E C O N O M Í A

ISSN 0124-4396

SERIE DOCUMENTOS

BORRADORES
DE
INVESTIGACIÓN

No. 46, julio de 2004

An Exploratory Assessment of the Potential Impact of the Free Trade Area of the Americas on the Andean Community

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ARGÜELLO, Ricardo
An exploratory assessment of the potential impact of the free trade of de Americas on the Andean community / Ricardo Argüello. — Bogotá: Centro Editorial Universidad del Rosario, 2004.
23 p. : il., cuad., tab. –- (Economía. Serie Documentos, Borradores de Investigación; 46).
Incluye bibliografía.
ISSN: 0124-4396

ÁREA DE LIBRE COMERCIO DE LAS AMÉRICAS. ALCA. / POLÍTICA COMERCIAL / REGULACIÓN DEL COMERCIO / COMPETENCIA ECONÓMICA INTERNACIONAL / INTEGRACIÓN ECONÓMICA / COOPERACIÓN INTERNACIONAL / I. Título / II. Serie.

Primera edición: julio de 2004
ISSN: 0124-4396
Impresión digital: JAVEGRAF - Colombia

AN EXPLORATORY ASSESSMENT OF THE POTENTIAL IMPACT OF THE FREE TRADE AREA OF THE AMERICAS ON THE ANDEAN COMMUNITY

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ABSTRACT

An exploratory evaluation of the potential impact of the Free Trade Area of the Americas on the Andean Community is performed through a simulation using GTAP. Hosted by Purdue University, GTAP is a multi-region, applied general equilibrium model widely used to analyze global economic issues. The experiment is performed in a perfect competition, constant returns to scale framework and eliminates tariffs on goods trade between Western Hemisphere countries. The simulation results show modest but positive net welfare gains accruing to the Andean Community, largely due to allocative efficiency gains. Adverse terms of trade effects and trade diversion considerably reduce potential gains. Economic distortions within the Andean Community also have negative effects on welfare. Trade becomes more concentrated in bilateral flows with the United States and real returns on factors of production show improvements.

Key Words: Commercial Policy and Trade Regulation; Economic Integration, Policy and Empirical Studies

JEL Codes: F130, F150

RESUMEN

A través de una simulación llevada a cabo con GTAP, este documento presenta una evaluación preliminar del impacto potencial que el Área de Libre Comercio de las Américas tendría sobre la Comunidad Andina de Naciones. Mantenido por la Universidad de Purdue, el GTAP es un modelo multiregional de equilibrio general, ampliamente usado para el análisis de temas de economía internacional. El experimento llevado a cabo tiene lugar en un ambiente de competencia perfecta y rendimientos constantes a escala y consiste en la completa eliminación de aranceles a las importaciones de bienes entre los países del Hemisferio Occidental. Los resultados muestran la presencia de modestas pero positivas ganancias netas de bienestar para la Comunidad Andina, generadas fundamentalmente por mejoras en la asignación de recursos. Movimientos desfavorables en los términos de intercambio y el efecto de la desviación de comercio con respecto a terceros países, reducen considerablemente las ganancias potenciales de bienestar. De la misma forma, la existencia de distorsiones

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económicas al interior de la Comunidad Andina tiene un efecto negativo sobre el bienestar. El patrón de comercio aumenta su grado de concentración en el comercio bilateral con los Estados Unidos y la remuneración real a los factores productivos presenta mejoras con la implementación de la zona de libre comercio.

Palabras clave: Política comercial y regulación del comercio, integración económica, estudios de empíricos y de política.

Clasificacion JEL: F130, F150

1. INTRODUCTION AND OVERVIEW

The objective of this paper is to perform an exploratory evaluation of the potential impact of the proposed Free Trade Area of the Americas (FTAA) on the Andean Community of Nations' (ACN) economic welfare and pattern of trade. As known, in 1994, during the First Presidential Summit of the Americas it was agreed that Western Hemisphere countries (with the exception of Cuba) would negotiate and establish a comprehensive free trade area by the year 2005. Since then, a number of developments have followed and the project has entered the negotiating phase that, obstacles apart, seem to be headed to the completion of at least a first generation free trade accord.

Among the issues that have spurred the debate surrounding the FTAA project, there are two of particular interest. The first has to do with the question about the potential of the FTAA to bring welfare gains to participating countries and what its impact may be on trade with third parties. The second points to the way potential gains may depend upon the route that needs to be agreed to establish the FTAA. This later question is of concern, since there is an important overlap between the proposed FTAA and existing (and coming) free trade agreements within the region and countries such as Brazil and Venezuela have manifested their intent to consolidate sub-regional processes before integrating the FTAA.

Of these two issues, only the first is addressed here. To tackle it use is made of GTAP. Hosted by Purdue University, GTAP is a suit of data, models and software for conducting multi-region, applied general equilibrium analysis of global economic issues. GTAP-based research has been presented at diverse international forums aimed at evaluating the Uruguay Round Agreement (World Bank, 1995), the so-called Millennium Round (WTO-World Bank, 1999), and the Intergovernmental Panel on Climate Change.

Applied General Equilibrium (AGE) modeling has been the main quantitative tool for analyzing the likely impacts of Free Trade Agreements and other forms of trade liberalization. Substantial work in this area was done for assessing the Canada-US FTA as well as the NAFTA (this work has been partly reviewed by Kehoe, 2002, Brown, 1992, and Francois and Shiells, 1994). However, considering the size of the proposed FTAA and its likely importance for potential member countries, there is relatively scant AGE work on it. The evaluations by Hinojosa-Ojeda, Lewis, and Robinson (1997), Brown, Deardorff, and Stern (2000), Diao and Somwaru (2001) and Hertel, Hummels, Ivanic, and Keeney (2003) are perhaps the best known. None of these focus on the Andean Community, although some of them include at least an Andean nation.

The paper takes advantage of GTAP's focus on government intervention and trade and contributes to the ex-ante analysis of the FTAA. It does so, in particular, from the perspective of the Andean Community of Nations. The paper is organized as follows: aside from this introductory section, the second section describes the model and presents the methodology followed by the experiment carried out. The third section focuses on the main results obtained, with a particular focus on welfare analysis. Finally, some conclusions are drawn.

