AGRICULTURE TRADE IN THE CAFTA-DR AGREEMENT

An Applied General Equilibrium Approach

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INTRODUCTION

The Central American Free Trade Agreement – Dominican Republic (CAFTA-DR) was signed on August 5, 2004, involving the United States, the Dominican Republic, and five Central American countries: Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua. The agreement was expected to enter into force in early 2006 (Hornbeck, 2006). All member countries have ratified the agreement with the exception of Costa Rica which has yet to vote on the agreement.

The CAFTA-DR covers all products traded within the regions. Liberalization will occur through tariff reductions, tariff-rate quota expansion, and a combination of approaches. Tariffs will be phased out according to specific schedules negotiated on a product and country specific basis where phase-outs will be immediate to 20 years. Market access for some products will be provided through the creation and expansion of Tariff Rate Quotas (TRQs) and some specified products will be safeguarded through specific triggers and increased duties. The agreement also mandates the country members to adopt the WTO agreement on Sanitary and Phytosanitary (SPS) measures. Export subsidies are not urged to be used into another party's market but they can be levied to compete with the third party export subsidies (USDA, 2005).

The CAFTA-DR is expected to create the conditions for the promotion of a more dynamic trade of good and services as well as investments and as a result benefiting at least the member countries. Recent CGE studies analyzing the impacts of CAFTA-DR show likely positive impacts on trade and welfares. Helaire and Yang (2004) show that

CAFTA-DR would have an important welfare gain for Central American countries as a whole, with GDP increasing by as much as 1.5 percent. The United States will also gain but much smaller. Similarly, the work of Brown *et al*. (2005) suggests positive impacts where economic welfare in the Central American Countries increased by 4.4 percent of the GNP and total US economic welfare increased by only 0.17 percent of US GNP. Francois *et al*. (2005) provided similar evidence but the overall impacts on macroeconomic indicators are insignificant.

There also seems to be an agreement of the recent studies in terms of sectoral analyses. In most cases, the impacts of CAFTA-DR vary by sectors. Brown *et al* (2005) found that the impacts of the bilateral removal of agricultural protection are negligible; while the impacts of bilateral elimination of manufactures are relatively more significant. The main source of the gain for CAFTA is from expanded sales of textiles and clothing and processed crops (Helaire and Yang, 2004). The diversity of impacts by sectors stems from the fact that many Central American products already enter the United States under preferential arrangements such as the Generalized System of Preferences (GSP) and the Caribbean Basin initiative (CBI). Therefore CAFTA-DR does not grant market access for all Central American products to the US, but it enhances the list of products that have had such trade preferences in the past (Francois *et al*., 2005).

Given the fact that barriers are still higher in agriculture (Helaire and Yang, 2004), the insignificant impacts of the bilateral removal of agricultural tariffs under CAFTA-DR (as demonstrated in previous study, i.e. Brown *et al*.) merits consideration. Consequently, the objective of this study is to exploit the impacts of tariff reductions under CAFTA-DR focusing on agricultural sector using a Computable General

Equilibrium (CGE) approach. A standard GTAP (Global Trade Analysis Project) CGE is adopted. The nature of the GTAP which captures linkages both within economies and among them by modeling the economic behavior and interactions of producers, consumers and governments has made it applicable for this study. For instance, it is possible to trace the implications of a policy change such as a tariff reduction to other parts of the economy as well as to other regions[1]. This study differs from previous study especially that of Francois *et al* (2005) in terms of aggregation and particularly in policy simulations. Because some products will have immediate removal and others will have phase-outs until 20 years, policy simulations based on such assumptions are warranted[2].

The paper is outlined as follows. Section 2 provides recent developments in trading relationships in the CAFTA-DR member countries, exploring particularly in agriculture sector. Section 3 outlines the GTAP CGE approach and the aggregations used in this study. Section 4 discusses simulation strategies and their associated results. The main results are summarized in section 5.

RECENT AGRICULTURAL TRADE IN THE CAFTA-DR REGION

Trade linkages between the United States and Central America have grown rapidly over the past decade. As a group, Central American countries' trade with the United States increased fivefold in dollar terms in the period 1994–2003 (Kose *et al*., 2005). However, the extent of trade linkages with the United States differed substantially

[1] Because this study concerns with simulating the effects of trade policy, notably tariff reductions, a standard GTAP which is a comparative static, global general equilibrium model based on neo-classical theory, provides a reasonable approach and assures consistency in accounting relationships (Hertel, 1997). Besides, Francois *et al.* (2005) argue the combined implementation of the CBI and CAFTA with a relatively long intermediate period, assures that the productive adjustment process is gradual within the CAFTA-DR country members; and therefore the static CGE limitations can be of impractical consideration.

[2] Different results of previous studies are usually due to the differences in model specifications, databases, aggregations, and policy simulations.

across the respective countries as well as across commodities. Table 1 displays current agriculture trade between the United States and CAFTA country members. Agriculture trade between the United States and its NAFTA's partner countries are also presented as comparison.

In 2005, US exports of agriculture to Central America amounted to $1.6 billions, representing about 2.5 percent of total US agriculture exports to the world. At the same time, total US imports from this region was $2.6 billions, generating a net trade deficit of $1 billion. Compared to US agriculture trade with its NAFTA's counterparts, these figures are of course far below. Considering the potential market access that this region can provide, however, the Central American countries are becoming more important for the future development of US agricultural products. An estimate indicates that the establishment CAFTA-DR could boost US agricultural exports by $1.5 billion (USTR, 2005).

Approximately, 86 percent of total US exports to Central America destined to the CAFTA member countries, where Guatemala ranked first and Nicaragua shared the least of the US exports to the region. Most of US exports came from grains & feeds, oilseeds & products, and horticultural products. US exports of these product categories represented about 78 percent of total US agriculture exports to Central America. US agriculture imports from Central America mostly came from horticulture products (58%) and sugar and tropical products (36%). Costa Rica and Guatemala contributed most to US agriculture imports from Central America. As shown in Table 1, US agriculture imports coming from these countries were $1.83 billions (72 percent of total imports from Central America).

