ESTIMATING THE IMPACT OF THE CANADA-EU AGREEMENT:

A GRAVITY APPROACH

by

Heather Sagar

An essay submitted to the Department of Economics

in partial fulfilment of the requirements for

the degree of Master of Arts

Queen's University

Kingston, Ontario, Canada

August 2011

ABSTRACT

The objective of this paper is to estimate the potential change in Canadian exports which

would be the result of the completion of the Canada-EU trade agreement currently under

negotiation. By using the gravity model to measure the current border effect and

estimates from the Canada-US Free Trade Agreement, we estimate the change in exports.

Exports are found to have the potential to increase significantly solely due to the

agreement but the amount of this increase remains uncertain, ranging between six and

sixty percent.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

I. Introduction

This paper estimates the possible impact of the Canada-European Union Trade Agreement (CETA) on Canadian exports to the European Union (EU) by using a gravity model approach and estimates from studies of the 1989 Canada-US Free Trade Agreement. CETA will be quite comparable in scope to the Canada-US Free Trade Agreement (CUFTA) based on three points. First and foremost they are both between developed and westernised economies with a shared history. Secondly, the areas being examined by the two agreements are very similar and the scope of openness will most likely be very comparable. Thirdly, it is expected that, as was done for the Canada-US Free Trade Agreement, the two economies will maintain the strict control that they exercise on certain sectors, such as agriculture, which will not allow for full trade potential to be reached. Therefore, we examine the estimated change that occurred to the Gross Domestic Products (GDP) of both economies due to the CUFTA which allows us to estimate a range within which the change in GDP may occur due to CETA. Furthermore, by using the gravity model, we estimate the current border effect between Canada and the EU. Once the border effect and a range for the GDPs is found, we then estimate a range for the change in exports by using the estimated gravity model.

We begin with a literature review of papers that have examined the changes to income and trade levels that may occur due to the implementation of CETA. Next, we apply the gravity model that McCallum (1995) developed to estimate the pre-CUFTA border effect to current Canada-EU trade. By doing so, we find the border effect between these two regions and determine whether it is large enough that an agreement will in fact significantly alter trade flows or if trade flows are primarily explained solely by distance

and GDP, in which case the benefits of an agreement will be limited. By comparing these border effects to those found by McCallum (1995) and Feenstra (2001) both for pre- and post-CUFTA, we estimate the border effect for post-CETA trade. We then examine the changes to national incomes that occurred due to CUFTA to estimate the potential impact of the Canada-EU negotiations on GDPs. By using the estimated border effect and GDPs for post-agreement, we then estimate a range for the change in Canadian exports to the EU using our estimated gravity equation. We conclude that CETA will increase the exports from Canada to the EU but that the potential increase remains uncertain. We estimate that the range of the change to Canadian exports will be between six and sixty percent.

The remainder of the paper is organised as follows: Section II explains the background of the agreement and the previous studies which have estimated the impact of CETA on trade: Section III presents the gravity model, its specifications for this paper, and the data used. Section IV provides the results of our estimations. Section V contains the final estimation of both the change in GDP and the change in exports based on previous estimations. Section VI examines the trade patterns between the EU and Canada as one potential reason the gravity model does not fully explain trade between Canada and the EU, and Section VII gives insights into other facets of the agreement which do not directly impact trade but may have a significant impact on the Canadian economy. Section VIII concludes the paper.

II. Background and Past Studies

II.1. Canada –EU Trade Background

At the Canada-EU Summit in Ottawa in 2004, leaders agreed to a framework for a new Canada-EU Trade and Investment Enhancement Agreement. In 2008, they published a joint study on the economic impact of a closer Canada-EU partnership. This study estimated that there would be important benefits for both sides to pursuing a closer economic partnership. As of 2009, Canada and the EU started working towards a free trade agreement that would liberalise various areas related to the economy including trade in goods and services. This proposed agreement raises questions regarding its impact on trade flows and overall benefits to both economies.

Canada and the EU already have significant economic ties. The European Union, the largest single common market in the world, has total trade flows of $98.4 billion in 2009, a population of over 500 million, and GDP of $18.7 trillion. It is Canada's second largest trading partner and has Canada as its seventh largest trading partner. While EU-Canada trade is dwarfed in comparison with that between Canada and the US, Canada trades almost the same amount with the EU as it does with the rest of the world (excluding the US).

Figure 1, below, shows the bilateral trade between Canada and the EU, the United States and the rest of the world from 1992 to 2007. This shows the substantial amount that Canada trades with the US and the EU compared with its trade with the rest of the world. Although the trade with the EU is not as important as that with the US we can see that it does remain a significant trading partner to and from whom trade flows have been increasing over time.

Figure 1:
Canada Trade Flows
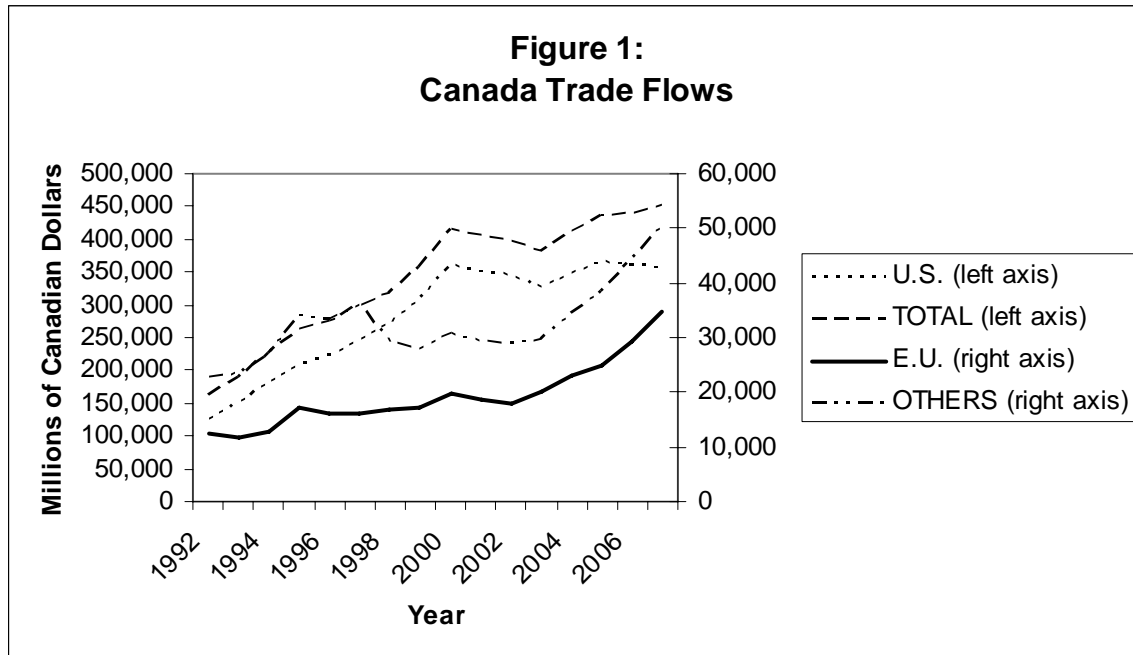
II.2. Previous Estimations of the Impact of the CETA

