NAFTA@10

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Editors

Foreword

The research assembled in this volume has been undertaken by academic and government researchers writing in a personal capacity. Foreign Affairs and International Trade Canada managed and assembled this volume with the objective of contributing to, and encouraging, debate on an issue of major importance to the Department, to the Government of Canada, and to Canadians. The views expressed in this volume, however, are those of authors and do not reflect the views of the departments represented in this volume or of the Government of Canada.

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Toward "Deeper" Canada-U.S. Integration: A Computable General Equilibrium Investigation

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Introduction

A number of respected analysts and economic commentators in Canada have been calling for deeper Canadian economic integration with the U.S. Wendy Dobson, Director of the Institute for International Business at the Rotman School of Management, has argued that deeper bilateral integration with the U.S. would remedy some of the economic weaknesses that became apparent in Canada during the 1990s, as evidenced by lagging standards of living in Canada in comparison to the U.S. and a decline in Canada's share of North American foreign direct investment (FDI) inflows[1]. Dobson argues that the post-September 11 context provides a window of opportunity to propose a "big idea" with respect to economic integration that would at once create new economic opportunities for Canada while addressing the U.S.'s overwhelming interest in improved homeland security.

Michael Hart and William Dymond argue that current cross-border arrangements for the management of common trade, security and immigration issues are inadequate to the demands being placed upon them[2]. They contend that integration will continue to deepen between Canada and the U.S. in virtually every area where the two countries connect; the question for government, in their view, is whether to actively further that integration. They propose that Canada take advantage of the increased importance that the U.S. now attaches to border issues to negotiate comprehensive formal agreements for a more open and secure North America—whether Mexico joins such an effort or not.

The Governor of the Bank of Canada, David Dodge, while making it clear that he was not speaking as an advocate for greater North American integration—which he emphasized is very much a political decision for Canadians, argued from the economist's perspective as follows: "For me, free world trade is still the ideal. We in Canada cannot, and should not, lose sight of that goal by focusing only on free trade in North America. But, *if* we cannot tear down barriers multilaterally, we should at least continue to tear them down between provinces in Canada, between Canada and the U.S., between Canada and Mexico and, indeed, throughout the Americas.[3]" He argued that the key issue for Canada was to reduce border risk (which in his words amounted to "guaranteeing Canadian producers and service providers access to U.S. markets without hassle

[1] See Wendy Dobson (2002).
[2] See Michael Hart, and William Dymond (2001).
[3] See David Dodge, Governor of the Bank of Canada (2003).

and expense at the border, and without the risk of suddenly being shut out of those markets by some discretionary U.S. action."). Mr. Dodge also suggested that broadening and deepening NAFTA would be "extremely valuable"—while at the same time recognizing that this would not be straight forward as the easier steps towards integration had already been taken. Concrete steps towards this would involve harmonization of regulatory standards and practices, particularly with respect to capital and labour markets. And, in a context in which there already existed "a true single market for goods and services, labour, and capital", consideration could be given to moving to a common currency insofar as the then-prevailing industrial structures of Canada and the U.S. would make that an efficient arrangement (i.e., that reduction of transactions costs would outweigh potentially higher adjustment costs).

Most proponents of deepening economic integration favour the European progressive approach[4]. With respect to trade and the market for goods and services, the progressive approach would involve the following steps, as outlined by Governor Dodge[5]:

- A common external tariff and common border practices for imports from, and exports to, overseas markets (which we will term a "basic" customs union);
- Harmonization of trade and commercial policies and regulation ("intermediate" customs union);
- An end to the application of trade remedies within North America ("full" customs union); and
- A uniform policy with respect to federal and state/provincial subsidies.

An "intermediate" customs union would, in the opinion of some observers, be the most that could be realistically attained in the foreseeable future[6]. The next stage of economic integration would be along the lines of the "single market" that Europe forged in 1992; this would basically involve free movement of, and harmonization of regulatory regimes for, not only goods and services, but also labour and capital.

Finally a full-blown economic union, as in the latest stage of the European experiment, would involve harmonization of competition, structural, fiscal and monetary policies and possibly a common currency.

The complexity of negotiating and implementing these arrangements increase from one step to the next. Harmonizing external tariffs is much easier than harmonizing regulatory regimes in areas as diverse as cultural, legal, financial and communication services at the various levels of government. Removal of the use of trade remedies within a customs union could be quite problematic: some observers[7] argue that the U.S. would in fact insist on maintaining its right to use trade remedies such as countervailing and antidumping

[4] See, for example, the discussion in the Report of the Standing Committee on Foreign Affairs and International Trade (2002).
[5] See David Dodge, ibid.

[6] See Report of the Standing Committee on Foreign Affairs and International Trade, ibid.
[7] See for example the comments of Professor Hill quoted in: Report of the Standing Committee on Foreign Affairs and International Trade, ibid.

duties. The creation of a common market would necessitate the creation of various new bilateral or NAFTA-based political and legal institutions. An economic union would be considered both impractical and undesirable as long as the structures of the North American economies remain divergent[8].

Without prejudging the outcome of the debate over deeper integration, which as Governor Dodge stressed is a political decision, it is nevertheless useful to ground the discussion of the economic costs and benefits of further economic integration on as rigorous a basis as possible. In this chapter, we use a Computable General Equilibrium (CGE) model to shed quantitative light on two hypothetical scenarios of closer economic integration with the U.S:[9]

1. Harmonisation of external tariffs towards the rest of the world, coupled with the elimination of remaining tariff protection in bilateral trade between the two countries; that is, the "basic customs union".
2. Elimination of "unobserved trade costs" resulting from, *inter alia*, administrative border measures and costs that arise from national differences in technical standards and regulations.

CUSFTA and NAFTA in a Nutshell

The Canada-United Sates Free Trade Agreement (CUSFTA) came into effect on January 1, 1989. It marked an important step in the development of bilateral trade relations between the two countries[10]. The stated objectives of the Agreement were to "eliminate barriers to trade in goods and services between the...Parties", to "facilitate conditions of fair competition within the free-trade area", to "liberalize significantly conditions for investment" and to "lay the foundation for further bilateral and multilateral cooperation to expand and enhance the benefits of this Agreement"[11].

As of January 1, 1998, virtually all tariffs on Canada–U.S. trade in goods originating in the two countries were eliminated. Exceptions involved tariffs that remained in place for certain products in Canada's supply–managed agricultural sectors (e.g., dairy and poultry), as well as for sugar, dairy, peanuts and cotton in the U.S.

CUSFTA was incorporated into the North American Free Trade Agreement (NAFTA) in January 1994, which extended the free trade

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[8] See David Dodge, ibid.

[9] As demonstrated by previous studies of the impact of NAFTA, it is the changing relationship with the U.S. that has and will have the largest impact in the Canadian economy (see T.J.,Kehoe. 2002). For this reason, not withstanding the added complexity of negotiating a trilateral agreement, only the Canada-U.S. case is considered at this stage of our research. However, in the future, by expanding our data set to include Mexico, we will be able to extend our analysis to a potential trilateral trade agreement.

[10] Prior to the CUSFTA, the General Agreement on Tariff and Trade (GATT) and several bilateral sectoral agreements primarily governed Canada-U.S. trade relations. Duty free trade in farm machinery was approved in 1944. The Defence Production Sharing Agreement of 1958 provided for cooperation weapons development and manufacture. The most important sectoral agreement, prior to the CUSFTA, was the Automotive Products Trade Agreement of 1965.

[11] For a full text of the agreement see:
http://wehner.tamu.edu/mgmt.www/NAFTA/index.htm

arrangements to Mexico. Almost all tariffs on goods originating in Canada, the U.S. and Mexico will be eliminated by January 1, 2008. NAFTA, however, goes beyond the CUSFTA to include substantially expanded coverage of government procurement (to services and construction), intellectual property and investor rights (introducing binding investor-state arbitration), as well as a higher local content requirement to meet the rules of origin test for NAFTA products. NAFTA also created some two-dozen working groups, committees and subcommittees to advance the objectives of the Agreement to reduce "barriers to trade" beyond the phasing out of duties to the reduction of non-tariff barriers to trade in goods and services by harmonizing procedures, recognizing standards as equivalent, and encouraging the exchange of information[12].

Since 1989, the year in which the CUSFTA came into force, Canada-U.S. trade has risen by a factor of 2.7, from C$235 billion to C$644 billion in 2003. In 2003, the U.S. accounted for 80 percent of Canada's exports of goods and services and 68 percent of its imports. How much of this expansion of bilateral trade is due to the CUSFTA/NAFTA is disputed. Some analysts argue that the long and sustained decline in the value of the Canadian dollar from the mid 1970s through 2002 contributed importantly to the increase in Canada's export intensity with the U.S.—although this would not explain the associated rise in the share of Canada's market accounted for by imports from the U.S. or the lack of an increase in foreign direct investment inflows from the U.S. (inward foreign direct investment from the U.S. decreased from 72 percent in 1986 to 67 percent in 2001, while outward foreign direct investment in the U.S. in 2001 was at the same level as in 1986[13]). The unprecedented economic boom in the U.S. during the 1990s, especially in technology-intensive sectors such as telecommunications and Internet related businesses, is also held to explain the sectorial distribution of Canadian exports that developed post-FTA, and in particular the significant increase in export intensity in such sectors as industrial goods and materials, sectors that had very low tariff rates prior to the CUSFTA.

Certain developments post-CUSFTA have not evolved as predicted by economic theory. In particular, given the spectacular increase in trade, productivity and real wage growth in Canada would have been expected to converge towards U.S. levels whereas in fact they lagged, resulting in an unexpected relative decline in Canada's standard of living compared to the U.S. From 1977 to 1994, the Canada-U.S. gap in output per hour in manufacturing averaged 14 percent. Since 1994, however, the gap has widened[14].

Canada's adjustment to free trade also appears to have been more difficult and costly than advocates of free trade had expected or economic theory would have predicted. Indeed, Canada's growth performance in the 1990s was worse than in any other decade of the last century except the 1930s. Living standards as expressed by average per capita income fell steadily in the first seven years of the decade and only regained 1989 levels by 1999. By comparison, per

[12] For further detail on theses committees and a summary description of how various issues related to the cross-border trade in goods are being managed through the NAFTA see: http://www.dfait-maeci.gc.ca/nafta-alena/2800216b-en.asp?#1

[13] See Globerman (2003).

