

The integration with the EU25 (scenario 5-A) is a preferable option for the Andean as a bloc. In fact, this option is the best approach for each member except Colombia. Ecuador and Peru are the largest beneficiaries from the agreement, as the aggregate exports grow by more than 4 percent, while GDP increases by 0.75 percent and 0.57 percent, respectively. Colombia and Ecuador are in the second group, while Bolivia is the least benefited, due to limited trade exchange and the lowest protection facing in the EU market.

Excluding sensitive agricultural products in the EU market (scenario 5-B), does not essentially change the impact on macroeconomic variables. Interestingly, however, our results show that the exclusion of sensitive products from the agreement is more sensitive on welfare than on the aggregate trade. This is

due to the unique production and labor market situations in the Andean countries. Although labor participation in the sensitive agricultural sectors is small, they account for certain shares: 11.3 percent in Bolivia, and 5.3 percent in Peru, for instance. As a result, the EU exclusion of these products reduces remuneration, particularly labor wages, which in turn leads to the decline in household income.

A troubling finding is that the Andean trade balance account with partners will worsen under the key scenarios such as with the United States and the EU25, requiring currency depreciation to bring about a return to the benchmark positions.[30] In the case of an agreement with the United States, for instance, the Peruvian trade surplus with the United States is transformed into a slight deficit, while Colombia incurs tremendous bilateral deficit, as the country heavily relies on the US imports. As a result, Colombia's overall trade deficit in goods account worsens from the benchmark, whereas Peru's gross trade surplus narrows.[31]

The integration with the EU25 generates heterogeneous impact on bilateral trade positions. Peru manages to maintain its trade surplus, while the surplus in Ecuador will disappear. For other three countries, their trade deficit widens. In particular, Venezuela, which has the least export dependency (8.7 percent) and the largest import dependency (20.0 percent) on the EU market, will aggravate its initial trade deficit in grave magnitude. The Andean countries will need real depreciation or productivity gains larger than the expected depreciation; otherwise they will risk a loss of competitiveness in the international market and a wider trade deficit. This situation could be particularly stressful for dollarized Ecuador, since it cannot implement its own monetary policies.

Impact on Production

As cited in international trade literature, changes in trade policies will influence production through the following channels: prices, demand, trade and resource allocation. With changes in prices due to tariff elimination, domestic firms transform production technologies along with their production possibility frontier. Price shocks also alter demand at home and the volume of trade with partners. Domestic resources move away from affected industries to booming sectors.

In addition, two more factors will play an important role in our modeling framework. First, because our model incorporates endogenized efficiency gains in production process, trade liberalization leads to higher productivity particularly in manufacturing industries relative to other sectors. Second, as the supply of non-skilled labor is endogenized, labor-intensive industries are expected to expand their outputs, following the Rybczynski theorem. Since all of these factors work simultaneously, the overall impact depends on the magnitude of each effect.

In the case of the US-related scenarios, the most booming sectors are coffee and cocoa in Colombia and Ecuador. Production jumps by 7.8 percent in Colombia and 5.9 percent in Ecuador. Other booming industries are light manufacturing industries such as textiles, wearing apparel and leather and footwear. Yet this is not always the case. Production of textiles in Colombia and particularly Ecuador declines by 1 percent and 3.6 percent, respectively (scenario 2).[32] Metal industries in Bolivia and Peru also enjoy modest expansion.

[30] To be clear, the overall trade balance in goods and services remains unchanged.

[31] As shown during the adjustment process after the Latin American economic crisis, in which exports play a significant role as an engine for strong recovery and growth, the Andean countries have sufficient potentials to manage external shocks. If this would not be the case, each county is likely to lose global competitiveness and aggravate the overall trade account position.

[32] They are due to two structural factors in trade and protection: (i) Colombia and Ecuador have low shares of textile exports to the United States, but high shares of imports of textiles from the US origin; (ii) they have higher applied tariffs in the Andean countries. As a result, with bilateral trade agreements, the impact on imports is far greater than

On the contrary, import-competing agricultural sectors are at risk across the Andean countries. The most notable is wheat with high import dependency. In the Andean countries, wheat is non-export agriculture, so that domestic wheat growers face stronger competition from the US producers, while they do not exports to the US market. Its output declines by 16 percent in Colombia, and by 6 percent in Peru. Furthermore, heavy industries, such as motor vehicles and machinery and electric equipment, also suffer decline in output, at the range of 1-3 percent.

Compared with the FTA with the United States, integration with Mercosur generates sectorally smaller and less heterogeneous impact. The exception is wheat in Bolivia, where the output of wheat sharply plummets by 15 percent. Moreover, heavy manufacturing industries such as motor vehicles will be affected, particularly in Colombia and Ecuador. But this is not the case with Bolivia, which enjoys slight output expansion, as the country is more engaged in intra-industry trade with Mercosur than any other Andean members.

Under the FTA with the European Union, agriculture will be the winner, followed by processed foods, but the impact is asymmetric over the sectors. Vegetable and fruits are the region-wide beneficiaries. In particular, Ecuadorian growers enjoy the booming production by 5.7 percent. Bovine meat in Peru is another winner. Because Peru is the only source exporting this meat product to the EU market, the output rises by 11 percent. On the contrary, heavy manufacturing industries will be affected in most Andean countries. Ecuador will be hit the hardest, with the decline by 2.8 percent in heavy manufactures; outputs in metal and motor vehicles will decline the most by 4 percent. When the sensitive agriculture in the European Union is excluded from the agreement, the aggregate impact barely change for each of the Andean countries.[33] At the sectoral level, the most affected is bovine meat in Peru; the increase of the production of 11 percent under the full agreement is reduced to less than 1 percent.

Sectoral Impact on Trade

The sectoral impact on trade and production are reported below for each scenario. The analysis mainly focuses on the Andean signing countries..

Scenario 1: Andean-US "2+1" FTA

The bilateral agreements increase total exports to the United States by 7 percent for Colombia and 5 percent for Peru. The patters of the export adjustments are highly asymmetric over the sectors. But the sectoral export performance is fully consistent with the neoclassical paradigm, and clearly follows the theory of Ricardian comparative advantage. The most booming sectors are coffee and cocoa, traditional agricultural export commodities for Colombia, with export growth of 30 percent or more in both countries. Exports of textiles, wearing apparel, leather and footwear, also enjoy rapid expansion of exports at around 20 percent. Crude oil and gas, other Colombia's traditional leading exports, increase by a small 2.3 percent. This is also true for metals from Peru, which expand at modest 2.6 percent. For Colombia, coffee and cocoa account for 60 percent of new exports to the United States in value terms, and crude oil by another 15 percent. For Peru, labor-intensive light manufactures—textiles and wearing apparel—account for 45 percent of the new sales, followed by metals, and coffee and cocoa by 22 percent each. Thus, these traditional sectors continue to be the export driving force, and key foreign exchange earners in both countries.

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on exports. While exports rise modestly, the surge in imports of textiles surpress domestic production in Colombia and Ecuador.

[33] The sensitive agricultural products account for less than 1 percent of exports to the European Union for Peru and other Andean countries have much smaller export share.

The signing Andean countries experience sharp rise in imports in all product lines from the US origin. Imports from the United States jump by 40 percent for Colombia and 36 percent for Peru. But, the sectoral impact on imports is fairly balanced in both countries. As expected, capital-intensive goods comprise the bulk of new imports, sharing around 60 percent of new purchase from the United States. Machinery and electronic equipment are the largest new commodities with the share of 24 percent in Colombia and 30 percent in Peru.

As anticipated, the bilateral agreements have incurred the negative impact on non-signing Andean members due to trade diversion. While Colombia and Peru slightly expand their exports to other Andean members, they shift imports from the intra-bloc sources to the US origin. Colombia reduces its imports from its Andean partners by around 7-10 percent. Peru has much smaller effects. Capital-intensive heavy industries are the most affected sectors, because intra-industry trade in these products dominates the Andean intra-bloc trade.

Scenario 2: Andean-US "4+1" FTA

When the Andean-4 countries sign FTAs on a bilateral basis, gains from bilateral agreements are expanded to new signing members, while the aggregate impact and the patterns of adjustments remain almost unchanged from the previous scenario for Colombia and Peru. Now Bolivia expands its exports to the United States by 3.3 percent, and by 4.9 percent for Ecuador. The country sharply boosts its exports of coffee and cocoa, traditional agricultural exports, by 28 percent to the United States, and textiles by 23 percent. Crude oil and gas, the country's leading exports, expand by a small 1.7 percent. But these traditional products are the mainstay of the Ecuadorian exports, and primary foreign currency earners, sharing more than 70 percent of new sales to the United States. While Bolivia experiences the sectoral impact on exports similar to other Andean countries, its composition is quite different. Unlike other Andean countries, labor-intensive textiles account for 30 percent of its new sales to the United States, followed by metals with 15 percent share.

Imports originating from United States sharply increase in Bolivia (35 percent) and Ecuador (37 percent). Some sensitive agriculture sectors experience huge rise in imports: wheat in Bolivia and Ecuador, poultry meat in Ecuador. This is due partly to very low imports at benchmark, because of domestic sensitivity. In value term, however, capital-intensive products far dominate the new imports. For Bolivia with small industrial base, these products reach 80 percent of the new purchase from the US origin; machine and electric equipment alone account for more than 45 percent and chemical products for intermediate use by 17 percent. The composition of the new purchase for Ecuador is similar to that of Colombia.

Competitive US products divert initial imports from the Andean partners and intra-bloc trade declines. Among the capital-intensive products, intra-bloc exports of machinery and electric equipment fall by 4.8 percent, while those of metals decline by 3.8 percent, followed by chemicals by 3.5 percent.

Scenario 3-A: No ATPDEA

The return to MFN protection, after ending ATPDEA preferences on Bolivia and Ecuador, has significant economic consequences at sectoral levels on these countries, although the negative impact on macroeconomic variables is small. For Bolivia, the aggregate exports decrease by 8 percent. Because the United States raises its barrier by 10 percentage point on wearing apparel, and by 3 percentage point on textiles, exports of these products to the US market sharply decline by nearly 30 percent. As a result, production drastically falls in these labor-intensive traditional industries: 5.3 percent decline in textiles, and 1.4 percent drop in wearing apparel. Metal exports also suffer by 9 percent. Labor-intensive light manufacturing products and metals account for 85 percent of lost exports to the United States.