Various studies have attempted to estimate the possible impact of this agreement. By using a computable general equilibrium model, the joint study by the European Commission and the Government of Canada, *Assessing the Cost and Benefits of a Closer EU-Canada Economic Partnership* (2004)*,* estimates that liberalising trade could lead to annual real income gains by the year 2014 of EUR 8.2 billion for Canada with total European exports increasing by 24.3% and total Canadian exports increasing by 20.6%. In contrast, Jim Stanford's paper *Out of Equilibrium* (2010), in which he assumes that the elimination of tariffs in goods' trade where trade flows respond to tariff elimination will be mediated by the elasticity of consumer demand, finds that Canadian exports will grow by only 12% but that EU exports will increase by 27%. He argues that because of this Canada would increase its trade deficit and therefore that it will not benefit from an agreement with the EU. Additionally, the EU commissioned a *Trade Sustainability*

Impact Assessment (2011) which delivered much smaller results for the change in the trade flow than the joint study (referenced above). Using another computable general equilibrium model with additional econometric and statistical analysis, this study found that total exports are expected to increase over the long-term, a 0.07% increase to the EU and 1.56% to Canada. This second study assumed a more modest deal than the previous one which resulted in a more conservative estimate of the impact of the agreement on trade. The numbers provided by these studies differ significantly from one another and show that there are many possible outcomes that this agreement could lead to, from being largely beneficial for Canada to in fact being a detriment to the Canadian economy.

Such differences are not unexpected. The North American Free Trade Agreement (NAFTA) and the CUFTA, also generated interest before they were signed, with various economists trying to estimate the impact that the proposed agreements would have on both the Canadian and US economies. Their results also differed widely. The estimates for NAFTA of the change in GDP expressed as a percentage of GDP for Canada and the United States ranged respectively from -1.47 to 10.57 and from -0.62 to 2.07. (Stanford 2003). Likewise the estimated change in GDP for CUFTA ranged for Canada from -0.05 to 11 and for the US from -0.03 to 0.34. These large discrepancies between papers reflects how underlying methods and assumptions included in a model can impact the estimates significantly.

III. The Model

III.1. Description of the Model

It is generally accepted that trade between countries is determined in part by the level of economic activity in the countries and the extent of the impediments to trade. The border that exists between two countries is one of these impediments that has been found to significantly affect trade even among industrialised countries due to the various additional procedures that are necessary for goods, people and services to cross these borders. (McCallum 1995)

In this paper, the gravity model is used to estimate the trade barriers that exist between Canada and the EU. Originally, the gravity model was solely based on distance and GDP between two countries (Ravenstein, 1889). For this paper we return to the basics of the gravity model and include an income variable, a distance variable, and a dummy variable for the border effect. The gravity model was chosen due to its high level of empirical success explaining trade flows and patterns: it has been found that 80-90% of trade can be explained by the gravity model in many studies (Anderson, 2010). It has had such empirical success that Deardoff (1998) referred to the gravity model as "a fact of life".

If the border effect is substantial, we anticipate that it will decrease due to this agreement because of the various areas which will be targeted such as changes to technical barriers to trade, trade facilitation, improvements to cross-border trade in services and improvements in custom procedures. The reduction of tariffs and quotas, the enhancements to the provisions in the areas of transparency, international standards, technical regulations and conformity assessment will decrease the cost of trading. The

increase to trade facilitation of both goods and services will increase the efficiency, transparency, cooperation and the consultation process for traded products. The increase in the cooperation for custom procedures so as to avoid duplication during the importing process and the clarification of the rules of origin will remove some of the unnecessary procedures for exporters. All of the aforementioned have the potential to of reduce the border effect between the Canada and the EU.

III.2. Empirical Specifications

The regression equation used by McCallum (1995) and which will be applied in this paper is as follows:

$$\ln X_{ij} = \alpha + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \rho \ln d_{ij} + \gamma \delta_{ij} + \varepsilon_{ij} \quad (1)$$

where X_{ij} are shipments of goods from region i to region j, Y_i and Y_j are the nominal gross domestic products in regions i and j, d_{ij} is the distance from i to j, δ_{ij} is a dummy variable equal to 1 for intraregional trade and 0 for province-to-state trade, and ε_{ij} is an error variable.

We use the individual EU countries in the same way as the states were used in McCallum's paper but we use the opposite dummy variable. Therefore δ_{ij} will be equal to 0 when i and j are both within Canada or both within the EU and 1 otherwise. This allows us to estimate a change in the exports due to a decrease in the border effect. Whereas McCallum only calculated the border effects of trade from Canada to the United States, we will estimate it for trade from Canada to the EU and from the EU to Canada. This will allow us to see whether the distortion caused by the border is more significant for trade flows from one economy to the other.

According to McCallum's (1995) paper, the coefficients on the two income variables should be positive indicating that the larger the economies of the two trading partners, the greater the exports. The coefficients on distance are expected to be negative since in most cases the greater the distance the more costly it is to transport the goods which depending on the elasticity of the goods, will either raise the cost of supplying the good or increase the price of purchasing the good both of which will decrease the amount of exports being traded.