US agriculture exports to the Dominican Republic were also substantial. In 2005, US agriculture exports to this country valued at $517 millions, ranked highest among the CAFTA-DR member countries. This value was approximately 28 percent of total US exports to CAFTA-DR member countries. Most cash value came from grains & feeds (45%). On the import side, US agriculture imports from the Dominican Republic were $260.4 millions, giving a positive trade balance of $256.8 millions.

From Table 1 it can also be inferred that grains & feeds, horticultural products, oilseeds & products, and sugar & tropical products are those agricultural products that contribute most to total agriculture trade within the CAFTA-DR region. The pattern of sectoral trade in the CAFTA-DR region is also similar to the NAFTA region. As can be seen in Table 1, trade flows for the corresponding product categories between the United States and its NAFTA's counterparts shared similar pattern.

Table 1. US Exports and Imports to CAFTA-DR and NAFTA: 2005 (Million Dollars)

Group Commodity	World	CA	CR	DR	ES	GT	HD	NC	CN	MX
Exports										
Agricultural Total	62,958.4	1,572.0	296.8	517.2	235.5	453.5	243.0	122.9	10,569.8	9,362.3
Cotton, Linters & Waste	3,928.3	62.8	0.2	1.0	22.0	38.0	2.3	0.0	59.6	389.0
Dairy Products	1,625.1	53.3	2.6	18.5	4.9	29.9	7.5	4.1	220.2	507.1
Grains & Feeds	16,067.9	720.1	166.5	232.6	113.6	164.8	114.7	75.2	1,883.9	2,406.5
Horticultural Products	15,029.8	186.7	29.3	40.1	31.2	42.4	28.5	7.1	4,834.2	1,415.0
Livestock & Meats	7,676.2	79.4	7.1	41.5	8.6	28.2	24.8	2.6	990.3	1,930.2
Oilseeds & Products	10,850.4	318.4	75.2	79.3	47.6	87.3	40.1	25.9	903.9	1,621.9
Planting Seeds	918.2	16.1	2.8	1.6	0.7	4.4	1.7	0.7	138.2	236.7
Poultry & Products	3,116.6	78.1	4.6	12.5	3.1	48.6	7.8	4.3	392.8	491.0
Sugar & Tropical Products	2,762.6	46.2	8.6	22.2	3.8	9.7	6.3	1.5	1,145.1	364.2
Tobacco & Products	983.2	10.9	0.0	68.1	0.0	0.2	9.2	1.4	1.6	0.7
Imports										
	World	CA	CR	DR	ES	GT	HD	NC	CN	MX
Agricultural Total	59,281.8	2,552.7	915.8	260.4	151.6	918.2	296.0	171.8	12,267.7	8,333.0
Cotton, Linters & Waste	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dairy Products	2,592.7	9.7	1.0	0.3	0.5	2.6	0.6	5.0	378.4	96.8
Grains & Feeds	4,508.2	26.2	5.1	5.1	11.5	5.0	0.9	3.2	2,256.9	355.4
Horticultural Products	27,215.1	1,473.9	703.7	123.2	14.1	484.9	199.7	20.2	2,976.7	6,204.2
Livestock & Meats	8,403.2	84.7	24.9	1.0	0.0	0.0	2.8	56.8	3,638.3	624.3
Oilseeds & Products	3,074.4	5.1	0.5	1.4	0.0	0.3	0.8	3.5	950.8	68.0
Planting Seeds	508.2	17.9	7.7	0.2	0.0	9.6	0.5	0.0	135.2	11.5
Poultry & Products	392.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	167.3	10.3
Sugar & Tropical Products	11,916.0	925.1	172.9	114.5	125.5	411.5	85.5	82.4	1,740.2	956.7
Tobacco & Products	651.6	10.1	0.0	14.7	0.0	4.1	5.2	0.8	23.9	5.5

Source: FAS Online database

Notes: CA: Central America; CR=Costa Rica; DR=Dominican Republic; ES=El Salvador; GT=Guatemala; HD=Honduras; NC=Nicaragua; CN= Canada; MX=Mexico

GLOBAL TRADE ANALYSIS PROJECT (GTAP) MODEL

The Global Trade Analysis Project (GTAP) model used in this paper is a comparative static, global general equilibrium model based on neoclassical economic theory (Hertel and Tsigas, 1997). The standard GTAP is characterized by an input-output structure that explicitly links industries in a value added chain from primary good, over continuously higher stages of intermediate processing, to the final goods and services for consumption. Consumers are assumed to maximize utility and producers to maximize profits. Markets are assumed to be perfectly competitive in all sectors and different regions and economies are linked through trade.

Production in each identified sector and each identified region operates under constant returns to scale with technology described by the Leontief function using both a composite of primary factors and a composite of intermediates. Primary factors cannot move across countries and are created as combinations of unskilled labor, skilled labor, land, and natural resources. Intermediate inputs are produced domestically or imported in a CES function. On the demand side, each region is equipped with one regional household governed by an aggregate utility function. The regional household distributes total regional income across savings and consumption expenditures (government and private household) according to fixed budget shares. Government expenditures are allocated across composite goods according to the Cobb-Douglas assumption of constant budget shares and private household consumption expenditures are allocated across commodities according to a non-homothetic CDE expenditure function. The standard GTAP closure states that global investment is assumed to be responsive to changes in the relative rates of return across region. This does not affect productive capital stock but

does have an impact on saving and thus on the current account balance in each region (Hertel and Tsigas, 1997).