Ecuador experiences a smaller impact when compared to Bolivia. Its aggregate exports decline by 3.4 percent. While the country has the patterns of sectoral shocks on exports similar to Bolivia, the composition of reduced exports to the United States differs significantly. Vegetables and fruits, coffee and cocoa, and other foods products—the country's leading agricultural exports—account for 80 percent of lost exports to the US market.

Because Bolivia and Ecuador do not change their tariff regimes, the shock on imports is essentially marginal at sectoral level. In order to maintain balanced trade, however, the aggregate impact on imports is surely on the negative side but again marginal. The economic impact on other Andean members is negligible, as intra-bloc trade is not affected at all.

Scenario 3-B: Andean-US "2+1" FTA plus No ATPDEA

The overall impact of this scenario is nearly the sum of policy shocks simulated under scenario-1 (Andean-US "2+1" FTA) and 3-A (No ATPDEA). The sectoral trade performance is further amplified, accompanied by larger structural adjustments. Signing Colombia and Peru further reinforce their traditional patters of trade with the United States. Their leading export products—coffee and cocoa, textiles, crude oil in Colombia and metals in Peru—are the main beneficiaries. In return, these countries continue to purchase capital-intensive products, largely machinery and electric equipment, from the United States. Yet, the composition of new exports to and new imports from the United States is almost unchanged from the results under scenario-1.

For non-signing Bolivia and Ecuador, exports further deteriorate in all sectors. Labor-intensive light manufactures suffer the most: 8.3 percent loss of exports to the United States for Bolivia, and 11.9 percent for Ecuador. Wearing apparel is hit the hardest, with the decrease in exports to the US market by more than 30 percent, followed by textiles by 27 percent for both countries.

Regarding bilateral trade positions with the United States, Colombia slightly reduces its trade deficit, while Peru's balance remains unchanged. For Bolivia, its trade surplus with the Andean partners declines, as signing countries shift from the intra-bloc trade to the United States particularly on imports. Due to the same reason, Ecuadorian trade deficit with the Andean members slightly worsens.

Scenario 4: Andean-Mercosur FTA

The biregional south-south agreement enhances the bloc's initial trade patterns further. Namely each of the Andean countries increases resource-based exports with their comparative advantage in trade, in exchange for capital-intensive goods from Mercosur.

Because the Andean's trade link with Mercosur is low with the exception of Bolivia, in spite of geographic proximity, the impact on trade is impressively dynamic. On the top, Peru's exports to Merocsur jump by more than 60 percent, followed by Colombia at 47 percent and Ecuador at 36 percent. Because it is already an associate member of Mercosur, Bolivia's exports rise by only 7 percent. Capital-intensive heavy manufacturing products register the second-highest export growth after light-manufacturing goods, but they are key commodities in value term for Colombia, Peru and Venezuela. Yet leading commodities differ; chemicals dominate the new sales in Colombia and Venezuela, while metals are the main products for Peru. For Ecuador, agriculture (vegetables and fruits) and food products account for 90 cent of the new exports to Mercosur.

Roughly, the impact on imports from Mercosur is much larger. Import adjustments reach nearly 60 percent in Colombia and Venezuela, followed by Ecuador at 45 percent. For these countries, heavy

manufacturing products dominate new purchase from Mercosur: chemical products and metals as intermediate inputs for Bolivia and Ecuador; and automobiles as consumer durable products for Colombia, Ecuador and Venezuela. In this regard, Peru is the exception. Reflecting the initial structure of imports, processed foods (31 percent share) and labor-intensive light manufacturing products (22 percent) have high share in new imports from Mercosur, though heavy manufacturing products have the largest share of 37 percent.

For all Andean countries, higher import growth exceeding export performance eventually results in exacerbating negative trade balance account with Mercosur. In particular, Venezuela's trade deficit with Mercosur worsens by more than 80 percent. Because of the erosion of preferences over Mercosur, the Andean intra-bloc trade declines, as observed in the previous scenarios.

Scenario 5-A: Andean-EU Full FTA

The biregional full agreement sharply boosts the Andean's exports to the European Union. Yet the overall impact differs, as export structures of each country with the EU25 are highly asymmetric. Exports to the EU market rises by 37 percent for Ecuador on the top, followed by Peru at 24 percent. Venezuela benefits the least with an increase of less than 8 percent. Large tariff elimination by the European Union is the main factor for the Andean's robust export performance than the bloc's resource-based comparative advantage. Processed foods, which are protected the most in the EU market, will be the largest winners. 91 percent increase for Peru and 60 percent for Colombia. Agriculture also enjoys high export growth. Vegetables and fruits, among commodities, see the rapid export expansion with an increase of more than 40 percent across the Andean countries.

In value terms, agriculture plus processed foods are the leading exports. In the new sales to the European Union, these commodities account for 90 percent for Ecuador, 75 percent for Colombia, and 65 percent for Peru. Interestingly, for Bolivia and Venezuela, resource-based products—crude oil and metals—are also as important as agriculture and agro products; they account for 30 percent for Bolivia and 44 percent for Venezuela, in the new sales to the European Union.

On imports, the impact is larger than on exports, because the Andean countries undertake greater tariff elimination than the EU does. Imports rise by almost 50 percent in Colombia, Ecuador and Venezuela, and by 40 percent in Bolivia and Peru. Compared with export performance, the sectoral patterns are balanced. Moreover, the sectoral impacts are similar to those with the United State with more balanced patterns. In value terms, as seen in other scenarios, heavy manufacturing goods dominate imports. They reach 75 percents in Bolivia, 70 percent in Ecuador, and account for nearly 60 percent in Peru and Venezuela.

The bi-regional agreement with the EU25 has less market diversification effects than integration with the United States. This is because the former eliminates greater barriers to the Andean countries than the latter. All Andean countries increase their imports of EU origin. They also concentrate exports to the EU market. In value terms, aggregate new sales outside the European Union diminish slightly, except Venezuela, due significantly to worsening intra-bloc trade. As a result, bilateral trade surplus with the EU25 for Ecuador and Peru slightly narrows, while trade deficit in Bolivia and Colombia worsens. Venezuela more than doubles its deficit in trade account with the European Union.

Scenario 5-B: Andean-EU Partial FTA

The partial agreement excluding sensitive agriculture in the European Union does not change trade gains in the aggregate, achieved in scenario 5-A.[34] However, the exclusion affects the sectoral performance in these products. Peru is the most affected, as its exports of bovine meat to the EU market almost disappear; the country's high export growth of processed foods to the European Union is reduced sharply from 91 percent to 39 percent, with total export growth to the European Union from 24 percent to 16 percent. Likewise, Colombia also reduces exports in bovine meat, pork and poultry meat, and processed sugar; the export growth of processed foods is reduced from 60 percent to 40 percent. In Bolivia, cereal grains are the affected products; export growth of agriculture is reduced by almost 6 percentage points. The exclusion of sensitive agriculture affects relatively more Peru, Colombia and Bolivia in this order. Because the Andean bloc does not exclude its sensitive agricultural products in the agreement, the impact on imports essentially remains unchanged from the previous scenario.

The changes in the scope of the agreement in the European Union alter bilateral trade positions of the Andean countries. Peru's trade surplus with the European Union narrows further, whereas trade deficit in Colombia, which is in a small negative position at benchmark, aggravates its account from the previous scenario. Bilateral trade balances with the European Union for Bolivia, Ecuador and Venezuela, barely change from the previous scenario.

4.3. Opportunities and Deficiencies of the Andean Industries

Identifying winners and losers by sector is of crucial importance, when analyzing trade policies. Based on the sectoral impact on production from key trade agreements (scenarios 2, 4, and 5-A) from the Andean perspective,[35] we classified industries into 4 categories: winning (W), neutral (N), conflicting (C), and losing (L). The sectors are classified by the following criteria with 1-percent threshold in absolute value change:

(i)	Winning:	if at least one output variation is beyond the threshold, while others fall between the ranges of thresholds (plus and minus);
(ii)	Neutral:	if no variation outside the thresholds take place;
(iii)	Conflicting:	if positive and negative variations appear outside the thresholds; and
(iv)	Losing:	if at least one is negative, while others are within the thresholds.

Table 7 presents industries classified, according to the above criteria. To avoid clutters, industries in "Neutral" category are in blank. In spite of simple evaluation, the outcomes are very informative. Clearly most of the Andean's traditional resource-based industries appear to be clear winning sectors: crude oil and gas in Colombia and Venezuela, minerals in Peru, metals in Bolivia and Peru. Some agricultural sectors, such as coffee and cocoa notably in Colombia and to some extent in Ecuador, and vegetables and fruits in Ecuador, also belong to this category.

In Bolivia, contrary to the common notion, crude oil and gas as well as minerals, the country's leading industries, are in the neutral category. But these industries are likely to be closer to the winning sectors, particularly under the agreement with the European Union. Light manufactures are in mixed position. While textiles are winners, leather and footwear is in conflicting, and wearing apparel is in neutral categories, respectively. Heavy industries other than metals tend to be losers sectors under the agreements

[34] The sensitive agricultural products excluded from the agreement in the European Union consists are: paddy rice; wheat, cereal grains; bovine meat; pork and poultry meat; dairy products; and processed sugar.

[35] For Venezuela, we apply only scenarios 4 and 5-A and exclude scenario-2, because the country is not engaged in the agreement with the United States.

with the United States and the European Union. These industries might find only opportunity in seeking stronger trade and production linkage with Mercosur.

In Colombia, most agricultural sectors belong to losing sectors, except coffee and cocoa. Particularly wheat will be a loser under both the US and EU integration approaches. Only vegetables and fruits are winners under the agreement with the European Union. In food industries, the situation is mixed. Bovine meat and processed sugar appear to be winners, while pork and poultry meat become losers. The outcome in light manufacturing industries is also mixed. Wearing apparel, and leather and footwear, are total winners in all scenarios. The opposite is the case with textiles. In heavy industries, chemicals are in the neutral category. Other capital-intensive industries such as motor vehicles as well as metals are losers.