2. Model Description and Methodology

As mentioned, the GTAP model and its accompanying database are especially well suited to conduct research on the topics of interest for this paper. The basic structure of GTAP is summarily presented here.[1]

A fictional regional household, associated with each country or country grouping (region) collects all income generated in the economy.[2] The regional household exhausts income, according to a Cobb-Douglas per capita utility function, between private household expenditures, government expenditures, and savings. Private household expenditure is integrated by individual product (or product grouping) demands by means of a Constant Difference of Elasticity (CDE) implicit expenditure function. In turn, individual product demands are decomposed in domestic and imported demanded quantities following a Constant Elasticity of Substitution (CES) function. Furthermore, the imported demanded quantity of each product is decomposed according to its country (or region) of origin using, again, a CES function. These two CES functions embody the Armington assumption.[3] The structure of government expenditure follows a similar pattern with the difference that the first decomposition of demand is done by a Cobb Douglas function. Diagram 1A in the appendix illustrates this.

On the production side, technology is nested, characterized by constant returns to scale, and every sector produces a single output.[4] Technology is weakly separable between primary factors (value added) and intermediate inputs. This implies that profit-maximizing firms choose the optimal mix of primary factors independently from intermediate inputs' prices. It also means that the elasticity of substitution between any primary factor and different intermediate inputs is the same. A CES function is used in aggregating the four different types of primary factors considered in the model as well as in aggregating value added and intermediates. On the other hand, intermediates are decomposed between inputs of domestic and foreign origin by a CES function and the same happens in decomposing imported inputs by country of origin. As before, these CES functions embody the Armington assumption. Diagram 2A in the appendix shows this structure. GTAP distinguishes between endowment commodities, which are factors that are perfectly mobile, and those that are sluggish to adjust. In the former case, factors earn the same return regardless of the sector where they are employed, while in the second they may earn different returns in equilibrium. This is modeled by using a Constant Elasticity of Transformation (CET) function as illustrated in Diagram 3A in the appendix.

Household's savings are completely exhausted on investment. Demand for investment is savings-driven and does not affect the current productive capability of firms, that is, the model

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1 The description is mainly based on Brockmeier (2001). Extensive documentation of the GTAP model is available from its web page (htpp://www.agecon.purdue.edu/gtap). Some references are also provided in the references section of this paper.

2 This concept of national (or regional) income ensures that no agent can expend more income than she receives and is very useful for computing equivalent variation as a measure of regional welfare.

3 Thus, allowing not only to distinguish between countries (or regions) of origin but also to account for intra-industry trade.

4 There is a GTAP version that allows for increasing returns.

is static. Nonetheless, demand for investment goods has an effect on economic activity as it affects the pattern of production. The mix of capital goods that are demanded for investment is treated in a similar fashion to that of intermediate inputs. The identity savings-investment is not imposed. Instead, separate calculations for both are used as a consistency check on the accounting relationships that derive from the structure just described. The model computes savings and investment on a global basis and therefore all savers face a common price for the savings commodity. As a consequence, if all markets in this multi-region model are in equilibrium, all firms earn zero profits, and all households are on their budget constraint, global investment must equal global savings and Walras' law is satisfied.

Government intervention is modeled through additional value flows that embody the effects of policy. For simplicity, all these value flows are denoted as taxes and consist of voluntary or involuntary transfers that are not accompanied by corresponding flows of goods or services in the opposite direction. As these flows comprise both taxes and subsidies they denote net transfers. Therefore, private households, the government, and producers not only expend their income on consumption goods, factors, and intermediate goods, but also on tax payments to the regional household. The distinction between these two types of expenditures is captured by using market prices and tax-inclusive agents' prices. Tax revenue and subsidy payments are calculated by comparing the value of a given transaction as evaluated at market and agents' prices. As a consequence, no track is kept of any individual taxes or subsidies nor of their different uses.[5]

Tax revenues and subsidy expenditures generated through international trade are computed analogously to those in the domestic market. The only difference rests in that they are defined as the ratio of market to world prices. Therefore, even though there is no explicit accounting of the government budget balance, this balance is achieved through the general equilibrium of the model.[6] No international income or transfer payments are allowed in the model. Additionally, GTAP includes a transportation sector that accounts for the difference between fob and cif prices for a particular good shipped along a specific route.

The database used is version four of the GTAP database that comprises 45 regions and 50 sectors. For the purposes of the experiment carried out here, this database has been manipulated to yield country and sector groupings that are meaningful for the problem to be analyzed. This manipulation or aggregation strategy attempts to capture the most relevant actors and sectors involved. Regions are defined in a way that allows to identify the main parties of interest within and outside the Western Hemisphere, based upon relative levels of development and/or pre-existing economic integration processes (or patterns of trade). The list of regions employed includes: Canada, the United States of America, Mexico, Central America and the Caribbean, the Andean Community (ACN), Mercosur -including the Rest of South America,

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[5] Taxes faced by the different agents in the model can be summarized as follows. Private households pay consumption taxes on domestic and imported goods and income taxes net of subsidies. The government pays consumption taxes on domestic and imported goods. Producers pay taxes on their purchases of domestic and imported intermediate goods and on their purchases of primary factors.

[6] GTAP database, by definition, allows no negative flows or changes in stocks for consistency purposes.

Chile, the European Union and EFTA, East Asia, and the Rest of the World. It must be noted that the East Asia region, due to the limitation in the number of regions allowed in the model, comprises a mix of developed, developing and least developed countries.[7] A list of all countries comprised in each region and their classification according to development level is provided in the appendix.

As for the commodity groupings included, nine groups are defined in a classification that captures the main differences in existing protection levels. These groups comprise: Agriculture (AGR), Mining (MNG), Processed Food (PFD), Textiles and Clothing (TXL), Iron and Steel (I_S), Machinery and Equipment (M_E), Transport Equipment (TRE), Other Manufactures (OMF), and Services (SVC). A detailed list of commodities is provided in the appendix. The highest possible disaggregation of factors of production is employed in the experiment. Five endowment commodities are included in the database: Land, Unskilled Labor, Skilled Labor, Capital, and Natural Resources. This allows for an initial evaluation of the effects of the FTAA on factor returns.