III.3. The Data

This paper uses data from various sources. Interprovincial exports are those reported by Statistics Canada and have been converted to US dollars using the Bank of Canada average nominal exchange rate for 2006. The EU-Canada trade data is from Industry Canada's Trade Data online also converted to US dollars using the same method. The intra-EU trade data is from the United Nations trade databases and are reported in 2006 US dollars. Nominal GDP in 2006 is used as a measure of the size of the respective regions. The statistics from Eurostat converted into US dollars for the year 2006 is used to get the GDP for the countries in the EU and we use Statistics Canada for the provincial income converted to US dollars using the Bank of Canada's average exchange rate for 2006. For distance, the great circle distance between i's and j's capital was used. The great circle distance is found by transforming latitude φ and longitude λ into radians ($x\Pi/360$) then using the following formula.

$$\Delta_{ij} = \lambda_j - \lambda_i$$
$$D_{ij} = Arc\cos[\sin\varphi_i \sin\varphi_j + \cos\varphi_i \cos\varphi_j \cos\Delta_{ij}] * z$$

with z=6367 for distance in kilometres.

We have used 2006 data to minimise the impact that the 2008 recession may have had on trade and protectionist measures.

IV. Results

In the following section, we refer to the results of McCallum (1995) and Feenstra (2001) to compare the gravity model estimations for Canada-EU trade with those estimated for pre- and post-CUFTA. The full results can be found in Appendix A.

IV.1. Estimating the Gravity Model Without the Border Effect

Before calculating the border effect between the two regions, it is interesting to see how well the gravity model explains the trade flows without it. For this we estimate regression equation (2) for trade within both Canada and the EU, and for international trade.

$$\ln X_{ij} = \alpha + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \rho \ln d_{ij} + \varepsilon \qquad (2)$$

The results from estimating equation **(2)** using 2006 data are shown in Table 1.

TABLE 1:

Comparison of Gravity Equations with Value of Exports for Province/Country Pairs as Dependent
Variables.

Regions Included	Regression 1 Intra-EU trade	Regression 2 Exports to Canada	Regression3 Interprovincial trade	Regression 4 Exports to the EU
Independent variables				
lnYi	0.9728 *	1.4218 *	0.9581 *	1.5465 *
	(0.021)	(0.072)	(0.053)	(0.0648)
ln Yj	0.7795 *	1.8706 *	0.7060 *	0.9969 *
	(0.021)	(0.083)	(0.053)	(0.0674)
ln dij	-1.3928 *	-1.1763 *	-1.1823 *	-1.4522 *
	(-1.139)	(0.333)	(0.139)	(0.3191)
Adjusted R^2	0.8580	0.7480	0.7903	0.7017
Observations	702	266	156	297

Note: Standard errors are given in parentheses and all variables are significant at the 1% level, as indicated
by an *.

We see from these results that the gravity model fits the data well for trade within
both the EU and Canada, from the EU to Canada and slightly less so for trade from
Canada to the EU. For all four regressions the coefficients closely resemble those found
by McCallum (1995) for pre-CUFTA which were 1.21, 1.06 for respective GDPs and
-1.42 for distance. This supports our conjecture that the Canada-EU trade agreement will
have a similar impact on the economies as did CUFTA.

By examining the data, we notice that there is significant variance in trade
volumes which could be creating some noise in the model. Whereas McCallum (1995)
dealt with this by removing the territories from his regression, we will attempt to remove
some of the distortion caused by the variance by running the same regressions but using
only pairs which have exports greater than US$1000. The results are presented in Table
2. Note that the regressions for cross-border trade are not affected since all the pairs trade
more than US$1000.

TABLE 2:
Comparison of Gravity Equations with Value of Exports for Province/Country Pairs as Dependent
Variables with only Significant Exports Included

Regions Included	Regression 6 Trade from EU to Canada	Regression 8 Trade from Canada to EU
Independent variables		
$\ln Y_i$	1.2662* (0.0659)	1.4587* (0.0604)
$\ln Y_j$	1.7647* (0.0745)	1.0004* (0.0618)
$\ln d_{ij}$	-1.1629* (0.2943)	-1.2827* (0.2914)
Adjusted R^2	0.7562	0.7193
Observations	256	291

Notes: Standard errors are given in parentheses and all variables are significant at the 1% level, as indicated with an *.
Significant exports mean exports greater than US$ 1000.

Regressions 6 and 8 both show improvements in the goodness of fit which suggests that there was some noise created by the smaller trading pairs. The question still remains as to why the trade from Canada to the EU is not explained as well by the gravity model as it is for other pairs.

It is interesting to note that the elasticity on the income variable within the economies is smaller than for international trade and that the model performs better for the Intra-EU and Interprovincial trade than for the trade from one economy to the other This is most likely due to the existence of national borders which may be creating additional frictions between some of the pairs.

IV.2. Estimating the Gravity Model with the Border Effect

IV.2.i. McCallum's Gravity Model

Since the model performs well without the border effect included, we now insert

the dummy variable and calculate the border effect that exists between Canada and the

EU both for trade from the EU to Canada and trade from Canada to the EU. By using our

original regression (Regression 1) [1] we obtain Table 3. For this we have kept all the pairs,

including those which trade less than US$1000.

The border effect in the following table is calculated by taking the exponential of

the norm of the indicator variable estimate since this is a logarithmic approximation. This

same methodology was used by McCallum (1995).

TABLE 3:
Comparison of Gravity Equations with Value of Exports for Province/Country Pairs as Dependent
Variables with Border Effect.

Regions Included	Regression 9 Interprovincial trade & Trade from Canada to EU	Regression 10 Intra-EU trade & Trade from EU to Canada
Independent variables		
$\ln Y_i$	1.3047 * (0.0467)	1.0690 * (0.029)
$\ln Y_j$	0.8706 * (0.0484)	1.0154 * (0.0297)
$\ln d_{ij}$	-1.1280 * (0.1633)	-1.2425 * (0.084)
Indicator variable	-4.9015 * (0.2869)	-1.7434 * (0.1796)
Border Effect	134.49	5.72
Adjusted R^2	0.7687	0.8284
Observations	453	968

Notes: Standard errors are given in parentheses and all variables are significant at the 1% level, as indicated
by an *.
The border effect is the exponential of the norm of the indicator variable.