This study uses the most recent version of GTAP (version 6.0) database (Dimaranan and McDougall, 2005). This version is an extension of previous version which incorporates all three components of support for agricultural production: producer subsidies, export subsidies and import tariffs. This version corresponds to the global economy in 2001, and divides the world into 87 regions, 57 sectors, and five primary factors of production (land, unskilled labor, skilled labor, capital, and natural resources). For the purpose of this study, the database was aggregated into four regions and eighteen economic sectors. The eighteen sectors are based on two categories: agricultural sector and non agricultural sector. The agricultural sector consists of all basic activities and those usually associated with agriculture such as fish, forestry, and leather products. The non agricultural sector represents all sectors under the GTAP categories that are not included in the first category such as mining, transportation and other services.

The four regions are the United States (US), Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), XFA (portions of FTAA members), and rest of the world (ROW). The regional aggregations are specified with the focus on the CAFTA-DR region. There are some drawbacks with respect to this aggregation. First, Belize and Panama are not CAFTA-DR members, however since these countries are included in the Central American aggregation in the GTAP database, we included these two countries in this region. To some extent, this aggregation will give difficulty in interpretation. Second, XFA consists of 14 countries in the GTAP 6 database. It is only one country: the Dominican Republic that belongs to the CAFTA-DR.

Consequently, the simulations and the interpretations of the results are difficult to conduct. However, since the Dominican Republic is part of CAFTA-DR and its contribution to trade is of considerable important, this aggregation seems necessary.

SIMULATION STRATEGIES AND RESULTS

Simulation Strategies

According to CAFTA-DR, tariffs will be phased-out according to specific schedules negotiated on a product and country-specific basis. Phase-outs will be immediate or 5 to 20 years. Products such as prime and choice cuts (beef), mushrooms, grapes, raisins, almonds, potato flour, soybeans, protein concentrates, and breakfast cereals will be phased out immediately. Some products are subject to 5 to 20 year removals. For example chicken leg quarters, rice, and certain dairy products are subject to 7-20 years phase-outs. For some products, immediate market access will also be provided through the creation and expansion of TRQs and safeguards will also be available for specified products[3]. Simulations on the basis of each product category are not possible due to the nature of the aggregation provided by the GTAP database. Therefore the simulations conducted in this study are adjusted according to the available aggregations combined with tariff schedules.

The simulations are divided into two basic scenarios: moderate and full liberalization. Moderate simulation assumes that commodity groups with immediate tariff removals are subjects to a 100 percent reduction. These products include meat, vegfruit,

[3] Tariff elimination schedules for agricultural products can be found in Foreign Agricultural Statistics (FAS) online available at: http://www.fas.usda.gov/info/factsheets/CAFTA/overall021105a.html.

and oilseeds[4]. In addition twl and svmfg sectors are also assumed to be removed immediately. Most products that are not subject to immediate removals are subjects to a 20 percent reduction of applied *ad valorem* tariffs. Under full liberalization, all product categories are subject to a 100 percent removal. The simulations also consider two scenarios concerning regional trade agreements. First, the agreements include only the United States and Central American countries (CAFTA). Second, the agreements are extended by involving XFA (rest of FTAA) countries. The inclusion of XFA is to account for the Dominican Republic in the agreements[5]. The moderate scenario can be viewed as a lower bound assessment and the full liberalization scenario is the most optimistic scenario. There are a total of four simulations conducted in this study.

Simulation 1:

> A 100 percent removal on tariffs for specific commodity groups between the United States and Central American countries (US-CAFTA) is applied; while tariffs from and to XFA as well as ROW are kept unchanged. The 100 percent removal applies to meat, vegfruit, and oilseeds. The three product categories are selected because most of the commodities under these product aggregations will be phased-out immediately. In addition this simulation will also assume a complete removal for twl and svmfg sectors. Textiles and apparel, for example, will be duty-free and quota-free immediately if they meet the agreement's rule of origin (Francois *et al*., 2005). The rest of the categories are assumed to have a 20 percent tariff removal of the current applied *ad valorem* rates.

Simulation 2:

> A 100 percent removal on tariffs for meat, vegfruit, oilseeds, twl, and svmfg and a 20 percent reduction of ad valorem tariffs for the rest of product categories within the regions of the United States, Central American countries and XFA (US-CAFTA-DR) is applied.

[4] For example Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua will immediately eliminate tariffs on prime and choice cuts; Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and DR immediately remove tariffs for most fruits and tree nuts and several of vegetables; and most tariffs of oilseeds are immediately removed under CAFTA-DR. Commodity aggregations are provided in annex 2.

[5] Under GTAP 6.0 database, the Dominican Republic is included in XFA (rest of FTAA countries) region together with 12 other countries.

Simulation 3:

A 100 percent removal on tariffs for all product categories traded between the United States and Central American countries (US-CAFTA) is applied.

Simulation 4:

A 100 percent removal on tariffs for all product categories within the United States, Central American countries, and XFA countries (US-CAFTA-DR) is applied.

Simulation Results

Table 2 provides initial tariffs applied in CAFTA-DR regions based on the GTAP version 6.0 databases. As can be seen, many Central American countries (XCA) as well as XFA products have been subject to zero tariffs to the US. Sugar, dairy products, and twl are those that are highly protected products. Sugar and related products from XCA countries are subject to 33.59 percent and those coming from XFA countries receive slightly higher tariff rates. On the other hand, most of the US products received relatively higher tariff rates. Average tariffs for agriculture products are about 10 percent with sugar seems to receive highest tariff rates to Central American countries. Cattle, wheat, oilseeds, and pltex are the sectors that have nearly zero tariffs.