The base year of the database does not include changes in trade policy brought about by the Uruguay Round (UR) of multilateral negotiations. It was therefore necessary to modify it first to incorporate an approximation of its results. This was accomplished by shocking worldwide tariff rates on goods according to the UR's tariff reductions as estimated by Yang, Martin, and Yanagishima (97) and running the model to get a new set of data. Also, quota rents for textiles and clothing were eliminated by removing export taxes imposed by textiles and clothing exporters vis-à-vis the main importing countries. Regarding agriculture, export subsidies were reduced by 36% and output subsidies by 20% in the case of developed countries. No export subsidies or output subsidies were reduced for developing countries or for the East Asia Region. Although incomplete, these modifications provide a good approximation for the UR results.

A second (subsequent) modification of the database incorporated the main sub-regional free trade agreements that exist in the Western Hemisphere. This modification followed the same procedure as before. Full liberalization among the North American Free Trade Agreement (NAFTA), Andean Community, and Mercosur partners, was attained by removing import tariffs on goods. Even though NAFTA has not yet entailed full liberalization of the agricultural sector, and there are important exceptions to liberalization among Mercosur partners, full liberalization was introduced in the data base on the grounds that by the time the FTAA will start implementation (December 2005), almost all tariff phase-off schedules in these agreements will be completed or near completion. In spite of being non exhaustive, these modifications take care of the most important pre-existing accords in the region (with the exception of some of the Chilean bilateral accords).

The new set of data, that takes into account the conditions under which a potential FTAA would be starting, provides the basis for running the experiment proposed. A general equilib-

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[7] It is important to note that when a region is defined, the economies that belong to it are aggregated in a single unit. Therefore, a unique regional household that collects all regional income is created and factors are assumed to be perfectly mobile within the region. Aggregation re-scales individual countries' input/output tables to match regional GDP and then sums up over them.

rium closure that allows for full adjustment of the economy is employed in the simulation. This closure implies that all markets are in equilibrium, all firms earn zero profits, and the regional household is on its budget constraint. The experiment aims at simulating the effects of complete trade liberalization for goods among Western Hemisphere countries. This is accomplished by full, simultaneous tariff elimination carried bilaterally over the set of Western Hemisphere countries. Thus, import tariffs between countries within the region are set to zero while those vis a vis third parties (and among them) remain unmodified.

3. MAIN RESULTS OF THE SIMULATION

Traditional trade theory predicts net welfare gains from trade liberalization. In a static framework, these gains come from increased allocative efficiency as countries devote their resources according to comparative advantage and consumers optimize along an expanded budget constraint. However, in the context of economic integration processes (like in Free Trade Areas and Customs Unions) this result does not necessarily holds. Economies entering such arrangements are subject to two opposite forces. Trade creation generates net welfare gains as countries import from the most efficient sources. Trade diversion, on the contrary, generates net welfare loses as trade is diverted from the most efficient sources to those that are now favored by tariff reductions. Also, in a general equilibrium setting and as countries entering the trade agreement have the capability for affecting world prices, terms of trade effects are of importance in determining the welfare outcome of the trade agreement.

In short, from above, the question as to whether an economy experiences welfare gains or loses stemming from a trade accord is an empirical one. Trade creation and trade diversion have to be estimated empirically in order to assess the net effect of the accord. The first subsection below presents the general welfare results for the ACN arising from trade liberalization in the Western Hemisphere and their decomposition by net value flows arising from government policies (taxes in the GTAP jargon).

Welfare changes come from sources that will be mentioned below. As trade liberalization modifies the conditions under which trade is conducted, the pattern of trade for countries implementing it (and of others as a consequence) will change and with them the structure of sectoral output and resource returns. All these changes are reported in this section as they personify the main effects of the potential FTAA on the ACN.

3.1 GENERAL WELFARE RESULTS AND THEIR DECOMPOSITION

GTAP uses the equivalent variation in income for measuring the money metric equivalent to the utility change brought about by a price change (in this case arising from tariff elimination). Equivalent variation measures how much money would have to be taken away from the representative consumer before the price change in order to leave him as well off as he would be after the price change. Decomposing welfare changes means breaking them down into their constituent parts. There are basically four major sources for any given welfare change: (1) allocative efficiency effects, (2) endowment effects, (3) technology effects, and (4) terms of

trade effects.[8] From these, endowment effects and technology effects are exogenous to the model and since we do not consider changes in these variables they have no effect on welfare. Allocative efficiency effects come from the reallocation of the existing resources between production sectors. Terms of trade effects result from more (less) favorable prices of exports or imports of a region due to trade policy reforms, or changes in supply and demand conditions. In this case, terms of trade effects derive from both changes in trade policy and changes in supply and demand conditions.

Aggregate welfare results arising from the establishment of the FTAA for the world economy are presented in Table 1, below. With the only exception of Canada, Western Hemisphere countries register moderate but positive welfare gains, measured as equivalent variation in million dollars. In absolute terms, the higher gains belong to the U.S.A., Central America and the Caribbean, and Mercosur. Canada's loses stem from adverse terms of trade and investment-saving balance effects (its allocative gains amount to just $21.17 million). As might be expected, non Western Hemisphere countries lose. The highest loses accrue to the European Union, followed by East Asian countries. These loses are a consequence of trade being diverted towards Western Hemisphere partners.

Among countries gaining from the FTAA, the ACN register the lowest level of welfare gains both in absolute and relative (to GDP) terms. Broken down by country, these gains originate mainly in the U.S.A., Mercosur, and Central America and the Caribbean.[9] On the other hand, loses come overwhelmingly from inside the ACN. Some of these loses will be discussed below. Finally, it is worth noticing that, as a percentage of GDP, all welfare effects of the FTAA are relatively small.

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[8] Another source of welfare changes in GTAP is the savings-investment balance position of a region. The savings-investment balance holds in the pre-simulation equilibrium. In GTAP this balance is given by equating the difference between savings and investment to the difference between exports and imports value (since no income flows or transfer flows are considered in the model. While the difference between savings and investment is largely determined by macroeconomic forces, the difference between exports and imports must adjust to keep the balance. Therefore, when tariffs are eliminated, as is done here, and imports surge, then exports must rise too to maintain the balance. However, any increase in exports will lead to a price decrease yielding a terms of trade deterioration. As a consequence, equilibrium can only be restored by changes in the exchange rate. As there is no money in GTAP, the real exchange rate is measured as the ratio of the price of primary factors in one region to the world price of primary factors. The role of relative primary factors in restoring the external balance derives from the zero profits condition. When tariffs are cut and imports surge, the only way that exports can become more competitive is for primary factors prices to fall relative to those in other regions. This also reduces regional income and helps damping the demand for imports. Welfare changes arising from the savings-investment balance relate to changes in prices for the investment goods and changes in prices for the aggregate global capital goods composite. As the position of a country changes in the valuation of its net investment and its savings welfare is affected.

