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Global Trade Analysis Project

<https://www.gtap.agecon.purdue.edu/>

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I. Introduction

The NAFTA and the European Union comprising 27 countries constitute the largest trading blocs in the world. In 2008, the value of exports of goods and services from the European Union to the NAFTA region amounted to 450.2 billion Euros while the value of imports of goods and services to the European Union from the NAFTA bloc amounted to 362.1 billion Euros. The two trade blocs are also highly interdependent through foreign direct investment (FDI). In 2007, EU stocks of FDI in the NAFTA region was about 1.25 trillion Euros while the relevant figure of the NAFTA in the EU bloc was about 1.15 trillion Euros.

For Canada the European Union is the second most important trade partner. In 2008, the exports of goods and services from the European Union to Canada was about 37.4 billion Euros. EU imports from Canada amounted to about 33.3 billion Euros during the same year. Trade between Canada and the European Union is dominated by high-value goods such as machinery, transport equipment and chemicals. Recently, Canada has expressed an interest in negotiating a free trade agreement with the European Union. Indeed, an economic summit was held with the European Union in October of 2008 to start off the negotiations for deeper economic integration, beyond the level of the NAFTA. This desire for a bilateral approach is driven by a need to diversify Canada's trade across countries. The United States and the EU together account for about half the world economy. Furthermore, the US-EU relationship drives the world economy as either the EU or the US is also the largest trade and investment partner for almost all other countries in the world economy. In 2008, the European Union exported goods and services to the United States worth 384.3 billion Euros while imported goods and services in the amount of 315.8 billion Euros from the United States. The European Union is Mexico's second largest market after the United States. The EU and Mexico have established a free trade agreement (FTA) which came into force in October 2000. The EU-Mexico FTA is one of the most comprehensive in the world economy. It covers trade in goods as well as services¹. In 2007, The EU exported goods and services worth 25.5 billion Euros to Mexico and imported goods and services worth 15.4 billion Euros from Mexico. Thus the European Union maintains a trade surplus with respect to all the NAFTA countries.

The main objectives of my paper are the following:

1. To investigate the effects of a bilateral free trade agreement between Canada and the European Union on output and exports for different sectors of Canada.
2. To explore the effects of a common free trade agreement between the European Union and NAFTA on various trade related variables in NAFTA countries.
3. To examine the effects of a common free trade agreement between the European Union and NAFTA on non-member countries especially the developing countries.

¹ Mexico still imposes tariffs and tariff quotas on certain sensitive products such as cereals, meat and dairy products.

II. Review of the Literature

In recent years, regional trade blocs in different forms have proliferated and expanded. For example, the European Union has expanded to include several East European countries. The Association of South-East Asian countries (ASEAN) has negotiated free trade agreements with the European Union, China, and India. Furthermore, each of the NAFTA countries (the United States, Canada, and Mexico) has negotiated bilateral free trade agreements with several countries. Regionalization of world trade has generated debates among trade economists over the motives, benefits and costs of regional trade liberalization as opposed to multilateral trade liberalization through the World Trade Organization. Some early studies (among others, Perroni and Whalley, 1994 and Whalley, 1996) examined various motives behind formation of regional free trade agreements. A large literature has emerged on the effects of regional free trade effects. Krueger (1999) focused on trade creation and trade diversion under the NAFTA. More recently, Romalis (2005) has examined the effects of Canada-US free trade agreements and the NAFTA. Islam (2003) has examined the effects of expansions of the NAFTA and the European Union on member and non-member countries. Lee and Mensbrugghe (2009) have explored the impacts of regional integration in Asia on the European Union and North America. In recent years, the effects of overlapping free trade agreements or “Spaghetti Bowls regionalism” have drawn the attention of several economists (Chong and Hurr, 2008; Baldwin, 2006; and Ibarra-Yunez, 2003). Baldwin (2008) provides a survey on theoretical issues concerning the systemic effects of free trade agreements on world trade and multilateral trade agreements. Schiff and Winters (2003) have examined the types and effects of free trade agreements from the perspective of developing countries. Some economists have explored the effects of protection and free trade agreements on international trade in agriculture (Femenia and Gohin, 2009 and Vollrath *et al.*, 2009). The literature on regional trade blocs has concentrated mainly on expansions of existing trade blocs and on overlapping regional free trade agreements. The literature is scanty on the consequences of 1) a free trade agreement between a major trading country of a big trade bloc such as the NAFTA with a mega trade bloc such as the European Union or 2) a common and comprehensive free trade agreement between two major trade blocs.