Table 7. Sectoral Winners and Losers in the Andean Industries

Industries	Bolivia	Colombia	Ecuador	Peru	Venezuela
Paddy rice			W	W	
Wheat	L	L		L	
Cereal grains		L	W	W	
Vegetables/ fruits		W	W		
Oil seeds/ Soybeans	L	L	L	W	C
Sugar cane			W	W	
Coffee/ cocoa		W	W	W	
Livestock				W	
Other agricultural products				W	L
Fishing			W		
Agriculture					
Coal, oil and gas		W			W
Minerals			L	W	
Petroleum					
Energy					
Bovine meat		W	W	W	
Pork and poultry meat		L			L
Dairy products					L
Processed sugar		W	W		
Other food products			W	W	
Processed Foods					
Textiles	W	L	L	W	L
Wearing apparel		W	W	W	
Leather products and footwear	C	W		W	
Other light manufactures		L	L		
Light Manufactures					
Chemical/ plastic products	L		L		
Metals/ metal products	W	W	L	W	
Motor vehicles	C	L	L		L
Machinery/ electric equipment	C	L	L	L	
Heavy Manufactures					

Source: Authors' estimation.
Note: In the table, W: Winning; C: Conflicting, L: Losing, and Blank for Neutral.

In Ecuador, the situation is promising in agriculture, except oilseeds and soybeans. Among others, vegetables and fruits as well as coffee and cocoa are the biggest winners. Likewise, processed food industries are also clear winners in all integration scenarios. On the contrary, our findings show that the outcome is challenging for manufacturing industries. All sectors, except wearing apparel, appear to be losers.

In Peru, the prospects are very promising. Agriculture is a clear winner. Particularly the integration with the European Union will bring about favorable outcome. This is also true for food industries. Light manufacturing industries—textiles, wearing apparel, and leather and footwear—are also winners, under the hemispheric and transatlantic initiatives. The exception is wheat—as seen in Bolivia and Colombia—that appears to be a loser. Similarly, machinery and electric equipment in heavy industries will be losers.

In Venezuela, the patters are generally challenging. Except crude oil and gas, which is a clear winner, all industries are either in losing or at best in neutral categories. Oilseeds and soybeans are categorized in conflicting class; the sector is a winner in the biregional FTA with the European Union, but a loser under the integration with Mercosur.

5. Impact of Policy Simulations on Poverty and Inequality

This section measures the impact of the policy simulations on inequality and poverty. To this end, we consider the possible external positions of the recently signed Andean-US FTAs combined with the reversal of ATPDEA as designed in scenario 3-B. This is because trade agreements with the United States are by all means the single most important regional initiative for Andean countries, due to strong trade linkages; bilateral agreements consolidate ATPDEA for signing parties, but non-signing countries may lose these preferences in trade. We evaluate the impact on poverty and inequality for Bolivia, Colombia and Peru, applying the microsimulation analysis by taking impacts simulated by the CGE model.

5.1. Household Income Profile

Based on the recent national household surveys,[36] households are classified by location, and urban and rural divisions outside the metropolitan area: 7 household categories in Colombia and Peru, and 8 in Bolivia.[37] Table 8 shows the sources of income for each regional household group. Factor income, consisting of receipts from labor, capital and land, is the main source of entire household income in each country, ranging from 82 percent in Colombia to 88 percent in Peru. Clearly labor income generated as wages is by far the key sources of household income. To this end, labor is decomposed into 6 classes by gender and skills, based on household surveys in each country.

While showing some common patters across countries, the composition of income fairly differs over household categories within each country and to lesser extent over countries. First, rural households tend to have higher income share of labor and land rents than those living in metropolitan or urban areas. The most obvious case is Colombia, where rural households rely more than 80 percent of income on labor wage earnings, followed by Peru. Similarly, land income share is particularly high for rural lowlands in Bolivia and rural coastal region in Peru.

Second, rural households tend to have lower capital income share than urban residents. Interestingly, however, rural households in Bolivia are more dependent on capital income than residents in Colombia and Peru, with income share ranging from 7 percent in rural lowlands to 10 percent in rural highlands and

[36] The national household surveys are: Encuesta Nacional de Hogares (2002) with 5,845 households for Bolivia; Encuesta Nacional de Calidad de Vida (2003) with 22,949 households for Colombia; and Encuesta Nacional de Hogares (2003) with 18,192 households for Peru. Sources are based on the Program Improving the Surveys of Living Conditions in Latin America and the Caribbean (MECOVI).

[37] In Colombia, household groups are: (i) metropolitan, (ii) urban coastal, (iii) urban lowlands, (iv) urban mountains, (v) rural coastal, (vi) rural lowlands, and (vii) rural mountains. In Peru, households comprise: (i) metropolitan, (ii) urban coastal, (iii) urban mountains, (iv) urban jungle, (v) rural coastal, (vi) rural mountains, and (vii) rural jungle. Bolivia's household groups are made up of: (i) La Paz-El Alto, (ii) Santa Cruz, (iii) urban highlands, (iv) urban valleys, (v) urban lowlands, (vi) rural highlands, (vii) rural valleys, and (viii) rural lowlands.

rural valleys. In sharp contrast, the capital income share in rural households is all below 2 percent in Colombia.

Table 10. Sources of Regional Household Income

(1) Factor Income and Transfers

(percentage share)

	Factor Income				Transfers					Total
	Labor	Capital	Land	Sub-total	Households	Government	Other institutions	Abroad	Sub-total	
Colombia										
Metropolitan	63.65	14.08	4.23	81.96	2.68	13.28	1.69	0.39	18.04	100.00
Urban coastal	68.83	10.93	4.15	83.91	4.59	9.21	1.60	0.68	16.09	100.00
Urban lowlands	70.58	8.10	5.09	83.78	5.70	8.16	2.02	0.34	16.22	100.00
Urban mountains	69.23	8.05	4.29	81.57	5.52	9.04	2.45	1.41	18.43	100.00
Rural coastal	80.24	1.64	8.50	90.38	4.28	4.51	0.73	0.10	9.62	100.00
Rural lowlands	81.43	0.50	9.38	91.31	2.53	5.69	0.43	0.05	8.69	100.00
Rural mountains	84.82	1.71	5.65	92.18	3.51	3.80	0.42	0.08	7.82	100.00
National	**65.60**	**12.65**	**4.37**	**82.62**	**3.24**	**11.99**	**1.69**	**0.47**	**17.38**	**100.00**
Peru										
Metropolitan	71.28	14.34	2.03	87.65	3.13	1.52	5.54	2.16	12.35	100.00
Urban coastal	72.75	10.89	2.59	86.23	4.98	1.35	6.17	1.26	13.77	100.00
Urban mountains	76.39	8.43	2.70	87.52	4.05	1.51	6.52	0.40	12.48	100.00
Urban jungle	75.96	11.52	3.20	90.68	2.96	1.29	4.04	1.03	9.32	100.00
Rural coastal	71.29	3.03	14.31	88.63	4.54	0.97	4.88	0.98	11.37	100.00
Rural mountains	82.85	2.34	6.39	91.59	5.79	0.43	2.09	0.10	8.41	100.00
Rural jungle	81.72	4.88	8.67	95.26	2.86	0.48	1.17	0.23	4.74	100.00
National	**74.53**	**10.08**	**3.76**	**88.37**	**4.03**	**1.27**	**5.13**	**1.19**	**11.63**	**100.00**
Bolivia										
La Paz-El Alto	74.99	8.92	2.74	86.64	2.81	0.75	8.58	1.22	13.36	100.00
Santa Cruz	69.85	11.26	4.43	85.54	6.93	0.53	4.23	2.77	14.46	100.00
Urban Highlands	73.88	9.78	1.77	85.43	4.69	0.72	7.54	1.62	14.57	100.00
Urban Valleys	63.61	13.05	5.01	81.67	5.74	0.78	10.18	1.63	18.33	100.00
Urban Lowlands	67.13	15.04	6.24	88.41	3.92	1.22	5.70	0.75	11.59	100.00
Rural Highlands	70.52	9.27	4.32	84.12	6.71	2.68	5.52	0.97	15.88	100.00
Rural Valleys	71.48	9.93	6.05	87.46	4.82	1.78	3.81	2.12	12.54	100.00
Rural Lowlands	72.62	6.84	12.84	92.29	3.09	0.83	3.08	0.70	7.71	100.00
National	**69.60**	**11.13**	**5.12**	**85.86**	**4.80**	**1.09**	**6.82**	**1.44**	**14.14**	**100.00**

(2) Composition of Labor Income

(percentage share)

	Low-skilled Female	Semi-skilled Female	High-skilled Female	Low-skilled Male	Semi-skilled Male	High-skilled Male	Total
Colombia							
Metropolitan	3.56	9.08	28.47	5.57	14.76	38.55	100.00
Urban coastal	6.24	13.37	19.37	14.25	23.97	22.80	100.00
Urban lowlands	7.95	13.98	17.21	15.75	24.40	20.71	100.00
Urban mountains	6.48	13.63	16.59	18.50	25.83	18.97	100.00
Rural coastal	12.53	5.51	6.95	59.58	12.27	3.17	100.00
Rural lowlands	9.51	5.99	4.13	60.24	16.80	3.33	100.00
Rural mountains	6.41	2.98	3.34	67.06	15.28	4.93	100.00
National	**4.55**	**9.95**	**24.97**	**10.55**	**17.09**	**32.90**	**100.00**
Peru							
Metropolitan	3.88	10.84	17.25	5.08	25.94	37.01	100.00
Urban coastal	5.45	9.66	13.77	10.44	30.31	30.37	100.00
Urban mountains	5.99	6.56	17.65	8.59	23.63	37.58	100.00
Urban jungle	5.97	9.44	16.10	10.66	27.98	29.86	100.00
Rural coastal	9.33	7.07	4.19	33.70	34.77	10.94	100.00
Rural mountains	10.92	5.67	5.42	39.82	26.28	11.88	100.00
Rural jungle	9.56	5.53	4.27	41.59	30.62	8.43	100.00
National	**6.13**	**8.70**	**13.81**	**14.45**	**27.56**	**29.34**	**100.00**
Bolivia							
La Paz-El Alto	10.08	6.22	16.26	13.74	18.81	34.88	100.00
Santa Cruz	8.27	7.04	16.09	16.39	21.45	30.77	100.00
Urban Highlands	11.25	5.07	14.02	23.99	22.41	23.27	100.00
Urban Valleys	9.81	5.58	15.45	18.80	14.59	35.78	100.00
Urban Lowlands	10.84	8.31	10.30	22.95	23.66	23.93	100.00
Rural Highlands	15.95	2.82	2.80	45.30	22.04	11.09	100.00
Rural Valleys	15.51	2.92	5.75	59.17	10.64	6.01	100.00
Rural Lowlands	11.52	3.38	1.85	62.20	15.64	5.41	100.00
National	**11.29**	**5.50**	**11.45**	**28.91**	**18.59**	**24.25**	**100.00**

Sources: National household surveys in each country.