[14] Source: Statistics Canada

capita income in the U.S. grew 14 percent during this period[15]. Thus Canadian GDP per capita in 2001 was 84.7 percent of the U.S. level, down from 90.7 percent at its peak in 1975[16]. The unemployment in Canada in the 1990s averaged 9.6 percent, higher than in any other decade since the 1930s; the gap with the U.S. rate, at 5.8 percentage points, was double that of the 1980s[17].

The impacts of the CUSFTA and NAFTA have been analyzed using ex-ante general equilibrium models. The estimated impacts have been influenced heavily by the assumptions incorporated in the models. Early models based on the assumption of constant returns to scale showed very modest gains for Canada; later models that incorporated economies of scale showed significantly larger gains for Canada in terms of welfare and every major economic indicator[18]. New generation models that varied the type of pricing rule employed by the firms, that included capital mobility, and dealt with types of protection other than nominal tariff rates, showed positive welfare gains ranging from a modest 0.7 percent of GDP to a quite spectacular 3 percent of GDP. Table 1 compares the estimates for major economic indicators such as welfare, trade volumes, terms of trade, based on variants of CGE models employed to capture the impact of CUSFTA and NAFTA.

Ex-post, the evidence is persuasive that the CUSFTA/NAFTA increased trade. Trefler (2001) found that over the 1988-1996 period, half of the decline in manufacturing employment and output in sectors subject to the largest tariff cuts[19] was due to the CUSFTA. Furthermore, he found that the CUSFTA tariff concessions raised labour productivity in these sectors by an average compound rate of between 1.7 and 3.3 percent per year. Trefler also found that the CUSFTA tariff cuts explain most of the change in imports in the post-FTA period for the most impacted industries but not for those least impacted. However, it would also appear that the magnitude and scope of the benefits flowing from expanded trade did not meet expectations.

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[15] See Sharpe (2000).

[16] Centre for the Study of Living Standards (2002).

[17] See Sharpe, ibid.

[18] The major reason for the larger welfare effects in imperfectly competitive models with increasing returns to scale versus perfectly competitive models with constant returns to scale, stem form the fact that tariff reductions in the CUSFTA lead to a terms of trade deterioration for Canada (as average tariffs were higher at the begining of the implementation period in Canada than the U.S.) which in the latter case dominate the welfare effects, leading to welfare losses or small welfare improvements. To the contrary, in models with increasing returns to scale, firms facing foreign competition and having access to larger markets will reduce their price-average costs mark-ups and move down their average costs producing larger output at even lower prices. These additional consumer and efficiency gains overcompensate for the welfare losses resulting from the terms of trade effect.

[19] These sectors are what Trefler calls the “most impacted” and correspond to industries for which tariff cuts exceeded 8 percent on the 1988-1996 period. To the opposite, the “least impacted” industries are those industries for which tariff cuts were between 4 percent and 8 percent.

Against that background, we now turn to a consideration of remaining gains from trade in Canada's economic relationship with the U.S.

TABLE 1
Impact of CUSFTA and NAFTA, Summary of CGE Results

	CUSFTA Simulation Results			NAFTA Simulation Results		
	Cox & Harris [1]	Wigle [1]	Hamilton & Whalley [2]	Cox & Harris [1]	Cox [1]	BDS [1]
Real GDP	4.57			4.93	5.11	
Gross Output	7.80			8.74	9.05	
Labour Productivity	9.96			11.21	10.82	
Total Factor Product.	4.27			4.48	4.47	
Trade Volume	14.77			14.81	19.28	
Trade Volume (Canada-USA)	25.70			25.32	22.95	
Imports						4.20
Exports						4.30
Terms of Trade	-0.92	-2.60	0.70	0.03	0.01	-0.70
Welfare	3.09	-0.1 bil. CND$*		3.14	3.18	0.70

[1] Imperfect competition

[2] Perfect competition

*Percentage change if not specified

Source: Brown,Deardorff and Stern (BDS) (1992/1995), Cox & Harris (1992), David Cox (1995), Hamilton & Whalley (1985) and Randall Wigle (1988)

Methodology: Description of the CGE model

The CGE model utilized in this paper is standard in its general approach. Its framework has been inspired by a generation of models following the seminal work of Mercenier (1995). The model is static, featuring perfect competition, constant returns to scale, and national product differentiation.

A unique feature of the model is that it disaggregates Canada into three regions[20]. Canada's recent experience has demonstrated that free trade agreements can have differential effects at the national and provincial level. Econometric studies have shown that the Canada-U.S. free trade agreement has diverted East-West inter-provincial trade to North-South state-province trade[21]. A CGE model with regional specification thus enables us to assess the impact of hypothetical policy changes not only on inter-provincial flows, but also on the industrial structure, revenue and welfare of the Canada's diverse regions.

The model consists of a multi-region, multi-sector applied general equilibrium model with perfectly competitive markets and constant returns to scale. The regions of the model currently consist of three Canadian regions, the U.S. and the Rest of the World.

[20] Though a three Canadian region model is presented here, a six Canadian region model has been also developed.

[21] John F. Helliwell, Frank C. Lee, and Hans Messinger (1999).

In the model, we first define different commodity sets. Sectors of activity are identified by *s* and *t*, with *S* representing the set of all industries so that *s*, *t* =1,…S . Regions are identified by indices *i* and *j*, with W representing the set of all regions so that *i, j*=1,..,W. In a multicountry, multisector framework, it is necessary to keep track of trade flows by their geographical and sectoral origin and destination. Thus, a subscript *isjt* indicates a flow that originated in sector *s* of country *i* with industry *t* of country *j* as recipient. Since it will be necessary more than once to aggregate variables with respect to a particular subscript, to avoid unnecessary proliferation of symbols, occasionally we substitute a dot for the subscript on which aggregation has been performed; for instance, $c_{.si}$ is an aggregate of c_{jsi} with respect to the first subscript.

Household

Final consumption decisions in each region are made by a representative household (consumer), which considers products of industries from different regions as imperfect substitutes [Armington (1969)]. The household's preferences are given by a log-linear transformation of a Cobb-Douglas utility function

$$U_i = \sum_{s \in S} \rho_{si} \log c_{.si} \quad \text{where} \quad \sum_{s \in S} \rho_{si} = 1 \tag{1}$$

whereas its preference between local and external origin of a given good *s* are given by a CES function

$$c_{.si} = \left(\sum_{j \in W} \delta_{jsi} c_{jsi}^{(\sigma_{si}-1)/\sigma_{si}} \right)^{\frac{\sigma_{si}}{(\sigma_{si}-1)}} \tag{2}$$

where c_{jsi} is the consumption in region *i* of goods *s* produced in region *j* , $c_{.si}$ is the composite of domestic and imported goods, δ_{jsi} are consumption share parameters in region *i* of goods *s* produced in region *j*, σ_{si} are the Armington elasticities of substitution for consumption in region *i* for good *s* .

In fact, consumption decisions are made at two levels. At the first level, the household chooses the optimal amount of a composite good $c_{.si}$ given constant expenditure shares ρ_{si} . At the second level it chooses the optimal composition of the composite goods in terms of geographic origin (Armington specification). Final demands c_{jsi} are given by maximization of (1) subject to (2) and to the consumer's budget constraint, that is to say, the sum of wage earnings, capital rental and the proceeds of tariff revenues, distributed as a lump sum transfer from the government.

$$Y_i = \sum_{s \in S} \omega_i L_{is} + \sum_{s \in S} r_i K_{is} + \sum_{j \in W} \sum_{s \in S} \tau_{jsi} p_{jsi} c_{jsi} + \sum_{j \in W} \sum_{t \in S} \sum_{s \in S} \tau_{jti} p_{jti} x_{jtis}$$

where p_{jsi} denotes the price in region *i* of goods *s* produced in region *j*; L_{is}, K_{is} are labour and capital supply in region *i* of sectors *s*, respectively; ω_i, r_i are wages and rental rates of capital of region *i*, respectively and τ_{jti} are tariff rates that region *i* impose on good *t* of region *j*. In this formulation it is assumed that both capital and labour are mobile between sectors but not between regions.

Firms

Each region is characterized by perfectly competitive industrial sectors. Demand for capital, labour and intermediate inputs by producers result from minimization of variable unit costs v_{is}

$$v_{is} Q_{is} = \sum_{j \in W} \sum_{t \in S} \left(1 + \tau_{jti}\right) p_{jti} x_{jtis} + \omega_i L_{is} + r_i K_{is} \qquad (4)$$

subject to a Cobb Douglas production function

$$\log Q_{is} = \alpha_{L_{is}} \log L_{is} + \alpha_{K_{is}} \log K_{is} + \sum_{t \in S} \alpha_{tis} \log x_{.tis} \qquad (5)$$

where α are share parameters and where

$$x_{.tis} = \left(\sum_{j \in W} \beta_{jtis} x_{jtis}^{(\sigma_{si}-1)/\sigma_{si}} \right)^{\frac{\sigma_{si}}{\sigma_{si}-1}} \qquad (6)$$

are composite intermediate inputs in terms of geographical origin, x_{jtis} is the amount of intermediate goods purchased by sector *s* of region *i* from sector *t* of region *j*, and p_{jti} is the price of goods *t* sold by region *j* to region *i*, and σ_{si} is the elasticity of substitution of sector *s* in region *i* (as households, firms consider intermediate inputs from different regions as imperfect substitutes).

To guarantee homogeneity of degree one of the unit costs in prices, we set

$$\alpha_{L_{is}} + \alpha_{K_{is}} + \sum_{t \in S} \alpha_{tis} = 1 \qquad (7)$$

where α and β are share parameters and $\beta_{jtis} = 0, \forall j \neq i$ if *t* is non-tradable. Profit maximization, in this perfect competitive setting, implies prices equal marginal cost.

$$p_{is} = v_{is}$$

Equilibrium conditions

There are two types of production conditions in the model. First, in each region demand for primary factors must equal their supply. Second, supply for goods and services equals its demand in each market (*i*,*s*). The Rest of the World (ROW) rental rate of capital is the numeraire.

Dataset and calibration procedure

The base year is 1999. The current model consists of five regions, three Canadian regions, the U.S., and the rest of the world (ROW) aggregated as one region. The three Canadian regions are:

(i) **Canada East** comprising Atlantic Canada and Québec.
(ii) **Ontario**
(iii) **Canada West** comprising the Prairies, North West Territories, Nunavut, Alberta, British Columbia and Yukon.