[9] Most of the results presented have been broken down by Western Hemisphere's countries' contributions. This decomposition provides an appreciation of the impact of each of the partner countries on a particular result. Even though these countries have eliminated tariffs and contribute to welfare changes, their overall contribution is of a general equilibrium nature (probably driven to a large extent by terms of trade effects) and therefore no direct inference can be made with respect to its causality.

TABLE 1
GENERAL WELFARE EFFECTS FROM THE FTAA CONFORMATION
($ MILLION)

Region	E.V.	% of GD*	Contribution from:						
			Canada	U.S.A.	Mexico	C.A. & C.	ACN	Mercosur	Chile
Canada	-115.45	-0.02	-22.89	-50.43	1.15	-15.74	10.05	-33.48	-4.11
U.S.A.	3014.88	0.04	-17.05	-794.64	-58.42	1046.90	849.00	1763.38	225.71
Mexico	343.33	0.12	0.29	-25.75	2.06	12.79	59.59	259.85	34.51
C.A. & C.	1512.77	1.77	35.83	1338.00	19.84	-115.02	110.54	115.53	8.06
ACN	**39.87**	**0.02**	**23.11**	**282.81**	**25.44**	**114.32**	**-629.52**	**244.90**	**-21.20**
Mercosur	578.21	0.06	29.84	655.35	130.60	94.11	316.95	-882.75	234.10
Chile	129.49	0.20	1.79	4.08	10.37	11.64	81.91	129.15	-109.45
East Asia	-1858.54	-0.02	-21.21	-496.53	-42.13	-665.08	-257.38	-226.93	-149.27
E.U. & EFTA	-1812.20	-0.02	-19.45	-460.93	-43.02	-347.13	-288.93	-497.63	-155.13
ROW	-394.37	-0.02	-3.97	-53.64	3.00	-45.20	-139.11	-108.30	-47.15

Source: GTAP simulation
E.V.: equivalent variation
* E.V. as a percentage of GDP

ACN's welfare gains are dominated by allocative efficiency. Out of a total net gain of $39.87 million, $167.03 come from allocative efficiency gains, while $99.93 million are lost due to adverse terms of trade effects, and $27.24 million are lost to changes in the investment-savings balance.

ALLOCATIVE EFFICIENCY

Breaking down allocative gains by sector of production, it is observed that almost all commodity groupings register this type of gain. The only exception is transportation equipment, which generates loses of $55.57 million. The highest positive contributors include machinery and equipment ($94.19 million), other manufactures ($42.62 million), processed food ($40.1 million), and textiles ($23.26 million). Considered by type of tax (net transfers), allocative gains are positive for input taxes ($125.74 million), export taxes ($48.18 million), and import taxes ($18.86 million) and negative for production taxes ($18.06 million), consumption taxes ($7.51 million), and government taxes ($0.19 million). That is, with the only exception of input taxes, all domestic taxes contribute negatively to welfare while all trade taxes make positive contributions. Tables 2 and 3 present a sectoral disaggregation of allocative gains by type of domestic tax and a regional disaggregation by type of trade tax, respectively.

As follows from Table 2, there are negative volume changes (column "dvol" under the "production tax" column) in the production of iron and steel (I_S), machinery and equipment (M_E), and transport equipment (TRE) which, in the face of existing production taxes, yield welfare loses. On the contrary, output increases in the rest of commodity groupings and leads to welfare gains. Regarding private consumption, welfare contributions are negative for most product groupings. Only textiles and clothing (TXL), iron and steel (I_S), and machinery and equipment (M_E) have positive welfare contributions. If private consumption were differentiated according to the origin of the goods, it would turn out that, with the only exception of textiles, all products of

domestic origin contribute negatively to welfare.[10] On the contrary, imported goods tend to make positive welfare contributions (only agriculture and services yield negative contributions). As a consequence, the negative contribution to welfare coming from private consumption taxes is largely due to the effect that goods of domestic origin have. A similar, though less marked, situation happens with government consumption taxes. This result is not surprising since these taxes are distortive and the bulk of consumption tends to be of goods of domestic origin while trade taxes are being reduced (through the elimination of tariffs). Any amelioration or change of this expected effect must be basically due to price changes induced by tariff elimination.

TABLE 2

SECTORAL DECOMPOSITION OF ALLOCATIVE EFFECTS BY DOMESTIC TAX ($ MILLION)

Sector	Production tax		Consumptn. tax		Governmt. tax		Input tax	
	welcnt*	dvol**	welcnt*	dvol**	welcnt*	dvol**	welcnt*	dvol**
AGR	0.66	239.88	-0.15	-25.22	0.00	-0.15	-0.28	27.76
MNG	0.93	178.51	-0.01	-0.24	0.00	0.38	-0.32	25.31
PFD	0.45	23.52	-6.94	17.42	-0.09	1.92	0.56	25.94
TXL	0.49	109.71	0.69	23.79	0.00	1.45	0.93	22.73
I_S	-0.06	-27.17	0.00	7.97	0.00	0.01	0.08	-79.60
M_E	-4.18	-367.46	1.73	55.00	0.00	4.63	109.34	-129.42
TRE	-21.70	-920.15	-0.77	75.15	-0.01	5.98	7.26	-180.70
OMF	0.76	47.72	-1.79	70.40	-0.02	14.86	7.38	8.09
SVC	4.59	387.72	-0.27	-100.98	-0.07	-79.33	0.80	307.74
CGDS	0.00	428.33						
Total	-18.06	100.61	-7.51	123.30	-0.19	-50.27	125.74	27.86

*welcnt = welfare contribution
**dvol = volume change
Source: GTAP simulation

In the case of input taxes, as before, Table 2 only shows the net welfare effect coming from goods of domestic and foreign origin. Here, welfare contributions arising from domestic goods most frequently show the opposite sign to those coming from imported goods. The only goods that show the same sign in both cases are agriculture (which is negative), textiles and clothing (which is positive), and machinery and equipment (which is positive). Additionally, among goods of foreign origin only agriculture and services generate negative welfare effects. Since only agriculture and mining show negative net welfare contributions, this means that the positive contribution coming from domestic services more than offsets the negative one arising

[10] The decomposition between goods of domestic origin and imported is not included in the table to make its reading easier.

from imported services. As a result, the overwhelmingly positive effect that input taxes have on welfare is basically due to the effect of imported goods.