Third, there is a salient difference in the structure of transfer income. In Colombia, government transfers constitute substantial portion, accounting for 12 percent at the national average. In particular, metropolitan and urban households considerably rely on these subsidies: 13 percent for metropolitan residents and 10 percent for other urban families. On the contrary, government transfers play a marginal role in the formation of income in Peru and Bolivia. In these countries, transfers from other institutions are more significant, mostly for urban residents. In Bolivia, households in urban valleys rely on this form of income by 10 percent, followed by 8.6 percent for families in La Paz and El Alto metropolitan area.

Table 8 reveals that wage income earned by low-skilled labor both in male and female categories is the major source for rural households, where poverty is chronic and acute. In Bolivia and Colombia, the share of low skilled labor accounts for more than 70 percent, except households in rural highlands in Colombia. In particular, rural households rely heavily on wage income by male: the majority from low-skilled category. This dependency is less obvious in Peru, but still features similar patterns as in Bolivia and Colombia. Combined with labor force structure (not presented), trade policies or any other domestic policy instruments targeting low-skilled male labor workers, who are mostly household heads in rural areas, are the key to combat poverty and inequity in the Andean countries.

5.2. Poverty and Extreme Poverty

Based on the FGT indices, Table 9 reports poverty and extreme poverty profiles. In Colombia, around 55 percent of the national population is below poverty line, and 25 percent are in extreme poverty. Poverty is extremely high in rural regions. Poverty head count reaches 84 percent in rural coastal and mountain regions, where more than half of the population lives below extreme poverty. There is no clear distinction in the nature of poverty between coast and mountain households in both urban and rural regions.

Table 9. Poverty and Extreme Poverty in the Andean Countries

(%)

	Poverty			Extreme poverty		
	Headcount (P_0)	Gap (P_1)	Severity (P_2)	Headcount (P_0)	Gap (P_1)	Severity (P_2)
Colombia						
Metropolitan	41.38	18.16	11.13	14.02	5.54	5.74
Urban coastal	67.92	38.24	26.45	35.63	15.93	10.00
Urban lowlands	62.57	32.59	21.59	27.55	12.32	8.04
Urban mountains	69.49	38.37	26.49	35.63	16.14	10.23
Rural coastal	83.94	52.93	38.65	56.68	27.42	17.55
Rural lowlands	80.04	46.48	32.80	50.95	21.93	14.02
Rural mountains	83.81	51.30	37.01	54.92	26.01	16.89
National	**54.77**	**28.11**	**18.76**	**25.41**	**11.03**	**7.08**
Peru						
Metropolitan	43.25	16.65	9.22	14.43	4.99	2.86
Urban coastal	44.25	16.99	9.31	16.13	5.40	2.97
Urban mountains	56.16	26.94	14.81	30.48	12.58	7.27
Urban jungle	58.63	27.22	16.13	37.00	14.57	7.91
Rural coastal	57.54	25.16	14.73	29.85	11.37	6.42
Rural mountains	86.60	54.31	38.84	74.06	40.12	26.14
Rural jungle	79.27	45.68	31.02	63.31	31.32	19.69
National	**61.85**	**31.90**	**20.80**	**39.62**	**18.75**	**11.63**
Bolivia						
La Paz-El Alto	39.52	13.81	7.10	15.58	5.01	2.61
Santa Cruz	35.14	14.04	7.93	12.16	4.94	2.88
Urban Highlands	54.36	26.07	15.89	32.50	12.05	6.67
Urban Valleys	45.89	20.43	12.12	21.71	7.71	4.33
Urban Lowlands	48.90	21.80	12.63	22.34	7.84	4.06
Rural Highlands	75.74	48.95	37.20	60.00	34.69	25.07
Rural Valleys	71.48	48.59	38.13	58.05	36.04	27.08
Rural Lowlands	56.41	30.84	21.67	36.24	19.37	13.14
National	**58.08**	**32.38**	**22.84**	**38.17**	**19.77**	**13.68**

Sources: National household surveys in each country.
Note: Poverty measurements follow the FGT indices.

In Peru, poverty rate by headcount is 62 percent, 7 percentage higher than Colombia.[38] As seen in Colombia, poverty is severe in rural area. In particular, poverty is treacherously high in rural mountain region—87 percent of poverty and 74 percent of extreme poverty—followed by rural jungle. Unlike Colombia, there is a distinct difference over geographic origin. Both in urban and rural areas, poverty is less prone in coastal regions than mountains and jungle regions. Both poverty and extreme poverty in urban coastal area is almost the same level as in metropolitan area. Moreover, rural coastal region shows lower extreme poverty rate than urban areas in mountains and jungle.

In Bolivia, the national poverty rate is 58 percent with 38 percent in extreme poverty. Santa Cruz, country's largest city, has the lowest poverty rate of 35 percent, and extreme poverty of 12 percent. But poverty rate jumps in rural region, with the highest poverty headcount of 76 percent in rural highlands. In both urban and rural regions, highlands are more prone to higher incidence of poverty than valleys or lowlands. Poverty and extreme poverty in rural lowlands are fairly low, compared with rural highlands and rural valleys.

5.3. Inequality

Table 10 presents income inequality, using three indices: mean income ratio between regional and national mean income; Theil and Gini indices. Clearly income distribution is highly heterogeneous in the Andean countries. In Colombia, income gap is substantially high over regions. Only the metropolitan area has higher mean income than the national average. Mean income of the urban mountains is slightly above 60 percent of the national average, while that of rural regions in coastal and mountains have only 30 percent of the national average. Measured by Theil and Gini indices, the national income inequality is the highest among three countries. High income region tend to have higher income inequality in Colombia. Metropolitan area with the highest mean income is the worst in inequality, measured by Theil index, and second worst by Gini index after urban coastal region. Inequality within each region is less in rural regions than urban regions for all corresponding regional households.

In Peru, the mean income ratio is clearly dichotomized between urban and rural regions outside the metropolitan region. Mean income in all urban regions with relatively small variations is higher than the national average, whereas that of rural regions is all lower than the national mean with larger deviations. Metropolitan region has more than 85 percent higher mean income than the national average, which is five times larger than that in rural mountains, the lowest income region. Peru's national income inequality is the lowest among three countries. Like Colombia, metropolitan region (Lima) is the worst in income inequality in the country.

In Bolivia, mean income in capital (La Paz-El Alto), Santa Cruz and urban regions is more than 50 percent higher than the national average. Income in urban areas is 2-3 times as high as that of the corresponding rural areas. Particularly in rural highlands, where poverty and extreme poverty are the highest in the country, mean household income is less than half of the national average. Income inequality within each region differs considerably. But in Bolivia, interestingly enough, region with higher mean income is associated with low inequality. Santa Cruz with the highest mean income has the least income disparity, whereas income inequality is the worst in rural highlands with the lowest mean income.

[38] Poverty and extreme poverty indices at the national level, based on the household survey in our estimation for Peru, are fairly different from those reported in the ECLAC (2005) Panorama Social de América Latina, ECLAC, which reports that Peru's poverty rate is 54.7 percent and extreme poverty at 17.1 percent. On the other hand, our estimation for Bolivia and Colombia well match with those in the ECLAC.

Table 10. Inequality by Regional Household in the Andean Countries

	Mean Income Ratio	Inequality	
	Regional over National	Theil index	Gini index
Colombia			
Metropolitan	1.313	0.678	0.560
Urban coastal	0.731	0.595	0.563
Urban lowlands	0.713	0.446	0.506
Urban mountains	0.620	0.522	0.541
Rural coastal	0.306	0.460	0.513
Rural lowlands	0.354	0.549	0.541
Rural mountains	0.307	0.504	0.528
National	**1.000**	**0.719**	**0.588**
Peru			
Metropolitan	1.851	0.463	0.496
Urban coastal	1.280	0.329	0.437
Urban mountains	1.134	0.401	0.485
Urban jungle	1.159	0.335	0.439
Rural coastal	0.758	0.376	0.425
Rural mountains	0.376	0.437	0.492
Rural jungle	0.479	0.352	0.451
National	**1.000**	**0.531**	**0.536**
Bolivia			
La Paz-El Alto	1.560	0.578	0.532
Santa Cruz	1.726	0.397	0.468
Urban Highlands	0.949	0.400	0.470
Urban Valleys	1.565	0.592	0.536
Urban Lowlands	1.609	0.469	0.495
Rural Highlands	0.440	0.719	0.624
Rural Valleys	0.504	0.642	0.604
Rural Lowlands	0.781	0.438	0.495
National	**1.000**	**0.666**	**0.588**

Sources: National household surveys in each country.

