

## EXTRA BORDER SECURITY AND ITS IMPACT ON CANADA-UNITED STATES TRADE AND INVESTMENT: A FOCUS ON THE QUEBEC-NORTHERN NEW YORK CORRIDOR

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### Abstract

The economic effects of supply disruption is studied from the perspective of trade between the U.S. and Canada. After 9/11, border security was significantly increased, resulting in both temporary and permanent (internalized) supply chain disruptions. Using the gravity model of McCallum (1995) we measure changes in the “border effect.” The deterrent effect of the border is shown to have increased, decreased, and then increased, and trade is likely to have decreased by at least \$20 billion. We also profile the northeastern U.S.-Canada region, examining in detail the economic and trade structure existing between Quebec, Ontario, and northern New York.

### Résumé

*L'effet économique de la rupture de l'approvisionnement est étudié du point de vue des échanges commerciaux entre les États-Unis et le Canada. Après les événements du 11 Septembre (9/11), la sécurité des frontières a été considérablement renforcée, entraînant des perturbations temporaires et permanentes (internalisées) de la chaîne d'approvisionnement. En utilisant le modèle de gravité de McCallum (1995), nous mesurons les changements dans « l'effet frontière ». L'étude montre que l'effet dissuasif de la frontière a augmenté, diminué, puis augmenté, et les échanges commerciaux ont probablement diminué d'au moins 20 milliards de dollars. Nous présentons également le profil de la région du nord-est É.-U.-Canada, en examinant en détail la structure économique et commerciale existant entre le Québec, l'Ontario et le nord de l'état de New York.*

Extra border security measures put into effect since September 2001 have been a major challenge to the free flow of goods and investment between the United States and its major trading partners. While the challenge to meet new security concerns is present to the U.S. from all four directions, the impact is most crucial to its northern neighbor and most important trade partner, Canada. The two countries have historically shared a long and undefended border, resulting in nearly a free flow of goods, services, people, and investments. The two economies are intertwined not only at the macro level of trade, but also at the micro level of production. Any amount of “thickening” at the border can thus be extremely detrimental to the economic integration of Canada and the United States.

International borders are not just a dividing line between two politically autonomous entities; they are economic barriers that have a cost over and above the cost of managing and manning the customs and immigration services necessary to smoothly move commercial traffic. Any interruption or slowdown to clear customs and immigration thus carries an economic cost beyond any tariffs or taxes imposed on such flows. That cost arises from the increased time required to deliver merchandise to a final destination, as well as from the time required for transporters to clear immigration. Measures imposed to further secure the borders add to that cost and are particularly worrisome for transnational companies that have developed networked supply chains and integrated production systems. Increased impediments to trade can also adversely affect those companies’ investment decisions.

This paper is an attempt to measure these so-called “border effects” and to quantify the potential effects of additional security measures in the context of Canada-U.S. trade. We begin with an introduction to the northern New York region and an examination of the current state of Canada-U.S. trade and investment. We then review the literature on the border effect and estimate its change in value since 9/11. After showing that there has been a significant increase in the border effect, we then introduce a model that enables us to quantify the potential loss of trade. Finally, we then reexamine in greater detail the nature and scope of investment and trade between Canada and the United States, focusing on the impact of the increased border effect and its relevance to the northern New York-Quebec region.

### **1. Northern New York**

Northern New York can be described as a combination of micropolitan statistical areas and surrounding non-core areas<sup>1</sup>. It includes the seven counties of Clinton, Franklin, Jefferson, and St. Lawrence (micropolitan), and Essex, Hamilton, and Lewis (non-core), stretching

from the shores of Lake Champlain in the east to the St. Lawrence Seaway in the north and west. It is isolated from the rest of New York State due to the presence of the Adirondack mountain range in the central and southern areas, which partly cuts into the smooth flow of commerce between its eastern and western parts. Proximity to Canada is seen by the fact that Clinton and Franklin counties border Quebec, while St. Lawrence and Jefferson counties border Ontario.

Historically, the region has had an economic base of mining, forestry, agriculture and dairy, as well as a heavy reliance on tourism. Except for a few firms in the paper and pulp industry and one in aluminum production, the region historically attracted little investment from the rest of the U.S. because of its rather remote location. One large exception, the Alcoa aluminum plant in St. Lawrence County, was based here due to the proximity of mining resources, cheap hydro-electric power (1950s), and the opening of the St. Lawrence Seaway. The region has also attracted a number of small- and medium-size companies, mostly from Quebec, that have provided a significant number of jobs in manufacturing. Quebec trade and investment are both integral to the economy of the region, so that prospective changes in trade relationships have the potential of causing significant economic dislocation on both sides of the border.

Prior to the establishment of the Canada-U.S. Free Trade Agreement (CUSFTA) and later with the launch of NAFTA (North American Free Trade Agreement), the region was anxious about its fate under a free-trade regime. The concern was that if Canada had established their operations in the region due to the existence of tariffs and restricted trade, CUSFTA might then make it unnecessary for Canadian firms to remain in northern New York. It was thought that in the absence of trade barriers, the firms could just as easily serve the U.S. market from locations in Quebec or Ontario. That situation did not, however, materialize and the question remained – what was attracting Canadians to invest in northern New York in the first place? We will return to this topic later in the paper, but the possibility of a re-thickening of the border has brought these issues back to the surface and has also increased the importance of measuring the possible effects of changes in border security.