In October, 2008, Canada and the EU released a Joint Study(2008)². The study emphasizes that there are important benefits for both sides to pursuing a closer economic partnership. Liberalizing trade in goods and services could generate a potential 20% increase in bilateral trade and GDP gains of up to \$12 billion (or €8.2 billion) for Canada by 2014. At the Canada-EU summit of May 2009, in Prague, Canada and the European Union announced the launch of negotiations toward a Comprehensive Economic and Trade Agreement (CETA). A CETA with the EU could generate benefits across many goods sectors, such as aerospace, chemicals, plastics, wood products, aluminum, fish and seafood, light vehicles and automotive parts, and agriculture products such as wheat, beef, and pork; it could also deliver benefits across services sectors such as transportation, engineering and computer services.

At the EU-US Summit of April 2007, the United States and the European Union signed the “Framework for Advancing Transatlantic Economic Integration between the USA and the EU.” A study by the European Commission (2009) shows that elimination of all non-tariff measures will increase EU GDP by 122 billion Euros per year and EU exports by 2.1%. The sectors that will

² This study provides a more detailed review of the literature on Canada–EU trade relations. The study uses a general equilibrium model developed by some Copenhagen economists.

gain in the EU are motor vehicles, chemicals, pharmaceuticals, food, and electrical machinery. In the USA, the gains will amount to 41 billion Euros per year for GDP and 6.1% for exports. US benefits will accrue to electrical machinery, chemicals, pharmaceuticals, and financial services.

My paper will contribute to the literature in several ways: First it will highlight the existing trade barriers involving Canada and the European Union at a disaggregated level. Second, it will evaluate the benefits and costs of a free trade agreement between Canada and the European Union from a Canadian perspective. Finally, it will examine the effects of a possible common free trade agreement between the NAFTA and the European Union on NAFTA, the European Union and non-member countries especially developing countries.

Methodology and Data

The effects of free trade agreements can be analyzed using several alternative techniques: applied general equilibrium model such as the GTAP model and various econometric techniques such as gravity equations, log-linear OLS regression models, and non-parametric econometric techniques. For a review of various techniques, see Baier and Bergstrand (2009).

In exploring the effects of a trans-Atlantic free trade agreements, this paper primarily relies on the Global Trade Analysis Project (GTAP) model and database, version 7, which is a standard comparative static applied general equilibrium model. The latest GTAP database contains 113 regions/countries and 57 sectors with the benchmark data for the year 2004.

In order to make the empirical analysis of this paper manageable, 113 regions/countries have been aggregated into 11 regions/countries: 1) Canada (Can); 2) USA; 3) Mexico (Mex); 4) the European Union (EU) comprising 27 member countries; 5) Japan; 6) China; 7) East and South-East Asia (ESEA); 8) South Asia (Sasia); 9) Africa (AFR); 10) Latin America (Lat); and 11) the Rest of the World (ROW). In this paper, the 57 sectors in the GTAP database have been aggregated into ten sectors: 1) Agriculture (Agri); 2) textiles (Tex); 3) apparel (App); 4) Mining (Min); 5) Processed food products (Prof); 6) Light manufactures (Ltm); 7) Heavy manufactures (Hvm); 8) Utilities and construction (Utc); 9) transport and communications (Trac); and 10) Other services (Oser). Two policy experiments are considered in this paper: 1) Elimination of all tariffs and export subsidies for all goods and services involving Canada and the European Union; and 2) Elimination of all tariffs and export subsidies³ for all goods and services involving NAFTA countries and the European Union.

II. BASIC STATISTICS

This section of the paper presents some basic statistics on trade involving the European Union and other regions. Table 1 displays data on exports by sectors from the European Union to NAFTA and other regions. It is evident that exports from the European Union to NAFTA countries are dominated by heavy manufactures. Exports of agricultural and mining products from the European Union to NAFTA countries are relatively low. Table 2 shows that dominant categories of exports of goods from Canada to the European Union are heavy manufactures

³ In GTAP model tariff rates and rates of export subsidies are represented by *tms* and *txs*, respectively.

(Hvm), light manufactures (Ltm), transport and communications (Trac), mining (Min), and agriculture (Agri). For US exports of goods to the European Union, agriculture and processed food (Prof) appear to be more important compared to Canada's exports. Mexico's exports of goods to the European Union are dominated by heavy manufactures, mining, and light manufactures. Table 3 reports the data on trade balances of the NAFTA countries with the European Union. It is evident that in 2004, Canada had a trade surplus in other services (Oser), mining, agriculture, and transport and communications but a huge trade deficit in heavy manufactures. In contrast, The USA had a substantial trade surplus only in agriculture while Mexico had a significant surplus in mining.

Table 4 presents data on the Self-Sufficiency Ratio (SSR) which is defined as domestic production as a ratio of total availability. Total availability is defined as domestic production + net imports (M-X). An SSR greater than 1 for a sector suggests that the relevant country has a comparative advantage in that sector while an SSR which is less than 1 implies a comparative disadvantage. However, it should be noted that SSR figures are affected by trade barriers in the home and foreign countries. As observed from Table 4, for Canada the SSR exceeds one in agriculture, mining, light manufactures, and transport and communications. In contrast, the SSR is significantly below 1 in textiles and apparel. For the USA, the SSR is greater than 1 in agriculture and other services (Oser) only. For Mexico, the SSR is greater than 1 several sectors: mining, apparel, light manufactures, utility and construction, and transport and communications. Finally, for the European Union, the SSR is greater than 1 in light manufactures and transport and communications.

