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UNITED STATES AND CANADIAN FREE TRADE AGREEMENT: ECONOMIC IMPLICATIONS

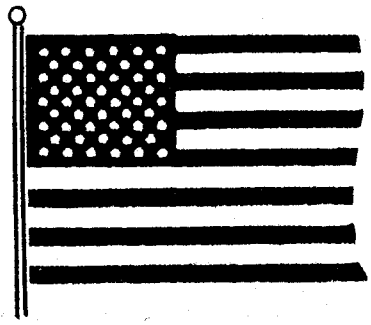

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Table of Contents

List of Tables

Highlights

The primary objective of this study was to empirically evaluate the economic effects of the United States and Canadian Free Trade Agreement (FTA). Emphasis was placed on bilateral trade flows of agricultural and industrial products between the United States and Canada given the removal of tariff and nontariff barriers under the FTA. The impact of the FTA on the two countries' trade with third countries was evaluated. A traditional log-linear trade model was specified which consisted of import demand and export supply equations for both agricultural and industrial products. The United States and Canadian trade data used were quarterly time series data for the period 1972 to 1985.

The models were estimated using the three-stage least-squares estimator (3SLS). The models had R^2s that ranged from 0.78 to 0.99 indicating the explanatory variables specified in the models explain most of the causes of variations in the dependent variable. This study revealed that U.S. imports of agricultural and industrial products from Canada were more sensitive than Canadian imports not only to import and domestic prices but also to world prices. This is because Canadian consumers have less domestic substitutes than their U.S. counterparts and also Canada has a smaller internal market than the United States. It was estimated that U.S. imports from Canada will increase $2.8 billion compared to $1.2 billion for Canadian imports from the United States. The impact on the two countries' trade with third countries will not be significant.

The largest impact in agricultural commodity trade will come in trade of horticultural products. The United States currently has a trade surplus with Canada in horticultural products. Under the FTA U.S. exports of fruits and vegetables to Canada should increase. Eliminating tariffs and increasing Canadian supplemental quotas for U.S. poultry should improve U.S. access to the Canadian poultry market. Eliminating discriminatory practices by Canada against U.S. wine should increase U.S. wine exports to Canada. All other agricultural commodity groups will experience negligible changes under the FTA.

United States and Canadian Free Trade Agreement: Economic Implications

Won W. Koo, Joel T. Golz, and Ihn H. Uhm*

The value of bilateral trade between the United States and Canada in 1988 amounted to $154.1 billion (U.S.), which constituted the largest two-way trade in the world. The two countries were each other's largest trading partner. U.S. merchandise exports to Canada amounted to $71.5 billion (U.S.), while U.S. imports from Canada were $82.6 billion (U.S.). The major proportion of U.S.-Canadian bilateral trade has been in natural resources and industrial products. U.S. imports include autos and auto parts, lumber, and energy products, while U.S. exports include autos and auto parts, computers, semiconductors, and telecommunication equipment.

United States trade with Canada in 1988 accounted for less than one-quarter of U.S. exports and for less than one-fifth of U.S. imports. By contrast, it accounted for almost three-fourths and two-thirds of Canadian exports and imports, respectively. The U.S. market for Canadian exports has increased, accounting for almost 75 percent of total exports in 1988 compared to 63 percent in 1980. Since Canadian exports to the United States account for almost 20 percent of Canadian GNP while U.S. exports to Canada represent less than 2.0 percent of the U.S. GNP, the degree of bilateral trade dependence is greater for Canada than for the United States.

About 70 percent of the value of goods traded between the United States and Canada now enters the other's market duty free. Of the remaining 30 percent, the average Canadian ad valorem tariff rate on U.S. commodities in 1986 was about 10.4 percent while the corresponding U.S. rate on Canadian commodities was 5.6 percent (Canadian Department of Finance). In terms of production weighted averages, the overall level of Canadian tariff protection was 4.5 percent, while U.S. protection averaged about 2.8 percent in 1987. Both countries have non-tariff barriers such as quantitative restrictions (quotas), defense procurement policies, and contingent protection measures (Table 1).

The United States-Canadian Free Trade Agreement (FTA)[1] eliminates most trade barriers between the two countries for ten years beginning January 1, 1989. The FTA raises many questions, inter alia, concerning economic interests of the United States, Canada, and the rest of the world. One group of economists in Canada believes, for example, that Canada would experience an increase in welfare by virtue of greater efficiency in resource use, improvements of trade volume and, especially, the realization of scale economies arising from improved access to large U.S. markets. On the other

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[1]In January of 1988, the United States and Canada signed a Free Trade Agreement, later ratified by the U.S. Senate, as well as the Canadian Parliament.

TABLE 1. COMPARISON OF CANADIAN AND U.S. TRADE BARRIERS (BILATERAL PERSPECTIVES) FOR SELECTED INDUSTRIES AND ALL INDUSTRIES (AGGREGATED)

Industry	Trade Barriers			
	Canada		U.S.	
	Tariff	NTB	Tariff	NTB
Agriculture	3.0	8.6	2.0	10.7
Forestry	0.0	0.0	0.2	0.6
Fishing and Trapping	0.2	0.0	1.7	0.0
Mining	0.2	0.0	0.4	0.0
Manufacturing (aggregate)	5.2	1.3	3.2	1.4
Food and beverage	5.2	6.9	3.6	8.4
Tobacco	16.5	0.0	20.7	0.0
Leather	15.7	0.0	7.5	0.0
Textiles	11.4	0.0	8.5	0.0
Knitting mills	22.7	0.0	12.3	0.0
Clothing	19.7	0.0	10.9	0.0
Furniture and fixtures	12.5	0.1	2.0	0.5
Shipbuilding	10.1	1.4	0.3	0.0
Goods-production (aggregate)	4.5	1.6	2.8	1.9

Note: the tariff estimates presented in Table 1 were derived using production data as aggregation weights. NTBs are expressed ad valorem equivalent which includes quantitative restrictions and federal government procurement.