The fifty-five commodities, level S[22], from the trade flow data were mapped into 24 sectors. Table 2 sets out the elasticities of substitution adopted in this study, and describes how they were constructed.

Data requirements for our model consist of nominal bilateral (international and inter-regional) trade flows; input-output tables, national accounts data (consumption demand by sector, labor and capital earnings[23]). Moreover, consistency among the sources must be ensured. This is a challenging and time-consuming task. Therefore, many CGE models have used existing databases such as the Global Trade Assistance and Production (GTAP) data package. Despite the convenience, GTAP data has some major disadvantages: the latest update of the database at the time of model building for this study was 1997[24]; furthermore, the GTAP database does not provide us with Canadian provincial data. For this reason, we opted to develop our own database, collecting data from a variety of national and international sources.

[22] Level S accounts for the *small* level industrial category according to NAICS, North-American Industrial Classification System

[23] Labour and capital remunerations, value added, in Canada and The United States, were extracted from the Input-Output tables and double checked with the respective Nationals Income Accounts. For ROW, we used the "Sources of Factor Income" from GTAP data-base as a proxy for labor and capital earnings.

[24] A new database based on the year 2001was released in 2005.

TABLE 2
Elasticity of Substitution between Domestic Goods and Services and Imports

	Canada	USA	ROW♦
Agriculture and Forestry	*5.3*	*5.3*	*3.5*
Food, Beverages and Tobacco	*5.4*	*5.4*	*3.6*
Textiles	**6.2**	**6.2**	*3.3*
Clothing	**4.5**	**4.5**	**3.0**
Wood Products	**6.4**	**6.4**	*4.2*
Furniture and Fixtures	**6.8**	**6.8**	**4.5**
Paper Products	*4.1*	*4.1*	*2.7*
Printing and Publishing	**5.6**	**5.6**	*2.7*
Chemicals, Fertilizers and Pharmaceuticals	**4.8**	**4.8**	*3.3*
Petroleum Products and Mineral Fuels	*4.4*	*4.4*	*2.9*
Leather, Rubber and Plastic Products	*5.0*	*5.0*	*3.3*
Non-metal Mineral Products	**8.3**	**8.3**	*4.2*
Metal Products	**5.1**	**5.1**	*4.2*
Non-electrical Machinery	**8.6**	**8.6**	*4.2*
Electrical Machinery	*6.3*	*6.3*	*4.2*
Transport Equipment	**7.5**	**7.5**	**5.0**
Miscellaneous Manufacturers	*6.3*	*6.3*	*4.2*
Mining and Quarrying other than Petrol.	*6.3*	*6.3*	*4.2*
Communication Services and Other Utilities	*5.3*	*5.3*	*3.6*
Construction	*4.3*	*4.3*	*2.9*
Wholesale Trade	*4.3*	*4.3*	*2.9*
Transportation and Storage	*4.3*	*4.3*	*2.9*
Financial Services	*4.3*	*4.3*	*2.9*
Personal, Business and Other Services	*4.3*	*4.3*	*2.9*

♦ Values in italics: the elasticities of substitution were calculated using the average of the elasticity of substitution between domestic and composite imported goods, and between the different sources of imports from the GTAP 5 for the ROW. As per convention, we multiplied the ROW estimates by 1.5 to derive the Canadian and U.S. elasticities. Values in bold: were retrieved from Erkel-Rousse H. and Daniel Mirza, (2002) for Canada. We assumed the same elasticities as for the U.S. The ROW estimates were obtained by dividing the Canadian estimates by 1.5.

The Canadian inter-provincial and international trade flows data were obtained from the National Accounts Division of Statistics Canada and Industry Canada Trade Data[25]. The trade flows of the U.S. and the Rest of the World were retrieved exclusively from Industry Canada Trade Data.

The three Canadian economic regions were assumed to share the same production technology as Canada as a whole; therefore the Canadian input-output table was used to derive the production technology coefficients; i.e., the share of intermediate inputs, labour and capital in final production. Due to confidentiality issues, provincial input-output tables have many cells with non-available data ("suppressed") that renders their use not always convenient[26]. The Canadian Input-Output tables were retrieved from CANSIM II database (tables 381009 and 3810010) for 1999. The Bureau of Economic Analysis provided the U.S. Input-Output tables. We have approximated a technological profile for the Rest of the World economies as one region, retrieving information on the "intermediate goods purchases" of firms in the Rest of the World economies, as provided in the GTAP database.

Information on tariffs originates from GTAP version 5, which provides us with weighted average tariffs for trade flows with the U.S. and the Rest of the World (and tariff equivalents of some non-tariff barriers) for the year 1997.

As data is collected from various sources, a major challenge consists of ensuring consistency of the dataset, or otherwise balancing the social accounting matrix for every region. This implies that: a) supply equals demand for all goods and services; b) budget constraints for firms and consumers are satisfied; c) domestic external trade balances equal to zero; and, d) firms in all sectors make no excess profits.

Once consistency of the dataset is established, the next step is the calibration of the model; determination of the share parameters in the supply side ($\alpha_{L_{is}}, \alpha_{K_{is}}, \alpha_{tis}$) and demand side of the model ($\rho_{si}, \delta_{jsi}, \beta_{jtis}$), such that the various supply and demand equations given the benchmark year dataset are satisfied. This approach is quite standard (see for instance, Srinivasan and Whalley 1986) for the case of the experiment of external tariff harmonization-customs union.

However, the calibration procedure for the experiment of abolishment of unobserved trade costs (UTCs) diverges from the norm. Unobserved trade costs are calibrated using a variation of a procedure that has been adopted by various researchers to estimate the impacts of EU enlargement[29]. The basic methodology uses gravity results for Canada-USA trade to estimate the potential trade flows in the absence of any UTCs. Appendix 1 describes in more detail the gravity equations and the approach adopted in this paper. Preference (demand side) parameters are calibrated such that the demand equations are consistent with the

[25] Industry Canada Trade Data. Canadian Trade By Industry- NAICS codes: http:/strategis.ic.gc.ca

[26] Though not available at the time of the construction of our database, Wilfrid Laurier University, has since produced a micro -consistent input-output data for Canada's provinces: CREAP 1998 Version 2 data (Snoddon and Wigle, 2004)

[29] See A.M. Lejour. et al (2001) and Dihel, N. P. Walkenhorst (2002).

new dataset. Using the new set of preference parameters, and the original benchmark data, tariff equivalents of the unobserved trade costs that are consistent with the demand and supply equations are calibrated.

Scenario 1: A "Basic Customs Unions"

In scenario 1, we model a "Basic Customs Union" - A common external tariff and abolition of all remaining tariff protection in Canada-U.S. trade.

Common external tariff harmonization implies reconciliation of Canadian and U.S. MFN rates, of general preferential rates extended to developing countries, and of preferential tariffs facing countries with which either Canada, or the U.S., or both has/have a bilateral FTA or other preferential arrangement[32]. With few exceptions[33], there are significant similarities between Canadian and USA lists of actual and expected preferential trade agreements; accordingly, the latter task would not be exceptionally difficult.

In economic terms, the impact of regional trade agreements (RTAs) is measured in terms of their welfare-enhancing effects. Generally speaking, a positive global welfare result obtains if the trade creation effects of an RTA are greater than its trade diversion effects. If trade diversion is greater, welfare losses can exceed the welfare gains for the members of the RTA. In the latter case, lower-cost production in the Rest of the World might well be displaced by higher-cost producers within the RTA who gain an expanded market within the RTA zone under the protection of MFN tariffs applied to third parties. Empirical evidence suggests that the trade created by CUSFTA/NAFTA exceeded the amount of trade diverted; that being said, the amount of trade diverted by CUSFTA/NAFTA was not insignificant—studies suggest that as much as 35 percent of the increased Canadian and Mexican exports to the USA following CUSFTA/NAFTA was due to trade diversion[34].

Insofar as moving to a common external tariff decreases average tariff rates, a "basic" customs union would be expected to reduce the trade diversion effects generated by the CUSFTA and NAFTA.

Indeed, this is likely the case for two reasons:

1) Most Canadian and USA MFN rates are "bound" under GATT/WTO agreements; accordingly, any increase in rates requires negotiated compensation to other trading partners. Harmonizing tariff rates within a customs union by lowering the higher rate is thus much less complicated than by raising the lower rate. While the tariff rates of one or the other

[32] They would also have to reconcile rates on Mexican agricultural exports because the agricultural provisions of NAFTA were not negotiated trilaterally. In principle, a customs union would also involve eliminating tariffs between Canada and the U.S. on agriculture, which did not occur under NAFTA.

[33] For example, the U.S. has a current bilateral agreement with Jordan, is pursuing FTAs with Morocco and the South African customs union, and has initiated discussions with Bahrain. In the case of Chile, though both Canada and the U.S. have bilateral agreements, the Canada-Chile agreement applies to fewer categories. For a list of similarities and differences, see Goldfarb (2003), Table 2, page 14.

[34] See John Romalis. (January 2004), Kimberly A. Clausing (2001).

partner to a customs union could potentially rise for certain goods, on average they would be expected to fall.

2) Negotiating asymmetries between Canada and the USA imply that it is more likely for Canada to harmonise its levels to the USA levels than vice versa. Given that in general Canadian rates are higher than USA rates, a customs union is likely to produce lower tariff rates.

It is therefore expected that Canada-USA harmonization of external tariffs would have a welfare enhancing effect, both for the partners and also for the rest of the world.

Furthermore, it is argued that the gains provided from the application of a common external tariff (CET) could be minimal compared to the potential gains from elimination of Rules of Origin NAFTA provisions. Rules of origin impose significant administrative costs on exporters, create production inefficiencies by inducing producers to buy from higher cost NAFTA sources than from "tariff ridden" cheaper world sources, and may also affect firms location decisions in favour of the largest market, the U.S. in the NAFTA case[35]. Estimating the cost of rules of origin and modelling its various transmission mechanisms, however is an extensive endeavour, beyond the scope of this paper.