## **2. Trade and Investment**

Canada and the United States are two of the most integrated economies in the world. Seventy percent of the value of products traded between the two countries are intra-firm exchanges (The Conference Board of Canada, 2007a). They are not only each other's largest customer, they are also among each other's largest investors. Table 1 provides a

snapshot of this relationship, showing compiled data for both trade (imports and exports) and FDI (foreign direct investment). The table shows that over the last decade the U.S. market for Canadian goods has declined somewhat, from about 85% in 2001 to about 74% in 2011, while the import percentage from the U.S. has also declined from about 63% in 2001 to nearly 49% by 2011. From the perspective of the U.S., Canada remains the largest export market (18.9% in 2012), and our second largest source of imports (14.3% in 2012) after China. For both countries the absolute amount of bilateral trade has increased since 2001, while the percentage share of both their imports and exports has declined. More recently, total trade between the two nations increased 43 percent between 2009 and 2012, from US\$400.1 billion to US\$572.8. This occurred despite the fact that the two economies were still experiencing relatively slow economic growth over the period and that the U.S had not fully recovered from the financial collapse of 2008–2009.

**Table 1.**  
**Canada–U.S. Trade and Investment 2001–2011 (US\$ in billions)\***

	2001	2003	2005	2007	2009	2011
Exports to U.S.	222.8	228.8	296.4	324.7	232.1	330.3
% of total exports	85.4	84.1	82.3	77.5	73.7	73.0
Imports from U.S.	138.4	142.9	174.7	202.3	161.1	220.8
% of total imports	62.5	59.6	55.6	53.4	50.4	48.9
Quebec export	38.0	37.2	46.4	47.3	34.4	43.0
Quebec imports	13.0	11.6	18.6	14.5	15.6	20.7
Ontario exports	118.9	120.9	144.2	154.1	102.0	142.2
Ontario imports	100.2	106.0	124.8	139.6	105.6	141.3
Canada's Direct Investment in U.S.	92.4	95.7	165.7	201.9	188.9	210.9
% of Canada's FDI	64.6	63.7	63.2	56.3	52.2	51.9
% of FDI in U.S.	6.9	6.9	10.1	10.1	9.1	8.3
U.S. Direct Investment in Canada	152.6	188.0	231.8	250.6	265.3	319.0
% of U.S. FDI	10.4	10.6	10.3	8.4	7.5	7.7
% of FDI in Canada	47.2	41.1	44.8	43.9	40.5	40.6

*\* Data sources are shown in the Appendix.*

All 50 states in the U.S. trade with Canada, which is the biggest market for 39 of those states. While bilateral trade has provided over 8 million jobs in the United States, of course not all states share equally in that benefit<sup>2</sup>. In 2009 the top 10 states accounted for about 38 percent of those jobs, and with the exception of Texas and California most of those were located in the Northeast and Midwest regions<sup>3</sup>. In Canada, both the sources and destinations for trade are highly concentrated in Ontario and Quebec. On average, Ontario accounts for 45 percent of Canada's exports to the U.S and 66 percent of its imports; meanwhile, in its trade with the U.S. Quebec accounts for 15.2 percent of Canada's exports and 10 percent of its imports.

Because of these spatial patterns of trade there is heavy congestion at 5 of the 147 border crossings located in the North and Northeast regions of the U.S. These are located at Sarnia-Port Huron; Windsor-Detroit; Niagara-Buffalo-Ft. Erie; Lacolle-Champlain and Massena-Cornwall. Sixty-eight percent of Canadian exports to the U.S. and 67 percent of its imports pass through just these 5 border crossings, each of which straddles the border at Ontario or Quebec (Mingus, 2002, 2003). This is a very important statistic since over 85 percent of all trade between Canada and the U.S. travels either by highways or railways. In recognition of existing bottlenecks, even before 9/11 the two countries established the Nexus and FAST programs in order to increase the efficiency of clearing customs and immigration.

Historically, investment and trade between Canada and the U.S. has been vast and deep in nature and in scope. Canada and the U.S. are among each other's largest investor. The United States is the largest foreign investor in Canada, with investment valued at US\$319 billion in 2011, a share of 40.6 percent within Canada. In the same year Canada, with 1/10 the size of the U.S. economy, held US\$210.9 billion of U.S. assets, a share of 8.3 percent, making it the 5<sup>th</sup> largest investor in the U.S. On a per capita basis, Canada, having about 1/10 the economic size of the U.S., invests in the U.S. about six times as much as the U.S. has in Canada<sup>4</sup>.

U.S. direct investment in Canada has historically been in the range of 7–11% of America's total FDI. The bulk of that investment goes to Canada's manufacturing and non-bank holding companies, and to the finance and insurance sectors. On the other hand, Canadian direct investment in the U.S. was valued at US\$211 billion in 2011, about 8.3% of all FDI in the U.S. Since 2001, Canadian investment in the U.S. has ranged between 51 to 65 percent of Canadian FDI, mostly in the areas of finance, insurance and manufacturing.