SOURCE: Department of Finance, Trade Barriers Between Canada and the United States, Working Paper No. 88-3, Ottawa, 1988, p. 10.

hand, international trade theory holds that it cannot be determined a priori whether a particular preferential arrangement will be beneficial or harmful because preferential tariff reductions introduce new distortions.[2] Since there is no presumption that free trade will result in a particular country specializing in decreasing-cost industries, the beneficiary of bilateral liberalization of trade is not obvious. Furthermore, gains from the FTA are likely to differ among industries with one industry gaining more than another.

Due to trade creation and diversion effects, the FTA is expected to affect not only the bilateral trade relationship between the two countries but also trade relations with third-party countries as well. Lower bilateral import prices relative to those of the rest of the world as a consequence of the FTA should create more trade between the two countries. A trade diversion effect would occur when U.S. exports to Canada and Canadian exports to the United States displace goods from other countries that still will face tariff and non-tariff barriers (NTB) in the North American market.

The primary objective of this paper is to evaluate bilateral trade flows of agricultural and industrial products between the United States and Canada with special emphasis to empirical evaluation of the FTA on the trade flow between the two countries and impacts on trade flows with third-party countries. Although the FTA contains a large number of measures for reducing the impediments to trade (from tariff removal to a dispute-settlement mechanism) for dealing with issues such as countervailing duties, tariffs and NTBs are the most common barrier between the two countries. Therefore, this paper will concentrate on examining the potential impact of removal of tariff and NTBs. In addition, trade in automobiles and auto parts is excluded from this analysis since these goods are part of a two-way tariff-free exchange that has existed since 1965 under the Auto Pact.[3]

Many studies have evaluated the trade relationship among countries [Appelbaum and Kohli (1979); Goldstein and Khan (1978); Haynes, Hutchison, and Mikesell (1986); Haynes and Stone (1983); Houthakker and Magee (1969); Murray and Ginman (1976); Officer and Hurtubise (1969); Warner and Kreinin (1983)]. Most of these studies used a simultaneous equation method to evaluate multi-country flow of manufactured commodities in bilateral and multilateral trade frameworks. Studies by Appelbaum and Kohli, Murray and Ginman, Harris and Cox (1984), Stokes (1989), Blandford and Sorenson (1987), and Wigle (1986) especially focused on bilateral trade flows between the United States and Canada.

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[2]A selective tariff reduction will remove the distortion between domestic goods and imports from the associated trading partner, which is welfare improving. But a new distortion is introduced between imports from the preferred country and those from third countries. In the realm of the second best, removing one distortion while creating another need not improve welfare.

[3]The Automotive Products Trade Agreement (APTA) between Canada and the United States often referred to as the Auto Pact, was completed in January 1965. The agreement stipulated that automotive products be permitted limited duty-free movement across the United States-Canadian border. This has led to the creation of an integrated North American automotive marketing and industrial sector.

Salient Features of the FTA

The FTA is broad in scope, as it provides for liberalization of trade in all sectors of both economies, including agriculture, services, business travel and investment, and manufactured goods. Objectives of the FTA are to eliminate trade barriers in goods and services, to facilitate conditions of fair competition, to expand liberalization of conditions for cross border investment, to establish effective procedures for the joint administration of the agreement and the resolution of disputes, and to lay foundation for further bilateral and multilateral cooperation to expand and enhance the benefit of the agreement.

Existing tariffs on some products were eliminated immediately after implementation of the FTA, but most reductions will be phased in over 5 to 10 years in equal annual installments. Many existing quantitative restrictions and federal government procurement practices are subject to reduction under the FTA. The FTA will also remove most border restraints and minimum price requirements governing the transmission of energy to ensure greater U.S. security in access to Canadian energy resources.

Tariffs, which constitute the most important type of trade restrictions between the two countries, were estimated in 1987 to account for about 75 percent and 60 percent of the total price protection applied by Canada and United States, respectively. Quantitative restrictions (primarily quotas) account for a further 25 percent and 35 percent.[4] Preferential federal non-defense procurement of goods is estimated to have minimal effect on the average rate of price protection for both countries (Canadian Department of Finance).

Despite low average rates of protection, some industries are protected by high tariffs and NTBs. Table 1 compares Canadian and U.S. nominal tariff rates and NTBs in 1987 for a selection of low and highly protected industries as well as for all manufacturing industry and all production sectors. Although the level of protection in Canada is somewhat higher than in the United States, the structure of protection in the two countries is quite similar. The industries which are highly protected in Canada also tend to be highly protected in the United States.