Summarizing the effect of domestic taxes on welfare changes we have the following. Production taxes, private consumption taxes, and government consumption taxes have negative effects on welfare that are dominated by domestic goods consumption. In contrast, input taxes show a large positive welfare contribution and are basically determined by consumption of imports.

On the other hand, as shown in Table 3, the welfare effect of trade taxes both on the export as well as on the import side is clearly positive. Results of the simulation are presented in this case following a regional perspective instead of a sectoral one. Even though this does not allow to persist on the discussion as done above, it has been considered that a regional perspective is more telling at this point for analyzing the structure of allocative effects. On the export side, most exports internal to the ACN fall as a consequence of tariff elimination among Western Hemisphere countries and determine the biggest of the two registered welfare loses (the only internal exports that rise correspond to agriculture and services). For the rest, the vast majority of ACN's exports to any destination, including third parties, increase. From a sectoral perspective, even though no product grouping shows net export decreases (in volume), three show negative welfare contributions: agriculture, mining, and machinery and equipment.

TABLE 3

REGIONAL DECOMPOSITION OF ALLOCATIVE EFFECTS BY TRADE TAX ($ MILLION)

Region	Export tax		Import tax[11]			
	welcnt*	dvol**	welcnt*	dvol**	taxrateb&	taxrateu&&
Canada	1.42	100.67	44.50	556.85	53.26	1.61
U.S.A.	15.74	1325.73	167.60	3099.00	62.70	1.81
Mexico	4.42	132.65	22.89	374.16	71.60	1.26
C.A. & C.	27.89	499.95	20.19	244.97	83.39	1.69
ACN	-15.22	-967.90	0.06	-967.90	3.27	3.27
Mercosur	9.68	917.61	70.25	1251.59	78.10	3.05
Chile	-1.41	-82.38	21.98	390.18	79.66	0.89
East Asia	0.32	39.78	-179.86	-1148.17	80.19	80.19
E.U. & EFTA	4.30	37.26	-129.32	-1425.13	66.71	66.71
ROW	1.04	22.87	-19.44	-176.09	68.16	68.16
Total	48.18	2026.25	18.86	2199.46		

*welcnt = welfare contribution
**dvol = volume change
&taxrateb = beginning tax rate
&&taxreu = final tax rate
Source: GTAP simulation

[11] Final import tax rates before Western Hemisphere partners are not zero in this table since they also comprise import taxes for services, whose trade, as explained before, was not liberalized in the simulation.

Imports from all Western Hemisphere origins make positive welfare contributions. As might be expected, practically no net welfare changes accrue from intra ACN imports, since there were no tariffs before and all Andean countries liberalize vis a vis other regions in the Hemisphere (however, with the exception of agriculture and services, all product groupings show decreases in intra ACN imports). Here, it is worth noting the size of trade divertion. Welfare loses arising from trade diverted from third parties towards FTAA partners are close to total import gains. As a matter of illustration, welfare loses stemming from trade divertion from East Asia are bigger than any individual gain from hemispheric partners. Sectorally speaking, agriculture is the only exception to the general decline in the volume of imports from third parties. In general, in terms of welfare contributions, transport equipment, machinery and equipment, and, more modestly, services are the only product groupings that show negative effects.

Terms of Trade

As noted before, terms of trade effects are important. Table 4, below, presents a decomposition of the terms of trade effects by product grouping and price type. From these figures, it is apparent that (with the only exception of agriculture) the main determinants of these effects come from adverse relative changes in the prices of ACN's exports and imports occurring simultaneously (columns pexport and pimport in the table). What the result of the interaction between world prices (pworld), export prices for the ACN, and import prices for the ACN (pimport) is, determine the sign of the welfare effect of changes in the terms of trade.[12] It is important to notice that the information presented in the table refers to the direct effect on welfare arising from each type of price considered, rather than to the price changes alone.[13]

As seen in Table 4, prices of goods exported by the ACN make positive welfare contributions only when export prices increase more than world prices (cases of agriculture and mining). In the rest of cases, either export prices decrease more than world prices do or export prices decrease while world prices increase, having a negative impact on the terms of trade and therefore on welfare. On the other hand, as for import prices are concerned, terms of trade improve in the following situations. First, import prices decline while world prices increase (cases of agriculture, mining, machinery and equipment, and other manufactures). Second, import prices decline more than world prices do (cases of processed food and services). Conversely, terms of trade deteriorate when either import prices increase while world prices decrease (case of iron and steel) or import prices increase more than world prices do (cases of textiles and transport equipment).

The net terms of trade effect corresponds to the summation over each component. As shown, the net trade position of the ACN along with the corresponding price change determines an overall positive welfare contribution from world prices. Negative, and sizeable, contributions

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[12] Pworld refers to the average world price across product groupings. This average is calculated as a composite average over all countries individual prices (recall that the model uses the Armington assumption).

[13] That is, data refer to the "net" effect of price changes times quantities traded on welfare. Hence, the column pworld is the result of the product between the net trade position of the ACN and the change in the average world price for the corresponding product grouping. Under pexport it is reported the product between quantities exported and changes in export prices for the ACN. Something analogous happens for the case of imports.

are registered from export and import prices. The corresponding net results for each product grouping are presented under the last column of the table. All in all, the welfare terms of trade effect is negative and, as mentioned, amounts to $99.93 million.

TABLE 4

DECOMPOSITION OF THE TERMS OF TRADE EFFECTS ON THE ANDEAN COMMUNITY BY SECTOR AND PRICE TYPE

($ MILLION)

Sector	pworld	pexport	pimport	Total
AGR	5.11	10.48	-5.83	9.76
MNG	1.59	83.87	-4.62	80.84
PFD	-0.13	-18.26	-1.58	-19.97
TXL	0.00	-8.00	1.68	-6.33
I_S	-0.55	-21.93	0.55	-21.93
M_E	0.68	-6.32	-10.92	-16.56
TRE	1.05	-22.27	11.58	-9.64
OMF	0.47	-52.20	-6.93	-58.66
SVC	-2.15	-41.78	-13.51	-57.44
Total	6.07	-76.42	-29.58	-99.93

Source: GTAP simulation

INVESTMENT-SAVINGS BALANCE

Lastly, the investment-savings balance determines a further welfare loss of about $27 million. This result comes out of an excess of net investment over savings that amounts to $2,540.18 million in the face of a larger decrease in the price of capital goods vis-à-vis the price of savings (making investment less valuable than savings).

