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Regional and Temporal Variations in Transportation Costs for U.S. Imports from Canada

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Abstract. This paper examines the behavior of transportation costs associated with U.S. imports from Canada. In particular, it evaluates whether transportation costs for U.S. imports from Canada increased in the post-9/11 period, thereby contributing to a "thickening" of the Canada-U.S. border. It also identifies whether changes in transportation costs varied across U.S. customs districts encompassing land ports along the Canada-U.S. border. The evidence indicates that an earlier declining trend in transportation costs noticeably decelerated in the post-2001 period. Furthermore, there was substantial variation in the rate of deceleration across the sample customs districts. The variation seems to be related to differential impacts of government policies across regions, such as "Trusted Trade" programs, rather than to changes in commodity import mixes or susceptibility of commodity import mixes to border disruptions.

1.Introduction

In recent years, a number of studies have identified a "thickening" of the Canada-U.S. border for commercial trade post-9/11 (Ackleson, 2009) and particularly for exports from Canada to the United States. Various measures of border thickening have been utilized, including waiting times for commercial shipments to cross the border (Goldfarb and Robson, 2003; Bonsor, 2004; and Lee, Martin, Ouellet, and Vaillancourt, 2005), costs associated with cross-border shipments (Taylor, Robideaux, and Jackson, 2003; DAMF Consulting, 2005) and bilateral trade volumes (Globerman and Storer, 2008; Globerman and Storer, 2009).

Several available studies have focused on specific border-crossing locations when addressing the impacts of border-related security developments following the 9/11 attacks. For example, Lee, Martin, Ouellet and Vaillancourt (2005) estimate the effects of such developments on exports from Quebec to the United States. MacPherson and McConnell (2005) examine the economic impacts of U.S. government anti-terrorism policies on cross-border commerce between Southern Ontario and Western New York State, while Goodchild, Globerman and Albrecht (2008) assess border crossing conditions at the Blaine, Washington, commercial truck crossing. However, to our knowledge, there has been no published study that systematically evaluates whether there are regional differences in the border-thickening effects of post-9/11 security developments, although Globerman and Storer (2008) observe that decreases in Canadian exports were not uniform across U.S. land ports.

Regional differences in commercial border crossing conditions would provide support for recent calls to decentralize to state and provincial governments at least some policy-making initiatives concerning administration of the Canada-U.S. border. To be sure, road and port infrastructure programs undertaken to expand the physical capacity of individual border crossing points on both sides of the border have involved planning and funding by agencies of the two federal governments as well as states, provinces and individual cities. However, programs associated with expediting commercial and passenger traffic in the context of border security procedures remain the sole responsibility of the federal government, as do initiatives related to staffing and managing border ports.

Since national security is primarily a responsibility of the federal government, it seems reasonable for the administration of ports, including land ports, to be centralized in the federal government bureaucracy. However, since that mandating of relatively uniform national border security and related policies imposes costs and consequences that differ across geographic locations, such centralization could lead to inefficiencies and regional inequities.

The specific purposes of this study are to assess whether and how the costs of shipping goods from Canada to the United States have changed over time, particularly when comparing the pre- and post-9/11 periods, and to identify whether changes in transportation costs vary across geographic locations in the United States. Transportation costs condition the thickness of a border. If transportation costs increased (or decreased at a slower rate) after 9/11, the competitiveness of Canadian exports in U.S. markets will decrease. To the extent that transportation cost changes are not uniform across the length of the Canada-U.S. border, the more geographically asymmetrical their competitive effects will be, other things constant.

To anticipate our conclusions, we find that across all customs districts as a whole, a marked trend towards declining transportation costs moderated after 9/11. This moderation is consistent with the border thickening for post-9/11 Canadian exports to the U.S. Moreover, the moderating trend differed across customs districts. Specifically, some districts showed much stronger signs of moderation than other districts. These differences across customs districts seem to reflect differences within individual districts in the capabilities of ports, as well as participants in the exporting process, such as shippers and transportation companies, to adjust to post-9/11 border security changes.

Our study proceeds as follows. Section 2 discusses our measure of transportation costs and reports data on the behavior of transportation costs over time and across customs districts. Section 3 considers whether observed changes in transportation costs are plausibly related to changes in the commodity composition of U.S. imports from Canada. The differential impacts of post-9/11 "Trusted Trade" programs on regional transport cost differences are explained in Section 4, while Section 5 considers the potential contribution of shipping distances and port concentration on regional cost differences. The final section offers policy conclusions.

2. Measurement of transportation costs

Our broad measure of transportation costs follows the method used by Frankel (1997) and Anderson and Van Wincoop (2004). The measure is calculated as:

$$r_{it} = \frac{(CIF_{it} - FOB_{it})}{FOB_{it}} \times 100 \qquad (1)$$

where CIF_{it} is the U.S. importers' reported customs value of imports including freight and insurance costs (the CIF value) for customs district i at date t, and FOB_{it} is the value reported excluding freight and insurance (the FOB value) for customs district i at date t. Presumably, the costs created by security-related developments, such as longer border crossing wait times, as well as regulatory-related obligations imposed upon Canadian exporters will be manifested over time in higher costs of freight and, possibly, insurance as well. The ratio implicitly factors out inflation that is common to both transportation and insurance services and to imported goods more generally. The construction of our cost ratio therefore captures increases in transport costs to the degree that they exceed increases in the "factory gate" cost of imported goods. Hence, it is not appropriate to deflate both the CIF and FOB ratios for general inflation.