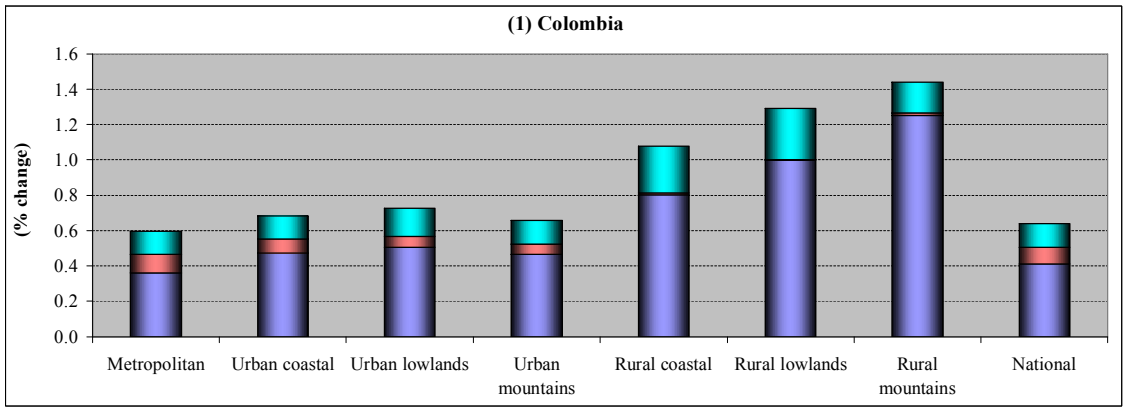
5.4. Impact on Household Income, Poverty and Inequality

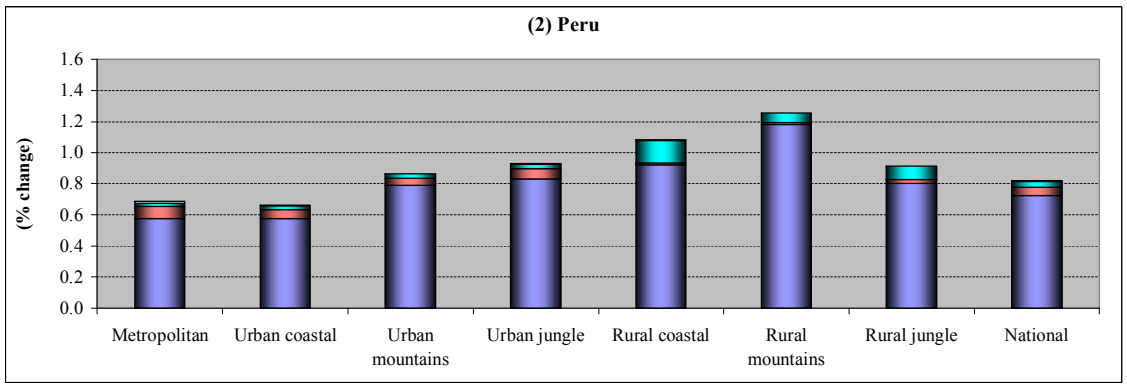
Impact on Household Income

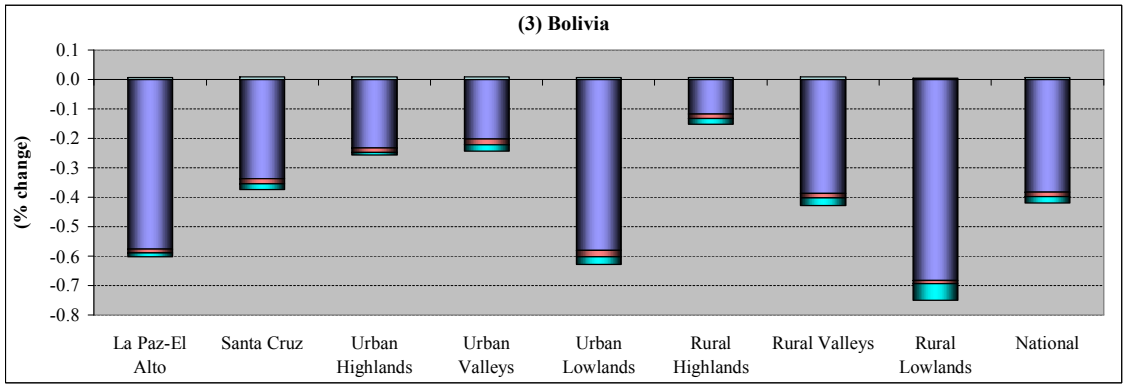
Figure 1 demonstrates the impact of trade liberalization on household income by region. In Colombia, the national household income rises by 0.6 percentage points, decomposed by two-thirds by labor income, 15 percent by capital income and 20 percent by land rents. As seen, income gains in rural households in terms of percentage change from base is greater than urban residents, implying that income disparity narrows at least at the national level. In particular, the impact on households in rural mountains with the lowest income in the nation is twice greater than that of urban mountain households.

Clearly the rise in labor income is the main source of rapid increase in rural household income, with two key factors. First, rural areas have larger labor income shares, which constitute more than 80 percent of the gross household income. Second, booming agriculture mostly in rural areas employs more workers, of which two-thirds belong to low-skilled male workers, who are largely household heads. Thus, higher labor income share and new employment opportunities for low-skilled labor in agriculture significantly contribute to narrowing stark income gap between urban and rural regions. This is an important and favorable outcome for Colombia. Land rents also contribute to raise income in rural areas. For households in rural coastal areas, an increase in land rent accounts for a quarter of the increased income. In contrast, new capital income gains constitute substantial share in an increased income in urban households.

Figure 1. Impact on Household Income (percentage change from base)







Legend:

Labor Capital Land Tranfers

Source: IDB-INT CGE model and microsimulation.

In Peru, the aggregate national income rises by 0.8 percentage points, and labor income accounts for a little less than 90 percent of this gain. The impact over regions follows the patterns similar to that in Colombia; namely, rural households receive greater income gains than urban residents. Furthermore, rural mountains with the lowest income level benefit the greatest income gain by 1.25 percent, followed by rural coastal region. Compared with Colombia, the smaller income growth in rural regions is attributed to two factors: (i) lower share of low-skilled labor, particularly male workers in agriculture; and (ii) smaller impact on employment creation in low-skilled male labor. Despite smaller factor returns and slower growth in rural household income gains, the larger share of rural households (accounting for some 40 percent share of the national total) pushes up the increase in national income more than in Colombia. In contrast, income gains in urban regions are greater in Peru than in Colombia. This is because job creation for low-skilled and semi-skilled labor is the greatest in light manufactures particularly in textiles and apparel, which are located in urban regions.

In sharp contrast with Colombia and Peru, the national household income falls by 0.4 percent in Bolivia. Loss in labor income constitutes more than 90 percent. Rural lowlands incur the largest income loss by 0.75 percent. This is because the region has the highest income share of low-skilled male workers (62 percent), who are mostly engaged in agriculture, and job loss in agriculture hit the hardest for households in rural lowlands. La Paz-El Alto and urban lowlands follow. This is due largely to the sharp decline in labor force in textiles by 7 percent for low-skilled female workers. Households in rural highlands, who have the lowest mean income and the lowest income share of low-skilled labor in rural regions are insulated from the negative impact. The aggregate income declines by 0.15 percent, which is the lowest over regions in Bolivia.

Impact on Poverty and Extreme Poverty

Table 11 presents the changes in the FGT poverty indices. In Colombia, the impact is modest, but positive in reducing poverty and particularly stark extreme poverty. At the national level, poverty measured in headcount declines by 0.37 percent. Yet the impact on poverty is uneven over regions. Poverty falls the greatest degree in rural lowlands by 0.68 percent, followed by metropolitan region, while poverty is least improved in urban mountains. In all regions, poverty gap and severity decline. In particular, poverty severity drops by more than 1 percent in metropolitan and rural mountain regions.

The impact on extreme poverty is more pronounced. The poverty headcount declines by 0.7 percent at the national level. In particular, extreme poverty improves by 2 percent in rural lowlands, followed by rural mountains by 1.33 percent. Poverty gap and severity also decrease in all regions. In rural regions, hinterlands (lowlands and mountains) improve more than coastal region. In urban regions, poverty gap and severity drop in metropolitan and urban mountains more than coastal and lowlands.

Poverty and extreme poverty also decline in Peru, and the impact at the national level is slightly greater than in Colombia; 0.54 percent and 0.76 percent, respectively. In general, poverty situation improves in urban areas relative to rural areas, with the highest reduction in metropolitan region by 1.24 percent. In rural areas, rural coastal region will improve the poverty than other regions. One of the reasons for this outcome is that industries such as light manufactures, energy and processed foods, which create the greatest employment opportunities, are mainly located in urban areas. Poverty gap and severity also improve in urban regions more than in rural areas. Extreme poverty follows the similar pattern to that of poverty with much greater magnitude. Metropolitan and urban jungle reduce extreme poverty by 1.16 percent and 1.38 percent respectively. But in terms of headcount, extreme poverty improves the most in urban coastal region with reduction by 2 percent.

In Bolivia, poverty aggravates nationwide. The national poverty level rises by 0.41 percent, but poverty worsens in urban region than rural areas. Metropolitan La Paz-El Alto is hit hardest; poverty in headcount

rise by 1.88 percent. In urban areas, poverty is the least aggravated in urban highlands. In rural regions, poverty worsens but with smaller dispersion. But extreme poverty considerably increases in Santa Cruz (5.56 percent) and La Paz-El Alto (4.76 percent). In particular, poverty gap and severity drastically rise in Santa Cruz—6.51 percent and 7.94 percent respectively—implying that the poor in this region becomes poorer. In Santa Cruz, the similar phenomenon appears in poverty situation, but much smaller magnitude. On the other hand, in rural areas, extreme poverty rises the most in lowlands (1.42 percent), which register the lowest extreme poverty rates. This is largely because the main destruction of jobs is due to industrial activities such as light manufactures, which are largely located in urban regions.

Table 11. Impact on Poverty (percentage change from base)

	Poverty			Extreme Poverty		
	Headcount (P0)	Gap (P1)	Severity (P2)	Headcount (P0)	Gap (P1)	Severity (P2)
Colombia						
Metropolitan	-0.53	-0.87	-1.08	-0.67	-1.52	-1.48
Urban coastal	-0.24	-0.57	-0.70	-0.92	-0.80	-0.84
Urban lowlands	-0.36	-0.45	-0.44	-0.41	-0.33	-0.48
Urban mountains	-0.08	-0.57	-0.88	-0.76	-1.56	-1.91
Rural coastal	-0.37	-0.47	-0.61	-0.18	-0.94	-1.09
Rural lowlands	-0.68	-0.49	-0.88	-2.02	-1.81	-2.61
Rural mountains	-0.39	-0.77	-1.05	-1.33	-1.53	-1.49
National	**-0.37**	**-0.67**	**-0.86**	**-0.70**	**-1.19**	**-1.35**
Peru						
Metropolitan	-1.24	-1.22	-1.32	-1.16	-1.62	-1.64
Urban coastal	-0.55	-1.07	-1.26	-2.00	-1.34	-1.08
Urban mountains	-0.60	-0.84	-0.85	-0.86	-0.85	-0.72
Urban jungle	-0.77	-1.49	-1.76	-1.38	-1.88	-2.23
Rural coastal	-0.67	-0.82	-0.80	-0.78	-0.72	-1.00
Rural mountains	-0.27	-0.59	-0.78	-0.46	-0.85	-1.00
Rural jungle	-0.35	-0.56	-0.79	-0.44	-0.83	-1.09
National	**-0.54**	**-0.81**	**-0.95**	**-0.76**	**-0.99**	**-1.11**
Bolivia						
La Paz-El Alto	1.88	1.36	2.03	4.76	2.06	4.19
Santa Cruz	0.51	3.07	4.68	5.56	6.51	7.94
Urban Highlands	0.27	0.68	1.20	1.36	1.90	2.45
Urban Valleys	0.51	-0.24	-0.37	0.54	-0.63	-0.61
Urban Lowlands	0.69	0.44	0.48	1.52	0.93	0.69
Rural Highlands	0.11	0.01	-0.01	0.25	-0.02	-0.02
Rural Valleys	0.39	0.31	0.34	0.48	0.37	0.41
Rural Lowlands	0.30	1.16	1.42	1.42	1.59	1.86
National	**0.41**	**0.46**	**0.55**	**0.81**	**0.63**	**0.71**

Source: IDB-INT Andean model simulation and miscrosimulation.