Tables 5 and 6 show some data on trade-related variables for the European Union and NAFTA markets. The main points can be summarized as follows. First, the market shares of the USA, Canada, and Mexico in the European Union are 10.46%, 1.4%, and .93%, respectively. Second, the USA exports the highest varieties of products to the European Union followed by Canada and Mexico. This is consistent with the hypothesis that a large advanced economy produces and exports a wider range of products compared to a small and less advanced economy. Third, the simple average tariff rate and the weighted average rate in the European Union are quite low – being only 6.44% and 5.56%, respectively. However, the tariff rate ranges from 0% to 604.3%. Fourth, in 2008, in the Canadian market, the market shares of the United States, the European union, and Mexico, were 52.5%, 12.54%, and 4.22%, respectively. Fifth, the simple average tariff rate and the weighted average tariff rate in Canada were 8.32% and 7.15%, respectively. The tariff rate in Canada ranged from 0% to 238%. Sixth, in Mexico, the market shares of the United States, the European Union, and Canada were 49.69%, 12.67%, and 3.05%, respectively. The simple average and weighted average tariff rates in Mexico were 13.56% and 18.39%, respectively – higher than the other NAFTA countries and the European Union. Seventh, in the United States, the market shares of the European Union, Canada, and Mexico, were 18.37%, 17.08%, and 10.19%, respectively. Finally, the simple average and weighted tariff rates in the United States, were 7.27% and 5.97%, respectively.

The low average tariff rates in the European Union and NAFTA countries coexist with tariff peaks involving agricultural and food products. For example, in 2008, in the European Union, applied average tariff rates were 49.4% on cereals, 35.7% on sugar and sugar confectionary, and 33.2% on dairy products. In Canada, average tariff rates were 237.3% on dairy products, 54.1%

on animals and animal products, and 14.2% on grains, in 2006. In the USA during 2007, average tariff rates were 56% on tobacco, 21.4% on dairy products, and 13.9% on footwear. In Mexico, during 2007, Canadian milk products faced a tariff rate of 31.2%. During the same year, average tariff rates on EU products in Mexico were 28.7% on animals and animal products, 24.4% on milk products, and 22.9% on coffee, tea, and sugar⁴.

International trade involving NAFTA and European Union is also substantially affected by numerous non-tariff barriers (NTB), especially involving agricultural and food products. These NTBs are represented by domestic support, export subsidies, tariff rate quotas, sanitary and phytosanitary measures, special safeguard measures, supply management systems, and government interventions.

The data presented in Tables 5 and 6 reveal the facts that while US-EU trade relationship can be characterized as “symmetric,” US trade relations with Canada and Mexico involve an asymmetry because of substantial differences in the sizes of the relevant economies.

Table 7 provides data on tariff rates EU products in different regions. It should be noted that these tariff rates are “*ex-post* tariff rates”: total duties paid as percentages of values of actual imports. In the Canadian market, the tariff rate on the European Union was 18% for processed food, 16.2% on apparel, and 8.9% on textiles. In the United States, the tariff rates on the European Union were high for apparel and textiles. In Mexico, the tariff rates were high for processed food, light manufactures, and apparel. Table 8 presents data on tariff rates in the European Union. In the EU market, Canada and the USA face higher tariff rates for agriculture, processed food, apparel, and textiles. In contrast, for Mexico tariff rates exist in agriculture and processed food.

⁴ Data on tariff rates in this paragraph are from Trade Policy Reviews of relevant region/country published by the WTO.

Table 1 Exports from European Union to Other Regions ,2004

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW	Total
Agri	779.2	594	1167.4	250.1	216.7	1493.8	112.6	386.1	66269	2379.8	7125.3	80773.6
Min	939.6	124.6	624.4	5503.8	995	3154.1	66.4	147.2	27380	840.1	5364.7	45140.3
Prof	932.9	4908.2	5391.3	462.5	1941	12996	667.3	2522.6	153588	6646.1	20648.1	210704
Tex	1360.3	1153.5	2298.2	527.3	496.2	3678.7	382.9	804.2	61132	4474.7	10309.6	86617.8
App	435.1	1343.4	1368.8	89.9	354.9	3270.2	234.5	386.6	40292	910	7533.3	56219.2
Ltm	13250	16341.3	19987.5	3992.5	7873	84289	4751	13473	649239	22181	110530	945906.3
Hvm	50922	28290.8	69168	15073	15965	154448	12785	29881	1E+06	51757	225107	1746040.9
Utc	1024.6	2705.3	2020.7	544.1	159.2	1099.2	12.9	940.1	26322	1606.9	6189.5	42624.6
Trac	9784.4	10984	24157.5	4876.2	2699	31066	1587	9102.2	162169	6592.7	30534.5	293552.3
Oser	10791	14122.8	34273	8799.6	5141	70154	3144	14532	290924	11770	51773.5	515423.4
Total	90219	80567.9	160457	40119	35839	365649	23744	72176	3E+06	109158	475115	4023002.2

Source: GTAP database, Version 7.