Elimination of tariffs will be carried out in three sets of changes starting January 1989. The first set of tariffs were eliminated immediately on January 1, 1989 for a group of goods that make up 15 percent of dutiable bilateral trade (Table 2). The second set of changes calls for tariffs to be phased out over five years in equal annual installments of 20 percent. The goods in this group are from sectors requiring a period of adjustment and constitute about a third of bilateral trade subject to duties. All other tariffs will be eliminated in ten annual installments of 10 percent. This group accounts for half of the bilateral trade subject to duties.

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[4]Note that the estimates of quantitative restrictions are expressed in ad valorem tariff equivalent terms.

TABLE 2. PRODUCTS INCLUDED IN EACH SET OF TARIFF REDUCTIONS UNDER THE FTA

First Set	Second Set	Third Set
Airbrakes	Chemicals (excluding drugs and cosmetics)	Most agricultural products
Animal feeds	Explosives	Appliances
Computer & related equipment	Furniture	Cosmetics
Ferro-alloys	Hardwood plywood	Drugs
Fur goods	Most machinery	Pleasure craft
Leather	Some meats	Processed-food
Motorcycles	Paints	Railcars
Needles	Paper & paper products	Softwood
Paper-making machinery	Printed matter	Plywood
Some categories of pork and unprocessed fish	Subway cars	Steel
Skis and skates	Telecommunications equipment	Textiles & Apparel
Vending machine parts		Tires
Warranty repairs		
Whiskey		
Yeast		

The Model

The static version of the traditional log-linear bilateral trade model, assuming no trade barriers, is specified as follows:

$$(1) \quad \log Q_{mt} = \beta_1 + \beta_2 \log P_{mt} + \beta_3 \log DP_{mt} + \beta_4 \log WP_{mt} + \beta 5 \log Y_t + e_t$$

$$(2) \quad \log Q_{xt} = \alpha_1 + \alpha_2 \log P_{xt} + \alpha_3 \log DP_{xt} + \alpha_4 \log WP_{xt} + \alpha_5 \log C_t + u_t$$

where Q_{mt} (Q_{xt}) is the quantity of a country's imports (exports), P_{mt} (P_{xt}) is the bilateral unit value index of imports (exports), DP_{mt} (DP_{xt}) is the domestic wholesale price index in the importing (exporting) country, WP_{mt} (WP_{xt}) is the multilateral unit value index of imports (exports), Y_t is a measure of national income in the importing country, C_t is a measure of production capacity in the exporting country, and e_t (u_t) is a random error term in the import (export) equation. Equation 1 represents a country's import demand while Equation 2 is the export supply of its trading partner. In equilibrium, $Q_{mt} = Q_{xt}$. This specification assumes firms in the exporting country and consumers in the importing country do not influence price.

Equation 2 is known as supply quantity equation. Alternative specification of export supply equation is a supply price relationship in which the bilateral unit value index of exports is specified as a function of quantity of commodities supplied (Haynes and Stone). Haynes and Stone argued in their

study on bilateral trade between the United States and the United Kingdom that the supply price relationship is more appropriate than the supply quantity relationship for dynamic trade models.

Equation 2 is rewritten in the supply price relationship as

$$(3) \quad \log P_{xt} = -\alpha_1/\alpha_2 + \log Q_{xt}/\alpha_2 - \alpha_3 \log DPxt/\alpha_2 - \alpha_4 \log WP_t/\alpha_2 + \alpha_5 \log C_t/\alpha_2 + U_t/\alpha_2$$

Equations 1 and 3 are static, assuming that all adjustments to equilibrium values of quantity traded and price occur immediately. However, adjustments generally take place with some delay (Goldstein and Khan). To introduce dynamic behavior into Equations 1 and 3, we followed the procedure used by Goldstein and Khan (1978). In the procedure, imports are assumed to adjust to the difference between demand for imports in period t and actual flow in previous period (Goldstein and Khan) as

$$(4) \quad \Delta \log Q_t = \gamma \log(Q_{mt}/Q_{t-1})$$

Where Q_t is the actual quantity of commodities traded, γ is the coefficient of adjustment ($0 \leq \gamma \leq 1$) and Δ is the first difference operation, $\Delta \log Q_t = \log Q_t - \log Q_{t-1}$. Combining Equations 1 and 4 yields

$$(5) \quad \log Q_t = a_1 + a_2 \log P_{mt} + a_3 \log DP_{mt} + a_4 \log WP_{mt} + a_5 \log Y_t + a_6 \log Q_{t-1}$$

where $a_1 = \gamma\beta_1$, $a_2 = \gamma\beta_2$, $a_3 = \gamma\beta_3$, $a_4 = \gamma\beta_4$, $a_5 = \gamma\beta_5$, and $a_6 = (1-\gamma)$

It is expected that $a_2 < 0$, $a_3 > 0$, $a_4, > 0$, $a_5 > 0$ and $a_6 > 0$.

Similarly, the dynamic supply price relationship can be derived with the following adjustment mechanism (Goldstein and Khan);

$$(6) \quad \Delta \log P_{xt} = \lambda \log (Q_t/Q_{xt})$$

Where λ is the coefficient of adjustment. Equation 6 indicates that the price of exports adjust to conditions of excess supply. For example, an increase in excess supply will lower the price of exports and conversely for a decrease. Combining Equations 3 and 6 yields

$$(7) \quad \log P_{xt} = -\lambda\alpha_1/A + \lambda \log Q_t/A - \lambda\alpha_3 \log bP_{xt}/A - \lambda\alpha_4 \log WP_{xt}/A - \lambda\alpha_5 \log C_t/A + \lambda \log P_{xt-1}/A + \lambda U_t/A$$

where $A = \alpha_2 (\lambda + 1)$

The relationship between import and export prices can be established under an assumption of no transportation costs as follows:

(8) $P_{xt} = P_{mt}/ER_t$

where ER_t is the exchange rate (the price of the exporting country's currency in terms of the importing country's currency).