The U.S. has always viewed Canada as a neighbor that possesses almost unlimited natural resources, while Canada has looked upon

the U.S. as a huge potential market and a means to further increase production efficiencies. Despite the fact that Canadian policy makers from 1871 up to the recent past have attempted to keep U.S. imports and investment at bay, and have been suspicious of heavy U.S. capital inflows as contributing to a potential “hollowing of corporate Canada” (Arthurs, 2000), in an absolute (value) sense the two economies are more integrated today than at any time before.

Over time there have been, however, significant changes in bilateral investment patterns. In 1967 U.S. investment in Canada was 8 times larger than Canadian investment in the U.S. (Rugman, 1987). In 1990 that fell to 1.4 times, and by 2011 it stood at about 1.5. This has occurred despite the fact that merchandise trade between the two countries stood at an all time high of over US\$550 billion in 2011. One can conclude that unlike in the past when trade and investment were considered alternatives, in a global economy they have today emerged as two sides of the same coin. Investment can replace trade in a tariff-ridden world, but they are increasingly being seen as complementary in an integrated world.

A majority of Canadian investment is held by its multinationals, which should not cloud the fact that northern New York has also benefitted enormously from a steady flow of small- and medium-size companies emanating from Quebec. It is this aspect of integration that became most at risk in the aftermath of 9/11 as many of those companies could not get the required components to feed into their production processes. This uncertainty and risk exposed the downside of a highly integrated North American market. The resulting delays and border confusion due to new security measures became an added economic barrier between the two trading partners.

### **3. The Border Effect and Congestion**

*International*, as opposed to *intranational* borders, constitute an economic impediment. There is always a cost to move goods and people across international borders regardless of the degree of mutual integration. This has been referred to in the literature by a number of authors (cited below) as ‘the border effect’. In general, it could be attributed to a combination of both natural and institutional factors. The natural factors are those that exist due to history, geography, culture, and language; institutional factors may include costs related to customs and immigration services, tariffs, and the cost of border congestion. In this study we assume that prior to 9/11 there already existed both natural and institutional factors and that each contributed to the existence of such a border effect between the U.S. and Canada.

We also hypothesize that additional security since then has created barriers that have added to the size of that border effect.

Immediately after the 9/11 attack, when all U.S. borders were closed to outside traffic, the problem of long delays at the border due to additional security came to the forefront. Such delays adversely affected the supply chain of cross-border businesses. Nowhere was the problem more acute than for auto companies having advanced, integrated production systems. The concern for adequate inventories of parts and other material resulted in their raising such supplies by as much as 5 percent to accommodate new levels of uncertainty (Ip, 2001; Kolber and Thachuk, 2002). Their cherished objective of “just in time” instead became “just in case” (Lockwood and Brinckerhoff 2004, The Conference Board of Canada 2007b).

One of the most obvious effects of additional security is an increased amount of border congestion. In the most definitive study of Canadian-U.S. border activity, Taylor and Jackson (2003, hereafter referred to as the Taylor Study) put the possible cost of extra congestion in the range of US\$7.5–\$13.2 billion. They further projected that cost to rise to \$17.5–23.2 billion for transport services alone by 2030. Having observed that congestion was more serious at certain crossings (esp. Ambassador Bridge between Windsor and Detroit; between Sarnia and Port Huron; and between Niagara-Ft. Erie and Buffalo), various solutions were subsequently suggested (Wolfson, 2007). These ranged from a “Job Tunnel” (Belzer, 2003) to the reapportionment of trade flows to other less-congested crossings (Mingus, 2003). It was clear that heavily-trafficked crossings suffered from a lack of both physical and human infrastructure, a situation that demanded long-term solutions. In the meantime, companies engaging in cross-border commerce were (and are) faced with an array of additional costs.

Following 9/11, the Canadian-American Business Council (2004) summarized the various costs mentioned on next page (Table 2). Besides those cited, other estimates range from a low of \$10.3 billion to a high of \$151 billion per year (Bernasek, 2002; Taylor and Jackson, 2003). While the bulk of such increases were often due to logistical difficulties that arise throughout the supply chain, such estimates should not be considered comprehensive. Usually they do not include possible environmental damages due to idling of trucks at the border, related health costs, or the opportunity cost of the foregone cross-border investment and sourcing arising from the increased amount of border transit uncertainties.

What impact have the extra security measures since 2001 had on Canada-based companies in the northern New York region? Personal interviews were conducted in 2009 on a small cross-section of

**Table 2. Quantifiable Costs of Border Delays (US\$)\***

<b>Cost</b>	<b>Borne By</b>	<b>Because Of</b>	<b>Source</b>
\$3.17 to \$4.23 per minute	Trucking Industry	Delays	Global Insight
\$1.3 bil per year	Trucking Industry	Delays	Global Insight
\$1.8 b to \$3.9 bil per year	Trucking Industry	Delays and uncertainty	Taylor Study
\$2.63 bil per year	Manufacturers	Delays and uncertainty	Taylor Study
\$80,000 per hour	Auto Assembly Plants	Delays; parts shortages	Canada Department of International Trade
\$450 mil per year (by 2020)	Tourist Industry	Delays and uncertainty	Border Transport Partnership

*\* Canadian-American Business Council (2004).*

companies located in the region (Gandhi and Glass, 2004). The sampled companies included a public-private development corporation, two customs brokers, one warehouse, and eight manufacturing firms. The interviews focused on two areas: the effect of the border on firm operations and decision-making, and the concern for the companies' future under conditions of uncertainty. The first area included the way companies have had to deal with tightened border security, and the strategies they have taken to overcome the various delays and costs. For the second area, the survey explored the firms' current operations and prospects for the future. Of special interest was whether companies had downsized, cut back, or expanded operations since 2001.