Table 2 Exports from All Regions to EU, 2004

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW	Total
Agri	1694.1	85.3	2166.1	1455.9	1440.9	5558.4	294.2	14909	66268.5	9920	11463.3	115255.4
Min	1103.1	23.1	953.2	893.4	2596.3	1812.9	2274.1	7757.3	27380.4	44653.3	143098	232545.1
Prof	2330.6	160.7	4828.9	1401.1	643.2	3815.5	246.9	11781	153588	6470.2	12507.6	197774
Tex	7051	747.3	7424.2	8465.7	133.7	1439.9	151.4	735.3	61132.1	3132.8	12167.2	102580.7
App	12363	86.2	6767.6	7287.5	116.2	497.1	93	483.7	40292.4	6412.4	8831.8	83230.6
Ltm	33823	30497	34696	7019.7	5354.9	52751.7	1406.8	11227	649239	8602.3	41325	875942.5
Hvm	88971	65299	106091	6419.5	9134	121858	4329.6	19397	1092645	20403.1	141136	1675682
Utc	1031.1	2787.7	1365.1	222.8	103.5	1572.4	103.6	705.4	26322	856.6	6880.5	41950.7
Trac	15435	8652.7	35758	3606.1	3807.2	28669	867.8	12198	162169	10708.5	38342.7	320213.9
Oser	7135.1	7015.7	33228	8742.5	8013.3	71084	1303.7	10475	290924	9266.4	41466.9	488654
Total	170937	115354	233279	45514	31343.2	289059	11071	89667	2569960	120425	457219	4133829

Source: GTAP database, Version 7.

Table 3. Trade Balance of NAFTA countries with European Union, 2004

	Can	USA	Mex
Agri	1224.2	4064.6	181.6
Min	1601.3	-1341.2	2207.7
Prof	-1297.3	-9180.7	-420.4
Tex	-362.5	-2238.8	-231.5
App	-238.7	-2773.1	-141.5
Ltm	-2517.6	-31536.9	-3344
Hvm	-6830.9	-32590.2	-8455.4
Utc	-55.7	473.2	90.7
Trac	1108.5	-2397.1	-719.5
Oser	2872.7	930.5	-1840
Total	-4496.1	-76589.8	-12672.4

Source: Computed from GTAP database, Version 7

Table 4 Self-Sufficiency Ratio, 2004

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	0.97	0.85	0.91	1	1.1	1.05	0.96	1.15	0.91	1.01	1
Min	0.77	0.13	0.59	0.41	1.47	0.54	1.93	1.43	0.41	2.81	2.12
Prof	1.03	0.89	0.99	0.95	1	0.97	0.98	1.16	1	0.91	0.93
Tex	1.17	0.83	1.19	1.18	0.68	0.82	0.88	0.86	0.91	0.7	0.81
App	2.02	0.69	1.56	4.39	0.59	0.57	1.25	1.09	0.89	1.2	0.79
Ltm	1.19	1.12	1.08	1.03	1.15	0.88	1.01	0.95	1.01	0.72	0.73
Hvm	0.97	1.13	1.06	0.82	0.85	0.93	0.94	0.91	1	0.75	0.89
Utc	1	1	0.99	1	1	1	1.02	1	1	0.99	1
Trac	1.01	1.01	1.15	1	1.02	1	1.01	1.03	1.03	1.06	1.05
Oser	0.99	0.99	1	1	0.99	1.01	0.98	0.99	1	0.99	0.99

Source: GTAP database, Version 7

Table 5 European Union and Canadian Markets**A. The European Union Market: NAFTA Countries as Suppliers and Tariffs, 2008**

	Canada	Mexico	USA
Number of products	6,187	4,214	8,458
Rank	16	23	2
Market share(%)	1.4	.93	10.46
Tariff Data			
Simple Average	6.44%		
Standard Deviation	4.92		
Weighted Average	5.56%		
Duty Range	0-604.3%		
Number of duty free lines	2,368		
Total number of lines	8,720		

B. The Canadian Market, 2008

	European Union	Mexico	USA
Number of products	7,302	4,180	8,003
Rank	2	4	1
Market share(%)	12.54	4.22	52.5
Tariff Data			
Simple Average	8.32		
Standard Deviation	8.04		
Weighted Average	7.15		
Duty Range (%)	0-238		
Number of duty free lines	4,336		
Total number of lines	8,046		