Equations 7 and 8 can be combined in a supply price relationship as follows:

(9) $\log P_{mt} = b_1 + b_2 \log Q_t + b_3 \log DP_{xt} + b_4 \log WP_{xt} + b_5 \log C_t + b_6 \log P_{xt-1}$

$+ b_7 \log ER_t + V_t$

where $b_1 = -\lambda a_1/A$, $b_2 = \lambda/A$, $b_3 = -\lambda a_3/A$, $b_4 = \lambda a_4/A$, $b_5 = -\lambda a_5/A$, $b_6 = 1/A$,

$b_7 = 1.0$ and $V_t = \lambda U_t /A$

Equations 5 and 9 are a dynamic system of the bilateral trade relationships in which Q_t and P_{mt} are endogenous and other variables are exogenous. This dynamic system is used to quantify the U.S. trade relationship with Canada and the Canadian trade relationship with the United States.

The Data

The United States and Canadian trade data for industrial products were collected quarterly from 1972 to 1985. Bilateral unit value indices for exports and imports were obtained from Statistics Canada. Quarterly values of U.S. exports and imports were obtained from Highlights of U.S. Export and Import Trade (U.S. Department of Commerce). The values were used to derive a quantity index from a method adopted by Kreinin (1967). The multilateral unit value indices for imports and exports, wholesale price indices (used as a proxy of the domestic prices of industrial products), and GNP were obtained from International Financial Statistics.

Results

The conceptual models, specified in Equations 5 and 9, of the U.S. import demand from Canada and the Canadian export supply to the United States were estimated simultaneously by using the three-stage least-square estimator (3SLS). Similarly, models for Canadian import demand from the United States and U.S. export supply to Canada also were estimated by using the 3SLS estimator. At the preliminary stage of the analysis, the coefficients on the quantity and capacity variables in the export supply equations were small in magnitude and statistically insignificant.[5] WP_{mt} and ER_{t-1} were highly correlated with P_{mt} and ER_t, respectively. Thus, the model was re-estimated after dropping these variables for the supply and demand equations. On the other hand, quarterly

[5]When a perfectly elastic export supply curve prevails in the market, quantity of supply changes without changing supply price. Similarly, when excess production capacity exists in the exporting country, firms in exporting countries can supply more goods without increasing prices.

dummy variables were added to Equations 5 and 9 to capture seasonality in the data.

The estimated parameters of the bilateral trade flow models for agricultural and industrial products are presented in Tables 3 and 4. All equations have high R^2s, ranging from 0.78 to 0.99, indicating that the explanatory variables specified in the models explain most of the causes of variations in the values of the dependent variables. All the estimated parameters have the signs as hypothesized.[6] Particularly, the estimated coefficients on the lagged dependent variable for all equations differ significantly from zero at the 5 percent level, indicating that the bilateral trade relationship through import demand and export supply between the two countries is subject to the dynamic adjustments hypothesized in equations 3 and 6.

i) U.S. import demand and Canadian export supply relationship

As shown in Table 3, the estimated import demand elasticities[7] with respect to import price (P_{mt}) and domestic price (DP_{mt}) for industrial goods are -0.90 and 1.04, respectively, indicating that U.S. imports from Canada are more sensitive to domestic prices in the United States than to import prices. Similarly, the estimated import demand elasticities with respect to import price and domestic prices for agricultural goods are -1.57 and 1.98, respectively. This also indicates that U.S. imports from Canada are more sensitive to domestic prices in the United States than to import prices. This is a reflection of the popular view that Canadian exports to the United States neither dictate price in the U.S. market nor can be classified as perfect substitutes for comparable goods made in the United States. A comparison of the magnitude of the elasticities for agricultural and industrial products indicates that U.S. imports of agricultural products are more sensitive to the prices of agricultural products than those of industrial products. The magnitude of income elasticities (0.60 and 0.26) illustrates that U.S. import demand for industrial goods is more sensitive to income changes than for agricultural products. The estimated income elasticity, however, is rather low (inelastic) because a relatively high proportion of U.S. imports from Canada are raw materials, including energy and lumber.[8]

The dependent variable of the Canadian export supply equation is import prices (P_{mt}) in the U.S. market instead of quantity of imports. Therefore, the estimated coefficients shown on the right side of the equation, such as domestic

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[6]In addition, "t" values of the estimated parameters are in most cases statistically significant at the 5 percent level.

[7]Note that since the coefficients are estimated from the log-log function, the estimated coefficients are by definition elasticities.

[8]In 1988 raw materials exported by Canada to the United States constituted about 14 percent of Canada's total exports to the United States including automobiles and auto parts. Raw materials exported by the United States to Canada accounted for about 8 percent.