---

[1] $\ln X_{ij} = \alpha + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \rho \ln d_{ij} + \gamma \delta_{ij} + \varepsilon_{ij}$

This model has considerable explanatory power for both regressions. The respective elasticities of exports with respect to own GDP, the importing regions GDP and distance from each other are 1.30 and 1.07, 0.87 and 1.01, and -1.12 and -1.24. These three elasticities resemble very closely those found by McCallum for the 1988 data which were respectively 1.21, 1.06 and 1.42.[2] On the other hand, the border effect is greater between Canada and the EU than it was between the US and Canada (where it was 22.0) and smaller for trade from the EU to Canada.

 One important difference between these regressions and those run by McCallum is that in this regression the dummy variable does not only account for the fact that EU countries and Canadian provinces are in different economies and therefore have trade barriers imposed but also that Canada and the EU are on different continents and therefore that a large amount of the trade is on waterways. Since it is less costly to transport goods by water than over land, per unit of distance, the border effect between Canada and the EU may be smaller.

As noted above, to remove some of the noise that is created by very small trading pairs, McCallum removed the territories from his regression. We have decided to maintain the territories because some of their trade is greater than that of the provinces with certain countries. We will, however, run the regression using only the pairs that trade more than US$ 1000 to remove some of the noise. The results for this regression are presented in Table 4.

By restricting the regression to those trading pairs that have trade greater than a thousand US dollars, the goodness of fit increased for both regressions. It is interesting to note that the indicator for the first regression is more similar to that found by McCallum

---

[2] His estimates are pre-Canada-US trade agreement.

between Canada and the United States than is the indicator variable for the second regression, which is much smaller.

Feenstra (2001), by running the same the regression with 1993 data found a substantially smaller border effect than McCallum (1995), 16.4 as opposed to 22.0. We therefore expect the border effect to decrease after the Canada-EU agreement as well, thereby increasing trade between the two economies.

TABLE 4:
Comparison of Gravity Equations with Value of Exports for Province/Country Pairs as Dependent Variables with Border Effect and only substantial exports included

Regions Included	Regression 11 Interprovincial trade & Trade from Canada to EU	Regression 12 Intra-EU trade & Trade from EU to Canada
Independent variables $\ln Y^i$	1.2489 (0.0435)	1.018982 (0.0265)
$\ln Y^j$	0.870766 (0.0448)	0.9888634 (0.0271)
$\ln d^{ij}$	-1.094985 (0.1503)	-1.253798 (0.0766)
Indicator variable Border Effect	-4.7917 (0.2647) 120.512	-1.503921 (0.1642) 4.499
Adjusted R^2 Observations	0.7842 447	0.8389 958

Notes: Standard errors are given in parentheses and all variables are significant at the 1% level.
Significant exports mean exports greater than US$ 1000.
The border effect is the exponential of the norm of the indicator variable.

IV.2.ii. Anderson and Van Wincoop's gravity model

To estimate the border effect between Canada and the EU, we have also run Anderson and Van Wincoop's (2001) regression using our data. In their regression Anderson and Van Wincoop allowed for the border effect for both countries to be included in the same regression by creating two dummy variables: one that is equal to 1

when there is intra-EU trade and 0 otherwise; and the other equal to 1 when there is intra-provincial trade and 0 otherwise.

The results of these regressions can be found in Table 5. Regression 13 is for all pairs while Regression 14 limits the estimation to the pairs that have exports greater than US$ 1000.

TABLE 5: Estimates of Anderson and Van Wincoop's (2001) gravity model for Canada-EU trade

Regions Included	Regression 13 Trade from Canada to EU, Trade from EU to Canada, Interprovincial Trade & Intra-EU Trade (for all pairs)	Regression 14 Trade from Canada to EU, Trade from EU to Canada, Interprovincial Trade & Intra-EU Trade (for pairs where exports are greater than US$1000)
Independent variables		
$\ln Y^i$	1.1422 * (0.0241)	1.0970 * (0.0222)
$\ln Y^j$	0.9714 * (0.0252)	0.9481 * (0.0232)
$\ln d^{ij}$	-1.1776 * (0.0769)	-1.1782 * (0.0702)
Indicator variable EU	1.7763 * (0.1570)	1.6344 * (0.1436)
Indicator variable Canada	5.1166 * (0.1810)	4.8444 * (0.1661)
Border effect	31.389	25.518
R^2	0.8220	0.8349
Observations	1421	1405

Note: Standard errors are given in parentheses and all variables are significant at the 1% level, as indicated by an *.

The R^2 are quite high for these regressions but removing the pairs which trade less than US$ 1000 does not substantially increase the goodness of fit. The border effect between Canada and the EU is greater than the 4.8 Canada-US border effect for post-agreement estimates as estimated by Anderson and Van Wincoop.[3]

---

[3] Anderson and Van Wincoop's estimates are for post CUFTA trade.

Note that in both regressions (McCallum's and, Anderson and Van WinCoop's), the border effect between Canada and the EU is substantial and represents a significant barrier to trade. This suggests that Canada and the EU have the potential to reduce the border effect by reducing their tariffs and trade distortion through this agreement.

By comparing Anderson and Van Wincoop's border effect to the border effects found by McCallum, we see that they are very different. In the former, averaging the indicator variables to obtain the border effect (the exponential of the average of the indicator variables) tempers the border effect

It is more likely that there exists a different border effect for each direction of trade since there are different tariffs and trade distortions that apply. Therefore, our estimation of the change to the border effects will use the estimates found using the original regression and specifications.

IV.2.iii. Estimating the change in the border effect.

Based on McCallum's (1995) and Feenstra's (2001) papers, the border effect from 1988 to 1993 decreased from 22.0 to 16.4. This is a 10% change in the coefficient on the dummy variable. We use this result as a basis to estimate what the border effect may be after CETA by anticipating a similar decrease.