Table 2. Initial Tariffs in the CAFTA-DR Regions

	USA Products			XCA Products			XFA Products		
rTMS	XCA	XFA	ROW	USA	XFA	ROW	USA	XCA	ROW
1 meat	7.74	9.06	28.42	3.78	14.49	22.64	0.51	21.48	6.94
2 cattle	0.9	4.31	1.99	0	0	4.16	0	0	0.47
3 paddy	18.25	19.5	175.57	0	0	19.33	0	79.44	6.19
4 wheat	0.42	0.01	31.09	0	0	0	0	0	0.04
5 ograins	13.65	0.4	45.44	0	0	6.2	0	0	0.44
6 Vegfruit	14.66	24.69	7.13	0.19	0.35	41.22	0.28	13.23	24.99
7 Oilseeds	0.65	2.85	45.78	1.25	0	1.2	1.93	0.83	0.38
8 Sugar	23.17	21.78	24.12	33.59	28.43	26.11	38.17	85.98	159.08
9 Ocr	2.5	13.24	13.01	0.53	13.99	0.79	3.89	3.36	1.74
10 Pltex	0.01	0.18	1.53	0.22	0	8.03	0	0	0.7
11 Oap	4.55	16.37	4.8	0	0	2.16	0	0.12	4.28
12 Dairy	18.78	16.91	27.8	20.28	11.66	13	16.72	25.06	17.57
13 FO_Fi	5.13	13.97	0.89	0	14.57	2.32	0	3.66	0.11
14 Omt	16.69	17.04	38.04	0	20.09	15.35	0	3.91	5.64
15 Vol	5.76	10.33	9.78	0.41	3.04	7.96	0.02	1.37	1.91
16 Fbev	12.54	18.59	17.57	0.32	12.73	6.98	0.93	7.2	6.08
17 Twl	15.41	13.5	4.68	11.76	16.38	12.58	10.73	5.24	7.87
18 Other	3.5	9	1.89	0	5.15	1.35	0.15	3.13	1.71

Source: GTAP 6 Database

Table 3 shows changes in GDP due to tariff liberalization. All scenarios produce significant welfare gains for the United States as well as for Central American countries. With trade liberalization that include between the US and XCA countries, clearly the net gain for XCA countries is much bigger than that for the United States. As shown in Table 3, the US GDP increased only by 0.01 percent, which was about $587 millions and the GDP for XCA countries increased nearly 4 percent which was about $2.8 billions. On the other hand, both XFA and ROW experienced a decrease in GDP.

Including XFA into free trade zone boosted the US GDP into $3.8 billion increase and created a substantial increase in XFA's GDP. The XCA's GDP, on the contrary, declined slightly and ROW was even worse off. Although XFA region includes 12 member countries, these results show the importance of the Dominican Republic for the United States. As demonstrated previously that the Dominican Republic shared about 28

percent of total US exports to CAFTA-DR region. The inclusion of the Dominican Republic in the agreement would reduce the net gain for XCA countries than it would have been otherwise.

Table 3. Changes in Gross Domestic product

	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
Region	$ million	%	$ million	%	$ million	%	$ million	%
USA	587	0.01	3,803	0.04	619	0.01	4,093	0.04
XCA	2,779	3.96	2,726	3.89	2,686	3.83	2,619	3.73
XFA	-128	-0.11	663	0.54	-144	-0.12	465	0.38
ROW	-6,350	-0.03	-12,708	-0.06	-6,646	-0.03	-13,380	-0.06

Source: Authors' simulations

The above discussions show the impacts of trade liberalization on welfare gains for each region, especially on Gross Domestic Products (GDP). The following sessions discuss its impacts on agriculture trades on sectoral basis.

Moderate Scenario

The simulation results for the impacts of tariff liberalization on trade flows are reported in Annex 1a, Annex 1b, and Annex 1c. Annex 1a shows percentage of changes in aggregate exports by commodity i from region r and Annex 1b provides percentage changes in aggregate imports of product i into region s. Trade balances are given in Annex 1c. The results for moderate simulation are under the headings simulation 1 and simulation 2 and the results for full liberalization are provided under the headings simulation 3 and simulation 4.

As shown in Annexes 1a, 1b, and 1c, a 100 percent removal in the five commodity groups and a 20 percent reduction of ad valorem tariffs in the remaining sectors changed the trade patterns. Under simulation 1, US exports experienced an increase in most of product categories with the highest increase occurred in twl sector (17.72%). Pltex is the sector that most hurt by trade liberalization in term of exports.

Meat and vegfruit, two agricultural products that are subject to a complete removal, are also benefited from tariff liberalization. US meat and vegfruit exports increased 0.77 percent and 0.48 percent, respectively. Oilseeds sector, on the other hand, declined by 0.11 percent. Twl, paddy and dairy sector gained relatively higher compared with the other sectors. Accounting XFA in the trade agreements even enlarge US exports (simulation 2). US exports of meat, paddy, vegfruit, and twl, for example, increased by a significant amount.

In the mean time, US imports of most products also increased. Decline in imports only occurred in vegfruit, ocr, fo_fi, and fbev sectors. Notice that ocr and fo_fi are the two sectors that experienced declines in both exports and imports. Similar to the export side, the inclusion of XFA countries would also increase US imports in all product categories (simulation 2).

A complete picture of the change in the US trade patterns as a result of trade liberalization is shown in the changes in trade balances (Annex 1c). Meat, vegfruit, dairy, omt, vol, fbev, and twl are among those that received higher benefits from trade liberalization. Meat and vegfruit, two sectors that will likely have immediate removal, would generate a large amount of trade surplus. The United States will approximately gain a net trade surplus of $22.94 millions from meat sector and $25.55 millions from vegfruit sector. As expected, the sugar sector would receive a negative trade balances with a value of $12.7 millions (simulation 1) and $24.4 millions (simulation 2). Although both exports and imports in sugar sector increased, trade balances are still negative. This is because the growth of imports in sugar sector grew faster than the growth in exports. Twl sector generated the most trade surplus among other sectors with a value of $371.4

millions; but this number was nearly offset by a deficit in trade balance from svmfg sector.