3.2 EFFECTS ON THE ACN'S TRADE BALANCE AND PATTERN OF TRADE

Changes in trade flows caused by tariff elimination induce deterioration in the ACN's trade balance of about $388.6 million. The only country that contributes positively to the ACN's trade balance is Chile and it does it very moderately ($9 million). The two biggest sources of this deterioration are the U.S.A. ($156.3 million) and the ACN itself ($179.8 million).[14] In sectoral terms, agriculture, mining, and services make up the bulk of positive changes in the trade balance (about $687 million), while machinery and equipment, and transportation equipment contribute most of the negative changes ($1,153 million).

[14] It must be remembered that regional (or country) effects are general equilibrium and no specific causation can be attributed to them. They most likely arise through terms of trade induced changes.

The highest relative increase in exports is found for textiles and clothing (about 22%) and it also registers the highest relative increase in imports (about 14%). Only agriculture and services experience relative increases in exports simultaneously with relative decreases in imports. The only product grouping that shows relative decreases in exports is transportation equipment. Detailed information on export and import changes, broken down by sector and countries' contributions is provided in the appendix (Table 3A).

As for export and import shares are concerned, ACN's trade becomes more concentrated in the U.S.A. as trade with this country gain five percentage points in export share and almost the same figure in import share. These changes put the shares of bilateral trade with the U.S.A. in the order of 33% for both exports and imports. Meanwhile, the E.U., the second largest ACN's commercial partner, lose 3.8 and 3.7 percentage points, respectively. East Asian countries also present important share loses. The latter are comparable in magnitude with the loses experienced by intra-ACN's trade. Table 5 below shows the relevant information.

TABLE 5

ACN's PRE-SIMULATION TRADE SHARES AND SIMULATION-INDUCED SHARE CHANGES

Region	Export Share	Change in Export Share	Import Share	Change in Import Share
Canada	2.7%	1.0%	2.6%	1.0%
U.S.A.	27.6%	5.0%	28.0%	4.9%
Mexico	2.7%	0.6%	2.7%	0.6%
C.A. & C.	2.4%	0.4%	2.4%	0.4%
ACN*	14.4%	-2.6%	14.7%	-2.6%
Mercosur	6.9%	2.1%	7.1%	2.1%
Chile	2.1%	0.7%	2.2%	0.7%
East Asia	12.3%	-2.8%	12.1%	-2.8%
E.U. & EFTA	22.7%	-3.8%	22.2%	-3.7%
ROW	6.1%	-0.6%	6.0%	-0.6%

* Refers to intra-ACN trade
Source: GTAP simulation

3.3 EFFECTS ON OUTPUT AND FACTOR RETURNS

Sectoral output in the ACN varies in a manner that is roughly consistent with the observed changes in trade flows. The ample deterioration in trade balances for machinery and equipment, and transport equipment reflects in the two largest percentage decreases in output. Meanwhile, export increases in agriculture, mining, and services contribute to increases in output, although at a relatively limited level for services due to its large size.

As shown in Table 6, seven of the product groupings experience increases in output. However, none of these reaches the one percent level. The groupings iron and steel, machinery and equipment, and transportation equipment show output decreases. For the last two groupings

these are of a sizable magnitude. It is interesting to note that, in general, the extent of the contribution of the U.S.A. to these results is high. Nonetheless, the scope of the contribution of the ACN itself tends to be bigger in size but with relative frequency goes in the opposite direction than the actual net output change.

Figures corresponding to percentage changes in private demand for domestically produced commodities, show that the only group of products for which this type of demand increases is agriculture (0.11%). The rest of commodity groups experience decreases that range from –0.01% (services) to –14.83% (transport equipment). On the other hand, private demand for imports decreases for agriculture (-3.47%) and services (-1.33%) and increases for the rest of commodity groups, ranging from 0.88 (iron and steel) to 18.23% (textiles). This implies that, taken into account the behavior of domestic demand, changes in trade flows appear to be the main driving force behind output changes.

TABLE 6

FTAA EFFECTS ON THE ANDEAN COMMUNITY'S SECTORAL OUTPUT (% CHANGES)

Sector	% Output change	Contribution from:						
		Canada	U.S.A.	Mexico	C.A. & C.	ACN	Mercosur	Chile
AGR	0.72	-0.01	0.01	-0.02	0.01	0.81	-0.11	0.02
MNG	0.56	0.02	-0.33	0.00	-0.01	0.76	0.12	-0.01
PFD	0.05	0.00	0.39	-0.04	0.18	-0.49	0.01	0.00
TXL	0.74	0.10	3.09	0.04	-0.26	-2.16	-0.03	-0.03
I_S	-0.32	-0.08	-1.94	0.27	-0.32	2.75	-1.05	0.05
M_E	-4.07	-0.05	-1.08	-0.03	-0.17	-2.48	-0.32	0.05
TRE	-9.57	0.05	-1.16	-0.06	-0.26	-7.71	-0.46	0.04
OMF	0.08	-0.03	0.07	0.02	0.08	-0.35	0.32	-0.03
SVC	0.21	0.00	-0.07	0.00	0.00	0.29	0.00	0.00
CGDS	0.95	0.01	0.36	0.02	0.04	0.43	0.12	-0.02

Source: GTAP simulation

Lastly, real returns on factors of production in the ACN improve in all cases. The largest increases are experienced by land and natural resources (3.77% and 5.13%, respectively), while unskilled and skilled labor have similar, intermediate, gains (0.79% and 0.74%) and capital register the lowest gains (0.57%). In the cases of land and natural resources, these results come mainly from increases in the market price of these commodities. In the other cases, real returns increase in spite of the fact that market prices for these factors decrease. This is so because consumption prices decrease for all goods (except agriculture), making the cost of living decrease more than factor market prices. A table (Table 4A) showing country contributions to the determination of real returns changes is included in the appendix.

4. CONCLUSIONS

Under the conditions of the scenario that provided the basis for this experiment, the ACN is expected to attain modest welfare gains from trade liberalization in goods under the FTAA. Most gains come from its interaction with the U.S.A., followed by Mercosur and Central America and the Caribbean. However, important loses seem to arise from domestic distortions. Allocative efficiency gains tend to dominate welfare results. However, significant loses arise as a consequence of adverse terms of trade effects.