Thus, the post-agreement border effect from Canada to the EU according to our estimates will be 74.63.[4] This still remains a relatively large border effect compared to that which existed between Canada and the US even before their trade agreement.

---

[4] This is obtained by taking the coefficient estimate found in Regression 11 multiplying it by 0.9 (which is equal to 1-0.1), then taking the exponential of that number to find the new border effect: exp(4.7917x(1-0.1))=74.63.

Since the border effect for Canada is so large, lowering barriers to trade should greatly increase the amount traded from Canada to the EU. However, trade from the EU to Canada may not substantially change since the border effect is already relatively low. This is in contrast with the views presented by Stanford (2003) who argued that one of the main impacts of this agreement will be a greater trade deficit for Canada with respect to trade with the EU. If the border effect is reduced substantially for Canadian exports and does not change significantly for trade to Canada, Canada stands to decrease its trade deficit with the EU. This increase in exports could lead to an increase in GDP for Canada, although the amount that it will increase by cannot be estimated for certain. In the following section, we will use the changes that occurred to the GDP after CUFTA to estimate a range within which the GDP may change due to this agreement with the EU.

V. Estimating the Change in Exports

V.1. Estimating the change in GDP

By comparing the GDP of Canada before and after CUFTA, we will estimate the change that will occur in Canada after the CETA. This is a rudimentary approach that does not account for the different trade patterns that exist between Canada-EU and Canada-US trade since Canada and US industries were more similar than Canadian and European industries trade today.

By using the most basic model of trade, the neoclassical model, we know that the greater the differences across two countries, the greater the impact of lowering trade barriers is on the trading partners. Canada and the US are more similar in terms of goods produced than Canada and the EU. Based on this, CETA should in effect bring more

advantages to Canada than did CUFTA. The Canadian GDP increased from 595 billion

Canadian dollars in 1988 to 750 billion Canadian Dollars in 1993; this is a change of

26%. The actual annual real growth of GDP for the free trade agreement period (1988-

1994) was 1.2% for Canada and 2.3% for the United States according to Jim Stanford

(2003). This change is not due to CUFTA alone. We therefore have to examine the

impact that the Canada-US free trade agreement had on the GDP to use this as an

estimate of the change in exports which will occur due to the Canada-EU trade

agreement.

　　　　According to both governments, Canada and the EU intend to take their

agreement further than the Canada-US trade agreement and NAFTA. If this occurs, the

impact on Canadian income may be more substantial than those predicted for CUFTA. In

which direction this will push the GDP is unknown. Various authors have calculated the

welfare consequences of the Canada-US Free Trade agreement. By examining their

papers which estimate the change in the GDP, we can create a range for the estimates of

the change to the GDP of the US and Canada after their agreement. By using these GDP

estimates and the estimates of the border effect (as calculated above) we estimate the

change in the trade that may occur. As Table 6 shows these studies yield very different

results and estimates. Furthermore, the EU in terms of economic size is very similar to

the US, for that reason we will use the estimates for the US to estimate the change to the

EU GDP and the changes to Canada will be applied to Canada.

TABLE 6: Effect of the Canada-US Free Trade Agreement on GDP, Selected Studies

Authors	Notes	United States[5]	Canada[3]
Hamilton & Whalley (1985)	All Trade Barriers Removed	0.03	0.63%
	Only Tariffs removed	-0.03	0.54
Brown & Stern (1987)	All Trade Barriers Removed	0.04	-0.35
Cox & Harris (1986)	All Trade Barriers Removed	-	8.74
Wigle (1986)	Only Tariffs removed	0.06	-0.05
Brown & Stern (1989)	Only Tariffs removed	0.09	1.00
Kouparitsas (2001)	Immediate Phase-out of tariffs	0.24	1.99
	10-year phase-out of Tariffs	0.31	1.60
	15-year phase-out	0.34	1.47
Stanford (2003)	Compares pre Agreement and post agreement GDP growth	No change	No change
Jenness (1987)	GDP change only due to the CUSFTA	-	1.6
Cox (1994)	GDP change only due to the CUSFTA	-	4.5
Roland-Holst et al. (1994)	GDP change only due to the CUSFTA	-	11

Based on the estimates in Table 6, the range for the change in the GDP in Canada solely due to the CUFTA is between -0.35 percent and 11 percent. Therefore by applying these estimates to the GDPs in 2006 we estimate that due to CETA the Canadian GDP will be between a fall to 1.35 trillion Canadian dollars (a negative change of 0.35%) and an increase to 1.5 trillion dollars (a positive change of 11%). The change EU GDP will be between a decrease to 11.685 trillion Euros (a negative change of 0.03 percent) and a rise to 11.73 trillion Euros (a positive change of 0.34 percent). We apply these estimates to the gravity model estimated above to estimate a range for the change in exports from Canada to the EU.

---

[5] The value of the effect on GDP is expressed as a percentage of GDP.

V.2. Estimating the Change in Exports

By summing up the estimated potential exports for each pair we find that the range for the change in exports from Canada to the EU will be between a 6% and a 60% increase. Since both of these are positive we can conclude that despite the possible decrease in GDP, trade will most likely increase due to the more significant decrease in the border effect.

It is possible that the larger result presents us with an exaggeration of the effect that the agreement will have on trade flows since the change in the GDP and the change in the border effect are based on CUFTA. Due to Canada's extensive trading with the US, it is possible that little trade will in fact be diverted to the EU with the removal of trade barriers. Furthermore, since CUFTA, Canada has entered more agreements which touch on trade issues. Therefore some of the barriers which were removed by CUFTA have already been removed between Canada and the EU. We still expect a substantial change to the trade flows resulting from this agreement but there remains a great deal of uncertainty as to how much trade will be created.