The most important factor identified was that increased border security had imparted additional costs, but it had not made a significant impact on cross-border operations because companies were prepared to do whatever was needed in order to continue operating. Firms essentially felt they had no choice. The border was "not going away" and therefore they each attempted to make the necessary adjustment to meet the regulations. One of those adjustments was a greater reliance on customs brokers; it became easier to rely on a professional broker's expertise than to do the same functions in-house. The net effect was that shipments and paperwork after 9/11 required more planning and better organization. For example, some information had to be sent electronically to the customs brokers 24 hours ahead of a carrier's arrival at the border. This had a subtle but not insubstantial



effect because unlike in the past, last minute orders could not as easily be filled.

It is worth noting also that the impact of border delays is felt more on the trucking industry than on competing transport such as railways, which undergo relatively minimal inspection (Gallagher, 2007). This has a significant effect on northern New York since most cross-border firms located in both regions prefer trucks over rail due to the relatively short distances involved. Any additional cost is typically shared between the company and the customers, a finding that has been well documented in earlier studies (the Conference Board of Canada, 2007a,b; Macpherson and McConnell, 2007). One silver cloud from the resulting border thickening has been an increase in the number of customs brokers located near the Lacolle-Champlain border crossing. In 2009 that number stood at 18, up from only 3 that were present 10-12 years before. Six of the new companies are from Canada, and all are new start-ups. Part of the increase in the number of brokers may be attributed to the expansion of trade, while some are likely to be a result of the complexity of newly-imposed security regulations and the uncertainty of future regulations.

#### 4. Measurement of the Border Effect

In estimating the aforementioned border effect we follow McCallum (1995) who applied the original gravity model developed by Tinbergen (1962) to the case of interregional trade. The gravity model takes the following form:

$$(1) \text{TRADE}_{ij} = f(\text{GDP}_i, \text{GDP}_j, \text{DISTANCE}_{ij}, \text{DUM})$$

in which trade shipments of goods from location  $i$  to  $j$  are a function of the GDPs of the two trading partners, and their intervening distance. It is expected that trade movements between any two entities are positively related to the economic strength of both places and inversely related to the distance between them. The (0,1) dummy variable (DUM) accounts for whether the shipment crosses an *international* or *intranational* border, with the value 1 assigned to cases of interprovincial trade. In the log form, the equation takes the following form:

$$(2) \log(\text{TRADE}_{ij}) = a + b_1 \log(\text{GDP}_i) + b_2 \log(\text{GDP}_j) + b_3 \log(\text{DISTANCE}_{ij}) + b_4 \text{DUM}$$

in which  $i$  and  $j$  cannot both be states.

In the case of Canada-U.S. trade, McCallum established the convention of using data on all 10 Canadian provinces but just 30 US states<sup>5</sup>. Because of data availability, measured trade is between

provinces, or provinces and states, but not between states. Our interest is in developing estimates of the value of the coefficient for the border dummy variable,  $b_4$ . To find the value of the border effect the natural log base  $e = 2.791$  is then raised to the  $b_4$  power. A greater positive value implies a stronger border effect, while a more seamless border would produce a lower value. Any economic impediment mentioned above – tariffs, congestion, custom or immigration regulations, or extra security measures – would be expected to contribute to a higher value of the border coefficient.

The initial model of McCallum used 1988 data, prior to the first free trade agreement. As seen in Table 3, his border effect attained a value of 23.6, meaning that after accounting for economic size and distance Canadian *interprovincial* trade could be expected to be approximately 23.6 times the level of *international* trade. Helliwell (2002) next found that McCallum's border effect declined to a value of 12.0 in 1996; he also measured the border effect for the service sector as increasing from 29 to a value of 42 between 1988 and 1996. This suggested that as trade legislation caused trade in goods to become less restricted, the border effect became less important, except possibly for the service sector. For the intervening year of 1993 Anderson and Wincoop (2003) found that the border effect (16.4) was midway between the values for 1988 and 1996.

Table 3. Estimates of the Border Effect, 1988–2009

Data	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	Border effect	Source
1988	1.24	1.09	-1.46	3.16	23.6	McCallum
1993	–	–	–	–	16.4	Anderson and van Wincoop
1996	–	–	–	–	12	Helliwell
2003	1.07	1.54	-1.41	3.72	41.3	Gandhi and Duffy
2005	1.05	1.48	-1.34	3.35	28.5	Gandhi and Duffy
2007	1.06	1.64	-1.49	3.54	37.3	Gandhi and Duffy
2009	0.97	1.61	-1.55	3.74	42.1	Gandhi and Duffy

Table 3 summarizes these earlier results and presents our gravity model estimates for the years 2003, 2005, 2007, and 2009<sup>6</sup>. We find that after 9/11 there was a substantial increase in the border effect. By 2005 the border effect declined somewhat, yet was still above its value prior to trade liberalization. For the most recent year for which data is available, 2009, we see a rather large increase compared to both 1996 and even the more recent 2005 values. One may speculate whether these fluctuation were due to short-term changes in the exchange rate (with the increasing value of the Canadian dollar versus the U.S.

dollar), or partially a result of the economic downturn of 2008–2009. Another possibility is that the massive growth of the energy sector in Alberta may have caused a variety of structural economic shifts favorable to domestic trade and development. Whatever the reasons, it appears that the border is just as much, if not more, of a deterrent to trade as it was before the trade agreements.