TABLE 3. 3 SLS ESTIMATES OF U.S. IMPORT DEMAND AND CANADIAN EXPORT SUPPLY EQUATIONS[a]

Dependent Variables and Products:	Independent Variables and Corresponding Coefficients										R^2	N
	C[b]	P_{mt}	Y_t	DP_{mt}	Q_{t-1}	D_1	D_2	D_3	D_{73}	TR		
1. U.S. import demand equation												
Industrial Commodities (Qmt)	-0.15	-0.90	0.60	1.04	0.38	-0.07	0.03	-0.17		-0.08	0.89	55
	(-0.19)	(-3.99)	(2.45)	(3.89)	(2.95)	(-1.87)	(0.92)	(-4.82)		(-1.85)		
Agricultural Products (Q_{mt})	0.14	-1.57	0.26	1.96	0.42	0.17	-0.10	-0.07	-0.11		0.94	55
	(0.07)	(-2.52)	(0.79)	(2.84)	(2.77)	(2.24)	(-2.49)	(-1.75)	(-2.33)			
2. Canadian export supply equation	C	DP_{xt}	Et	WP_t	P_{mt-1}	D_1	D_2	D_3	D_{73}			
Industrial commodities (P_{mt})	0.22	0.01	-1.47	0.66	0.46	0.03	-0.02	-0.01			0.99	55
	(2.26)	(0.14)	(-9.52)	(7.67)	(8.17)	(3.55)	(-2.44)	(-1.11)				
Agricultural products (P_{mt})	0.69	0.05	-0.28	0.62	0.18	0.03	0.05	0.05	0.04		0.98	55
	(2.18)	(0.40)	(-1.23)	(4.68)	(1.61)	(2.29)	(3.19)	(3.55)	(1.70)			

[a]Figures with parenthesis underneath the coefficients are "t" values.
[b]Constant term.

TABLE 4. ESTIMATES OF CANADIAN IMPORT DEMAND AND U.S. EXPORT SUPPLY EQUATIONS[a]

Dependent Variables and Products:	Independent Variables and Corresponding Coefficients										R^2	N
1. Canadian import demand equation	C[b]	P_{mt}	Yt	DP_{mt}	Q_{t-1}	D_1	D_2	D_3	D_{73}	TR		
Industrial Commodities (Q_{mt})	-0.93 (-1.06)	-0.63 (-3.02)	0.76 (3.64)	0.72 (3.06)	0.44 (4.11)	-0.02 (-0.93)	0.07 (2.91)	-0.15 (-5.28)		-0.03 (-2.27)	0.90	55
Agricultural Products (Q_{mt})	1.22 (0.68)	-0.21 (-0.83)	0.27 (0.79)	0.29 (0.62)	0.63 (6.10)	-0.22 (-4.45)	0.05 (1.04)	-0.19 (-4.36)	-0.06 (-0.93)		0.78	55
2. U.S. export supply equation	C	DP_{xt}	Et	WP_t	P_{mt-1}	D_1	D_2	D_3	D_{73}			
Industrial commodities (P_{mt})	0.87 (6.02)	0.29 (2.88)	0.70 (6.33)	0.18 (4.43)	0.43 (5.24)	-0.01 (-1.27)	0.01 (1.56)	0.00 (0.26)			0.99	55
Agricultural products (P_{mt})	0.09 (0.29)	0.16 (3.10)	0.16 (0.61)	0.05 (0.70)	0.76 (6.33)	0.13 (7.05)	0.02 (1.32)	0.06 (3.52	0.02 (0.65)		0.98	55

[a]Figures with parenthesis underneath the coefficients are "t" values.
[b]Constant term.

prices (DP_{xt}), world prices (WP_t), and exchange rates (ER_t), all are interpreted as transmission elasticities.[9] Transmission coefficients for world prices and exchange rates are statistically significant at the 5 percent level while the coefficients in regard to the domestic price (DP_{xt}) of both industrial and agricultural goods are not significant. These findings indicate that import prices in the United States are largely influenced by world prices and exchange rates but not by domestic prices in Canada. The exchange rate coefficients for both agricultural and industrial products have negative signs in the Canadian export supply equation since exchange rates are expressed as the Canadian dollars per unit of the U.S. dollars. Appreciation of the U.S. currency, therefore, will raise the magnitude of ER_t, ceteris paribus, and subsequently reduce the prices of imported goods into the United States, leading to increased U.S. imports.

As shown in Table 3, the transmission elasticity with respect to the exchange rate differs between industrial (i.e., greater than 1) and agricultural goods (smaller than 1). This indicates that exchange rate swings will be transmitted fully to import prices of industrial goods obtained from Canada but not to the import prices of agricultural goods--at least in the short run. However, the transmission elasticity with respect to world prices is inelastic in the case of both industrial products and agricultural goods (i.e., 0.66 for industrial goods and 0.62 for agricultural products).

By using the estimated transmission elasticities, the import demand elasticity with respect to the domestic price in the exporting country (DP_{xt}), world price (WP_t), and exchange rate (ER_t) can be derived.[10] The estimated import demand elasticity with respect to the domestic price in the exporting country (DP_{xt}), world price (WP_t), and exchange rate (ER_t) for industrial goods are -0.01, -0.59, and 1.32, respectively. This indicates that through transmission mechanism, U.S. imports from Canada are influenced more by world prices and exchange rate variations than by the variation of domestic prices in Canada. Similarly, import demand elasticities with respect to DP_{xt}, WP_t, and ER_t for agricultural products are -0.08, -0.98, and 0.44, respectively.

ii) Canadian import demand and U.S. export supply relationship

For Canada, import price and domestic price elasticities of demand for industrial goods are -0.63 and 0.71, (Table 4) respectively, which are smaller magnitudes than those in the U.S. import demand equation. This is perhaps because Canadian consumers have fewer domestic substitutes than their U.S. counterparts. The Canadian economy has a much smaller internal market and a less competitive environment than the United States. On the other hand, the income elasticity in the Canadian import demand equation is 0.76 (Table 4),

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[9]For details see Bredahl, M.E., W.H. Meyers, and K.J. Collins.