Changes in trade flows reinforce a marked concentration on bilateral trade with the U.S.A. and lead to a further deterioration of the trade balance. More importantly, there are significant welfare loses arising from trade diverted from third parties towards FTAA partner countries. Output increases modestly for most product groupings, but important decreases appear for transport equipment and machinery and equipment. Also, land and natural resources register significant increases in real returns while positive but low increases are found for unskilled labor, skilled labor, and capital.

Further inquiry would prove useful in determining alternative scenarios or conditions that may lead to better results for the ACN. In particular, removal of selected domestic distortions, different paths to regional integration, and consideration of imperfect competition seem to be of interest.

APPENDIX

TABLE 1.A
COMMODITY AGGREGATION

Code	Group Name	Products Included
AGR	Agriculture and Livestock	Paddy rice; Wheat; Cereal grains nec; Vegetables, fruit, and nuts; Oil seeds; Sugar cane; sugar beet; Plant-based fibers; Crops nec; Cattle, sheep, goats, and horses; Raw milk; Wool, silk-worm cocoons; Forestry; Fishing; Processed rice
MNG	Mining	Coal; Oil; Gas; Minerals nec
PFD	Processed Food	Animal products nec; Meat: cattle, sheep, goats, horse; Meat products nec; Vegetable oils and fats; Dairy products; Sugar; Food products nec; Beverages and tobacco products
TXL	Textiles and Clothing	Textiles; Wearing apparel
I_S	Steel and Iron	Ferrous metals; Metals nec
M_E	Machinery and Equipment	Electronic equipment; Machinery and equipment nec
TRE	Transport Equipment	Motor vehicles and parts; Transport equipment nec
OMF	Other Manufactures	Leather products; Wood products; Paper products, publishing; Petroleum, coal products; Chemical, rubber, plastic prods; Mineral products nec; Metal products; Manufactures nec
SVC	Services	Electricity; Gas manufacture, distribution; Water; Construction; Trade, transport; Finance, business, rec service; Pub. Admin, defence, educ., health; Dwellings

TABLE 2.A
REGIONAL AGGREGATION

Code	Region Name	Countries Included	Developed (DC) Developing (LDC)
can	Canada	Canada	DC
usa	United States	United States of America	DC
mex	Mexico	Mexico	LDC
cam	Central America and Caribbean	Central America and Caribbean	LDC
acn	Andean Community	Venezuela; Colombia; Rest of the Andean Pact	LDC
mer	Mercosur	Argentina; Brazil; Uruguay; Rest of South America	LDC
chl	Chile	Chile	LDC
eas	East Asia, Australasia	Australia; New Zealand; Japan; Korea; Indonesia; Malaysia; Philippines; Singapore; Thailand; Viet Nam; China; Hong Kong; Taiwan; Sri Lanka; Rest of South Asia	LDC
eun	European Union, EFTA	United Kingdom; Germany; Denmark; Sweden; Finland; Rest of European Union; EFTA	DC
row	Rest of World	India; Central European Associates; Former Soviet Union; Turkey; Rest of Middle East; Morocco; Rest of North Africa; South African Customs Union; Rest of southern Africa; Rest of sub-Saharan Africa; Rest of World	LDC

TABLE 3A.

FTAA INDUCED CHANGES IN ANDEAN COMMUNITY'S EXPORTS (FOB) AND IMPORTS (CIF) VALUE (% CHANGE)

Export changes		Contribution from:						
Sector	(%)	Canada	U.S.A.	Mexico	C.A. & C.	ACN	Mercosur	Chile
AGR	3.21	-0.04	0.13	-0.07	-0.04	3.47	-0.35	0.11
MNG	1.80	0.15	-0.36	0.02	0.13	1.21	0.69	-0.07
PFD	9.99	-0.04	5.16	-0.37	2.55	2.18	0.53	-0.02
TXL	22.04	0.75	23.20	0.40	-0.88	-1.52	0.38	-0.30
I_S	2.32	-0.10	-2.53	0.63	-0.33	5.98	-1.36	0.03
M_E	0.50	-0.10	-2.17	0.41	0.41	0.78	1.23	-0.06
TRE	-9.28	0.60	-1.79	0.03	-0.29	-8.15	0.19	0.13
OMF	7.34	-0.04	1.64	0.24	0.75	2.39	2.56	-0.20
SVC	1.28	-0.07	-1.85	-0.12	-0.40	4.41	-0.76	0.07
Import changes		Contribution from:						
Sector	(%)	Canada	U.S.A.	Mexico	C.A. & C.	ACN	Mercosur	Chile
AGR	-3.39	0.04	1.59	0.03	0.34	-5.87	0.55	-0.05
MNG	3.63	0.09	0.13	0.10	0.25	2.22	0.90	-0.07
PFD	12.76	0.04	1.40	0.05	0.38	10.21	0.74	-0.07
TXL	14.23	0.06	1.62	0.10	0.65	11.12	0.76	-0.08
I_S	2.03	0.03	0.63	0.09	0.19	0.70	0.44	-0.05
M_E	2.82	0.03	0.70	0.05	0.16	1.59	0.33	-0.04
TRE	13.24	0.07	1.32	0.09	0.30	10.83	0.70	-0.06
OMF	5.78	0.06	1.13	0.09	0.30	3.58	0.69	-0.06
SVC	-1.12	0.06	1.53	0.10	0.32	-3.79	0.72	-0.08