The transport cost ratio data used in this study are derived from import documents such as U.S. Customs and Border Protection Form 7501. These documents require importers of record to disclose separate figures for the commercial value of their imports and for the combined cost of freight and insurance charges. For U.S. imports from Canada, reported freight and insurance charges can include both foreign inland freight charges and post-importation freight costs. The inclusion of pre- and post-importation freight and insurance charges means that changes in our transport cost ratios will reflect some combination of pure variations in the cost of crossing the border and fluctuations in other transportation cost factors such as fuel costs or the distances traveled within Canada and the United States.

While we have no direct way to control for changes in factors such as distance traveled between the points of origin and destination, we minimize the potential impact of these factors by comparing transport cost ratios before and after 9/11. There is little reason to believe that shipping distances for Canadian exports changed in a systematic way after 2001. Furthermore, any changes in transportation distances that are uniform across all customs districts will not affect our analysis, because we focus on transport cost differences both over time and between customs districts.[1] In a later section of this paper, we check the robustness of our results by examining the fraction of imports that clear at ports located away from the physical border. To anticipate the results of this exercise, we find little evidence that changes in shipping distances explain the evolving nature of our transport cost ratios.

Table 1 lists the eight major customs districts in our study and reports the total imports from Canada (in nominal U.S. dollars) for each district for the years 1989-2008. Individual land ports within each sample customs district are identified in Appendix 1. Sample customs districts are those containing land ports at the Canada-U.S. border. One customs district (Duluth) was dropped from the sample because the composition of ports for that district changed over time.

Figure 1 reports the calculated transportation cost ratios for the total value of all commodity imports from Canada crossing through land ports within each customs district in each year from 1989-2008. There is a clear and dramatic upward spike in the ratio for every customs district from 1989 to 1990. The sharp increase was ostensibly due to a dramatic increase (almost 30%) in the price of oil between the two years. Hence, a more meaningful picture of changes in transportation cost over time would be gleaned by focusing on the data for 1990-2008.

In this regard, it can be seen from Figure 1 that the transportation cost ratio differs in absolute value across districts. Of more interest are the differences across customs districts in the movement of the ratio over time. For example, for a number of districts (Buffalo, Detroit, Great Falls, and Pembina) the ratio decreases more or less constantly over the full sample period with the exception of a modest increase in 2001-2002. It might be inferred that this latter increase was related to border security developments and the associated border crossing delays in the immediate aftermath of the 9/11 terrorist attacks. By contrast, in other districts (Portland, Seattle, and St. Albans) the trend in the declining ratio prior to 2001 does not continue in the post-2001 period.

For all imports aggregated across the eight sample customs districts, Figure 2 shows that the ratio decreased from 2002 onwards, following an increase from 2001-2002; however, the decrease is noticeably slower in the 2002-2008 period compared to the 1990-2001 period, as seen by comparing the flatter slope of the curve from 2002-2008 to the steeper slope from 1990-2001. The continued decrease in the ratio after 2002 might reflect the fact that other factors contributing to lower transportation costs more than offset the specific impact of post-9/11 border security-related procedures on transportation costs. Productivity gains in transportation certainly have the potential to explain these declining transportation costs. Estimates for the United States show that labor productivity in local trucking grew by 5.2% per year between 1990 and 2000, and productivity in rail grew by 5.1% per year over the same period (U.S. Department of Transportation, 2003). Lim and Lovell (2009) provide evidence that productivity improvements in rail transportation continued after 2001.

Hence, the decrease in the ratio for most districts after 2001 should not be interpreted as evidence that there was no significant impact on shipping costs for goods imported into the U.S. from Canada after 9/11. As noted above, productivity gains in the transportation industry may have offset any measurable cost increases associated with post-9/11 border security developments. In addition, border delays and associated uncertainties may have led to a substitution away from goods with relatively high shipping costs to those with lower shipping costs, a phenomenon identified by Hummels (2001), among others. Finally, declines in Canadian exports to the United States could have contributed to the observed decreases in the post-2001 ratios by reducing congestion at border crossings and increasing pressure on carriers to charge lower freight rates.

Whatever the factors influencing transportation costs, the data summarized in Figures 1 and 2 suggest that there are important differences in the pre- and post-2001 behavior of the transportation cost ratio. Specifically, the trend toward lower transportation costs appears to have slackened in the later period compared to the earlier period. Furthermore, differences in the pre- and post-2001 behavior of the ratio are not identical across customs districts, with the slackening being more marked for some districts than for others.

[1] Ideally, we would conduct our analysis at the individual port level. Unfortunately, the data required to estimate our transport cost ratio are reported only on the basis of country of origin, commodity, and customs district of entry into the U.S.