Design of the experiment

We use our CGE model to simulate the impact of a hypothetical policy change that consists of: a) adoption of a common external tariff (CET) between the USA and Canada against all third countries, and b) and the elimination of remaining tariffs in Canada-USA trade. The combination of these two policies would resemble a basic customs union[36] between the two countries. Taking into consideration the GATT provisions and negotiating asymmetries discussed above, we have adopted two alternative assumptions for a CET, which we will henceforth refer to as: ***scenario a*** when CET is set equal to the USA external tariff; and ***scenario b*** when CET is set equal to the minimum of Canada-USA MFN tariff rates.

Table 3 sets out the bilateral export and import tariffs between Canada and the U.S. (columns 2 and 3), the tariffs applied to the Rest of the World by Canada and the U.S. (columns 3 and 4), and vice-versa (columns 5 and 6). There are only two sectors that would be affected by elimination of remaining tariff protection in bilateral trade: the primary sectors and the food sector. Furthermore, the food sector is considerably more protected in Canada than in the U.S. In terms of tariffs applied to imports from the Rest of the World, the sectors mostly protected in both countries are the primary sectors, food, textiles and clothing.

With the notable exception of the primary sector, and to a much lesser degree the non-metal mineral products and non-electrical machinery sectors, tariff protection in Canada remains greater than it in the U.S.

[35] See Appiah (1999).

[36] As mentioned earlier, a customs union would also eliminate the ROO provisions. In a forthcoming paper, we have used a conventional methodology for capturing "upper bound" estimates of gains from elimination of NAFTA's ROO.

Bilateral trade effects

The results of the simulations are reported in terms of the impact of the hypothetical policy change. In ***scenario 1a,*** Canadian tariffs imposed on imports from the Rest of the World decrease in all sectors but those of agriculture, non-metal mineral and non-electrical machinery whose tariff protection to the contrary increases. These changes lead to an overall larger inflow of Canadian importations from the Rest of the World (see Table 4). Thus, Ontario's imports from this region increase by 4.08 percent and Canada's East by 5.55 percent. Though there will be some diversion of imports from the U.S. to imports from the Rest of the World following the CET, the later will be overcompensated by an increase in trade between Canada and the U.S. following the bilateral tariff elimination in the agricultural and food sectors, leading to an overall increase of imports from the U.S. Thus, Ontario's imports from the U.S. increase by 1.47 percent while those from Canada's West increase by 5.01 percent[37]. As expected, some of the increase in international trade is trade diverted from Canadian regions: trade between Canadian regions decreases across Canada.

A CET does not affect tariff levels imposed on U.S. imports from the Rest of the World. However, the Canada-U.S. bilateral tariff elimination leads to an increase of U.S. demand for Canadian goods, ranging from 2.61 to 3.66 percent. This will happen at the expense of imports from the Rest of the World, which decrease by 0.22 percent.

Results in ***scenario 1b*** are similar to those of ***scenario 1a***, as in most cases the U.S. external tariff is indeed the minimum of the current Canadian and U.S. external tariffs. The only substantial policy differences among the two scenarios are relevant to the agricultural sector. Under a CET in this scenario, tariff protection of this sector towards the Rest the World remains unchanged in Canada and decreases in the U.S. In the aggregate, this leads to slightly larger increases in imports from the Rest of the World for most Canadian regions, and only a slight decrease in U.S. imports from that region.

[37] We break down scenario 1 into its components: a) a CET and b) CAN-US zero bilateral tariff . These tables are not presented in this paper, but are available from the authors upon request.

TABLE 3
Import Weighted Average Tariff Rates, 1997, in percent.

	Canada on USA	USA on Canada	Canada on ROW	USA on ROW	ROW on Canada	ROW on USA
Agriculture and Forestry	3.4	3.6	2.9	11.9	51.4	31.3
Food, Beverages and Tobacco	25.4	8.8	33.7	11.7	35.4	35.4
Textiles	0	0	15.0	9.7	10.3	9.7
Clothing	0	0	20.9	11.9	12.7	14.8
Wood Products	0	0	4.9	1.7	2.5	4.4
Furniture and Fixtures	0	0	3.3	2.1	5.6	4.8
Paper Products	0	0	1.9	1.0	2.6	4.1
Printing and Publishing	0	0	3.3	2.1	5.6	1.6
Chemicals, Fertilizers and Pharmaceuticals	0	0	7.0	6.1	5.1	5.1
Petroleum Products and Mineral Fuels	0	0	6.1	2.2	5.4	4.0
Leather, Rubber and Plastic Products	0	0	7.0	6.1	5.1	5.1
Non-metal Mineral Products	0	0	5.2	5.4	6.3	6.0
Metal Products	0	0	3.5	2.7	2.6	4.6
Non-electrical Machinery	0	0	5.2	5.4	6.3	6.0
Electrical Machinery	0	0	1.1	1.1	5.5	3.6
Transport Equipment	0	0	3.6	1.9	8.0	4.2
Miscellaneous Manufacturers	0	0	3.3	2.1	5.6	4.8
Mining and Quarrying other than Petrol.	0	0	0	0.3	0.8	1.0
Communication Services and Other Utilities	0	0	0	0	0.4	0.4
Construction	0	0	0	0	0.2	0.1
Wholesale Trade	0	0	0	0	0.4	0.3
Transportation and Storage	0	0	0	0	0.1	0.1
Financial Services	0	0	0	0	0.2	0.2
Personal, Business and Other Services	0	0	0	0	0.2	0.2

Source: GTAP 5, 1997.

TABLE 4
Impact of a Canada-USA Customs Union on Bilateral Trade Flows
(Percentage change over the base case)

Scenario a: CET is set to USA MFN rates.

	Importers				
Exporters	Canada East	Ontario	Canada West	USA	ROW
Canada East	-0.82	-2.65	-2.24	3.66	1.07
Ontario	-1.56	-1.18	-1.62	2.61	0.88
Canada West	-2.03	-1.85	-0.74	3.53	0.79
USA	1.91	1.47	5.01	-0.04	0.11
ROW	5.55	4.08	5.23	-0.22	0.00
Scenario b: CET is set to the minimum of Canada-USA MFN rates.					
Canada East	-0.84	-2.62	-2.24	3.67	1.67
Ontario	-1.56	-1.20	-1.66	2.64	1.45
Canada West	-2.01	-1.85	-0.79	3.52	1.45
USA	1.91	1.49	4.98	-0.07	0.59
ROW	5.57	4.06	5.67	-0.02	-0.07

Sectoral trade effects

In terms of imports, the most obvious difference between the two CET scenarios is their relative impact on the sector of agriculture. Under ***scenario 1a,*** protection of this sector towards the Rest of the World actually increases. While this increase is compensated by the elimination of Canada-U.S. tariffs, the overall impact is a slight decrease in the international agricultural imports of all three Canadian regions, in the range of 0.24 to 1.89 percent (Table 5). In ***scenario 1b***, tariff protection towards imports from the Rest of the World in the agricultural sector does not change in Canada, but it decreases by 75 percent in the U.S. As a result, across Canadian regions international imports of agricultural goods will rise, by a modest 9.27 percent in the case of Canada West, whereas agricultural imports in the U.S. will increase by a more impressive 37.49 percent (Table 6).

In both scenarios, the sector most impacted in Canada is food, whose tariff protection is reduced by 100 percent with respect to imports from the U.S., and by 65 percent with respect to imports from the Rest of the World. Subsequently, international imports of food rise by a spectacular 147.20 percent in the case of Canada West (***scenario 1b***)[38]. The second most impacted sector in Canada as a whole is clothing whose tariff protection from imports from Rest of the World declines by 43 percent. Thus, in ***scenario 1b***, our model estimates that

[38] The increase of international trade is of course compensated by a decrease in inter-Canadian regional trade, leading to smaller increases in total trade. Thus, in the case of Canada West, total imports of food (including imports from other Canadian regions) increase by 37.03 percent (tables of total sectoral trade impacts are available upon request).

imports of clothing increase by 18.35 percent in Canada East, and by 19.46 percent in Canada West[39].

TABLE 5
Impact on Trade Flows for Selected Sectors[a]
(Percentage change over the base case)
Scenario a: CET is set to USA MFN rates.

		Agriculture and Forestry	Food, Beverages and Tobacco	Textiles	Clothing
Canada East	**EXP.**	18.61	46.71	1.64	1.72
	IMP.	-1.10	133.30	9.08	18.83
Ontario	**EXP.**	19.89	57.36	1.25	1.11
	IMP.	-1.89	114.50	2.95	11.90
Canada West	**EXP.**	11.96	46.10	0.81	0.92
	IMP.	-0.24	147.40	6.18	20.01
USA	**EXP.**	3.45	19.27	-0.59	-0.48
	IMP.	3.96	10.04	-0.01	-0.07
ROW	**EXP.**	-3.56	6.11	1.48	0.96
	IMP.	0.44	0.43	0.20	0.16

[a] Interprovincial trade is not taken into account

TABLE 6
Impact on Trade Flows for Selected Sectors[a]
(Percentage change over the base case)
Scenario b: CET is set to the minimum of Canada-USA MFN rates.

		Agriculture and Forestry	Food, Beverages and Tobacco	Textiles	Clothing
Canada East	**EXP.**	13.58	46.96	1.95	1.89
	IMP.	8.05	131.50	8.67	18.35
Ontario	**EXP.**	13.01	57.37	1.70	1.47
	IMP.	5.41	114.20	2.76	11.59
Canada West	**EXP.**	10.06	45.97	1.32	1.21
	IMP.	9.27	147.20	5.84	19.46
USA	**EXP.**	4.01	20.52	-0.22	-0.11
	IMP.	37.49	8.54	-0.55	-0.58
ROW	**EXP.**	39.01	4.24	0.79	0.42
	IMP.	1.60	1.69	0.62	0.55

[a] Interprovincial trade is not taken into account

Following the elimination of remaining Canada-U.S. tariffs, international exports of food increase by 57.37 percent in Ontario and by 45.97 percent in

[39] When inter-Canadian region imports are taken into account, the respective increases are 12.29 percent in Canada East and 4.52 percent in Canada West.

Canada West, while agricultural exports rise by 13.58 percent in Canada East (***scenario 1b***). In the U.S. exports of food and agricultural goods increase by 20.52 percent and 4.01 percent respectively.

Sectoral output effects

As the sectors most impacted by the proposed policies are those of agriculture, food, textile and clothing, we focus on these sectors for the following discussion of sectoral effects. Thus in ***scenario 1a,*** agricultural output increases across regions from 4.15 percent in Ontario to 1.91 percent in Canada East (Table 7a). This is the result of reduced competition from imports from the Rest of the World and an increased demand for agricultural exports in the USA. In the sectors of food, textiles and clothing, output decreases as local producers face increased competition from imported goods. The biggest decline is experienced in Ontario's food production, by 7.30 percent.