Source: GTAP simulation

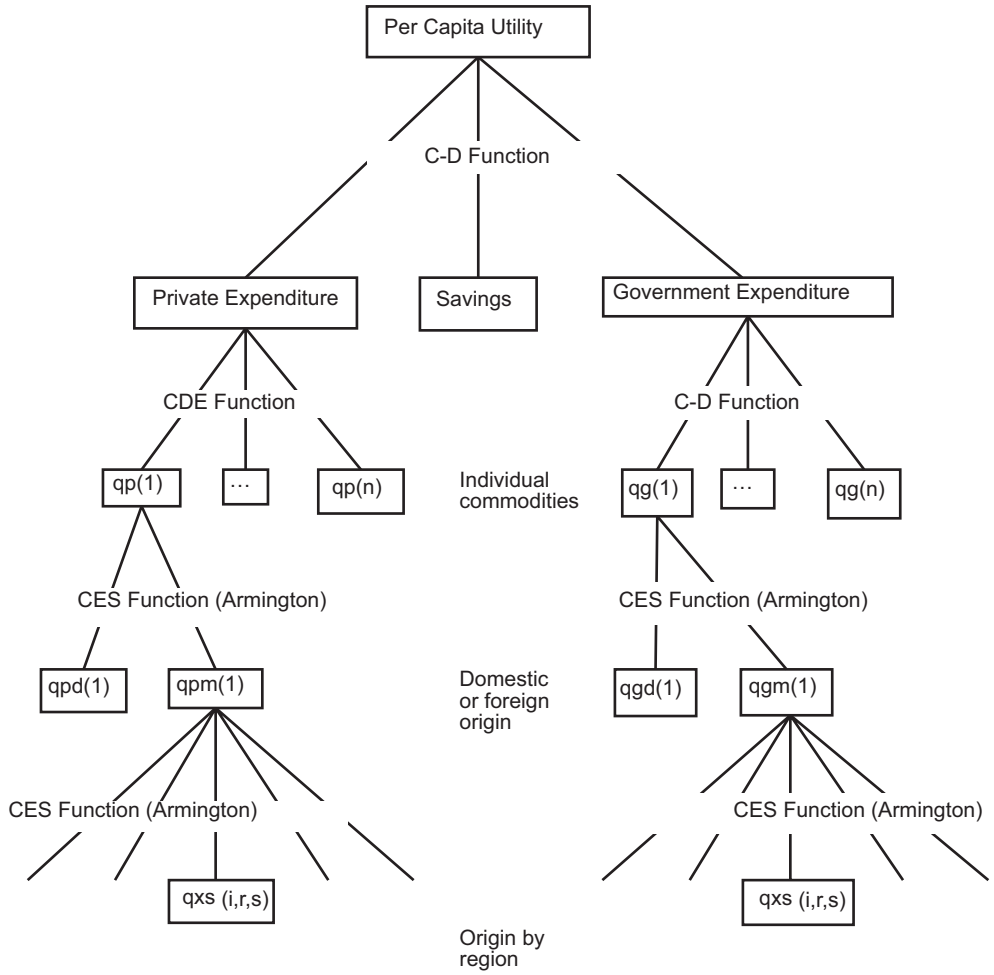
TABLE 4A

FTAA EFFECTS ON THE ANDEAN COMMUNITY'S REAL RETURN ON FACTORS (% CHANGE)

Factor	Real Return	Contribution from:						
		Canada	U.S.A.	Mexico	C.A. & C.	ACN	Mercosur	Chile
Land	3.77	-0.03	0.39	-0.10	0.14	3.65	-0.36	0.08
UnSkLab	0.79	0.00	0.20	0.01	0.04	0.47	0.08	-0.01
SkLab	0.74	0.01	0.17	0.02	0.04	0.43	0.10	-0.01
Capital	0.57	0.01	0.25	0.02	0.04	0.15	0.11	-0.01
NatRes	5.13	0.18	-2.19	0.01	0.01	6.28	0.91	-0.06

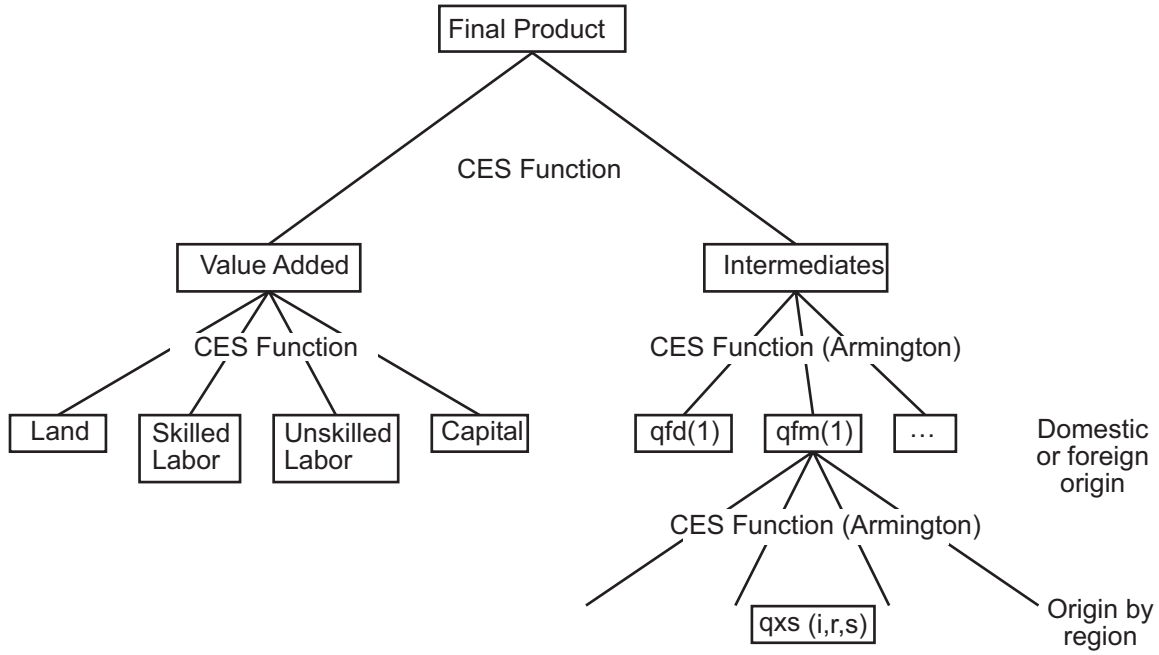
Source: GTAP simulation

DIAGRAM 1A
STRUCTURE OF FINAL DEMAND



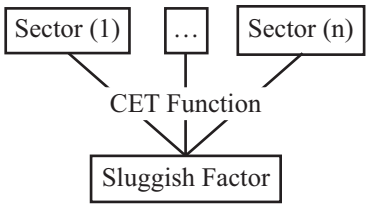
C-D = Cobb Douglas
CDE = Constant Difference Elasticity
CES = Constant Elasticity of Substitution

DIAGRAM 2A
PRODUCER BEHAVIOR



CES = Constant Elasticity of Substitution

DIAGRAM 3A
FACTOR "FIXITY"



CET = Constant Elasticity of Transformation

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