The impacts of trade liberalization on Central American countries (CAFTA) were surprising. Exports of all products from CAFTA countries decrease substantially. Imports destined to these countries, on the other hand, significantly increase. These magnitudes gave a substantial negative gain in trade balances. The only sector that benefits from trade liberalization in terms of trade balances was twl. As shown in simulation 1, twl exports increased by 97.82 percent and imports was up by 48.29 percent. The CAFTA countries would gain a positive trade balance in twl sector by $4.4 billions. Including XFA into the free trade zone will not significantly affect trade flows from and to CAFTA countries.

In contrast to CAFTA countries, FXA and ROW would receive benefits from trade liberalization within the US-CAFTA agreements (simulation 1). Percentages changes in both exports and imports clearly show how XFA and ROW would gain from trade liberalization. Notably, trade balances in all sectors except twl show positive numbers. Interestingly, XFA countries would not gain by joining the free trade agreements, particularly in terms of trade balances. As shown in simulation 2, XFA countries experienced negative trade balances in most of the sectors. ROW, on the other hand, would be better off.

It is important to provide special notes on twl sector. As shown in Annex 1c, both the United States and CAFTA enjoy a huge positive trade balances in twl sector. For CAFTA countries, twl is the only sector that gains positive trade balances (simulations 1 and 2). Approximately, the gain in trade surplus is $4.4 billions, outweighing the gain for

the United States. The costs of the gains clearly go to ROW; and to some extent, XFA countries. As can be seen in Annex 1c, ROW experienced a deficit trade balance in twl sector by $4.9 billions (simulation 1) and $7.2 billions (simulation 2). Including XFA into the free trade zone would make this region benefited from twl sector.

The findings obviously indicate that twl sector is very important for Central American countries. Helaire and Yang (2004) suggest similar results. Using the same database, they found that the main source of gains for CAFTA is from expanded sales of textiles and clothing (and processed crops). Furthermore they also state that an agreement between the United States and CAFTA would help integrate the textiles and clothing facilities in Central American countries.

Full Liberalization

Simulation 3 and simulation 4 in Annexes 1a, 1b, and 1c give the results of full liberalization scenario. The results for the United States vary by sectors. The most injured sector is sugar where its trade balances accruing at $221.4 millions (simulation 3) and $346.3 millions (simulation 4) in deficits. On the contrary, XCA countries benefit from sugar liberalization. Trade balances for XCA countries under full liberalization are $281.9 millions (simulation 3) and $$253.01 millions (simulation 4). Similarly, XFA countries will also benefit from sugar liberalization. These findings suggest and support previous studies that trade protectionism in US sugar is very harmful for Central American countries and trade liberalization in sugar industry deteriorates US trade.

US trade for other sectors like dairy, omt, vol, and fbev seem to be better off with full liberalization. Trade balances for these sectors are relatively higher compared with

the results from moderate scenario. The SXCA countries, on the other hand, experienced negative trade balances in these product categories.

The obvious picture that can be deduced from fully liberalized trade in agriculture is that the United States will mostly have positive gains in trades from relatively sensitive products such as paddy, dairy, omt, meat, vegfruit, and grains and XCA countries will only gain from sugar. For non agricultural products, the three regions (US, XCA, and XFA) share positive trade balances in twl but at the expense of ROW. Twl sector seems to be the most importance sector for XCA and XFA countries. This is not surprising given the fact that the Dominican, El Salvador, and Honduras are the main exporters of apparel, accounting nearly 75 percent of the Central American countries' total apparel exports to the United States (Kose *et al*., 2005). The most gain for ROW is from svmfg sector.

SUMMARY AND CONCLUSION

The impacts of US-CAFTA agreements on the US economy as a whole and US agriculture products in partial are likely to be positive. Partial and full liberalizations scenarios show that the US GDP would increase. Including the Dominican Republic (namely XFA region) would reinforce the gains that the United States would enjoy. Central American countries would also experience an increase in welfare although its benefits would decline when the agreement was extended to XFA countries.

The US agriculture would also benefit especially sensitive sectors like dairy, vegfruit, and paddy. Liberalization in sugar, on the other hand, would create a huge trade deficit for the United States. Fbv (food and beverages) and twl (textiles, wood, and leather) are the other two sectors that would likely gain much in trade balances. For

Central American countries, sugar the only sector that would generate trade surplus; but this would only occur if full liberalization took place. The only sector that generated trade surplus is twl sector. These findings clearly support previous studies the importance of this sector for Central American countries.

The gains from free trade agreements within the CAFTA-DR region seem to be at the expense of ROW. However, whether trade diversion occurred is beyond this study. A more detailed analysis should be conducted in order to be able to measure such possibility.

There are of course some drawbacks of this study. First, the creation and expansion for TRQs for some products were not accounted in the simulations. Because TRQs are likely to be an important instrument, neglecting this instrument in the simulations will reduce the accuracy of the results. Second, tariffs will be phased out according to specific schedules negotiated on a product and country specific basis. This implies that the aggregations (sectoral and regional) used in this study did not well capture the “real scenarios”. Third, analysts argue that the creation of CAFTA-DR will results in FDI flows, especially from the United States to its counterparts. Therefore, the dynamic effect of new investments that will likely take place should be taken into account in the analysis.