[10]For example, the import demand elasticity with respect to the domestic price in the exporting country ($\partial \log Q_{mt}/\partial \log DP_{xt}$) is a product of the import demand elasticity with respect to the import price ($\partial \log Q_{mt}/\partial \log P_{mt}$) and transmission elasticity of the import price with respect to the domestic price in the exporting country ($\partial \log P_{mt}/\partial \log DP_{xt}$).

which is somewhat larger than that of the United States. This is because a higher proportion of Canadian imports from the United States are technologically oriented consumer goods, which are more sensitive to the national income level.

Canadian import demand for agricultural products, however, shows that key economic variables such as P_{mt}, DP_{mt}, and Y_t do not influence the imports as they are statistically insignificant. This indicates that Canadian imports for agricultural products are determined largely by considerations other than the market forces manifested by price mechanism.[11] Institutional factors, such as the existence of supply management programs and government intervention (e.g., import license requirements), appear to play an important role in determining the flow of imports for many of the agricultural products.

In the U.S. export supply equation, the estimated coefficients in regard to the domestic price variable for both industrial and agricultural products differ significantly from zero at the 5 percent level; the transmission elasticities are 0.29 and 0.16, respectively, much larger than those in the Canadian export supply equation shown in Table 3. This implies that Canadian import prices of commodities originating in the United States are relatively more sensitive to U.S. domestic prices mainly because of Canada's relatively greater dependency on the U.S. economy. The transmission elasticity with respect to the Canadian multilateral unit value index (WP_t) for industrial goods is 0.18, which is relatively smaller than that in the Canadian export supply equation in Table 3, probably because Canada imports more from the United States than from the rest of the world.

Since exchange rates are expressed as the Canadian dollars per unit of the U.S. dollars, the exchange rates in the U.S. export supply equation have a positive sign. Appreciation of U.S. dollars against Canadian dollars raises ER_t and increases Canadian import prices (P_{mt}), which reduces the Canadian imports (Q_{mt}). The transmission elasticity with respect to the exchange rate is 0.70 in the U.S. export supply equation, implying that changes in exchange rates are not transmitted fully to the Canadian import prices in the short run. The long-run transmission elasticity, however, is 1.18,[12] indicating that exchange rates are fully transmitted to the import prices in the long run.

The Canadian import demand elasticities for industrial goods, with respect to domestic prices in the United States, world prices, and exchange rates, are -0.18, -0.11, and -0.44, respectively. Canadian imports are far more sensitive to exchange rates than U.S. domestic and world prices.

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[11]Both countries support and protect their agricultural sectors through a variety of market intervention and subsidy payments, as is the case of most industrial countries. These programs often create trade barriers such as quotas, import licenses, and non-tariff border measures of phytosanitary regulations. These barriers loom large in relation to agriculture's relatively small share of the total bilateral trade between the two countries. Imports of agricultural products, including live animals, and food, feed, beverages and tobaccos, constitute less than 5 percent of Canadian total imports from United States in 1988.

[12]The t-test accepts the null hypothesis that the long-run elasticity is equal to 1.0 at the 5 percent significance level.

Finally, using dummy variables shown in Tables 3 and 4, the seasonality of the United States-Canadian bilateral trade flow was tested.[13] The test rejects the null hypothesis that the set of dummy variables are equal to zero, indicating that trade is seasonal in nature.

iii) Economic effects of the FTA

As shown in Table 1, the average ad valorem equivalent nominal tariff rate imposed by Canada on agricultural goods in 1987 was 3.0 percent compared to 5.2 percent for industrial goods. The corresponding rates imposed by the United States were 2.0 and 3.2, respectively. The average tariff equivalent NTBs for agricultural goods are 8.6 percent in Canada and 10.7 percent in the United States. The corresponding rates for industrial goods are 1.3 and 1.4, respectively, in Canada and the United States. When tariffs and NTB protection are eliminated completely under the FTA in 1998, trade volume between the two countries would be increased through trade creation and diversion effects.

Trade creation effects occur when trade volume between the two trading partners is increased by displacing their domestic production, while trade diversion effects occur when increases in the trade volume displace imports from the third-party countries. By following Baldwin and Murray[14] the trade creation and diversion effects of the FTA are calculated as follows:

$$(7) \quad TC_i = M_i e_i \, (\Delta t_i/(1+t_i))$$

$$(8) \quad TD_i = TC_i \, (M_{Ni}/V_i)$$

$$(9) \quad TE_i = TC_i + TD_i$$

where

TC_i = trade creation effects in country i
TD_i = trade diversion effects in country i
TE_i = trade expansion effects in country i
M_i = initial level of imports in country i
e_i = import demand elasticity in country i
Δt_i = changes in tariffs in country i
t_i = initial level of tariffs in country i
M_{Ni} = import from non-beneficiary sources trading with country i
V_i = total domestic production in country i

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[13]Sum of the squared residuals from unrestricted model (coefficients of the seasonal dummy variables are not equal to zero) and restricted model (the coefficients are zero) are compared by using the F-statistics.