Effects on Income Inequality

Table 12 shows the impact on income inequality, measured by mean income, and two inequality indices: Theil and Gini coefficients. In Colombia, as household income in rural regions increases faster than in urban areas, income inequality slightly declines at the national level. Inequality improves in rural areas relative to urban regions. Within each region, inequality decreases the most in rural lowlands, followed by rural mountains. Rural coastal region is the exception, where inequality slightly worsens. With the least increase in mean income, inequality in metropolitan area barely changed. An increase in labor demand particularly for low-skilled male workers in agriculture contributes to and differentiates the reduction in inequality in rural areas and the rest of the country.

Like Colombia, the mean income in Peru grows faster in rural areas than in urban regions. As a result, the national income disparity slightly narrows, and inequality improves. Yet the impact on inequality between urban and rural is opposite to the pattern in Colombia. Metropolitan and urban areas improve inequality

within each region, except urban mountains, where inequality remains unchanged. On the contrary, inequality worsens in all rural areas, with the highest rise in inequality in rural mountains, which have the lowest mean income in the country. Despite marginal improvement in inequality at the national level, this outcome is unfavorable in reducing inequality in rural regions, where income levels are prevalently low.

Table 12. Impact on Income Inequality (percentage change from base)

	Mean Income	Inequality Indices	
		Theil	Gini
Colombia			
Metropolitan	0.57	0.01	-0.04
Urban coastal	0.63	-0.05	-0.06
Urban lowlands	0.64	0.08	-0.04
Urban mountains	0.59	-0.22	-0.19
Rural coastal	1.07	0.42	0.20
Rural lowlands	1.08	-0.75	-0.35
Rural mountains	1.34	-0.44	-0.18
National	**0.64**	**-0.11**	**-0.08**
Peru			
Metropolitan	0.67	-0.24	-0.11
Urban coastal	0.63	-0.18	-0.12
Urban mountains	0.82	0.01	0.01
Urban jungle	0.93	-0.36	-0.17
Rural coastal	1.08	0.39	0.43
Rural mountains	1.28	0.51	0.38
Rural jungle	0.91	0.08	0.10
National	**0.81**	**-0.23**	**-0.07**
Bolivia			
La Paz-El Alto	0.15	0.34	0.89
Santa Cruz	-0.37	0.82	0.41
Urban Highlands	-0.11	0.34	0.38
Urban Valleys	-0.01	-0.08	0.14
Urban Lowlands	-0.46	-0.12	-0.01
Rural Highlands	-0.15	-0.09	-0.06
Rural Valleys	-0.34	0.36	0.21
Rural Lowlands	-0.58	0.78	0.56
National	**-0.25**	**0.21**	**0.22**

Source: IDB-INT Andean model simulation and miscrosimulation.

In Bolivia, the mean income slightly declines at the national level and in all regions, except La Paz-El Alto. As a result, inequality rises at the national level. Yet there is no clear pattern between urban and rural areas, and within the respective regions. Inequality improves in urban valleys, urban lowlands and rural highlands, whereas worsening in the rest of the country.

6. Summary and Conclusion

Andean countries are at a crossroads in external strategies—trade and integration—and face challenges in combating poverty. Trade and integration continue to be an engine for growth, origin for global competitiveness, and source for sustained trade surplus. Meanwhile, despite visible economic growth over decades, the bloc continues to face high and persistent poverty, and lags behind other countries in Latin America in reducing poverty. Thus, these twin agendas are the core of development policies today, and the countries are in a critical moment to re-evaluate their strategies in external front, and in their impact on poverty.

To meet these challenges, we employ a two-step, top-down approach in sequence. The first step evaluates a wide set of Andean trade and integration options, using a brand-new CGE models with innovations in database and modeling. The second step measures the impact of the Andean-US bilateral agreements on poverty and inequality for three countries (Bolivia, Colombia and Peru), by applying the microsimulation analysis.

The CGE simulation results show that the impact of trade agreements is unambiguously expansionary. Bilateral trade agreements with the United States generate divergent outcome between signing and non-signing countries. The signing countries benefit from consolidating market access, but the non-signing members suffer loss due to deterioration of trade preferences. The costs of losing the ATPDEA preferences are much larger than the negative effects incurred by the exclusion from the agreements alone. The Andean-Mercosur bioregional agreement enhances dynamism of traditional resource-based exports in exchange for capital-intensive imports. The transatlantic agreement sharply increases the Andean exports particularly agricultural and agro-products to the European Union. The agreement with the EU25 has little market diversification effects than hemispheric approaches. The exclusion of sensitive agriculture affects relatively more Peru, Colombia and Bolivia in this order.

Trade and integration strategies also pose challenges for the Andean countries. In the hemispheric approaches, the Andean countries experience a strengthening of their pattern of comparative advantage, especially in traditional resource-based sectors. Most of the Andean's traditional resource-based industries appear to be clear winners, whereas the majority of capital-intensive heavy industries will be losers across the Andean bloc. Market opening alone does not automatically guarantee export diversification, nor change the economic structure and reinforce technology-intensive industries.

Another challenge is that the decline of intra-bloc trade has a direct impact on economic performance. This is particularly the case with non-resource-based capital-intensive industries, concentrated in intra-regional or domestic markets. An increase in exports beyond the Andean market will not necessarily offset the decline in intra-regional trade, resulting in a net loss of total sectoral exports. Moreover, trade agreements tend to erode trade balance positions with major partners—reduction of surplus with United States and increase in deficit with European Union—and the countries need currency depreciations to enhance exports to balance rising imports.

Regarding poverty and inequality, the impact of Andean-US bilateral agreements is pro-poor, reducing poverty and particularly extreme poverty both at national and regional levels for signing countries. It is demonstrated that the positive impact on poverty is less heterogeneous, but the effects on extreme poverty are highly uneven over regions. Income inequality also improves slightly at the national level, but uneven over regions in Colombia and Peru. The opposite is the case with non-signing Bolivia. Poverty rises both at national and regional levels, and income inequality worsens.

Our analysis shows that labor income gain is the primary determinant to reduce poverty and extreme poverty. The key element is income generation process for low- and semi-skilled male workers in rural regions. In particular, job creation effects for these labor categories are crucial. But this positive impact on poverty does not directly translate into improvement in inequality particularly at regional levels, due largely to heterogeneity in income composition, family structure and other elements at each household.

In sum, it is important for the Andean countries to continue to clinch to regional initiatives for growth, competitiveness and welfare. These strategies are also expected to improve poverty and to lesser extent inequality, but do not necessarily panaceas to combat chronic poverty and reduce prevalent inequality. To tackle these challenges, it is important to devise policy measures directly targeting the poor, in the combination with trade and integration approaches.

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Annex Table 1. Regions and Countries in the Model

Region	Country/subregion
Western Hemisphere	
Canada	Canada
United States	United States
Mexico	Mexico
Central America	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Bolivia	Bolivia
Colombia	Colombia
Ecuador	Ecuador
Peru	Peru
Venezuela	Venezuela
Argentina	Argentina
Brazil	Brazil
Chile	Chile
Rest of WH	Paraguay, Uruguay, and countries in the Caribbean subregion
Extra-hemispheric Region	
EU25	Austria, Belgium, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom
China	China
Asia3	Korea, Malaysia, Thailand
Asia7	Hong Kong, Indonesia, Japan, Philippines, Singapore, Taiwan, Vietnam
Rest of World	Rest of World

Table 2. Sectoral Classification in the Model

No.	Sectors	Description
I.	**Agriculture**	
1	Paddy rice	Paddy rice
2	Wheat	Wheat
3	Cereal grains	Corn, cereal grains, maize, sorghum
4	Vegetables and fruits	Vegetables and fruits
5	Oil seeds and Soybeans	Oil seeds, soybeans, sunflower
6	Sugar cane	Sugar cane, sugar beet
7	Coffee and cocoa	Coffee and cocoa
8	Livestock	Bovine cattle, sheep and goats, horses, animal products, wool, silk-worm cocoons, Raw milk
9	Other agricultural products	Plant-based fibers, cotton, jute, raw milk, forestry
10	Fishing	Fishing
II.	**Energy**	
11	Coal, crude oil and gas	Coal, crude oil, gas
12	Minerals	Mineral products (china, glass, cement), minerals (iron ores, tin ores, copper ores)
13	Petroleum	Petroleum, coal products
III.	**Processed Foods**	
14	Bovine meat	Bovine meat
15	Pork and poultry meat	Pork and poultry meat
16	Dairy products	Dairy products
17	Processed sugar	Processed sugar
18	Other food products	Vegetable oils and fats, processed rice, beverages and tobacco products
IV.	**Light Manufactures**	
19	Textiles	Textiles
20	Wearing apparel	Wearing apparel
21	Leather products and footwear	Leather products, footwear, shoes
22	Other light manufactures	Wood products (furniture), paper products, publishing, books, magazines, manufactures nec, toys, jewels
V.	**Heavy Manufactures**	
23	Chemical and plastic products	Chemical, rubber, plastic products, fertilizers, tires
24	Metals and metal products	Ferrous metals, iron, steel, metal products, cutlery, tools
25	Motor vehicles	Motor vehicles and parts, transport equipment (aircraft, trains, ships)
26	Machinery and electric equipment	Electronic equipment, machinery and equipment
VI.	**Services**	
27	Utilities and financial services	Electricity, gas manufacture, distribution, water, financial services, insurance, business services, public administration, defense, education, health
28	Construction	Construction
29	Trade and tourism	Trade, recreational and other services, dwellings
30	Transport and communication	Transport, water transport, air transport, communication

Note: Sectoral classification follows Global Trade Analysis (GTAP).