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Annex 1a

Percentage Changes of Aggregate Exports of Product i from Region r, FOB Base

	Simulation 1				Simulation 2				Simulation 3				Simulation 4			
qxw	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW
meat	0.77	-11.92	0.5	0.06	1.2	-10.59	-6.07	0.1	0.68	-10.47	0.76	0.07	1.03	-8.9	-3.02	0.12
cattle	-0.19	-0.76	0.33	0.06	-0.37	-0.75	-6.22	0.12	-0.27	-1.21	0.55	0.09	-0.45	-1.13	-6.5	0.16
paddy	2.9	-29.62	-0.78	0.15	3.49	-29.48	-0.72	0.13	11.13	-58.01	-5.87	0.65	9.97	-61.52	657.85	-0.02
wheat	-0.09	-15.03	0.71	0.12	-0.26	-14.78	-9.32	0.2	-0.18	-15.57	1.13	0.15	-0.46	-15.05	-10.2	0.24
ograins	0.11	-6.76	0.17	0.05	0.05	-6.66	-3.09	0.09	0.47	-15.56	-0.21	0.05	0.36	-15.43	-3.53	0.1
Vegfruit	0.48	-6.29	0.39	0.2	1.29	-6.26	-2.73	0.19	0.4	-6.16	0.55	0.21	1.14	-5.99	-2.92	0.2
Oilseeds	-0.11	-9.47	0.4	0.08	-0.23	-9.33	-5.04	0.14	-0.2	-9.61	0.69	0.13	-0.41	-9.22	-4.71	0.21
Sugar	0.74	-8.15	0.12	0.31	1.04	-7.58	5.54	0.28	3.46	44.34	-7.18	-1.34	5.99	39.82	93.75	-2.22
Ocr	-0.13	-10.38	0.73	0.27	0.1	-10.2	-5.04	0.31	-0.21	-9.73	1.04	0.27	1.49	-9.2	3.73	0.25
Pltex	-0.64	-20.85	1.08	-0.22	-1.04	-20.55	-24.49	-0.28	-0.74	-20.53	1.44	-0.2	-1.22	-19.91	-25.12	-0.25
Oap	-0.12	-4.93	0.24	-0.04	-0.16	-4.85	-1.99	-0.04	-0.12	-5.69	0.19	-0.03	0	-5.52	-2.21	-0.04
Dairy	1.24	-11.16	0.47	0.07	1.87	-10.88	-2.99	0.1	8.66	-6.24	0.4	-0.04	15.45	-5.17	23.61	-0.13
FO_Fi	-0.09	-8.17	0.34	0.05	-0.22	-7.98	-1.69	0.06	-0.05	-7.33	0.39	0.04	0.02	-6.78	-0.51	0.05
Omt	0.32	-20.05	0.76	0.04	0.36	-19.65	-9.98	0.09	2.23	-40.09	0.03	0	4.13	-38.55	-12.18	-0.01
Vol	0.83	-12.9	0.55	0.08	1.03	-12.72	-5.77	0.11	2.28	-14.64	0.6	0.05	4.51	-14.24	-6.13	0.02
Fbev	0.24	-8.84	0.3	0.07	0.34	-8.6	-2.79	0.09	1.06	-9.74	0.26	0.03	2.34	-8.92	-2.15	0
Twl	17.72	97.82	-3.66	-1.33	24.88	95.35	93.99	-1.96	17.69	97.52	-3.59	-1.33	24.84	95.18	94.3	-1.95
Svmfg	0.02	-22.26	0.46	0.09	0.13	-21.31	-5.47	0.13	0.01	-22.49	0.51	0.09	0.1	-21.49	-5.44	0.14

Source: Authors' simulations.

Simulation 1: Moderate, US-CAFTA countries; Simulation 2: Moderate, US-CAFTA-XFA countries.

Simulation 3: Full Liberalization, US-CAFTA countries; Simulation 4: Full Liberalization, US-CAFTA-XFA countries.

Annex 1b

Percentage Changes of Aggregate Imports of Product i into Region s, CIF Base

	Simulation 1				Simulation 2				Simulation 3				Simulation 4			
viwcif	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW
meat	0.21	28.07	-0.47	-0.08	0.42	28.21	24.32	-0.15	0.28	27.2	-0.59	-0.09	0.55	27.25	22.49	-0.15
cattle	0.15	2.06	-0.21	-0.04	0.27	2.03	4.25	-0.07	0.21	1.26	-0.32	-0.05	0.38	1.26	4.9	-0.08
paddy	1.03	15.23	-0.24	-0.06	1.45	14.85	5.4	-0.1	3.36	54.68	-0.75	0.01	3.55	57.68	37.89	-0.05
wheat	0.22	7.01	-0.2	-0.03	0.37	6.87	2.61	-0.05	0.36	8.37	-0.41	-0.05	0.61	8.02	2.2	-0.09
ograins	0.09	4.97	-0.08	-0.02	0.16	4.88	1.02	-0.05	0.19	13.84	-0.24	-0.05	0.33	13.51	1.18	-0.09
Vegfruit	-0.22	9.14	-0.24	-0.06	-0.12	9.12	17.3	-0.08	-0.17	9.44	-0.31	-0.07	-0.02	9.33	17.24	-0.09
Oilseeds	0	5.32	-0.21	-0.07	0.11	5.2	6.92	-0.11	0.14	6.97	-0.39	-0.09	0.42	6.57	5.97	-0.15
Sugar	1.12	11.12	-1.99	-0.41	2.45	11.1	4.7	-0.41	24.77	38.74	-2.22	-0.46	39.4	41.08	35.76	-0.46
Ocr	-0.18	4.15	-0.34	-0.15	-0.05	4.08	6.85	-0.18	0	5.68	-0.51	-0.16	0.4	5.62	23.2	-0.2
Pltex	0.41	10.88	-0.77	-0.38	0.55	10.58	14.01	-0.58	0.49	12.89	-1.03	-0.39	0.69	12.21	14.81	-0.61
Oap	0.07	4.02	-0.35	-0.1	0.13	3.89	8.39	-0.15	0.14	4.59	-0.41	-0.1	0.29	4.49	15.83	-0.16
Dairy	0.16	8.6	-0.2	-0.01	0.41	8.53	3.75	-0.03	0.72	18.1	-0.26	-0.02	1.53	18.13	11.81	-0.03
FO_Fi	-0.16	4.64	-0.31	-0.01	-0.1	4.63	2.28	-0.02	-0.11	8.09	-0.32	-0.01	0	8.21	11.34	-0.03
Omt	0.17	22.16	-0.34	-0.04	0.42	21.82	11.12	-0.08	0.21	73.74	-0.45	-0.04	0.5	73.02	53.86	-0.08
Vol	0.04	6.33	-0.19	-0.04	0.2	6.24	3.54	-0.05	0.13	9.93	-0.27	-0.04	0.37	9.76	11.33	-0.06
Fbev	-0.07	3.94	-0.17	-0.02	0.01	3.91	2.37	-0.04	-0.03	8.21	-0.18	-0.02	0.1	8.19	11.14	-0.03
Twl	2.93	48.29	-0.88	-0.18	4.44	47.39	42	-0.27	2.93	48.23	-0.89	-0.18	4.45	47.36	42.01	-0.27
Other	0.07	8.89	-0.27	-0.03	0.2	8.84	7.47	-0.06	0.08	9.04	-0.28	-0.03	0.22	8.98	7.46	-0.06