### **5. Estimation of the Effects of Extra Border Security Measures**

Having determined that the international border does still in fact impede Canadian-American trade, and that recent additional security measures seem to have raised transportation and transaction costs, our next concern is to quantify those effects. One way of looking at extra border security is to consider that it has an effect similar to a tariff. Measures to secure the border further are tantamount to the reversal of free trade that the two countries have enjoyed since 1989. Delays at the border imply a loss of time for a shipper to deliver goods to a final destination. The wait time at the border is a dead period that any shipper must account for in their cost estimate, in essence a premium or tariff added on to cross-border freight. The longer the wait time, the higher would be that premium, making trade that much more expensive.

We will proceed in our estimation by considering the time lost at the border to be essentially equivalent to an additional distance a shipper must cover to reach a destination. For example, the distance between Montreal, QC and Plattsburgh, NY is 65 miles. In a borderless world, a trucker driving at 65 miles an hour would reach the destination in one hour. If it normally takes the trucker a half hour to clear customs and immigration, that translates into at least an additional 32.5 miles that would have to be factored into any cost estimate. Any additional wait of a half hour due to extra security would bring the total to the equivalent of 65 miles for the trucker to make up in cost estimates. Thus an actual transportation time of one hour could easily become equivalent to about a two-hour drive, significantly raising the cost to ship across the border.

Such costs can include, for example, the wait time at secondary inspection yards while completing customs paperwork and undergoing random inspections. The Taylor study notes that 10.4 percent of all trucks entering the U.S. must enter secondary inspection yards to visit brokers or to clear paperwork with customs staff. One percent of vehicles are actually physically inspected with some contents removed, and such inspections can take anywhere from 45 to 105 minutes. For the period May 1 to August 30, 2002 the Taylor study found that the average wait time for truckers entering the U.S. ranged from a low of

11.7 minutes to a high of 28.3 minutes. On the other hand, archival data from Canada Customs for entry to Canada showed the delay at 9 p.m. ranged from a low of 21.4 minutes to a high of 40.6 minutes; at various other times the delay was 60 to 120 minutes.

Our concern is not in explaining long-run changes in trade values, but in merely determining the “potential” impacts of extra border security measures. The formulation of our model is based on the general assumption that trade is directly related to the economic size of two regions, and negatively related to distance. Since there was no clear evidence for a specific increase in time associated with border delays, we integrate a wide range of values for additional distance – from a low of 35 miles to a high of 500 miles, along with two intermediate values of 100 and 250 miles.

The model itself incorporates potential demand (GDP of importing region), potential supply (GDP of exporting region), and distance. However, it differs from the McCallum formulation in two ways: (1) Since all trade is international (no interprovincial or interstate trade) we do not require a border dummy, and (2) we directly include distance in each of the market potential variables. There are two dependent variables: Canada-to-state imports and Canada-state total trade (exports plus imports), explained by the same set of independent variables. Each of the 5 independent variables takes the general form  $P = \text{GDP} / (D)^{\text{exp}}$ , in which distance,  $D$ , is raised to the ‘exp’ power:

$$P_{11} = \text{GDP}_i / (D_{11})^{.5}; \text{ where } D_{11} = \text{Distance of state capital to state's major city}$$

$$P_{12} = \text{Ontario GDP} / (D_{12})^{.5}; \text{ where } D_{12} = \text{Distance of state capital to Toronto}$$

$$P_{13} = \text{Quebec GDP} / (D_{13})^{.5}; \text{ where } D_{13} = \text{Distance of state capital to Quebec City}$$

$$P_{14} = (\text{Canadian GDP} - [\text{Ontario} + \text{Quebec GDP}]) / (D_{14})^{.5}; \text{ where } D_{14} = \text{Distance of state capital to Regina, SK}$$

$$P_{15} = (\text{U.S. GDP} - \text{GDP}_i) / (D_{15})^{.5}; \text{ where } D_{15} = \text{Distance of state capital to St. Louis}$$

These variables account for both demand and supply conditions. In particular, we posit that trade and imports are each dependent upon  $P_1$ , which accounts for the state's own GDP;  $P_2$ ,  $P_3$ ,  $P_4$  account for the potential effect of the state's proximity to both Canada and its two most important economic regions; and  $P_5$  accounts for the effect the rest of the U.S. may have on state trade. Note that the distance exponent of .5 reflects the notion that the deterrent effect of greater distance is likely to be non-linear. This has the effect of mitigating the impact of longer distance since loading and unloading are the major fixed costs for any trip, while the actual travel imparts a variable cost dependent only on distance. The final model is then:

(3)  $\text{TRADE}_i$  (or  $\text{IMPORTS}_i$ ) =  $\beta_0 + \sum \beta_j P_{ij}$ , where  $j = 1$  to  $5$  and  $i = 1$  to  $49$ .