VI. Trade Patterns

Although the gravity model significantly explains trade flows, by looking at the trade patterns between Canada and the EU it is possible to increase our understanding of the other factors affecting Canada-EU trade. According to Industry Canada data (see Appendix B), Canada exports primarily raw materials (marked with a *) such as wood and precious stones and metals. One of the reasons that the model may not be able to fully explain trade between Canada and the EU is that there is a large discrepancy in the worth of each product relative to its weight and dimensions (which would

most likely be a significant basis used to determine transportation costs). For example, a kilogram of wood is worth far less than a kilogram of diamonds but on a per kilogram basis might incur similar transportation costs – albeit the wood would not incur the insurance and security costs of diamonds Furthermore, despite the infrastructure for resource exploitation being sophisticated and expensive, it is also often highly specific of the resource meaning that it may not contribute to the overall welfare of the region. Moreover, resource exports often come from remote regions without broad basis of activity and the region may not be able to capture the economic rents associated with the exploitation due to factors such as foreign ownership, central taxes, and high exploitation costs.

In contrast, the majority of the EU's exports are manufactured goods. The model seems to perform much better with this since regions with a high level of manufactured products, especially high end manufactured products, tend to have higher GDPs and greater trade.

Note that trade in specific commodities can be affected by factors totally exogenous to the model. For example, due to the 2011 Japanese nuclear disaster, both economies are becoming reticent to use nuclear power. This is exemplified by Germany which has vowed to close down all of its nuclear facilities. This will affect trade in nuclear products no matter how the Agreement may reduce barriers. As mentioned previously trade in agricultural products between the two is dampened significantly by large existing trade barriers. If these barriers were to be removed it is possible that the two economies will begin to increase their trade, especially in regards to dairy products destined for Canada, which could increase the goodness of fit of the model as well.

VII. Other Areas of the Agreement which may Affect GDP and Trade

The decrease in the border effect and the predicted increase in GDP discussed in this paper only reflect changes to technical trade barriers, customs procedures and facilitated trade in services. This section reviews briefly other key elements of the negotiations that may, for better or worse impact Canada's economy, including facilitating the movement of persons, enhancing accesses to government procurement contracts, increasing cooperation in the areas of intellectual property, the environment and regulations, and promoting investments.

VII.1. Facilitating the movement of persons

Due to the increasing inter-connectedness of global economies, the mobility of the workforce across borders has become an important policy issue for governments. It has been documented that increasing the access to the internal market to foreign sources has some benefits for the economy such as increasing efficiency, reallocating the labour force and lowering prices. For this the agreement should examine the short term labour mobility which consists of temporary entry of business people, foreign credential recognition and increasing the cooperation between governments on education and social issues relating to the workforce.

An increase in short term labour entry has been proven to increase trade by increasing knowledge transfer, contacts, cultural and business nuances and laws which decrease the cost of transaction. Jansen and Piermartini (2004) found that a 10% increase in temporary movements of persons led to an 8% increase of inflows and outflows of Foreign Direct Investment which would

Both the EU and Canada are increasing their demand for well-educated and skilled workforces which means that both economies are looking to increase foreign credential recognition. By facilitating the recognition of a degree, highly skilled labour will have more access to the market and temporary entry will increase. This may be difficult to achieve, however, due to the existence of a large number of professional associations who sign the Mutual Recognition Agreements (MRAs) which govern professions' recognition between countries and whose support and cooperation is far from certain.   In addition to these two areas, governments will attempt to increase their cooperation in employment and social issues such as social security agreements which include healthcare and pension coordination. Increasing the transferability of health insurance for posted workers and students, and increasing the transferability of state pensions which would allow workers to continue to accumulate state pension rights would make it more likely that people will seek employment in the other economy. Whether or not opening up the Canadian employment market to EU workers will benefit the economy will depend on how quickly employment can shift from one sector to the other to have the most efficient distribution of labour and the extent that this may facilitate increased trade and investments.

VII.2. Government Procurement

Public purchasing amounts to 16% of GDP (or 1700 billion Euros) in the EU and the Canadian government procurement advertised in the *Official Journal* accounts for approximately 3% of the GDP (or 320 billion Euros). Both governments have signed the WTO Government Procurement Agreement (GPA) but since Canada has significantly

limited the scope of application of the GPA, the EU has applied reciprocal restrictions. Therefore if Canada were willing to open its sub-central entities procurement contracts to the EU, the EU would open up reciprocally. Additionally, language transparency provisions that may be added to help foreign companies understand the underlying laws that will apply to them increases their chances of submitting a winning bid.

The issue of government procurement is in part a political question. Governments typically prefer to hire at home because of job creation and stimulated investment which can be claimed, and which can benefit governments through increased tax returns and lower support payments if the projects are truly incremental. That these may come at the expense of economic efficiencies and at taxpayers' expense are important issues which argue against the maintenance of procurement protections. Canada has traditionally maintained rather strict rules for government procurement which allowed it to greatly discriminate against foreign companies in favour of domestic ones. This changed when procurement markets were opened to the United States in part to protect Canadian producers from the "Buy America" plan[6].

The EU's procurement directive (which is an Intra-EU law) resulted in a price reduction of around 30% according to European Commission. Therefore it is expected that by increasing access to government procurement, prices in both Canada and the EU will decrease. Whether or not Canadian firms will be able to compete substantially in the EU market will be an important issue for establishing whether Canada will truly benefit from this agreement and the reciprocal opening up of Canadian contracts to the EU.

---

[6] This plan was to help fight the recession. It permitted, for government procurement projects the discrimination of foreign competitors and subsided the use of local providers.

VII.3. Intellectual Property, including Geographic Indications.

Although both Canada and the EU are signatories to the World Trade Organisation's Trade-Related Aspects of Intellectual Property Rights agreement (WTO TRIPS) which provide the basis and the minimum levels of protection, both economies have imposed additional but different protection within their jurisdictions.

Unlike Canada, the EU is a party to the Madrid Protocol which extends trademark protection for nationals of signatory countries into other member countries. If Canada were to join the Madrid Protocol it would considerably increase the protection of its trademarks abroad and European trademarks in Canada. At the moment, Canada's trademark system is not based on registration but is obtained through use, whereas in the EU one can register a trademark. In effect, at the moment, the EU offers more protection to trademarks then Canada does. Note that if Canada were to become a member of the Madrid Protocol as a condition of an agreement with the EU, it would not just affect its trademark relationship with the EU but also with all other signatory countries to the Protocol. The effects of this will undoubtedly be examined closely before agreeing to this provision with the EU.