[14]The Baldwin and Murray model assumes the following: (1) imports from beneficiary and non-beneficiary countries are imperfect substitutes, (2) imports from both beneficiary and non-beneficiary countries are imperfect substitutes for the domestic production of the preference granting country, (3) supply curves are perfectly elastic, etc.

Based on 1987 trade flow data and estimated import demand elasticities, U.S. imports of agricultural products from Canada could increase an estimated $644.7 million due to elimination of tariffs and NTBs by displacing domestic production (trade creation effects) and about $106.3 million by displacing imports from other countries (trade diversion effects) as shown in Table 5.[15] Similarly, U.S. imports of industrial goods through trade creation and diversion effects could increase $2,160.7 million and $204.6 million, respectively. Canadian imports could increase $42.2 million for agricultural products and $1,339.6 million for industrial products. The Canadian imports are smaller in absolute magnitude than those in the United States mainly because Canadian import demands are relatively more inelastic than those of the United States. Since the NTBs are much higher than nominal tariffs for agricultural goods, the removal of NTBs increases the trade volume of agricultural goods more than the removal of nominal tariffs. On the other hand, the NTBs influence trade volume of industrial goods less than the nominal tariffs (Table 5). The overall impacts of FTA on third countries are approximately $451.0 million as shown in Table 5.

The income effect of the FTA on the bilateral trade volume depends upon the magnitude of income growth arising from the FTA. An assessment of the net income generation out of the FTA is beyond the scope of this partial equilibrium approach. However, the effects of income growth on bilateral trade volume can be evaluated using income elasticity. Since income elasticity for industrial goods in Canada has a somewhat higher magnitude (i.e., 0.76) than that of the United States (i.e., 0.60), Canada would import proportionately more from the United States than the reverse order given the same percentage of increased income level in both countries.

This implies that producers in the United States should get more benefit from the FTA than producers in Canada because expected increases in Canadian imports of industrial goods are higher than in the case of U.S. imports from Canada, arising from both price and income effects of the FTA. Consumers in Canada, on the other hand, will benefit more from the elimination of the nominal tariffs under the FTA than consumers in the United States because, historically, Canada has maintained relatively higher tariff protection than the United States.

The above analysis is based on the assumption of exchange rate neutrality. However, if exchange rate swings occur during the tariff elimination period (1989-1998), the effects of exchange rate changes may reinforce or counter the effects of the FTA. If U.S. dollars appreciate 10 percent against Canadian dollars during the FTA era, U.S. import demand for industrial goods from Canada would be increased by 13.2 percent in addition to increases in imports attributable to the FTA. Canadian import demand, on the other hand, would decrease about 4.0 percent when U.S. dollars appreciate about 10 percent. On the contrary, if U.S. dollars depreciate against Canadian dollars, U.S. import demand would decrease 13.2 percent while Canadian import demand would be increase 4.0 percent.

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[15]The price data used in our study include duty collected. Under Baldwin and Murray's assumption that price elasticity of supply is perfectly elastic, any changes in tariffs and NTBs will be fully reflected to the price levels. For details of methodology, see paper by Baldwin and Murray (1977).

TABLE 5. ESTIMATED TRADE EXPANSION EFFECTS[a] OF THE FTA ($U.S. MILLION)

Item	Agriculture	Industry	Total
1. Removal of Tariffs			
US. Imports from Canada			
Trade creation	$108.7	$1,495.0	$1,602.7
Trade diversion	17.9	141.6	159.5
Total	$126.6	$1,636.6	$1,762.2
Canadian Imports from U.S.			
Trade creation	$8.6	$960.4	$969.0
Trade diversion	3.2	103.1	106.3
Total	$11.8	$1,063.5	$1,075.3
2. Removal of NTBs			
U.S. Imports from Canada			
Trade creation	$536.0	$665.7	$1,201.7
Trade diversion	88.4	63.0	151.4
Total	$624.4	$728.7	$1,353.1
Canadian Imports from U.S.			
Trade creation	$23.3	$249.3	$272.6
Trade diversion	7.0	26.8	33.8
Total	$30.3	$276.1	$306.4
3. Total			
U.S. Imports from Canada			
Trade creation	$644.7	$2,160.7	$2,805.4
Trade diversion	106.3	204.6	310.9
Total	$751.0	$2,365.3	$3,116.3
Canadian Imports from U.S.			
Trade creation	$31.9	$1,209.8	$1,244.7
Trade diversion	10.3	129.8	140.1
Total	$42.2	$1,339.6	$1,381.8

[a]The estimated trade expansion effects of the FTA are derived from the 1987 actual trade volume.

iv) Economic Effects of the FTA on Individual Commodity Groups

This study does not evaluate directly the impacts of the FTA on trade flows of individual commodities. The findings of this study induct general assessment of how the bilateral trade between the U.S. and Canada could change for agricultural commodity trade under the FTA.