The only substantive difference in ***scenario1b*** is again relevant to the agricultural sector: agricultural output increases by less in *scenario b*, as local producers do not benefit from the tariff protection from the Rest of the World afforded to them in ***scenario 1a*** (Table 7b).

TABLE 7a

Impact of a Canada-USA Customs Union on Sectoral Output

(Percentage change over the base case)

Scenario a: CET is set to USA MFN rates.

	Canada East	Ontario	Canada West	USA	ROW
Agriculture and Forestry	1.91	4.15	2.43	0.04	-0.61
Food, Beverages and Tobacco	-4.13	-7.30	-4.81	0.52	0.68
Textiles	-2.76	-1.80	-1.49	-0.13	0.17
Clothing	-6.39	-5.76	-5.88	-0.04	0.24

TABLE 7b

Impact of a Canada-USA Customs Union on Sectoral Output

(Percentage change over the base case)

Scenario b: CET is set to the minumim of Canada-USA MFN rates.

	Canada East	Ontario	Canada West	USA	ROW
Agriculture and Forestry	0.22	0.73	1.31	-2.31	8.82
Food, Beverages and Tobacco	-3.89	-7.16	-4.89	0.81	0.37
Textiles	-2.53	-1.47	-1.21	0.06	0.08
Clothing	-6.21	-5.42	-5.62	0.16	0.10

Aggregate economy effects

Overall, the impact of the proposed policies on the economy of Canadian regions (Table 8) are of a very small magnitude, as Canadian trade with the Rest of the World consist only a small percentage of total Canadian trade, and Canada-USA bilateral liberalization affects only two sectors, agriculture and food.

In ***scenario 1a***, international imports increase in all three Canadian regions: from 2.06 percent in Ontario to 5.08 percent in Canada West. The smaller increase in total import flows (in parenthesis, in Table 8) ranging from 1.30 to 2.16 percent demonstrates the shift form West-East trade to North-South trade. As in the aggregate tariff protection towards international imports declines, there is deterioration in the terms of trade in all Canadian regions, particularly so with respect to its international trade partners. However, real revenue increases in all Canadian regions, leading to an increase in real consumer spending (welfare). The largest gains are witnessed in Canada West, with increases in real revenue and real spending of 0.12 to 0.09 percent respectively, or the equivalent of C$ 879.48 million and C$ 508.65 million.

The slight aggregate decline in output in Canada East is mostly due to a decline in domestic demand in three sectors in particular: food, textiles and clothing. These sectors contribute more to value added in Canada East than in Canada West and Ontario.

The U.S. economy, in the aggregate, is hardly impacted at all in this scenario as its external tariff towards the rest of the world is not affected and the impact of U.S.-Canada bilateral tariff has a negligible impact in the U.S. economy as a whole. However, because of the later, the impact on its terms of trade is positive rather than negative as in the Canadian case.

TABLE 8
Impact of a Canada-USA Customs Union on Aggregate Economic Variables
(Percentage change over the base case)

	Exports[a]	Imports[a]	Terms of Trade[a]	Output	Real Revenue	Welfare
Scenario a: CET is set to USA MFN rates.						
Canada East	3.27 (1.53)	3.76 (1.48)	-0.27 (-0.17)	-0.01	0.10	0.08
Ontario	2.48 (1.42)	2.06 (1.30)	-0.21 (-0.18)	0.01	0.07	0.05
Canada West	2.94 (1.86)	5.08 (2.16)	-0.19 (-0.09)	0.01	0.12	0.09
USA	0.44	0.33	0.01	0.00	0.00	0.00
ROW	0.07	0.14	0.04	0.01	0.01	0.01
Scenario b: CET is set to the minimum of Canada-USA MFN rates.						
Canada East	3.37 (1.60)	3.78 (1.49)	-0.37 (-0.23)	0.00	0.08	0.06
Ontario	2.56 (1.47)	2.07 (1.31)	-0.26 (-0.22)	0.02	0.05	0.03
Canada West	3.07 (1.97)	5.21 (2.22)	-0.27 (-0.14)	0.01	0.10	0.07
USA	0.84	0.50	-0.12	0.01	-0.01	-0.01
ROW	0.26	0.62	0.20	-0.01	0.05	0.06

[a] For Canadian regions, numbers in bracket take into account interprovincial trade.

The overall impact on the Rest of the World is also positive, slightly larger than the USA, but considerably smaller than in Canada as whole.

In ***scenario1b,*** aggregate tariff reduction on goods imported to Canada is larger, leading to a further deterioration in the terms of trade of all Canadian regions. As a result, the gains in real revenue and real consumer spending are smaller than in ***scenario 1a***.

As the external tariff towards U.S. imports from the Rest of the World declines, USA terms of trade deteriorate in this scenario, leading to a slight decrease in its real revenue and real consumer spending. The reduction in tariffs imposed on exports of the Rest of the World region to the U.S. lead to a further improvement in the terms of trade of the ROW region and a further improvement in its real revenue and real consumer spending.

Scenario 2: The Elimination of Unobserved Trade Costs

Given the long history of Canada-U.S. trade, the huge bilateral trade volume boosted by a free trade agreement and significantly reduced transportation and communication costs, economists expected that the Canada-USA border would no longer be an important determinant of geographic trade patterns. Accordingly, John McCallum's (1995) finding that, after controlling for distance, trading partner sizes and a small number of other factors, trade between two individual Canadian provinces was on average 22 times larger that trade between Canadian provinces and USA states, became one of the most puzzling empirical findings in the recent international trade literature. Subsequent research challenged both the measurement and theoretical underpinnings of the McCallum estimates. Though more recent estimates have reduced the "border" effect to more than half the size estimated by McCallum, they nevertheless have confirmed the existence of a sizable "border" effect in Canada-USA merchandise trade.

While the existence of a "border effect" in Canada-USA trade has now become generally accepted, its interpretation is still a matter of debate. Two popular interpretations have competing policy implications: (a) the border effect could be due to differing national preferences: i.e., consumers prefer to buy from domestic producers; or (b) the border effect could be due to unobserved trade costs (UTCs), such as costs due to customs controls and administrative formalities, costs that arise out of national differences in technical standards and regulation, transactions costs related to currency exchange and hedging of currency risks, and costs associated with developing trade relations in different cultural and legal environments.

The first interpretation would imply that further integration between Canada and the USA would not provide any further economic advantages to either of the two countries. The second implies, however, that co-coordination of regulatory, monetary and transportation policies to lower or remove these implicit costs of trade could facilitate cross-border exchange.

Efforts to empirically test the alternative hypotheses in the Canada-USA context and more generally have been hampered by two factors.[40] First, the lack

[40] See Head and Ries (1999) for a demonstration of the linkages and attempt to separate the two factors on the border effect.

of reliable data on "unobserved" trade costs has led to a reliance on proxies that only poorly reflect the real size of these costs. Secondly, estimation complexities have been encountered in establishing a causal link (covariance issues arising between the estimated border coefficients and measures of border related costs).

Even though empirical research has not yet succeeded in providing a definitive answer on the source of the border effect[41], it is generally accepted that even apparently small trade impediments can potentially have large effects on bilateral trade[42] if traded goods are close substitutes, which recent research evidence seems to confirm to be the case. As the CUSFTA has significantly reduced the border effect in Canada-USA bilateral trade[43], the "border" gravity literature suggests that reduction or elimination of UTCs by means of a common market, monetary union, or even smaller scope agreements such as closer regulatory co-operation would lead to significant increases in bilateral trade. Gravity models, however, cannot predict the impact of policy change on other aspects of the economy such as gross domestic product, industry structure, prices, etc. This is one area where a computable general equilibrium model can provide useful insights on the impact of trade policy on economic factors besides bilateral trade flows.

Design of the experiment

We use our CGE model to simulate the impact of a hypothetical policy change that completely abolishes the unobserved trade costs in Canada-USA trade. Given that unobserved trade costs arise from a broad range of sources, only the most ambitious economic union scenarios, including a common currency, would likely come close to eliminating them.

Our model calibrates the UTCs as ad-valorem tariff equivalents following the methodology described under 'dataset and calibration proceedure'. Given that we are implicitly assuming that the border effect captured by the gravity models is fully due to unobserved trade costs, these calibrated values can only be considered as upper bound approximations. The resulting UTCs are reported in Table 9. We observe that in most sectors, UTCs are larger trade impediments to U.S. exports in Canada than vice versa.

In the wholesale trade sector for instance, UTCs are the equivalent of a 45 percent tariff facing U.S. exports to Canada. As expected, UTCs in the services sectors (communications, finance/business and personal services) are also particularly high, especially so in Canada. The same observation applies to the

[41] Two alternative explanations: a) Canada and the U.S. are very similar countries, thus unlikely to trade (the comparative advantage hypothesis) and b) the border induces changes in the composition of trade are either not tested directly or their estimations are also prone to the criticism mentioned above.

[42] See Obstfeld and Rogoff (2000).

[43] Helliwell (1998) examines the impact of the CUSFTA on border effects for Canada's trade flows. His estimates cover the period 1988-1993. He finds that the average border effect was constant from 1988-1990 and then fell substantially from 1990-1993. The border effect was the same as in 1973 and about 60 percent of the estimated 1990 value.

petroleum industry. UTCs according to our estimations are higher in the U.S. only in the electrical and leather sectors.

TABLE 9

Calibrated Unobserved Trade Costs, in percent.

	USA	Canada
Agriculture and Forestry	10.05	22.57
Food, Beverages and Tobacco	8.61	19.43
Textiles	5.65	10.35
Clothing	3.98	5.96
Wood Products	6.89	18.88
Furniture and Fixtures	3.83	8.74
Paper Products	13.22	26.33
Printing and Publishing	10.13	27.21
Chemicals, Fertilizers and Pharmaceuticals	8.68	17.95
Petroleum Products and Mineral Fuels	7.83	37.80
Leather, Rubber and Plastic Products	12.06	10.31
Non-metal Mineral Products	4.50	9.99
Metal Products	10.44	15.36
Non-electrical Machinery	3.18	3.28
Electrical Machinery	7.45	4.66
Transport Equipment	2.97	5.11
Miscellaneous Manufacturers	4.45	11.37
Mining and Quarrying other than Petrol.	6.64	17.95
Communication Services and Other Utilities	12.68	36.47
Construction	7.34	9.54
Wholesale Trade	16.70	45.43
Transportation and Storage	15.22	27.77
Financial Services	12.56	42.50
Personal, Business and Other Services	15.05	38.79

Bilateral trade effects

As UTCs are of significant magnitude, their elimination leads to a large increase of Canadian exports to the USA (Table 10). Ontario increases its exports to the USA by 48.62 percent while Canada East and Canada West increase their exports by 62.15 and 72.84 percent, respectively.