Source: Authors' simulations.

Simulation 1: Moderate, US-CAFTA countries; Simulation 2: Moderate, US-CAFTA-XFA countries.

Simulation 3: Full Liberalization, US-CAFTA countries; Simulation 4: Full Liberalization, US-CAFTA-XFA countries.

Annex 1c
Changes in Trade Balances, US $ millions

	Simulation 1				Simulation 2				Simulation 3				Simulation 4			
DTBALi	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW	USA	XCA	XFA	ROW
meat	22.94	-48.34	0.72	23.69	34.77	-46.58	-30.69	40.04	17.46	-45.32	0.97	25.87	24.21	-43.12	-27.19	43.7
cattle	-3.79	-1.01	0.05	4.74	-6.81	-1	-1.02	8.7	-5.45	-0.86	0.08	6.13	-9.46	-0.83	-1.14	11.11
paddy	8.47	-12.99	0.05	3.59	10.2	-12.74	-2.38	3.93	32.64	-46.34	-0.04	10.16	29.22	-49.25	15.61	-0.46
wheat	-2.56	-16.65	0.42	18.38	-9.02	-16.33	-5.94	31.11	-5.67	-19.85	0.78	24.35	-16.34	-19.05	-5.62	41.02
ograins	8.82	-14.04	0.1	4.72	6.31	-13.86	-2.37	9.72	31.92	-38.78	0.09	5.33	27.35	-38	-2.88	12.38
Vegfruit	25.55	-112.9	1.21	85.33	63.36	-113.2	-41.91	85.57	18.85	-111.6	1.64	90.12	51.11	-109.6	-42.2	94.43
Oilseeds	-4.32	-10.63	0.22	15.4	-10.2	-10.46	-4.16	25.79	-8.2	-12.02	0.38	20.54	-18.88	-11.47	-3.74	35.21
Sugar	-12.7	-31.03	0.86	44.5	-24.44	-27.88	10.56	41.11	-221.4	281.9	-14.96	-72.37	-346.3	253.01	182.17	-138.3
Ocr	1.06	-129	1.95	131.38	1.27	-126.8	-23.26	154.07	-12.51	-121	2.82	135.43	17.28	-114.2	-41.58	140.91
Pltex	-14.24	-7.5	0.31	23.24	-22.95	-7.32	-7	40.09	-16.03	-8.76	0.42	26.18	-26.63	-8.34	-7.25	45.08
Oap	-3.71	-3.34	0.26	7.43	-4.7	-3.28	-4.89	13.77	-4.21	-4.02	0.24	8.61	-0.76	-3.94	-9.22	14.55
Dairy	8.49	-34.94	0.84	24.92	10.99	-34.46	-12.56	34.93	62.13	-58.56	0.99	-6.9	108.38	-57.68	-25.02	-29.97
FO_Fi	-0.61	-6.94	0.23	8.87	-2.85	-6.75	-1.42	13.05	-0.4	-6.99	0.26	8.51	-0.37	-6.35	-3.76	11.96
Omt	12.45	-36.64	0.86	22.56	11.95	-36.06	-22.17	45.13	94.56	-112.4	0.65	12.99	174.21	-110.9	-90.73	18.8
Vol	6.79	-23.21	0.36	16.68	7.26	-22.89	-5.73	21.91	18.5	-31.12	0.46	12.68	35.9	-30.44	-15.35	9.63
Fbev	50.9	-185	4.81	129.81	57.39	-180.8	-63.76	186.89	197.7	-279.5	4.25	70.89	414.48	-266.1	-194.4	23.05
Twl	371.4	4421	-117.5	-4906	272.44	4285.6	2323.9	-7209	368.05	4405.5	-114.9	-4889	254.16	4276.9	2333.6	-7192
Other	-326.3	-5224	145.67	5628.1	-321.9	-5080	-3065	8795.3	-440.4	-5296	158.79	5846	-691.6	-5142	-3056	9308.9

Source: Authors' simulations.

Simulation 1: Moderate, US-CAFTA countries; Simulation 2: Moderate, US-CAFTA-XFA countries.

Simulation 3: Full Liberalization, US-CAFTA countries; Simulation 4: Full Liberalization, US-CAFTA-XFA countries.