Annex Table 3. Composition of Andean Trade by Macrosector with Major Partners in 2001 (Percentage share)

	United States	Andean	Mercosur	EU 25		United States	Andean	Mercosur	EU 25
Bolivia					***Bolivia***				
Agricuture	6.9	10.9	1.4	14.4	Agricuture	1.1	2.7	9.9	
Energy	2.9	3.1	75.3	29.5	Energy	2.9	6.8	10.1	2.7
Procesed Foods	1.7	78.2	2.2	1.6	Procesed Foods	2.9	10.0	13.4	6.4
Light Manufactures	58.9	3.1	3.3	15.6	Light Manufactures	7.2	20.0	13.1	11.0
Heavy Manufactures	29.6	4.8	17.8	38.9	Heavy Manufactures	85.8	60.5	53.5	80.0
Total	100.0	100.0	100.0	100.0	Total	100.0	100.0	100.0	100.0
Colombia					***Colombia***				
Agricuture	18.7	2.1	1.9	33.6	Agricuture	9.4	6.1	4.7	2.4
Energy	54.8	4.3	29.9	37.6	Energy	2.4	3.3	3.6	3.2
Procesed Foods	3.2	13.9	4.0	8.5	Procesed Foods	3.3	27.4	11.5	5.0
Light Manufactures	12.9	25.4	13.2	7.8	Light Manufactures	9.6	9.5	12.4	12.5
Heavy Manufactures	10.4	54.2	50.9	12.5	Heavy Manufactures	75.4	53.7	67.7	77.0
Total	100.0	100.0	100.0	100.0	Total	100.0	100.0	100.0	100.0
Ecuador					***Ecuador***				
Agricuture	24.8	6.6	45.3	61.0	Agricuture	6.7	0.8	3.7	1.1
Energy	47.7	29.3		0.9	Energy	4.7	10.8	3.9	4.9
Procesed Foods	21.3	19.4	51.6	30.3	Procesed Foods	3.6	9.9	6.8	4.2
Light Manufactures	4.7	12.5	1.2	3.7	Light Manufactures	13.9	17.2	6.7	9.4
Heavy Manufactures	1.5	32.1	1.8	4.1	Heavy Manufactures	71.1	61.3	78.8	80.4
Total	100.0	100.0	100.0	100.0	Total	100.0	100.0	100.0	100.0
Peru					***Peru***				
Agricuture	11.99	2.96	0.46	10.19	Agricuture	10.67	2.01	28.67	1.22
Energy	10.29	5.54	30.40	10.03	Energy	4.46	47.62	5.15	3.88
Procesed Foods	2.98	12.03	4.68	14.98	Procesed Foods	5.21	6.74	18.04	4.66
Light Manufactures	28.61	24.51	8.10	7.03	Light Manufactures	7.24	9.37	9.96	12.65
Heavy Manufactures	46.13	54.96	56.37	57.77	Heavy Manufactures	72.41	34.26	38.17	77.59
Total	100.00	100.00	100.00	100.00	Total	100.00	100.00	100.00	100.00
Venezuela					***Venezuela***				
Agricuture	0.23	0.92		3.24	Agricuture	4.36	3.42	4.28	0.77
Energy	85.81	17.94	68.20	66.07	Energy	3.67	1.99	2.64	3.70
Procesed Foods	1.09	10.41	4.37	5.16	Procesed Foods	3.31	23.02	6.46	12.17
Light Manufactures	0.47	3.46	0.48	2.25	Light Manufactures	7.75	24.56	10.71	12.59
Heavy Manufactures	12.40	67.27	26.94	23.28	Heavy Manufactures	80.92	47.01	75.91	70.77
Total	100.00	100.00	100.00	100.00	Total	100.00	100.00	100.00	100.00

Source: IDB-INT Andean model database.

Annex Table 4. Impact on Aggregate Sectoral Exports

	Bolivia	*Colombia*	*Ecuador*	*Peru*	*Venezuela*
Scenario 1: Andean-US "2+1" FTA					
Paddy rice					
Wheat					
Cereal grains	-0.72		-4.97	0.60	
Vegetables/ fruits	0.14	-0.01	0.22	0.75	0.06
Oil seeds/ Soybeans	-1.70	-0.78	-5.36	-3.87	-1.17
Sugar cane					
Coffee/ cocoa	0.26	13.02	-0.56	6.85	-0.63
Livestock		0.66	-1.41	2.89	0.13
Other agricultural products	-5.14	0.40	0.28	0.71	0.18
Fishing		0.65	0.17	0.52	0.13
Agriculture	**-0.76**	**9.18**	**-0.05**	**3.75**	**-0.26**
Coal, oil and gas	0.20	1.77	0.15	1.09	0.12
Minerals	0.21	1.33	-0.48	1.41	0.06
Petroleum		1.24	0.18	0.69	0.09
Energy	**0.21**	**1.67**	**0.14**	**1.29**	**0.11**
Bovine meat	-7.12	1.27		2.24	-6.00
Pork and poultry meat		1.12	-7.30		
Dairy products	-2.98	1.93	0.39	2.31	-2.59
Processed sugar	-0.06	5.73	-4.70	25.83	0.18
Other food products	-1.18	1.90	-0.10	1.36	-0.75
Processed Foods	**-1.23**	**2.58**	**-0.32**	**1.74**	**-0.78**
Textiles	-3.20	4.40	-4.90	6.10	-1.85
Wearing apparel	0.25	6.45	0.28	4.73	0.15
Leather products and footwear	0.15	4.00	-1.90	2.67	0.00
Other light manufactures	0.27	1.76	-0.59	0.95	-0.62
Light Manufactures	**-0.16**	**4.05**	**-1.62**	**3.85**	**-0.85**
Chemical/ plastic products	-1.11	2.13	-2.58	0.93	-1.24
Metals/ metal products	0.44	2.86	-1.65	2.39	-0.32
Motor vehicles	0.38	3.83	-1.56	1.33	-1.07
Machinery/ electric equipment	-0.27	0.77	-1.68	-0.02	-1.28
Heavy Manufactures	**0.17**	**2.25**	**-1.99**	**2.14**	**-0.74**
Total	**-0.28**	**3.47**	**-0.28**	**2.26**	**-0.07**
Scenario 2: Andean-US "4+1" FTA					
Paddy rice					
Wheat					
Cereal grains	-0.42		-4.84	0.60	
Vegetables/ fruits	0.46	0.05	0.87	0.72	0.07
Oil seeds/ Soybeans	-1.36	-4.28	-5.09	-4.10	-1.18
Sugar cane					
Coffee/ cocoa	2.90	12.95	13.44	6.70	-0.67
Livestock		0.73	-0.02	1.88	0.18
Other agricultural products	-4.46	0.48	1.05	0.19	0.23
Fishing		0.69	0.57	0.51	0.15
Agriculture	**-0.12**	**9.14**	**3.59**	**3.63**	**-0.25**
Coal, oil and gas	0.42	1.75	0.90	1.02	0.15
Minerals	0.83	1.15	0.20	1.32	0.08
Petroleum		1.00	0.45	0.55	0.11
Energy	**0.64**	**1.61**	**0.84**	**1.19**	**0.14**
Bovine meat	-6.14	1.37		2.13	-6.03
Pork and poultry meat		-1.20	-5.71		
Dairy products	-1.89	1.96	2.15	2.20	-2.66
Processed sugar	24.87	5.51	5.67	25.68	0.20
Other food products	-0.80	1.54	2.07	1.34	-0.84
Processed Foods	**-0.61**	**2.25**	**1.95**	**1.70**	**-0.87**
Textiles	4.44	3.32	-3.12	5.51	-2.07
Wearing apparel	3.98	6.35	4.95	4.58	0.21
Leather products and footwear	1.52	3.87	-0.32	2.37	0.04
Other light manufactures	1.25	0.94	-0.13	0.62	-0.78
Light Manufactures	**1.92**	**3.49**	**-0.38**	**3.50**	**-0.99**
Chemical/ plastic products	-0.41	1.60	-1.53	0.12	-1.36
Metals/ metal products	2.44	2.68	-0.44	2.22	-0.40
Motor vehicles	0.28	2.74	-0.18	1.27	-1.52
Machinery/ electric equipment	-0.50	**-1.08**	**-1.29**	**-0.94**	-1.98
Heavy Manufactures	**1.35**	**1.49**	**-0.99**	**1.88**	**-0.90**
Total	**0.58**	**3.14**	**1.67**	**2.07**	**-0.08**

(continued)