Source: The WTO

Table 6 The Mexican and US Markets**A. The Mexican Market, 2008**

	European Union	Canada	USA
Number of products	9,095	5,311	10,163
Rank	2	6	1
Market share(%)	12.67	3.05	49.69
Tariff Data			
Simple Average	13.56		
Standard Deviation	15.82		
Weighted Average (%)	18.39		
Duty Range (%)	0-254		
Number of duty free lines	2,309		
Total number of lines	9,687		

B. The US Market, 2005

	European Union	Mexico	Canada
Number of products	9,685	5,957	7,690
Rank	1	4	2
Market share(%)	18.37	10.19	17.08
Tariff Data			
Simple Average	7.27		
Standard Deviation	13.93		
Weighted Average	5.97		
Duty Range (%)	0-350		
Number of duty free lines	4,579		
Total number of lines	10,058		

Source: The WTO

Table 7 Average Tariff Rates on EU Products, 2004

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	11.3	6.3	5.3	17.1	2.2	4.4	1.1	7.7	0.2	17.5	16.8
Min	2.7	0.1	1	14.6	0	0.3	0.4	4.3	0	2.1	0.5
Prof	17.8	32.3	19.8	38.4	18	4.9	16.4	16.6	0.3	20.6	19.9
Tex	11.7	6.8	8.8	10.9	8.9	6.9	3.5	12.1	0.6	23.5	4
App	18.3	10.9	9.2	16.8	16.2	10.6	6.1	18.2	0.3	30.4	7.1
Ltm	14.3	2.1	8.9	15.9	3.4	1.8	9.7	10.4	0.1	15.9	4.8
Hvm	6.6	0.6	3.7	13.4	1.6	1.4	4	8.2	0.1	9.5	3.6
Utc	0	0	0	0	0	0	0	0	0	0	0.5
Trac	0	0	0	0	0	0	0	0	0	0	0
Oser	0	0	0	0	0	0	0	0	0	0	0

Table 8 Average Tariff Rates on Products of Other Regions in EU Market

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	20.7	6	14.4	15.8	7.1	9.9	7.2	26.3	0.2	2.9	5.1
Min	0	0.2	0	0	0	0	0	0	0	0	0
Prof	14.5	11.7	12.3	6.9	15.8	15.1	5	15.1	0.3	18.6	14.7
Tex	8.6	6.6	7.9	4.2	7.2	6.1	0	2.8	0.6	0.1	1.1
App	11.2	10.4	9.3	4.9	9.8	10.2	0	2.3	0.3	0	1.4
Ltm	3.5	7.2	4.7	1.4	1.2	2.3	0	1	0.1	0.6	0.3
Hvm	2.3	2.2	1.2	0.5	1.2	1.4	0	0.5	0.1	0.2	0.6
Utc	0	0	0	0	0	0	0	0	0	0	0
Trac	0	0	0	0	0	0	0	0	0	0	0
Oser	0	0	0	0	0	0	0	0	0	0	0

Source: GTAP database, Version7

IV EMPIRICAL RESULTS

This section presents and examines the results from the general equilibrium analysis based on the GTAP model. Two policy experiments are carried out. Under policy experiment 1, Canada and the European Union form a free trade agreement by eliminating tariffs and non-tariff barriers such as subsidies and quantitative restrictions. Under policy experiment 2, NAFTA and the European Union form a mega- free trade bloc by eliminating tariffs and non-tariff barriers. Table 9 presents the effects of policy experiment 1 on output levels in different sectors in Canada, the European Union and other regions. Under this scenario, in Canada, output levels will grow in agriculture, textiles, and apparel sectors but decrease in processed food and light

manufacturing sectors. In the European Union, output levels will increase modestly in most sectors with the exceptions of agriculture, mining, and heavy manufactures. In the United States, output levels will decrease in processed food and textiles. As reported in Table 10, under policy experiment 1, Canada's exports will expand for most sectors such as agriculture, processed food, textiles, and apparel. For the European Union, exports will increase modestly in textiles, apparel, light manufacturing sectors and decrease in the agriculture sector. Table 11 displays the effects of policy experiment 1 on sectoral trade balances in different regions. In Canada, the trade balance will improve in agriculture while decrease in most sectors. In contrast, for the European Union, the trade balance will improve in processed food, textiles, apparel, and light manufacturing sectors but worsen in the agriculture sector. For the United States, the trade balance will improve in heavy manufactures and other services but worsen in the processed food sector. Finally, as reported in Table 12, a Canada-EU free trade agreement will increase the economic welfare (as measured by the equivalent variation) in Canada and the European Union with adverse effects on other regions notably, the United States.