For each dependent variable there are 49 state observations (Hawaii is excluded) and five independent variables. Our expectation is that each of the  $\beta$ 's will be both significant and positive since larger values of the  $P_{ij}$  are reflective of either greater GDP or shorter distance, each of which is favorable to trade, whether it is acting as a supply or demand factor. This therefore requires a one-tail hypothesis test for each slope coefficient in which the alternative hypothesis is  $H_A: \beta_j > 0$ . After obtaining the estimates for each of the  $\beta$ 's we then factor in additional border security costs by adding distances of  $k$  to the denominators of variables  $P_2$ ,  $P_3$ , and  $P_4$ , replacing  $D$  in each case with  $(D + k)$  in the estimated model. Each of the 49 states will then have a new predicted value for trade or imports that incorporates the effect of greater distance. The sum of those predicted values is then compared to the actual value of trade or imports to determine the impact of extra border security.

The results for both dependent variables for each of the five years are as follows:

**Table 4. Potential Model Estimates, 2003–2011\***

<b>Trade</b>						
2003:	-23.6	+ .31 <sup>A</sup> P1	+ 1.7 <sup>A</sup> P2	- .88 P3	+ .55 <sup>C</sup> P4	+ .008 P5 R <sup>2</sup> = .55
2005:	-23.9	+ .38 <sup>A</sup> P1	+ 1.3 <sup>A</sup> P2	- 1.1 P3	+ .77 <sup>C</sup> P4	+ .007 P5 R <sup>2</sup> = .57
2007:	-27.2	+ .39 <sup>A</sup> P1	+ 1.1 <sup>A</sup> P2	- .94 P3	+ .66 <sup>C</sup> P4	+ .008 P5 R <sup>2</sup> = .59
2009:	-18.9	+ .29 <sup>A</sup> P1	+ .54 <sup>B</sup> P2	- .36 P3	+ .52 <sup>B</sup> P4	+ .009 <sup>B</sup> P5 R <sup>2</sup> = .65
2011:	-29.7	+ .37 <sup>A</sup> P1	+ .72 <sup>B</sup> P2	- .49 P3	+ .60 <sup>B</sup> P4	+ .013 <sup>B</sup> P5 R <sup>2</sup> = .60
<b>Imports</b>						
2003:	-16.7	+ .20 <sup>A</sup> P1	+ 1.1 <sup>A</sup> P2	- .48 P3	+ .44 <sup>C</sup> P4	+ .003 P5 R <sup>2</sup> = .51
2005:	-16.9	+ .25 <sup>A</sup> P1	+ .82 <sup>B</sup> P2	- .55 P3	+ .62 <sup>C</sup> P4	+ .003 P5 R <sup>2</sup> = .51
2007:	-18.9	+ .25 <sup>A</sup> P1	+ .66 <sup>B</sup> P2	- .46 P3	+ .50 <sup>B</sup> P4	+ .004 P5 R <sup>2</sup> = .54
2009:	-12.7	+ .19 <sup>A</sup> P1	+ .27 <sup>C</sup> P2	- .09 P3	+ .37 <sup>B</sup> P4	+ .006 <sup>B</sup> P5 R <sup>2</sup> = .59
2011:	-21.0	+ .23 <sup>A</sup> P1	+ .42 <sup>B</sup> P2	- .17 P3	+ .45 <sup>B</sup> P4	+ .008 <sup>B</sup> P5 R <sup>2</sup> = .53
* p-values shown for one-tail test of alternative hypothesis $H_A: \beta_j > 0$ , where A=.01, B=.05, C=.10						

Following the procedure outlined above, Tables 5 and 6 show the effect of adding distance values of 35, 100, 250, and 500 miles. For example, in 2011 just an additional 35 mile delay reduces the values of imports and total trade by \$9.4 billion (2.8%) and \$20.4 billion (3.7%), respectively. A 100-mile delay reduces imports by \$36.0 billion (10.9%) and total trade by \$57.6 billion (10.5%).

**Table 5.**  
**The Predicted Effect of Border Delay on Imports (US\$ in billions)**

<b>Additional Distance Assumed</b>					
<b>Year</b>	<b>Actual Imports</b>	<b>35 mi</b>	<b>100mi</b>	<b>250mi</b>	<b>500mi</b>
<b>2003</b>	\$228.8	217.9	193.2	145.9	86.5
<b>2005</b>	296.4	290.4	264.1	213.7	150.6
<b>2007</b>	324.7	302.4	275.0	222.3	156.1
<b>2009</b>	232.1	230.2	215.2	186.2	149.4
<b>2011</b>	330.3	320.9	294.3	243.2	178.8

**Table 6.**  
**The Predicted Effect of Border Delay on Total Trade (US\$ in billions)**

<b>Additional Distance Assumed</b>					
<b>Year</b>	<b>Actual Trade</b>	<b>35 mi</b>	<b>100mi</b>	<b>250mi</b>	<b>500mi</b>
<b>2003</b>	\$371.7	\$344.0	\$310.3	\$245.6	\$164.6
<b>2005</b>	471.1	458.3	422.0	352.3	265.2
<b>2007</b>	527.0	496.5	457.2	381.8	287.2
<b>2009</b>	393.2	376.3	353.3	309.1	253.3
<b>2011</b>	551.1	530.7	493.5	421.9	331.7

To conclude, we find that extra security measures appear to have the potential of imposing very substantial additional costs over and above the “natural” border effect and the regular costs associated with it. For even a relatively modest extra delay of 35 minutes, the potential impact on total trade appears to be quite substantial. Policymakers should consider the marginal benefits of preventing terrorism, and weigh those against the marginal economic cost of lost trade value before implementing further security measures.