The EU has *sui generis* systems for the registration of geographic indications (GIs) which means that geographic indications are their own category of intellectual property, whereas Canada incorporates GIs into its trademark protection system which makes it more difficult for European firms to protect their GIs in Canada. Canada does award certification marks as a type of trademark which relates to quality and/or the geographic region where the good was produced. Although well constructed patent and other forms of intellectual property protection are largely viewed as positive contributions

to innovation (Posner 1983), increased GI protection does not have a similar effect as the products being protected are typically traditional products not subject to welfare enhancing innovation. Therefore the economic benefit of increasing GI protection in Canada is not obvious and may in fact represent an increase in trade barriers that could harm Canadian producers who have come to use some of the names that would become protected through this agreement (such as Parmesan and Feta).

In terms of patent protection, the EU is asking for, among other requests, a lengthening of the term of patent protection for drugs. This would cost Canadians a substantial amount in terms of healthcare costs since generic versions of the drugs would take longer to reach the market. (Grootendorst and Hollis 2010).

Taken on their own, therefore, it seems unlikely that agreeing to the EU demands in these areas would be positive for Canada. However, to secure the whole agreement and other potential gains it may be necessary to concede this area.

VII.4. Regulatory Cooperation, Including Environmental

Within this agreement Canada and the EU will most likely look at increasing their regulatory cooperation in the areas of environment and consumer safety. This is one of the areas where it will be the most difficult to predict what impact it will have on the Canadian economy.

On the one hand, increased regulatory cooperation could increase the sales in the European economy by making the products more relatable and safe to the consumer. On the other hand, it also may increase the cost of producing these products which may make

them more expensive not only in the European and Canadian market but also in the rest of the world.

Changes to environmental regulation in Canada would impact businesses since they would have to find more environmentally friendly ways of producing their products. This would once more increase the cost of production which may, depending on the elasticity of demand, affect the profit margin of the firms. Indeed the environmental regulations applied by Canada to its producers will not simply affect those who export to the EU but also those who export to the rest of the world. This could therefore decrease the competitiveness of Canadian firms in Europe and other markets.

VII.5. Investment Promotion

The EU is Canada's second most significant source and destination of Foreign Direct Investment and the Joint Report maintained that there are still more opportunities to be found for both economies. Although this would indeed open the EU market to Canadian companies it also opens up the Canadian market to strong competition from the EU. This in the long run will lead to positive changes in Canada but, in the short run Canada may suffer due to an increase in competitors in the market to the extent that they displace Canadian producers.

Canada and the EU do not cooperate on investment promotion directly. This happens at the state level which means that Canada must enter into separate agreements which each country to increase investment. Furthermore, the EU has currently one office in Canada and the EU Chamber of Commerce would like to expand and add more offices

in Canada to raise awareness increase the interest in investing in the EU and encourage the formation of business links between the two economies.

VIII. Conclusion

By using the gravity model and the 1989 Canada-US Free Trade Agreement as a basis, we find that Canada-EU free trade agreement will have a significant impact on the exports of Canada. We estimate that the border effect between Canada and the EU is presently very high and could be reduced through this agreement. The lowering of trade barriers will result in a reduction of the border effect between the two economies. Although the amount of the change remains uncertain and only a range can be estimated at this time, the agreement will lead to an increase in Canadian exports. However, due to the extensive nature of the agreement, its effect as a whole on Canadian welfare remains to be examined. Given the uncertainty over the content of the final agreement and therefore of these results, further estimates should be done once the agreement is finalised to better understand and take appropriate business and policy steps to deal with the potential impact of the agreement on Canada-EU trade.

In this appendix we present the results of the three papers to whose results we refer in the paper:

McCallum, John. 1995. "National Borders Matter: Canada-U.S. Regional Trade Patterns", *The American Economic Review* (June 1995), pp.615-623.

Year of data Regression	1988
Regions included	Canada to US exports
	US to Canada exports
Independent variables	
ln Y_i	1.21
	(0.03)
ln Y_j	1.06
	(0.03)
ln d_{ij}	-1.42
	(0.06)
Indicator variable	3.09
	(0.13)
Border effect- Canada	22.0
R^2	0.81
Observations	683

Feenstra, Robert C. (2001) "Border Effects and the Gravity Equation: Consistent Methods for Estimation", *Journal of Political Economy*, vol 49, No 5 November 2002.

Year of data Regression	1993
Regions included	Canada to US exports
	US to Canada exports
Independent variables	
ln Y_i	1.22
	(0.04)
ln Y_j	0.98
	(0.03)
ln d_{ij}	-1.35
	(0.06)
Indicator variable	2.80
	(0.13)
Border effect- Canada	16.4
R^2	0.76
Observations	679

APPENDIX B: Ten most highly traded product categories ranked by monetary value between Canada and the EU in 2006

In thousands of Canadian Dollars		In thousands of Canadian Dollars	
Canadian imports from the EU	**2006**	**Canada Exports to the EU**	**2006**
84 - Nuclear Reactors, Boilers, Machinery and Mechanical Appliances	8,768,967	**71 - Pearls, Precious Stones or Metals, Coins and Jewellery**	5,229,451*
27 - Mineral Fuels, Mineral Oils, Bituminous Substances and Mineral Waxes	7,130,803	**84 - Nuclear Reactors, Boilers, Machinery and Mechanical Appliances**	3,302,914
30 - Pharmaceutical Products	5,454,632	**88 - Aircrafts and Spacecrafts**	2,610,887
87 - Motor Vehicles, Trailers, Bicycles, Motorcycles and Other Similar Vehicles	4,629,734	**85 - Electrical or Electronic Machinery and Equipment**	2,472,501
85 - Electrical or Electronic Machinery and Equipment	2,588,639	**26 - Ores, Slag and Ash**	1,485,487*
29 - Organic Chemicals (Including Vitamins, Alkaloids and Antibiotics)	2,088,563	**28 - Inorganic Chemicals and Compounds of Precious Metals and Radioactive Elements**	1,447,919
90 - Optical, Medical , Photographic, Scientific and Technical Instrumentation	1,942,955	**75 - Nickel and Articles Thereof**	1,218,628*
22 - Beverages, Spirits and Vinegar	1,519,340	**27 - Mineral Fuels, Mineral Oils, Bituminous Substances and Mineral Waxes**	1,212,694*
88 - Aircrafts and Spacecrafts	1,359,290	**47 - Pulp of Wood and The Like; Waste and Scrap of Paper or Paperboard**	895,782*
72 - Iron and Steel	1,193,432	**90 - Optical, Medical , Photographic, Scientific and Technical Instrumentation**	887,064
TOTAL (ALL PRODUCTS)	48,936,464	**TOTAL (ALL PRODUCTS)**	29,200,731
Source of data: Statistics Canada Report Date: 11-Jul-2011		**Source of data: Statistics Canada** Report Date: 11-Jul-2011	