The effects of a free trade agreement between the NAFTA and the European Union are reported in Tables 13, 14, 15, and 16. As observed from Table 13, most of the sectors in Canada will experience decreases in output levels, with the exception of agriculture. For the United States, the evidence is mixed: output levels will contract in textiles and apparel but expand in agriculture. In the European Union, the effects are largely the opposite of that of the United States. The effects on Mexico are quite modest: output levels will expand in agriculture and mining but contract in textiles and apparel. As shown in Table 14, Canadian exports will increase for agriculture, processed food, textiles and apparel but decrease for light manufactures. The effects on US exports will increase for most sectors especially, processed food, apparel, light and heavy manufactures. In the European Union, exports will grow for sectors such as apparel, textiles, and processed food but decline for agriculture and mining. In Mexico, exports of textiles and apparel will be adversely affected while exports of agriculture and light manufactures will be augmented by a NAFTA-EU free trade deal. Table 15 reports the effects of policy experiment 2 on sectoral trade balances in different regions. For Canada the trade balance will improve in agriculture, heavy manufactures, transport and communications, and other service sectors but worsen in processed food, light manufactures, textiles, and apparel. For the United States, the trade balance will improve in agriculture and heavy manufacturing sectors but will worsen in other sectors. For the European Union, the trade balance will increase notably in apparel, light manufactures, textiles and processed food but decrease in other sectors such as heavy manufactures and agriculture. In Mexico, the sectors that will experience increases in the trade balance are agriculture, mining, transport and communications, and other services while the sectors that will experience decreases in the trade balance are processed food, textiles, apparel, light manufactures, and heavy manufactures. Finally, a NAFTA-EU free trade agreement will increase the economic welfare (measured by the equivalent variation) of the United States and the European Union but reduce that of Canada, Mexico and other regions notably, China.

The finding that in a NAFTA-EU free trade agreement large trading partners such as the European union and the United States gain while a small trading partner such as Canada loses deserve some discussion. A possible explanation is that in the European market, export baskets of the United States and Canada overlap to a substantial extent and that the United States will have an enhanced competitive advantage over Canada. One way to ascertain the extent of

overlapping export baskets is to compute and examine the “Export Similarity Index” ESI) (Finger and Kreinin, 1979). This index is computed as follows:

$$ESI = \sum_{i=1}^n [\text{Min} (S_{ij}, S_{ik})]$$

where S_{ij} = Country j 's share of export of product i to the third market in its total exports to the third market.

S_{ik} = Country k 's share of export of product i to the third market in its total exports to the third market.

The ESI can range from 0 to 1. A value of 1 suggests that export baskets of two countries are perfectly similar. Table 17 shows the ESI data for Canada-USA and Canada-Mexico in the European market. It is clearly evident that ESI figures for Canada-USA are higher than for Canada-Mexico, suggesting that in the European market Canada faces greater competition from the United States than from Mexico. It is also evident that the ESI for Canada and Mexico shows a strong upward trend while the ESI for Canada and the United States displays a somewhat weak upward trend.

Table 9 Effects of Canada-EU Free Trade Agreement (Policy Experiment 1) on Output (%)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	0	0	-0.01	0	0.6	0	0	-0.01	-0.06	-0.01	-0.02
Min	0.01	0.02	0.01	0.01	-0.08	0.03	0.01	0.01	-0.03	0	0
Prof	-0.02	0	-0.03	-0.01	-0.11	-0.09	-0.02	-0.03	0.07	-0.01	-0.03
Tex	-0.05	-0.02	-0.07	-0.03	0.35	-0.07	-0.04	-0.05	0.08	0	-0.01
App	-0.12	0	-0.11	-0.18	0.55	0	-0.03	-0.04	0.09	-0.01	-0.03
Ltm	0	-0.01	-0.01	0.01	-0.14	-0.02	-0.01	0.01	0.02	0.01	0.01
Hvm	0.01	0	0	0.01	0.01	0.02	0.01	0	-0.02	0.01	0
Utc	0	0	0	0	0.22	-0.02	0	-0.01	0.01	-0.01	0
Trac	0.01	0	0.01	0	-0.01	0	0.01	0.01	0	0	0
oser	0	0	0	0.01	-0.04	0	0	0	0	0	0

Source: Simulation Results from the GTAP model.