## **6. Trade and Investment in Northern New York and Quebec**

Why do companies (countries) invest abroad, and more importantly why do they locate in a particular region such as northern New York? As previously mentioned, tariffs and resource availability had traditionally been considered important reasons for firms to invest abroad when they wished to service a given market. Why should General Motors produce in Detroit and ship automobiles to Ontario and pay extra freight and tariff duties, when it can cross over the border at Windsor and produce in Ontario (Canada) to service the Canadian market? In addition, the rising prevalence of multinational companies in the second half of the last century expanded the number of factors

that led to greater investment abroad. These ranged from following the industry leader, gaining a foothold in a growing potential market, securing the growth of the company and protecting shareholder value, to overcoming hurdles from labor unions, environmental regulations, and prohibitive tax rates (The Development Corporation, 2009).

U.S. Bureau of Economic Analysis data shows that most of Canada's investment in the U.S. goes into finance, insurance, and manufacturing, particularly in primary and fabricated metals, chemicals, transportation equipment industries, and more recently in electric power generation and distribution. Bilateral trade in goods between Canada and New York State stood at US\$34.6 billion in 2012, with Quebec's share nearly \$8 billion (see Appendix for trade and investment sources). The state of New York is in fact Quebec's largest export market. A significant number of Canadian small- and medium-size companies are concentrated mainly in northern New York and the Buffalo-Niagara Falls region. Both of these regions are well integrated with the adjoining Canadian provinces: northern New York mostly with Quebec (the Quebec City-Montreal-Ottawa corridor) and western New York with Southern Ontario (the Toronto-Hamilton corridor). The proximity of New York State to the economic and industrial heartland of Canada stretching from Quebec City to Toronto is a locational advantage enjoyed by no other state in the U.S.

Why are Canadian companies attracted to this region, and what do we know about such investment? Periodic surveys on the nature and scope of Canadian investments in the region have been conducted at SUNY-Plattsburgh since the early 1970s and they reveal a number of interesting facts<sup>7</sup>. In Clinton county alone there were 100 companies in 2008 that owed their origin to Canada (Quebec alone accounted for 60 percent, followed by Ontario at 30 percent); this was an increase from only 28 in the mid-70s and 56 in 1989. Two-thirds of these Canada-based companies manufacture and assemble products such as transportation vehicles, chemicals, paper products, plastics, pharmaceuticals, crystals and chandeliers, and toiletries. In general, their presence in the U.S. is attributed to two main considerations: access to a huge market in the U.S., and ability to more easily service their customers in the U.S. Other factors include: (1) proximity to their Canadian operations, (2) an excellent transportation network (the interstate highways), and (3) the availability of a trainable labor force. Interestingly, neither the exchange rate nor tariffs and duties emerged as important considerations; nor was the border a factor.

Comparing the latest list of companies in the northern New York region in 2008 with the list from 2005, it was determined that at least 17 companies listed in 2005 had left the area while at least nine new

companies had entered the region (The Development Corporation, 2009). A few of the firms from 2005 were under new management and had changed names. Most of the companies that had left the area were small, involved in storage and warehousing, and employed fewer than 10 employees. There were also a number of companies that were present in 2009 which were also present in the 1970s. Many of the firms, though starting small, have grown into medium-size companies employing between 125–350 people. Their reasons for entering the U.S. market via northern New York continue to be those listed above. Most have maintained operations both in northern New York and in Quebec. In many instances back office activities such as accounting, invoicing, payments to suppliers, payroll, R & D, MIS, purchasing, and hiring of top executives are performed at headquarters in Quebec. Offshoot locations maintain offices to hire local workers, including both staff and supervisory personnel.

Surveys have been conducted in northern New York at the time of CUSFTA, the launching of NAFTA, and since border security became an issue (Gandhi, 1990; Gandhi and Glass, 2004). There was obviously a great deal of panic created in 2001 when the border between Canada and the U.S. was briefly closed. This most acutely affected the Lacolle-Champlain customs station, which is the third most important trade crossing between Canada and the U.S. (6 percent of trade). One third of Canada's exports contain imported components from the U.S. that require further processing, and which are then transported back and forth (sometimes 3 or 4 times) before ending in a finished export product, either to one of the partner countries or exported to a third country (Goldfarb, 2007). As a result, uncertainty about border delay may have a correspondingly greater effect on corporate decisions concerning investment or disinvestment.