Canadian imports from the U.S. are even more impacted as UTCs in Canada are larger. Canada East and Canada West experience the largest increases in imports, following the elimination of UTCs, as high as 162.80 percent in the

case of Canada West. Ontario's imports from the USA increase by less, at 53.55 percent.

TABLE 10
Impact of Elimination of all UTCs between Canada-USA on Bilateral Trade Flows
(Percentage change over the base case)

	Importers				
Exporters	Canada East	Ontario	Canada West	USA	ROW
Canada East	-14.00	-16.30	-19.90	62.15	-1.94
Ontario	-16.60	-18.10	-23.50	48.62	-4.66
Canada West	-9.59	-13.20	-15.20	72.84	0.19
USA	152.30	53.55	162.80	-1.16	-0.88
ROW	-6.82	-7.33	-13.80	0.15	0.07

The lowering of costs of doing business with the USA results in some degree of trade diversion. For example, Canada West's imports from the Rest of the World decrease by 13.80 percent in this simulation. By the same token, aggregate imports from the Rest of the World decrease in Canada East and Ontario. As expected, the rise in Canada-USA trade is also accompanied by a significant decline in intra-regional trade within Canada.

Sectoral trade effects

Sectoral trade effects are very impressive, in particular with regards to imports (Tables 11a and 11b). Thus, international imports in Canada West will increase by 200 percent or more in the sectors of agriculture, petroleum, communications and financial services. Increases in international exports, though of smaller magnitude, exceed 80 percent in the food sector and range between 95.33 to 110.50 percent in wholesale trade.

In the U.S., increases in trade volumes are of smaller magnitude. The largest increases in terms of imports are in the sectors of mining and wholesale trade, by 29.48 and 33.88 percent, respectively. U.S. exports of financial services increase by 83.86 percent, while agricultural exports increase by 41.05 percent.

Aggregate economy effects

As expected, the economic impact of the elimination of UTCs in the economy as a whole are of an impressive magnitude (Table 12). Given the large volume of Canadian exports to the USA, the elimination of UTCs leads to a slight improvement in the terms of trade of two out of three Canadian regions. Real revenue increases in all Canadian regions by 6.01 percent to 7.29 percent. Consequently, real consumer spending rises by as high as 7.15 percent in the case of Ontario. The U.S. will also experience positive gains in terms of increases in real output, real revenue and real consumer spending, but the size of these gains are comparatively very small. As expected, the Rest of the World will be negatively impacted from "freer" trade between Canada and the USA.

TABLE 11a

Impact of Elimination of all UTCs between Canada-USA on Sectoral Trade Flows[a]

(Percentage change over the base case)

	Canada East		Ontario		Canada West	
	EXP.	**IMP.**	**EXP.**	**IMP.**	**EXP.**	**IMP.**
Agriculture and Forestry	61.58	161.30	45.11	69.20	54.28	203.00
Food, Beverages and Tobacco	80.97	83.43	85.71	75.83	86.44	144.70
Textiles	22.71	23.67	5.37	19.05	-0.46	30.43
Clothing	13.96	6.22	8.37	9.84	16.86	9.34
Wood Products	48.65	128.00	32.71	69.24	51.49	132.80
Furniture and Fixtures	44.12	71.99	32.75	26.14	53.08	52.00
Paper Products	53.39	122.30	52.47	50.84	35.97	104.60
Printing and Publishing	86.79	176.20	67.77	118.40	79.60	228.50
Chemicals, Fertilizers and Pharmaceuticals	29.72	32.39	31.13	17.17	31.64	72.30
Petroleum Products and Mineral Fuels	27.83	68.14	23.12	186.00	44.39	263.30
Leather, Rubber and Plastic Products	60.23	28.06	51.49	16.48	57.82	34.13
Non-metal Mineral Products	38.80	72.09	27.82	35.96	45.75	95.76
Metal Products	64.86	47.90	54.55	37.38	44.25	57.26
Non-electrical Machinery	1.44	8.94	-4.27	5.92	11.06	12.35
Electrical Machinery	47.96	10.02	36.51	5.44	43.06	11.26
Transport Equipment	25.69	13.28	33.11	12.17	23.96	8.14
Miscellaneous Manufacturers	24.75	24.04	17.56	12.52	25.48	20.85
Mining and Quarrying other than Petrol.	24.01	9.31	34.65	57.49	54.16	193.90
Communication Services and Other Utilities	75.18	134.20	59.73	63.67	79.75	227.30
Construction	56.43	51.56	54.53	36.13	65.88	88.77
Wholesale Trade	95.98	144.60	95.33	70.71	110.50	138.40
Transportation and Storage	64.69	157.30	52.82	100.60	75.60	186.00
Financial Services	62.19	189.40	65.22	137.10	65.19	250.50
Personal, Business and Other Services	76.74	161.10	73.53	95.45	84.92	198.90

[a] Interprovincial trade is not taken into account

TABLE 11b

Impact of Elimination of all UTCs between Canada-USA on Sectoral Trade Flows[a]
(Percentage change over the base case)

	USA		ROW	
	EXP.	**IMP.**	**EXP.**	**IMP.**
Agriculture and Forestry	41.05	15.75	-1.13	-0.51
Food, Beverages and Tobacco	21.46	18.05	-1.60	-0.67
Textiles	4.19	2.98	0.79	-1.20
Clothing	1.38	1.20	0.71	-0.89
Wood Products	29.53	18.49	-1.53	-1.18
Furniture and Fixtures	13.71	8.88	-0.44	-1.69
Paper Products	19.21	19.18	-2.22	-0.66
Printing and Publishing	35.42	16.01	0.34	-0.84
Chemicals, Fertilizers and Pharmaceuticals	6.45	5.83	-0.46	-0.91
Petroleum Products and Mineral Fuels	29.86	2.26	0.12	-0.71
Leather, Rubber and Plastic Products	4.47	10.71	-0.55	-0.85
Non-metal Mineral Products	15.39	5.45	0.92	-1.39
Metal Products	16.17	13.41	-1.76	-1.06
Non-electrical Machinery	0.03	1.20	1.21	-1.07
Electrical Machinery	1.67	7.72	0.24	-1.18
Transport Equipment	5.31	7.82	-1.52	-1.30
Miscellaneous Manufacturers	0.61	1.79	0.86	-1.14
Mining and Quarrying other than Petrol.	19.51	29.48	-0.57	-1.76
Communication Services and Other Utilities	33.06	15.66	-0.61	-0.81
Construction	14.77	10.80	-0.96	-0.49
Wholesale Trade	13.03	33.88	-0.89	-0.55
Transportation and Storage	8.57	5.55	0.02	-0.54
Financial Services	83.86	14.96	-0.93	-0.62
Personal, Business and Other Services	26.82	19.44	-1.18	-0.76

[a] Interprovincial trade is not taken into account

TABLE 12

Impact of Elimination of all UTCs between Canada-USA on Aggregate Economic Variables
(Percentage change over the base case)

	Exports[a]	Imports[a]	Terms of Trade[a]	Output	Real Revenue	Welfare
Canada East	52.55 (31.55)	71.07 (34.49)	0.23 (0.09)	1.63	6.01	5.94
Ontario	44.65 (27.91)	39.73 (30.16)	0.79 (0.84)	2.82	7.29	7.15
Canada West	57.25 (41.83)	105.10(50.66)	-0.45 (-0.66)	1.31	6.62	6.62
USA	13.39	9.80	0.14	0.14	0.18	0.19
ROW	-0.34	-0.92	-0.29	-0.01	-0.09	-0.13

[a] For Canadian regions, numbers in bracket take into account interprovincial trade.

TABLE 13

Sensitivity Analysis for Scenario 1

(Percentage change over the base case)

CET is set to the minimum of Canada-USA MFN rates.

With Original Elasticity Substitution Parameters

	Exports[a]	Imports[a]	Terms of Trade[a]	Output	Real Revenue	Welfare
Canada East	3.37 (1.60)	3.78 (1.49)	-0.37 (-0.23)	0.00	0.08	0.06
Ontario	2.56 (1.47)	2.07 (1.31)	-0.26 (-0.22)	0.02	0.05	0.03
Canada West	3.07 (1.97)	5.21 (2.22)	-0.27 (-0.14)	0.01	0.10	0.07
USA	0.84	0.50	-0.12	0.01	-0.01	-0.01
ROW	0.26	0.62	0.20	-0.01	0.05	0.06

Elasticity Substitution Parameters Decrease by 25%

	Exports[a]	Imports[a]	Terms of Trade[a]	Output	Real Revenue	Welfare
Canada East	2.45 (1.19)	2.63 (1.05)	-0.36 (-0.22)	0.00	0.03	0.01
Ontario	1.87 (1.10)	1.46 (0.92)	-0.26 (-0.22)	0.02	0.01	-0.01
Canada West	2.24 (1.44)	3.63 (1.57)	-0.27 (-0.14)	0.01	0.07	0.03
USA	0.62	0.35	-0.12	0.01	-0.02	-0.01
ROW	0.17	0.48	0.20	0.00	0.05	0.05

Elasticity Substitution Parameters Increase by 25%

	Exports[a]	Imports[a]	Terms of Trade[a]	Output	Real Revenue	Welfare
Canada East	4.37 (2.06)	5.06 (1.99)	-0.38 (-0.23)	-0.01	0.12	0.10
Ontario	3.28 (1.86)	2.71 (1.71)	-0.26 (-0.22)	0.01	0.09	0.07
Canada West	3.98 (2.55)	6.96 (2.93)	-0.27 (-0.15)	0.00	0.14	0.11
USA	1.09	0.67	-0.12	0.02	-0.01	-0.01
ROW	0.36	0.78	0.20	-0.01	0.05	0.06

[a] For Canadian regions, numbers in bracket take into account interprovincial trade.