APPENDIX C: DATA APPENDIX

"Estimating the impact of the Canada-EU agreement on exports:
A Gravity Approach"
August 2011

1. Provincial GDPs:
   Statistics Canada. *Table 379-0025 - Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS) and province, annual (dollars)*, CANSIM (database), Using E-STAT (distributor).
http://estat.statcan.gc.ca.proxy.queensu.ca/cgi-win/cnsmcgi.exe?Lang=E&EST-Fi=EStat/English/CII_1-eng.htm
(accessed: August 17, 2011)

2. European GDPs
   Eurostat. *Economy and finance: National Accounts: Annual national accounts: GDP and main components-Current prices (nama_gdp_c)*.
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_c&lang=en#
(accessed: August 17, 2011)

3. Interprovincial Trade, Trade from Canada to the EU and Trade from the EU to Canada:
   Statistics Canada. *Canadian Trade by Industry (NAICS Codes)*. Using Industry Canada's Trade Data Online.
http://www.ic.gc.ca/sc_mrkti/tdst/tdo/tdo.php#tag
(accessed: August 17, 2011)

4. Intra-EU Trade:
   UN Comtrade. *United Nations Commodity Trade Statistics Database*.
http://comtrade.un.org/db/
(accessed: August 17, 2011)

REFERENCES

Anderson, James. 2010. "The Gravity Model". NBER Working Paper 16576. Available at http://www.nber.org/papers/w16576

Anderson and E Van Wincoop. 2001. "Gravity with gravitas: a solution to the border puzzle". *American Economic Review*, 69, pp 106-116.

Brown, Drusilla K. and Robert M. Stern, 1987. "A Modelling Perspective" in Robert M. Stern, Phillip H. Trezise and John Whalley, eds., *Perspective on a U.S.-Canadian Free Trade Agreement* (Brookings Institution, 1987), pp 155-190.

Brown, Drusilla K. and Robert M. Stern, 1989. "Computable General Equilibrium Estimates of the Gains from U.S.-Canadian Trade Liberalization." in David Greenaway, Thomas Hyclak and Robert J. Thornton, eds., *Economic Aspects of Regional Trading Arrangements* (New York University Press, 1989), pp 69-108.

Cox, David and Richard G. Harris, 1985. "Trade Liberalization and Industrial Organization: Some Estimates for Canada", *Journal of Political Economy* (February 1985), pp. 115-145.

Cox, David and Richard G. Harris, 1986. "A Quantitative Assessment of the Economic Impact on Canada of Sectoral Free Trade with the United States", *Canadian Journal of Economics* (August 1986)

European Commission and the Government of Canada, 2004. *Assessing the costs and benefits of a closer EU-Canada economic partnership"* available at http://www.international.gc.ca/trade-agreements-accords-commerciaux/agr-acc/index.aspx?view=d

Eurostat, "Public Procurement advertised in the Official Journal", available at epp.eurostat.ec.europa.eu

Feenstra, Robert C., 2001"Border Effects and the Gravity Equation: Consistent Methods for Estimation", *Journal of Political Economy*, vol 49, No 5 November 2002.

Hamilton, Bob and John Whalley, 1985. "Geographically Discriminatory Trade Arrangements", *Review of Economics and Statistics* (August 1985), pp. 446-455.

Grootendorst and Aidan Hollis. 2010. "The Canada-European Union Comprehensive Economic & Trade Agreement: An Economic Impact Assessment of Propsed Pharmaceutical Intellectual Property Provisions" Study Commissioned by the Generic Pharmaceutical Association.

Jansen and Roberta Piermartini, 2004. "The Impact of Mode 4 on trade in Goods and Services", WTO Economic Research and statistics Division, Staff Working Paper ERSD-2004-07, November 2004, p. 13.

McCallum, John. 1995. "National Borders Matter: Canada-U.S. Regional Trade Patterns", *The American Economic Review* (June 1995), pp.615-623.

OECD, 2002, , "Service Providers on the Move: A Closer Look at Labour Mobility and the GATS", Working Party of the Trade Committee. TD/TC/WP(2001)26/FINAL, 20 February 2002, p13.

Posner, Richard. 1983. *The Economic Analysis of Law*.

Ravenstein, Edward. 1889. "The Laws of Migration". *Journal of the Royal Statistical Society*. Vol. 52,No.2. (June, 1889), pp 241-305.

Stanford, Jim, 2003, "Economic Models and Economic Reality: North American Free Trade and the Predictions of Economists", *International Journal of Political Economy*, vol 33, no 3(Fall 2003) pp28-49.

Stanford, Jim, 2010, "Out of Equilibrium: The impact of EU-Canada Free Trade on the Real Economy" Published by the Canadian Centre for Policy Alternatives (October 2010). Available at http://www.policyalternatives.ca/sites/default/files/uploads/publications/National%2 0Office/2010/10/Out_of_Equilibrium.pdf

Wigle, Randall. "General Equilibrium Evaluation of Canada-U.S. Trade Liberalization in a Global Context", *Canadian Journal of Economics* (August 1988), pp.539-564.