What impact have the extra security measures since 2001 had on Canada-based companies in the northern New York region? Personal interviews were conducted in 2009 on a small cross-section of companies that included a development corporation responsible for attracting business to the region, two customs brokers, one warehouse, and eight manufacturing firms (Gandhi, Glass, and Corporon, 2009). The focus was on (1) the general effect of the border on firm operations and decision-making, and (2) the companies' future under conditions of uncertainty. The most important factor identified in these interviews was that border security had not made a significant impact on the firms' cross-border operations. The border was an 'irritant' but they had each taken the thickening of the border in stride since they felt they had no choice. Necessary adjustments were made to meet the regulations, including the wider usage of customs brokers.



What about the companies' expectations about the future? The primary factors that will continue to commit the Canada-based companies to the region were found to be: (1) access to excellent highways and an efficient border crossing facility; (2) availability of physical facilities, e.g., industrial parks, warehouses, real estate, etc.; (3) availability of a skilled, trainable, and dedicated labor force; (4) communities' welcoming attitude towards businesses; and (5) the recent increased certainty and stability of the exchange rate. Of these factors, the two most mentioned were the excellent highways between Quebec and Northern New York and the recent modernization of the border facility at Champlain. For Canadian companies in particular, highways are important not only for making cross-border shipping smooth and less costly, but also for facilitating the commuting of key personnel between headquarter operations in Quebec and their offshoots in this region.

The concern for the stability of exchange rates has frequently been noted in the literature. Earlier studies had revealed that although the impact of any given exchange rate on real investment may be relatively small, the more important factor was the uncertainty that arises from its variability. Any given rate can affect parent company deliberations over the relative concentration of labor and capital, for example. And even after an initial investment is begun, further fluctuations can tangibly affect the preference to shift activities between locations.

## **7. Conclusion**

The worst of the 2001–2002 era of border insecurity and its impact on cross-border business appears now to be over. Businesses have made the appropriate adjustment to additional security measures to secure their supply chain. Any additional cost of meeting new regulations has been partially internalized and the balance has presumably been passed on to transport companies and consumers. But the threat of border insecurity has not abated. Perhaps this is why it was reported in 2008 that “the [border customs] offices complained that crossing fees, long security inspections and wait times are steadily rising.” (Pacific Shipper, 2008)

The uncertainty of future regulations is always present in international business. Correspondingly, for policy makers it is imperative to undertake measures to ensure a less intrusive border, since any further thickening would hurt international trade and investment. Moreover, as the economies in Canada and the U.S. come out of the current recession, increased economic activity will only serve to make border crossings even more congested. Any cuts in public funds to modernize the crossings at this time would be detrimental

to cross-border businesses, especially to small and medium-sized firms which have a larger role to play within border communities such as Quebec-northern New York.

## APPENDIX

### *Data sources*

**GDP:** (1) Statistics Canada/ CANSIM, Table 384-0037; (2) U.S. Bureau of Economic Analysis, "GDP by State," June 6, 2013, Table 4; (3) 2012 U.S. Statistical Abstract, Table 672.

**Trade:** (1) Industry Canada/Trade Data Online, Search by Product (HS Code); (2) U.S. Bureau of the Census, Table 1307, U.S. Exports, Imports, and Trade Balance by Country; (3) Statistics Canada/ CANSIM, Table 386-0002, Annual.

**Distance:** (1) Geobytes.com/citydistance.htm; (2) Canada Road Map by MapArt.

**Investment:** (1) U.S. Bureau of Economic Analysis, U.S. Direct Investment Position Abroad on a Historical-Cost Basis: Country Detail by Industry; (2) Foreign Affairs, Trade and Development Canada [www.international.gc.ca](http://www.international.gc.ca) Foreign Direct Investment Statistics.

**Exchange Rates:** (1) Bank of Canada: [www.bankofcanada.ca/stats/exchange-avg\\_pdf](http://www.bankofcanada.ca/stats/exchange-avg_pdf).

## ENDNOTES

- 1 Micropolitan and non-core counties are designated as such by the U.S. Office of Management and Budget. Micropolitan counties have a population of at least 50,000 with one population center of 10,000. Non-core counties lack a population center of at least 10,000.
- 2 Employment estimate is found at [Connect2Canada.com](http://Connect2Canada.com): Trade & Security Partnership Map, Embassy of Canada (April, 2010).
- 3 The top ten states are California, Illinois, Indiana, Massachusetts, Michigan, New York, Ohio, Pennsylvania, Texas, and Vermont.
- 4 Both the population and the GDP of Canada have historically been about 10–11 percent of the U.S.'s. The statistic was calculated by finding  $A/B$ , where  $A = (\text{Canada FDI in U.S.} / \text{Canada population})$  and  $B = (\text{U.S. FDI in Canada} / \text{U.S. population})$ . Since 2001 this ratio has ranged from 4.7 to 7.3 and for 2011 the value stood at 6.2.
- 5 The thirty states are Alabama, Arizona, California, Florida, Georgia, Idaho, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Jersey, New York, North Carolina, North

- Dakota, Ohio, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Washington, Wisconsin.
- 6 Note that 2009 is the most recent date of availability for interprovincial trade data.
  - 7 Unpublished surveys conducted by Prem Gandhi of the Center for the Study of Canada, State University of New York College at Plattsburgh, Plattsburgh, New York.

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