Table 10 Effects of Canada-EU Free Trade Agreement (Policy Experiment 1) on Exports (%)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	0	-0.06	-0.01	-0.01	2.68	0.13	0.05	-0.02	-0.21	-0.1	-0.07
Min	0.03	0.03	0.01	0.02	-0.31	0.21	0.02	0.03	-0.13	0	0.01
Prof	-0.19	-0.15	-0.13	-0.1	3.1	-1.56	-0.16	-0.1	0.43	-0.09	-0.15
Tex	-0.06	-0.07	-0.09	-0.03	2.58	-0.67	-0.12	-0.12	0.21	-0.01	-0.02
App	-0.18	-0.07	-0.18	-0.22	5.5	-0.76	-0.09	-0.13	0.47	-0.03	-0.07
Ltm	-0.01	-0.03	-0.01	0.05	0.12	-0.25	-0.02	0.01	0.08	0.03	0.01
Hvm	0.02	0.01	0	0.03	0.51	0.02	0.03	-0.01	-0.02	0.01	-0.01
Utc	0.11	0.09	0.07	0.1	-0.38	0.25	0.08	0.09	-0.06	0.04	0.05
Trac	0.09	0.07	0.05	0.09	-0.33	0.19	0.06	0.09	-0.03	0.03	0.04
Oser	0.09	0.05	0.05	0.09	-0.5	0.22	0.09	0.09	-0.08	0.04	0.03

Source: Simulation Results from the GTAP model.

Table 11 Effects on Canada-EU Free Trade Agreement (Policy Experiment 1) on Trade Balance (Millions of US \$)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	8.07	2.65	7.17	1.25	312.86	88.14	4.51	-10.7	-422.13	-19	-25.12
Min	-1.43	-7.82	1.81	-4.48	-53.77	-17.49	6.86	18.62	-22.31	15.34	63
Prof	-29.42	-3.94	-47.33	-4.83	-152.66	-440.45	-8.46	-45.67	718.69	-11.01	-60.71
Tex	-15.51	-4.35	-27.23	-1.67	8.85	-63.63	-4.34	-6.36	103.14	0.29	-1.69
App	-100.2	0.14	-59.58	-36.25	4.44	17.16	-5.44	-9.72	194.8	-2.7	-9.46
Ltm	-7.57	-35.12	-11.67	15.43	-328.37	-117.14	-12.2	15.09	391.86	7.1	15.78
Hvm	94.23	63.73	16.11	18.82	-86.85	600.95	22.44	7.27	-808.56	9.63	-16.3
Utc	2.45	6.82	3.07	0.86	-7.86	16.88	0.52	3.17	-35.43	1.34	8.17
Trac	40.68	47.12	93.6	11.67	-70.94	225.65	4.51	32.34	-151.28	11.83	59.28
Oser	17.82	11.87	45.33	17.5	-178.4	469.41	6.62	28.06	-458.3	9.12	30.96

Source: Simulation Results from the GTAP model.

Table 12 Effects of Canada-EU Free Trade Agreement (Policy Experiment 1) on Economic Welfare (Equivalent Variation) in Millions of US \$

Regions	EV
China	-37.35
Japan	-1.59
ESEA	-16.37
Sasia	-24.14
Can	578.96
USA	-722.53
Mex	4.92
Lat	-23.33
EU	854.29
AFR	-14.59
ROW	-14.19

Source: Simulation Results from the GTAP model.

Table 13 Effects of NAFTA –EU FTA (Policy Experiment 2) on Output (%)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	0	0.07	0.01	-0.01	0.81	0.42	0.2	0	-0.43	-0.07	-0.05
Min	0.05	0.14	0.03	0.06	0.05	-0.09	0.16	0.09	-0.17	0.02	0
Prof	-0.04	0	-0.1	-0.02	-0.36	0.06	-0.11	-0.04	0.07	-0.04	-0.08
Tex	-0.11	0	-0.52	-0.15	-0.24	-0.73	-0.7	-0.51	0.67	-0.04	-0.14
App	-0.16	0.01	-1.19	-0.97	-0.22	-0.99	-0.68	-0.77	1.07	-0.19	-0.36
Ltm	-0.03	0	-0.05	0.03	-0.28	-0.05	-0.02	-0.02	0.11	0.02	-0.01
Hvm	0.02	0.07	-0.07	0.05	0.07	0.06	0.12	0.07	-0.06	0.03	-0.03
Utc	-0.09	-0.14	-0.14	-0.08	-0.07	0.08	0.11	-0.18	0.05	-0.16	-0.09
Trac	0.05	0.01	0.11	0.01	0.03	0	0.07	0.06	0.02	0.04	0.04
Oser	0	0	0.06	0.06	0.01	-0.02	-0.06	0.03	-0.02	0.03	0.03

Source: Simulation Results from the GTAP model.