Sensitivity Analysis

The magnitudes of the elasticities of substitution are critical determinants of the direction and size of the impact of any hypothetical trade policy change. The higher the degree of substitution between goods produced locally and imported goods, the larger the impact of a reduction in the external tariff or tariff equivalent protection on trade flows and consequently on domestic production, prices and economic welfare. Furthermore, the value of the elasticity of substitution directly affects the size of the unobserved trade costs: the smaller the elasticity, the larger the UTCs calibrated and vice versa. To check for the robustness of our model, we have run sensitivity results for the different experiments that we have undertaken. We have first reduced the values of the elasticities of substitution by 25 percent and then increased them by 25 percent. Sensitivity analysis for ***scenario 1b*** of CET (Table 13) demonstrates that trade flows fluctuate by approximately 25 to 35 percent from the base case scenario in

each case. Changes in real income and welfare also vary in the expected direction, offering a minimum and a maximum bound to the base case scenario. Finally, Table 14 illustrates the impact of a variation of the elasticity of substitution relative to the value of the unobserved trade costs.

TABLE 14
Sensitivity Analysis of Calibrated Unobserved Trade Costs (UTCs)

	Elasticity Substitution Parameters Decrease by 25%		Elasticity Substitution Parameters Increase by 25%	
	Calibrated UTCs, in percent.			
	USA	**Canada**	**USA**	**Canada**
Agriculture and Forestry	9.85	35.44	7.93	17.52
Food, Beverages and Tobacco	7.70	31.72	6.81	15.19
Textiles	4.71	18.03	4.46	8.11
Clothing	1.69	14.69	3.16	4.74
Wood Products	6.47	29.62	5.46	14.78
Furniture and Fixtures	2.54	14.72	3.04	6.88
Paper Products	13.35	41.77	10.47	20.57
Printing and Publishing	10.33	42.74	8.00	21.08
Chemicals, Fertilizers and Pharmaceuticals	7.97	29.28	6.88	14.06
Petroleum Products and Mineral Fuels	6.70	60.76	6.21	29.10
Leather, Rubber and Plastic Products	12.51	17.92	9.45	8.07
Non-metal Mineral Products	3.92	16.01	3.57	7.87
Metal Products	10.62	25.06	8.22	12.02
Non-electrical Machinery	2.31	6.39	2.52	2.59
Electrical Machinery	7.23	8.70	5.88	3.67
Transport Equipment	1.66	9.19	2.36	4.02
Miscellaneous Manufacturers	3.26	18.38	3.52	8.92
Mining and Quarrying other than Petrol.	6.06	27.60	5.24	14.00
Communication Services and Other Utilities	13.48	24.55	10.05	28.19
Construction	10.11	13.36	5.75	7.42
Wholesale Trade	18.39	73.01	13.07	34.42
Transportation and Storage	16.66	44.85	11.93	21.34
Financial Services	12.65	66.82	9.83	32.50
Personal, Business and Other Services	16.09	61.20	11.79	29.72

Concluding Remarks

In this chapter, we have attempted to contribute to the debate over closer economic integration with the U.S. We have developed a computable general equilibrium model and dataset to implement the hypothetical scenarios of: a) Canada and the U.S. adopting a common external tariff towards imports from third countries; and, b) the elimination of remaining bilateral trade protection between Canada and the U.S. In order to assess the differential impact of these scenarios on Canadian regions, our model features three such regions: Canada West, Ontario, and Canada East. Our findings suggest that due to previous free trade agreements between Canada and the U.S., the impact of these policy scenarios, with respect to the economy as a whole, was generally positive, as expected, yet of almost negligible size. However, certain sectors, food in particular, but also agriculture and clothing, will experience notable impacts,

mostly in terms of a significant increase in trade activity. Our results also capture the differential impact of these policies on Canadian regions and the trade-off between international and inter-Canadian trade. However, our model does not capture the gains that would result from the elimination of the NAFTA provisions of rules of origin.

In combination with econometric "gravity" results, we have used our CGE model to calibrate "unobserved" trade costs between Canada and the U.S., and subsequently assessed the impact of elimination of these costs following the adoption of ambitious economic integration/union policies. The impact of such a hypothetical policy scenario is substantive for all Canadian regions in terms of increased trade flows, and positive gains in real revenue, output, and real consumer spending. One may want to interpret these substantive results as an upper bound to "deep" integration between Canada and the U.S. as the border effect detected by gravity models is assumed to be fully due to unobserved trade costs.

Bibliography

Acharya, R.C., Sharma, P. and S. Rao (2001). "Canada's Trade and Foreign Direct Investment Patterns with the United States", Micro-Economic Policy Analysis. Paper presented for Industry Canada conference *North American Linkages: Opportunities and Challenges for Canada*.

Anderson, J. and E. Wincoop (2001a). "Gravity with Gravitas: A Solution to the Border Puzzle", NBER Working Paper 8079 (January)

Anderson, M. A., and S.Smith (1999). "Canadian Provinces in World Trade: Engagement and Detachment", *Canadian Journal of Economics* 32, (February), pp22-38

Appiah, J. A. (1999) "Applied General Equilibrium Analysis of North American Integration with Rules of Origin", doctoral dissertation, Simon Fraser University

Armington P. (1969). "A Theory of Demand for Products Distinguished by Place of Production", *International Monetary Fund Staff Pap*ers, 16, pp159-176

Brown, D.K., A.V. Deardorff, and R.M. Stern (1989). "U.S.-Canada Bilateral Tariff Elimination: The Role of Product Differentiation and Market Structure" in R.C. Feenstra, editor, *Trade Policies for International Competitiveness*, Chicago: University of Chicago Press, pp217-245

Brown, D.K., A.V. Deardorff, and R.M. Stern (1992). "A North American Free Trade Agreement: Analytical Issues and a Computational Assessment", *The World Economy*, 15, pp11-30

Brown, D.K., A.V. Deardorff, and R.M. Stern (1995). "Estimates of a North American Free Trade Agreement", in P.J.Kehoe and T.J.Kehoe, editors, *Modeling North American Economic Integration*, Boston: Kluwer Academic Publishers, pp59-74

Brown, D.K., and R.M.Stern (1987). "A Modeling Persperctive", in R.M.Stern, P.H. Trezise and J.Whalley editors, *Perspectives on a U.S.-Canadian Free Trade Agreement*, pp155-182

Brown, F. and J. Whalley (1980). "General Equilibrium Evaluation of Tariff Cutting Proposals in the Tokyo Round and Comparisons with More Extensive Liberalisation of World Trade", *Economic Journal*, 90, (December), pp838-866

Centre for the Study of Living Standards (2002). "Raising Canadian Standards: A framework for Discussion", TD forum on Canada's Living Standards.

Clausing, K. A. (2001). "Trade Creation and Trade Diversion in the Canada-Unites States Free Trade Agreement", *Canadian Journal of Economics*, 34, (3), pp677-696

Coulombe, S. (2002). "Border Effects and North American Economic Integration: Where Are We Up To?", first draft, prepared for the workshop, Social and Labour Market Aspects of North American Linkages (August)

Cox, D.J. (1994). "Some Applied General Equilibrium Estimates of the Impact of a North American Free Trade Agreement on Canada", in J.F. Francois and C.R. Shiells, editors, *Modeling Trade Policy: Applied General Equilibrium Assessments of North American Free Trade*, New York: Cambridge University Press, pp100-123

Cox, D.J. (1995). “An Applied General Equilibrium Analysis of NAFTA’s Impact on Canada”, in P.J.Kehoe and T.J.Kehoe, editors, *Modeling North American Economic Integration*, Boston: Kluwer Academic Publishers, pp75-89

Cox, D.J. and R.G. Harris (1985). “Trade Liberalization and Industrial Organization: Some Estimates for Canada,” *Journal of Political Economy*, 93, pp115-145

Cox, D.J. and R.G. Harris (1992b). “North American Free Trade and its Implications for Canada: Results from a CGE Model of North American Trade,” *The World Economy,* 15, pp31-44

Deardorff, A.V., and R.M. Stern (1981). “Aggregated Model of World Production and Trade: An Estimate of the Impact of the Tokyo Round”, *Journal of Political Modeling*, 3 , pp127-152

Dihel, N. and P. Walkenhorst (2002). “European Union trade and non-tariff measures” OECD, 5th Conference on Global Economic Analysis.

Dixit, A.K. and J.E. Stiglitz (1977). “Monopolistic Competition and Optimum Product Diversity”, *American Economic Review*, 67(3), pp297-308

Dobson, W (2002). “Shaping the Future of North American Economic Space”, *Commentary: The Border Papers*. C.D. Howe Institute.

Dodge, D. (2003) Economic Integration in North America”, Speech to the Couchiching Institute on Public Affairs, Geneva Park, Ontario, (August)

Dungan, P. and S. Murphy (1999). “The Changing Industry and Skill Mix of Canada’s International Trade”, *Perspectives on North American Free Trade*. Paper No. 4. Industry Canada

Dymond, B. and M. Hart (2003). “Canada and the Global Challenge: Finding a Place to Stand”, *Commentary: The Border Papers.* C.D. Howe Institute

Erkel-Rousse H. and D. Mirza (2002). "Import Prices Elasticities: Reconsidering the Evidence", *Canadian Journal of Economics*, 35 (2), pp282-306

Ethier, W.J. (1982). “National and International Returns to Scale in the Modern Theory of International Trade”, *American Economic Review*, 72, pp389-405

Fox, A.K. (1999). “Evaluating the Success of a CGE Model of the Canada-U.S. Free Trade Agreement”, University of Michigan

Globerman, S. and P. Storer (2003). “Canada-U.S. Economic Integration Following CUSFTA and NAFTA, Western Washington University.

Goldfarb, D. (2003). “The Road to a Canada-U.S. Customs Union: *Step-by-Step or in a Single Bound?*” *Commentary: The Border Papers*. C.D. Howe Institute.