	Bolivia	*Colombia*	*Ecuador*	*Peru*	*Venezuela*
Scenario 3A: No ATPDEA					
Paddy rice					
Wheat					
Cereal grains	0.07		-0.04	0.01	
Vegetables/ fruits	-1.05	0.03	-0.78	0.05	0.02
Oil seeds/ Soybeans	0.20	-0.79	0.21	-0.04	0.00
Sugar cane				0.03	
Coffee/ cocoa	-0.04	0.06	-2.44		0.02
Livestock		0.02	-0.16	-0.09	0.02
Other agricultural products	0.14	0.02	-0.05	-0.43	0.02
Fishing		0.02	-0.66	0.02	0.02
Agriculture	**-0.34**	**0.05**	**-1.13**	**0.03**	**0.02**
Coal, oil and gas	0.23	0.01	0.24	0.02	0.01
Minerals	0.03	0.00	-3.59	0.01	0.02
Petroleum		0.01	0.19	0.02	0.01
Energy	**0.12**	**0.01**	**0.16**	**0.01**	**0.01**
Bovine meat	0.34	0.02		0.02	0.00
Pork and poultry meat		-0.14	0.44		
Dairy products	0.33	0.00	0.36	0.02	0.00
Processed sugar	-5.92	0.00	-1.95	0.03	0.01
Other food products	0.15	-0.02	-1.91	0.01	0.00
Processed Foods	**0.10**	**-0.02**	**-1.86**	**0.01**	**0.00**
Textiles	-9.82	-0.05	-1.91	-0.01	-0.01
Wearing apparel	-15.77	0.03	-16.57	0.02	0.02
Leather products and footwear	0.03	0.00	0.19	-0.02	0.02
Other light manufactures	-2.20	-0.02	-0.77	0.00	0.00
Light Manufactures	**-4.18**	**-0.01**	**-2.50**	**0.01**	**0.00**
Chemical/ plastic products	-0.50	-0.02	-0.05	-0.05	0.00
Metals/ metal products	-1.13	0.02	-0.53	0.03	0.01
Motor vehicles	-2.31	-0.02	0.47	0.02	0.00
Machinery/ electric equipment	0.32	0.00	0.38	0.00	0.01
Heavy Manufactures	**-0.71**	**-0.01**	**0.12**	**0.02**	**0.01**
Total	**-0.64**	**0.01**	**-0.81**	**0.02**	**0.01**
Scenario 3B: Andean-US "2+1" FTA plus Reversal of ATPDEA					
Paddy rice					
Wheat					
Cereal grains	-0.64		-5.01	0.61	
Vegetables/ fruits	-0.91	0.02	-0.56	0.80	0.09
Oil seeds/ Soybeans	-1.50	-1.56	-5.16	-3.90	-1.16
Sugar cane					
Coffee/ cocoa	0.24	13.10	-2.96	6.89	-0.61
Livestock		0.67	-1.59	2.79	0.14
Other agricultural products	-5.01	0.42	0.24	0.27	0.20
Fishing		0.67	-0.50	0.54	0.14
Agriculture	**-1.10**	**9.24**	**-1.17**	**3.79**	**-0.24**
Coal, oil and gas	0.43	1.78	0.39	1.11	0.13
Minerals	0.24	1.33	-4.10	1.43	0.08
Petroleum		1.25	0.36	0.70	0.10
Energy	**0.33**	**1.68**	**0.30**	**1.31**	**0.12**
Bovine meat	-6.80	1.29		2.26	-5.99
Pork and poultry meat		0.97	-6.88		
Dairy products	-2.66	1.92	0.75	2.33	-2.58
Processed sugar	-5.98	5.73	-6.69	25.87	0.19
Other food products	-1.04	1.88	-2.02	1.38	-0.75
Processed Foods	**-1.13**	**2.56**	**-2.19**	**1.76**	**-0.78**
Textiles	-13.20	4.35	-6.93	6.09	-1.87
Wearing apparel	-15.54	6.48	-16.31	4.75	0.17
Leather products and footwear	0.18	3.99	-1.71	2.66	0.02
Other light manufactures	-1.93	1.74	-1.37	0.95	-0.61
Light Manufactures	**-4.37**	**4.04**	**-4.15**	**3.86**	**-0.85**
Chemical/ plastic products	-1.62	2.11	-2.65	0.89	-1.24
Metals/ metal products	-0.69	2.89	-2.19	2.42	-0.31
Motor vehicles	-1.94	3.81	-1.10	1.35	-1.08
Machinery/ electric equipment	0.06	0.73	-1.30	-0.02	-1.29
Heavy Manufactures	**-0.55**	**2.23**	**-1.87**	**2.16**	**-0.74**
Total	**-0.92**	**3.48**	**-1.10**	**2.28**	**-0.06**

(continued)

	Bolivia	*Colombia*	*Ecuador*	*Peru*	*Venezuela*
Scenario 4: Andean-Mercosur FTA					
Paddy rice					
Wheat					
Cereal grains	0.07		0.02	0.50	
Vegetables/ fruits	1.43	0.67	1.31	0.62	1.09
Oil seeds/ Soybeans	-1.74	0.35	-0.89	-1.02	0.47
Sugar cane					1.42
Coffee/ cocoa	0.93	1.08	0.91	0.97	
Livestock		0.23	0.06	1.29	1.91
Other agricultural products	-1.11	0.83	0.78	-1.76	1.51
Fishing		0.58	0.56	0.59	0.80
Agriculture	**-0.04**	**0.95**	**1.16**	**0.78**	**1.23**
Coal, oil and gas	0.98	0.72	0.46	0.63	0.85
Minerals	1.17	0.98	0.39	2.63	2.28
Petroleum		0.75	0.48	0.72	0.84
Energy	**1.08**	**0.75**	**0.46**	**2.26**	**0.94**
Bovine meat	-5.70	0.31		0.75	2.28
Pork and poultry meat		0.65	0.07		
Dairy products	-0.53	-1.33	0.91	1.21	-2.12
Processed sugar	1.47	0.19	0.31	1.01	1.64
Other food products	-0.68	0.48	1.79	0.95	2.12
Processed Foods	**-0.68**	**0.34**	**1.73**	**0.94**	**2.11**
Textiles	-0.08	1.71	-0.82	1.77	0.99
Wearing apparel	6.25	2.29	0.84	1.11	2.36
Leather products and footwear	0.62	0.29	-1.18	0.48	1.71
Other light manufactures	2.35	1.51	0.55	2.42	2.32
Light Manufactures	**2.25**	**1.69**	**0.16**	**1.76**	**1.88**
Chemical/ plastic products	1.81	2.75	0.28	1.63	4.28
Metals/ metal products	3.10	0.19	-0.72	3.70	2.48
Motor vehicles	25.54	-2.52	-3.19	-0.55	2.13
Machinery/ electric equipment	9.87	1.44	0.88	3.38	2.79
Heavy Manufactures	**6.00**	**1.34**	**-0.60**	**3.50**	**3.08**
Total	**1.70**	**1.05**	**0.84**	**2.37**	**1.35**
Scenario 5-A: Andean-EU Full FTA					
Paddy rice		(%)			
Wheat					
Cereal grains	41.07		-0.27	60.43	
Vegetables/ fruits	13.98	18.83	15.59	8.26	17.10
Oil seeds/ Soybeans	0.64	3.70	-0.53	0.79	2.90
Sugar cane					
Coffee/ cocoa	3.39	1.74	-0.32	3.10	5.38
Livestock		-0.79	-1.36	4.64	5.88
Other agricultural products	1.17	0.60	-0.32	0.43	1.67
Fishing		2.22	0.27	1.72	4.57
Agriculture	**7.69**	**6.08**	**11.21**	**5.93**	**8.12**
Coal, oil and gas	0.51	1.17	-0.29	0.27	1.18
Minerals	1.32	0.55	-0.87	1.07	2.84
Petroleum		1.00	-0.15	0.42	1.16
Energy	**0.94**	**1.08**	**-0.29**	**0.94**	**1.28**
Bovine meat	-2.49	152.67	-5.04	112.15	2.20
Pork and poultry meat		61.18			
Dairy products	-4.87	7.84	0.05	1.31	-3.81
Processed sugar	1.11	-0.86	-1.10	1.35	2.35
Other food products	-3.08	6.42	7.46	6.60	7.30
Processed Foods	**-3.08**	**7.15**	**7.06**	**14.28**	**7.22**
Textiles	4.61	2.79	-1.97	5.47	3.66
Wearing apparel	4.38	3.60	8.30	6.16	20.10
Leather products and footwear	12.85	6.42	-0.45	7.39	14.10
Other light manufactures	1.24	-0.46	-1.29	-0.31	2.04
Light Manufactures	**3.16**	**2.18**	**-0.50**	**3.76**	**4.69**
Chemical/ plastic products	0.57	0.41	-2.97	-0.37	2.86
Metals/ metal products	4.29	2.05	-2.49	2.76	3.74
Motor vehicles	1.10	-1.56	-5.96	-0.28	3.25
Machinery/ electric equipment	0.20	-1.51	-1.59	-1.01	1.80
Heavy Manufactures	**2.78**	**0.19**	**-3.36**	**2.31**	**3.28**
Total	**1.01**	**2.28**	**4.42**	**4.78**	**1.82**

(continued)

	Bolivia	*Colombia*	*Ecuador*	*Peru*	*Venezuela*
Scenario 5-B: Andean-EU Partial FTA without Sensitive Agriculture					
Paddy rice					
Wheat					
Cereal grains	0.42		-0.29	0.70	
Vegetables/ fruits	14.08	19.00	15.65	8.58	17.16
Oil seeds/ Soybeans	0.39	3.81	-0.61	0.85	2.94
Sugar cane					5.42
Coffee/ cocoa	3.55	2.00	-0.27	3.37	
Livestock		-0.76	-1.48	4.39	6.00
Other agricultural products	0.65	0.64	-0.26	0.41	1.68
Fishing		2.36	0.32	1.81	4.62
Agriculture	**6.30**	**6.31**	**11.27**	**5.58**	**8.19**
Coal, oil and gas	0.59	1.23	-0.24	0.52	1.23
Minerals	1.40	0.63	-0.82	1.39	2.89
Petroleum		1.05	-0.10	0.60	1.21
Energy	**1.02**	**1.14**	**-0.24**	**1.23**	**1.33**
Bovine meat	0.66	-1.63		1.61	2.07
Pork and poultry meat		-2.36	-5.19		
Dairy products	-5.12	-9.00	0.10	1.63	-3.76
Processed sugar	1.17	-0.79	-1.11	1.45	2.41
Other food products	-3.08	6.50	7.52	6.78	7.33
Processed Foods	**-3.08**	**4.23**	**7.11**	**6.31**	**7.25**
Textiles	4.61	2.92	-1.94	6.07	3.71
Wearing apparel	4.46	3.71	8.37	6.79	20.16
Leather products and footwear	12.92	6.52	-0.47	7.76	14.17
Other light manufactures	1.32	-0.38	-1.26	0.16	2.08
Light Manufactures	**3.22**	**2.28**	**-0.47**	**4.32**	**4.73**
Chemical/ plastic products	0.53	0.51	-2.98	0.00	2.88
Metals/ metal products	4.42	2.17	-2.50	3.35	3.78
Motor vehicles	1.20	-1.45	-5.91	0.35	3.31
Machinery/ electric equipment	0.27	-1.41	-1.56	-0.47	1.85
Heavy Manufactures	**2.88**	**0.29**	**-3.34**	**2.87**	**3.32**
Total	**0.98**	**2.17**	**4.47**	**3.62**	**1.87**