Grains and Oilseeds

The United States produces various crops including wheat, corn, soybeans, barley, and oats, while Canada produces hard red spring, durum, and some oilseeds. Both the United States and Canada are major exporters of the crops they produce. U.S. tariffs on Canadian wheat are small and vice versa. Thus, removal of these tariffs will have little impact on trade volume between these two countries in the short-run. The two provisions which could affect grain trade between the United States and Canada are 1) Canada's removal of import licenses for U.S. wheat, barley, and oats as soon as support levels in both countries are equal and 2) Canada's agreement to remove transportation subsidies on shipments of grain and oilseeds from Western provinces destined to ports in the Pacific Northwest. In the long run, there might be structural changes in agricultural production and trade in both the United States and Canada with a full implementation of the FTA on the basis of the principle of comparative advantage. Canada may reduce production of corn and soybeans, while wheat trade remains almost unchanged.

Livestock, Dairy, and Poultry

Live animals and animal products are the largest U.S. agricultural import from Canada and the second largest U.S. export to Canada. Trade in live cattle is essentially free. However, both countries have a variety of health and sanitary restrictions which will be reduced under the FTA. Tariffs are also low on beef and veal trade, but both countries have global import quotas on meat. Under the FTA both countries will exempt each other from this quota. The trade balance in pork and live hogs is heavily in Canada's favor. The United States has a countervailing duty on live hog imports from Canada to offset subsidized Canadian hogs. Canada requires that imported hogs be quarantined for 30 days to prevent the introduction of pseudorabies; this effectively eliminates U.S. exports of slaughter hogs to Canada. The United States will maintain the countervailing duty on Canadian hogs. Trade in dairy products is small between the United States and Canada because dairy sectors in both countries are highly protected and benefit from government support. The trade agreement did not include any specific measures for liberalizing dairy trade. Canada agreed to increase global import quotas for poultry and eggs. Producer price of Canadian poultry was only five percent higher than in the United States, however, prices paid by Canadian consumers were 45 percent above their American counterparts. Canadian marketing agencies pass along the cost of supporting producers as higher consumer prices rather than as higher taxes. Canadian demand has exceeded domestic production, allowing the United States to export additional quantities to Canada under supplemental quotas. Canada's reduction of supplemental quotas in the future will ensure greater United States access to the Canadian market.

Horticultural Products

The bilateral balance of trade in horticultural products is in favor of the United States. Both countries use seasonal tariffs to protect domestic producers. Tariff phase-out will favor expanded U.S. exports of fruits and vegetables to Canada. Both countries retain the option for the next 20 years

to impose an additional duty if imports threaten either domestic industry. Nontariff barriers such as packaging and labeling requirements and health and sanitary regulations will not be directly changed in either country by the agreement. The FTA will have the most impact on horticultural trade between the two countries.

Sugar and Sugar Products

Both countries import raw sugar from third countries and export refined sugar to each other and third countries. Canadian raw sugar imports are unrestricted with low tariffs. Producers in the United States receive support prices above the world price and are protected from cheaper imports by duties, fees, and quotas. The United States imposed quotas on imports of sugar blends from Canada in 1985. Under the FTA, the United States agreed to remove quotas on Canadian products having 10 percent or less sugar. This provision will not provide an economic incentive for Canada to increase exports.

Wine and Malt Beverages

Trade in malt beverages and wines is subject to significant tariff and nontariff barriers. Tariffs, which are high in both directions, will be removed. Provincial liquor control boards control distribution of alcoholic beverages in Canada. Retail markups and handling surcharges on imported alcoholic beverages have effectively limited U.S. access to the Canadian market. The FTA will relax discriminatory pricing, distributing, and retailing practices by Canada on U.S. wines. However, strong protests from Canadian brewers resulted in no extension of more equal treatment for U.S. beer exports. U.S. wine exports should benefit substantially from the FTA.

Concluding Remarks

Although both the United States and Canada have similar economic conditions and heritage, the bilateral trade structure between the two countries differs significantly from each other. Furthermore, the trade relationship with the third party countries differs substantially between the two trading partners. Such differences have been attributed to, *inter alia*, the differences of relative intensity in resource endowments and size of economy.

This study found that U.S. import demand for Canadian goods is more sensitive not only to import and domestic prices but also to world prices than Canadian import demand for U.S. goods, mainly because the United States has a relatively large internal market compared to Canada and has unlimited import substitutes. In addition, the bilateral trade relationship for agricultural goods between the two countries also differs from that for industrial goods. Consequently, the impacts of the elimination of all tariffs and NTBs under the FTA on the countries' economies will differ from each other.

The effects on bilateral trade flows of the elimination of all tariffs and NTBs would increase trade volume of agricultural and industrial goods

between the two countries, primarily through trade creation and diversion effects. The trade diversion effects of the FTA, however, are small in magnitude, implying that the FTA will not significantly affect the two countries' trade relationship with third-party countries. This study also found that, under the exchange rate neutrality assumption, the expected increases in U.S. imports of both agricultural and industrial goods from Canada are much larger than the Canadian imports under the FTA.

Agricultural trade in horticultural products between the two countries will benefit the most from the FTA. Currently the bilateral balance of trade favors the United States and tariff phase-out will expand U.S. exports of fruits and vegetables to Canada. Canada's reduction of supplemental quotas will ensure greater United States access to Canadian poultry markets. The FTA will relax discriminatory pricing, distributing, and retailing practices by Canada on U.S. wines which should benefit U.S. wine exports to Canada. The FTA will have a negligible impact on other agricultural commodity groups including grain and oilseeds, livestock and dairy, and sugar and sugar products.

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