Table 14 Effects of NAFTA –EU FTA (Policy Experiment 2) on Exports (%)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	0.24	0.05	-0.03	0.14	3.34	3.9	1.68	-0.04	-1.15	-0.58	-0.3
Min	0.2	0.04	0.09	-0.01	-0.1	-0.68	0.26	0.11	-0.39	0.03	0.02
Prof	-0.34	-0.41	-0.45	-0.26	1.83	4.51	-0.75	-0.2	0.84	-0.28	-0.46
Tex	-0.29	-0.16	-0.54	-0.15	0.97	1.9	-1.86	-1.34	1.69	-0.21	-0.21
App	-0.58	-0.4	-1.98	-1.23	3.02	6.3	-1.76	-3.01	5.48	-0.52	-0.82
Ltm	-0.16	0.02	-0.11	0.1	-0.31	2.06	0.97	-0.26	0.64	0	-0.15
Hvm	-0.04	0.2	-0.11	0.13	0.26	1.97	0.48	0.01	0.2	-0.05	-0.15
Utc	0.76	0.81	0.55	0.72	0.84	-0.69	1.53	0.67	-0.4	0.33	0.4
Trac	0.75	0.7	0.52	0.7	0.76	-0.3	0.9	0.82	-0.1	0.48	0.45
Oser	0.88	0.84	0.69	0.88	0.89	-0.49	0.82	1.03	-0.31	0.58	0.52

Source: Simulation Results from the GTAP model.

Table 15 Effects of NAFTA-EU FTA (Policy Experiment 2) on Trade Balance (Millions of US \$)

	China	Japan	ESEA	Sasia	Can	USA	Mex	Lat	EU	AFR	ROW
Agri	108.55	66.21	78.02	23.53	419.49	1445.95	95.95	-48.97	-2289.9	-92.15	-98.1
Min	114.55	80.34	190.89	36.82	-11.92	-199.79	25.17	14.33	92.88	-74.08	-250.9
Prof	-58.31	75.15	-153.88	-6.07	-281.57	-74.6	-180.85	-129.28	649.1	-16.24	-146.8
Tex	-146.98	6.86	-118.88	-21.14	-6.33	-465.61	-73.65	-37.19	750.64	12.48	5.61
App	-407.72	40.81	-674.68	-227	-17.53	-801.59	-138.56	-213.51	2533.47	-51.25	-103.2
Ltm	-264.86	55.92	-61.85	58.5	-601.31	-1486.7	-222.8	41.79	1698.45	111.55	244.1
Hvm	346.17	887.29	-274.89	215.19	125.64	266.94	-181.38	384.27	-2695.7	182.5	40.16
Utc	17.58	73.59	31.82	7.67	17.49	-48.18	8.44	25.95	-226.89	15.84	76.69
Trac	340.72	465.14	821.16	93.76	156.94	-421.77	72.22	278.68	-654.12	141.31	588.3
Oser	187.61	365.89	656.48	166.42	322.93	-1007.5	83.37	317.35	-1890.1	163.72	633.8

Source: Simulation Results from the GTAP model.

**Table 16 Effects of NAFTA-EU FTA on Economic Welfare
(Equivalent Variation in Millions of US \$**

Regions	EV
China	-964.78
Japan	-907.14
ESEA	-824.04
Sasia	-265.57
Can	-349.35
USA	3067.96
Mex	-265.92
Lat	-615.01
EU	5474.5
AFR	-304.7
ROW	-1047.93

Source: Simulation Results from the GTAP model.

Table 17 Export Similarity Index

Year	Canus	Canmex
1992	0.533	0.347
1993	0.624	0.363
1994	0.563	0.404
1995	0.568	0.463
1996	0.609	0.499
1997	0.608	0.536
1998	0.648	0.522
1999	0.613	0.440
2000	0.651	0.436
2001	0.627	0.408
2002	0.620	0.409
2003	0.583	0.430
2004	0.563	0.439
2005	0.581	0.445
2006	0.613	0.436

Source: Computed from the time series data of GTAP database, Version 7.

V. Summary and Concluding Remarks

The empirical evidence presented in this paper shows that a Canada-EU free trade agreement will significantly increase the economic welfare of Canada and the European Union but reduce that of the United States, China and other regions. The magnitude of the gain to Canada is less than suggested by the Canada-EU joint study (2008)⁵. The sector in Canada that will gain is agriculture as indicated by increases in output, exports, and the trade balance. In the European Union, the sector that will contract is agriculture. Textiles, apparel, and processed food sectors in the European Union will expand. The results under the scenario of a NAFTA-EU free trade agreement suggests that the economic welfare will increase in the European Union and the United States but decline in all other regions including Canada and Mexico. Under this agreement, in Canada gains will accrue to sectors such as agriculture, heavy manufactures, transport and communications, and other services. However, this agreement will weaken Canada's advantage in processed food, textiles, and apparel. The evidence seems to suggest that Canada's competitive position of the processed food sector in the European market will worsen because of competition from the United States.

The paper can be expanded by disaggregating further the sectors used and by incorporating more recent data on trade flows, tariffs, and non-tariff barriers. Finally, one should be aware of the limitations of comparative static CGE models given the fact that the results from these models are sensitive to trade elasticities (Hertel *et. al.*, 2004).

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⁵ One possible explanation is that the joint study considered elimination of a wider range of non-tariff barriers.

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