Annex 2
Percentages Relative to Total World Exports/Imports

Group Commodity	World	CA	CR	DR	ES	GT	HD	NC	CN	MX
Exports										
Agricultural Total	100.00%	2.50%	0.47%	0.82%	0.37%	0.72%	0.39%	0.20%	16.79%	14.87%
Cotton, Linters & Waste	100.00%	1.60%	0.01%	0.02%	0.56%	0.97%	0.06%	0.00%	1.52%	9.90%
Dairy Products	100.00%	3.28%	0.16%	1.14%	0.30%	1.84%	0.46%	0.25%	13.55%	31.21%
Grains & Feeds	100.00%	4.48%	1.04%	1.45%	0.71%	1.03%	0.71%	0.47%	11.72%	14.98%
Horticultural Products	100.00%	1.24%	0.20%	0.27%	0.21%	0.28%	0.19%	0.05%	32.16%	9.41%
Livestock & Meats	100.00%	1.03%	0.09%	0.54%	0.11%	0.37%	0.32%	0.03%	12.90%	25.15%
Oilseeds & Products	100.00%	2.93%	0.69%	0.73%	0.44%	0.80%	0.37%	0.24%	8.33%	14.95%
Planting Seeds	100.00%	1.76%	0.30%	0.17%	0.07%	0.48%	0.19%	0.07%	15.05%	25.77%
Poultry & Products	100.00%	2.51%	0.15%	0.40%	0.10%	1.56%	0.25%	0.14%	12.60%	15.75%
Sugar & Tropical Products	100.00%	1.67%	0.31%	0.80%	0.14%	0.35%	0.23%	0.06%	41.45%	13.18%
Tobacco & Products	100.00%	1.10%	0.00%	6.92%	0.00%	0.02%	0.94%	0.14%	0.17%	0.07%
Imports										
	World	CA	CR	DR	ES	GT	HD	NC	CN	MX
Agricultural Total	100.00%	4.31%	1.54%	0.44%	0.26%	1.55%	0.50%	0.29%	20.69%	14.06%
Cotton, Linters & Waste	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	1.40%
Dairy Products	100.00%	0.38%	0.04%	0.01%	0.02%	0.10%	0.02%	0.19%	14.60%	3.74%
Grains & Feeds	100.00%	0.58%	0.11%	0.11%	0.25%	0.11%	0.02%	0.07%	50.06%	7.88%
Horticultural Products	100.00%	5.42%	2.59%	0.45%	0.05%	1.78%	0.73%	0.07%	10.94%	22.80%
Livestock & Meats	100.00%	1.01%	0.30%	0.01%	0.00%	0.00%	0.03%	0.68%	43.30%	7.43%
Oilseeds & Products	100.00%	0.16%	0.02%	0.05%	0.00%	0.01%	0.03%	0.11%	30.93%	2.21%
Planting Seeds	100.00%	3.53%	1.52%	0.03%	0.00%	1.89%	0.11%	0.00%	26.61%	2.27%
Poultry & Products	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	42.59%	2.61%
Sugar & Tropical Products	100.00%	7.76%	1.45%	0.96%	1.05%	3.45%	0.72%	0.69%	14.60%	8.03%
Tobacco & Products	100.00%	1.55%	0.00%	2.26%	0.00%	0.63%	0.80%	0.12%	3.67%	0.85%

Source: Calculated based on Table 1

Notes: CA: Central America; CR=Costa Rica; DR=Dominican Republic; ES=El Salvador; GT=Guatemala; HD=Honduras; NC=Nicaragua; CN= Canada; MX=Mexico

Annex 3a. Regional Aggregations

CAFTA-DRMEMBERS	Included countries
1. United States	United States
2. Dominican Republic	XFA: Rest of FTAA Dominican Republic is a grouped in XFA with some other rest of FTAA members.
3. XCA: Central America	Belize Costa Rica El Salvador Guatemala Honduras Nicaragua Panama
4. ROW	Australia, New Zealand, Rest Oceania (XOC), China, Hong Kong, Japan, Korea, Taiwan, XEA (Rest of East Asia), Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam, XSE (Rest of Southeast Asia), Bangladesh, India, Sri Lanka, XSA (Rest of South Asia), Canada, Mexico, XNA (Rest of North America), Colombia, Peru, Venezuela, XAP (Rest of Andean Pact), Argentina, Brazil, Chile, Uruguay, XSM (Rest of South America), XCB (Rest of the Caribbean), Austria, Belgium, Denmark, Finland, France, Germany, United Kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, Switzerland, XEF (Rest of EFTA), XER (Rest of Europe), Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Malta, Poland, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Russian Federation, XSU (Rest of Former Soviet Union), Turkey, XME (Rest of Middle East), Morocco, Tunisia, XNF (Rest of North Africa), Botswana, South Africa, XSC (Rest of South African Customs union), Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, XSD (Rest of Southern African Development Community), Madagascar, Uganda, XSS (Rest of Sub-Saharan Africa).

Annex 3b. Sector Aggregations

SECTOR	DESCRIPTION
1. Meat	Cattle and their meats
2. Cattle	Cattle, sheep, goats, horses
3. Paddy	Paddy rice: rice husked and unhusked
4. Wheat	Wheat
5. Ograins	Other grains: maize 9corn), rye, oats, other cereals
6. Vegfruit	Vegetables & fruit: vegetables, fruit vegetables, fruit and nuts, potatoes, cassava, truffles.
7. Oilseeds	Oilseeds: oil seeds and oleaginous fruit; soybeans, copra.
8. Sugar	Sugar cane and sugar beet
9. Ocr	Other crops: live plants, cut flowers and flower buds, flower seeds and fruit seeds, vegetable seeds, unmanufactured tobacco, etc.
10. Pltex	Plant fibers and wool
11. Oap	Animal products nec
12. Dairy	Raw milk, dairy products
13. Fo-Fi	Forestry and fish
14. Omt	Other meat: pig meat and offal
15. Vol	Vegetable oils
16. FBev	Food and beverages
17. TWL	Textile leather products
18. Svmfg	All other sectors not included in the above 15 aggregations: Coal, oil, gas, other mining, lumber, paper & paper products, petroleum & coke, chemical rubber products, non-metallic minerals, non-ferrous metal, fabricated metal products, motor vehicles, other transport equipments, electronic equipment, other machinery and equipment, other manufacturing, water, electric, gas distribution, construction, trade, other transport, water transport, air transport, communications, other financial intermediation, insurance, other business services, recreation and other services, other services, dwellings.