GTAP (2001). Global Trade, Assistance, and Production: The GTAP 5 Data Package, Centre for Global Trade Analysis, Purdue University

Hamilton, R. W. and J. Whalley (1985). “Geographically Discriminatory Trade Arrangements”, *The Review of Economics & Statistics*, 67 (3), pp446-55

Harris, R.G. (1984). “Applied General Equilibrium Analysis of Small Open Economies with Scale Economies and Imperfect Competition”, *The American Economic Review*, 74(5), pp1016-1032

Harris, R.G. (2003). “Canada’s Economic Interest and the CUSFTA-NAFTA Agreements: A Review of Evidence” *Perspectives on North American Free Trade*. Industry Canada

Hart, M. and W. Dymond (2001). "Canada, the United States and Deepening Economic Integration: Issues and Research Agenda", University of Ottawa, Center for Trade Policy and Law
Hazledine, T. (1990). "Why do the Free Trade Gain Numbers Differ So Much? The Role of Industrial Organisation in General Equilibrium", *Canadian Journal of Economics*, 4 (4), pp791-806
Head, K. and J.Ries (1999). "Can Small Country Manufacturing Survive Trade Liberalization? Evidence from the Canada-U.S. Free Trade Agreement", *Perspectives on North American Free Trade*. Industry Canada
Head, K. and T.Mayer (1998). "Non-Europe: the Magnitude and Causes of Market Fragmentation in the EU", mimeo (October)
Helliwell, J. F. (1996). "Do National Borders Matter for Quebec's Trade?" *Canadian Journal of Economics* 29 (3), pp.507-522
Helliwell, J. F. (1997). "National Borders, Trade and Migration", NBER Working Paper 6027 (March)
Helliwell, J. F. (1998). "How Much Do National Borders Matter", Washington, DC: Brookings Institution Press.
Helliwell, J. F. (2002). "Border Effects: Assessing Their Implications for Canadian Policy in a North-American Context". (September)
Helliwell, J. F., F C. Lee, and Messinger, H (1999). "Effects of the Canada-United States Free Trade Agreement on Inter-provincial Trade", *Perspectives on North American Free Trade*. Industry Canada
Helliwell, J.F., and L.C. Frank (1999). "Effects of the Canada-United States Free Trade Agreement on Inter-provincial Trade", *Perspectives on North American Free Trade*. Industry Canada
Hillberry, R. (1998). "Regional Trade and the 'Medecine Line': The National Border Effect in US Commodity Flow Data", *Journal of Borderlands Studies* (Fall), pp1-17
Hillberry, R. (1999). "Explaining the 'Border Effect': What Can We Learn from Disaggregated Commodity Flow Data?" Indiana University Graduate Student Economics Working Paper Series, No.9802 (April)
Hillberry, R. (2000). "Interpreting 'Home Bias' in U.S.-Canada Trade", *International Economic Review*, (June/July)
Hillberry, R. (2002). "Aggregation Bias, Compositional Change, and The Border Effect", *Canadian Journal of Economics* (August), pp517-530
Hillberry, R. and D. Hummels (2002). "Explaining Home Bias in Consumption: the Role of Intermediate Input Trade", NBER Working Paper 9020 (June)
Huw Edwards, T. (2002). "Modeling the Accession of the Central and Eastern European Countries to the EU Single Market" Centre for the Study of Globalisation and Regionalisation, Warwick UK.
Kehoe, T.J. (2002). "An Evaluation of the Performance of Applied General Equilibrium Models of the Impact of NAFTA", Research Department Staff Report, Federal Reserve Bank of Minneapolis (April)
Krueger, A. (1999). "Trade Creation and Trade Diversion under NAFTA", NBER Working Paper 7429 (December)

Lavoie, Claude, Mérette, M. and M. Souissi. (2001). "A Multi-sector Multi-country Dynamic General Equilibrium Model with Imperfect Competition", Department of Finance. Working Paper No. 2001-10.

Lejour, A.M and R.A. de Mooij, and R. Nahuis (2001). "EU enlargement: Economic implications for countries and industries", CPB Netherlands Bureau for Economic Policy Analysis.

McCallum J. T. (1995). "National Borders Matter: Canada-U.S. Regional Trade Patterns", *American Economic Review* 85 (June), pp615-623

Mehanna, R. and H. Shamrub (2002). "Who is Benefiting the Most from NAFTA? An Intervention Time Series Analysis", *Journal of Economic Development*, 27(2)

Mercenier, J. (1995). "Can "1992" Reduce Unemployment in Europe? On Welfare and Employment Effects of Europe's Move to A Single Market", *Journal of Policy Modeling*, 17, pp1-37

Mirus, R. and N. Rylska. "Economic Integration: Free Trade Areas vs. Customs Unions", Western Centre for Economic Research (August)

Nguyen, T.T. and R.M. Wigle (1992). "Trade Liberalisation with Imperfect Competition The Large and Small of It", *European Economic Review*, 36, pp17-35

Obstfeld, M. and K. Rogoff (2000). "The Six Major Puzzles in International Macroeconomics: is there a Common Cause?", NBER Working Paper 7777 (July)

Papadaki, E. (1998). "Welfare Effects of the Completion of the Single European Market on Greece" in *Global Trading Arrangements in Transition*, in C. Paraskevopoulos, editor, Massachusetts, Edward Elgar Publishing

Reed, G. (1996). "The Use of CGE Modelling in the Analysis of Trade Policy Reform", Centre for Research in Economic Development and International Trade, University of Nottingham, Nottingham, UK (January)

Report of the Standing Committee on Foreign Affairs and International Trade. 2002. "Partners in North America: Advancing Canada's Relations with the United States and Mexico"

Romalis, J. (2001). "NAFTA's and CUSFTA's Impact on International Trade", University of Chicago and NBER (December)

Sharpe, A. (2000). "A Comparison of Canadian and U.S. Labour Market Performance in the 1990s," in *Vanishing Borders Canada Among Nations 2000*, in M. Molot and F. Hampson, editors, Toronto: Oxford University Press

Snodon, T. and R. Wigle (2004). "CREAP Data V2.0: Documentation and Methods" Wilfrid Laurier University

Trefler, D. (2001). "The Long and Short of the Canadian –US Free Trade Agreement", *Perspectives on North American Trade*, Industry Canada

Wigle, R.M. (1988). "General Equilibrium Evaluation of Canada-U.S. Trade Liberalisation in a Global Context", *Canadian Journal of Economics*, 20(3), (August), pp539-564

Wigle, R.M. and J. R. Markusen (1989). "Nash Equilibrium Tariffs for the United States and Canada: the Roles of Country Size, Scale Economics, and Capital Mobility", *Journal of Political Economy* 97(2), (April), pp368-386

Appendix 1: The Gravity Model

Economic Gravity models are based on an analogy to the law of gravity in physics: "after controlling for size, trade between two regions is decreasing in their bilateral trade relative to the average barrier of the two regions to trade with all their partners. Intuitively, the more resistant to trade with all others a region is, the more it is pushed to trade with a given bilateral partner".

In his pioneering article, McCallum (1998) estimated the following gravity equation in a Canada-USA context:

$$\ln x_{ij} = \alpha_1 + \alpha_2 \ln y_i + \alpha_3 \ln y_j + \alpha_4 \ln d_{ij} + \alpha_5 \delta_{ij} + \varepsilon_{ij} \qquad \text{(i)}$$

where x_{ij} stands for exports from region i to region j, y_i and y_j are gross domestic product per capita of the importing and exporting regions, d_{ij} is distance between the capitals of regions and δ_{ij} is a dummy equal to 1 for inter-provincial trade and zero for state province trade. The exponential of the dummy variable coefficient, α_5, is the "border effect", or the effect of the border on the ratio of inter-provincial trade to state province trade after controlling for distance and size. Based on 1988 data, McCallum estimated that inter-provincial trade is 22 times larger than state-province trade.

Anderson and Wincoop (2001) have criticized McCallum's work and subsequent studies based on "theoretical" gravity models on the grounds that they failed to capture the key implication of the theoretical gravity equation that "trade between regions is determined by relative trade barriers" and therefore have overestimated the border effect. Anderson and Wincoop (2001) estimated a non-linear regression that is consistent with the theoretical underpinnings of the gravity model as developed by Anderson (1979). In effect they develop a term they call multilateral resistance variable that effectively measures the average barrier implied in the gravity theory. Based on the assumption that the exporter passes on to the importer the trade costs they incur (nominal information costs, design costs, transport costs, legal and regulatory costs) Anderson and Wincoop take into account two price index terms (in a two country model) that take the following form[30]

$$p_j = \left[\sum_i \left(\frac{\beta_i t_{ij} p_i}{p_j} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \forall i, j \qquad \text{(ii)}$$

where σ is the elasticity of substitution between imported and domestic goods, t_{ij} are the trade costs that the authors proceed in assuming they are symmetrical

[30] This is derived from a CES preferences and goods that are differentiated by region of origin. The authors also assumed that each region is specialized in producing one good following Deardorff (1988).

and β_i is a positive distribution parameter implied by the CES utility function assumption. Using 1993 data, they estimate the following theoretical gravity equation in the context of Canada-USA trade (two country model):

$$\ln z_{ij} = \ln\left(\frac{x_{ij}}{y_i y_j}\right) = k + (1-\sigma)\rho \ln d_{ij} + [(1-\sigma)\ln b](1-\delta_{ij}) - \ln p_i^{1-\sigma} - \ln p_j^{1-\sigma} + \varepsilon_{ij} \quad \text{(iii)}$$

where $(b-1)$ represents the ad-valorem tariff-equivalent of the USA-Canada border barrier, and δ_{ij} is the same variable as in equation (i) above.

To take into account the fact that the U.S. and Canada also trade with other countries, A&W also estimate a multi-country model that includes a total of 22 industrialized countries. A&W estimate a border effect of 10.2 and 10.7 for the two-country and multi-country mode respectively. They also re-estimated the McCallum gravity equation border effect for the same year, which as expected yielded a considerably larger estimate of 16.4. After estimating the tariff equivalents of the border barriers for bilateral trade, A&W also consider the implications for bilateral flows. Their estimated ratios of trade flows with border barriers to that under borderless trade (BB/NB) for the multi-country model is reproduced below

Ratio BB/NB					
USA-USA	CAN-CAN	USA-CAN	USA-ROW	CAN-ROW	ROW-ROW
1.25	5.96	0.56	0.40	0.46	0.71

Source: Anderson & Wincoop, 2001

In this paper we have used these ratios to produce "predicted" trade flows on the base of actual trade flow dataset 1999. In a world without unobserved trade costs (UTCs), trade between Canada and the U.S. would be 1.78 (1/0.56) times larger than actual trade flows where UTCs are present.