Table 1. Nominal import values by customs district.

District	1989	1990	1991	1992	1993
Buffalo, NY	$17,037,289,362	$17,383,987,105	$16,816,407,954	$18,982,140,625	$22,110,639,441
Detroit, MI	$33,364,276,392	$32,833,409,012	$33,154,481,398	$36,768,036,210	$41,562,488,614
Great Falls, MT	$3,081,675,598	$3,607,705,152	$3,544,342,572	$3,679,535,124	$4,194,866,663
Ogdensburg, NY	$8,411,547,900	$8,950,921,496	$9,078,612,274	$9,226,461,744	$10,456,217,204
Pembina, ND	$3,852,927,012	$4,022,141,952	$3,973,318,721	$4,403,483,805	$5,145,147,669
Portland, ME	$2,226,446,040	$2,425,226,975	$2,323,999,011	$2,293,150,751	$2,518,500,769
Seattle, WA	$4,105,656,465	$4,285,463,067	$4,158,274,660	$4,730,920,224	$5,365,951,418
St. Albans, VT	$3,807,546,061	$4,728,633,543	$4,735,325,273	$4,811,828,896	$4,959,955,634
8 District Total	$75,887,364,830	$78,237,488,302	$77,784,761,863	$84,895,557,379	$96,313,767,412
District	**1994**	**1995**	**1996**	**1997**	**1998**
Buffalo, NY	$24,820,943,896	$26,347,872,305	$26,572,462,119	$27,162,900,886	$32,488,541,836
Detroit, MI	$51,123,617,281	$57,947,797,230	$62,614,727,706	$68,498,718,976	$68,123,193,259
Great Falls, MT	$4,979,892,887	$4,682,383,808	$5,203,354,011	$5,949,680,220	$6,022,934,292
Ogdensburg, NY	$11,276,739,118	$13,074,368,869	$14,408,306,685	$15,656,082,763	$16,661,844,608
Pembina, ND	$5,922,682,974	$6,979,234,674	$7,287,783,241	$7,574,759,161	$7,878,654,324
Portland, ME	$2,716,848,300	$3,079,690,313	$3,373,799,638	$3,654,227,363	$3,677,831,573
Seattle, WA	$6,196,371,291	$6,719,748,776	$8,039,688,654	$9,574,898,490	$10,266,777,618
St. Albans, VT	$5,541,206,445	$6,628,011,931	$7,054,365,489	$7,016,692,195	$7,439,131,685
8 District Total	$112,578,302,192	$125,459,107,906	$134,554,487,543	$145,087,960,054	$152,558,909,195
District	**1999**	**2000**	**2001**	**2002**	**2003**
Buffalo, NY	$35,806,247,474	$34,079,525,132	$31,249,022,312	$31,060,902,500	$32,173,669,651
Detroit, MI	$78,111,576,373	$87,508,068,378	$82,747,424,603	$84,526,966,423	$89,160,283,315
Great Falls, MT	$7,641,030,100	$10,869,408,219	$14,471,616,323	$12,265,260,683	$14,325,982,210
Ogdensburg, NY	$18,084,926,599	$21,791,137,585	$20,123,639,264	$19,226,485,809	$19,427,481,037
Pembina, ND	$8,479,164,708	$10,691,027,708	$9,999,325,157	$9,340,203,496	$9,042,452,986
Portland, ME	$4,198,570,627	$5,018,693,428	$5,186,388,972	$5,060,710,190	$5,397,182,489
Seattle, WA	$11,852,765,533	$14,653,489,804	$12,614,953,352	$10,349,675,930	$11,416,432,188
St. Albans, VT	$7,817,028,637	$8,583,307,026	$8,468,931,436	$7,681,239,785	$8,786,683,540
8 District Total	$171,991,310,051	$193,194,657,280	$184,861,301,419	$179,511,444,816	$189,730,167,416
District	**2004**	**2005**	**2006**	**2007**	**2008**
Buffalo, NY	$36,798,886,597	$38,079,329,299	$40,174,048,089	$40,262,083,633	$40,734,639,988
Detroit, MI	$100,296,811,873	$108,922,392,639	$111,672,485,985	$111,837,876,135	$102,851,069,946
Great Falls, MT	$17,189,393,299	$21,348,311,762	$21,761,137,374	$23,461,003,021	$28,345,134,577
Ogdensburg, NY	$21,839,874,991	$25,304,185,585	$26,842,354,609	$26,174,755,567	$27,360,722,103
Pembina, ND	$10,653,134,294	$12,403,917,176	$13,647,725,917	$14,658,560,605	$16,989,357,940
Portland, ME	$6,153,639,059	$6,918,972,840	$7,135,203,564	$6,835,661,925	$7,428,941,714
Seattle, WA	$13,336,843,884	$15,193,962,125	$15,906,899,872	$15,767,143,027	$17,196,899,267
St. Albans, VT	$9,292,432,099	$11,436,236,877	$10,241,561,173	$9,984,955,960	$9,273,359,276
8 District Total	$215,561,016,096	$239,607,308,303	$247,381,416,583	$248,982,039,873	$250,180,124,811

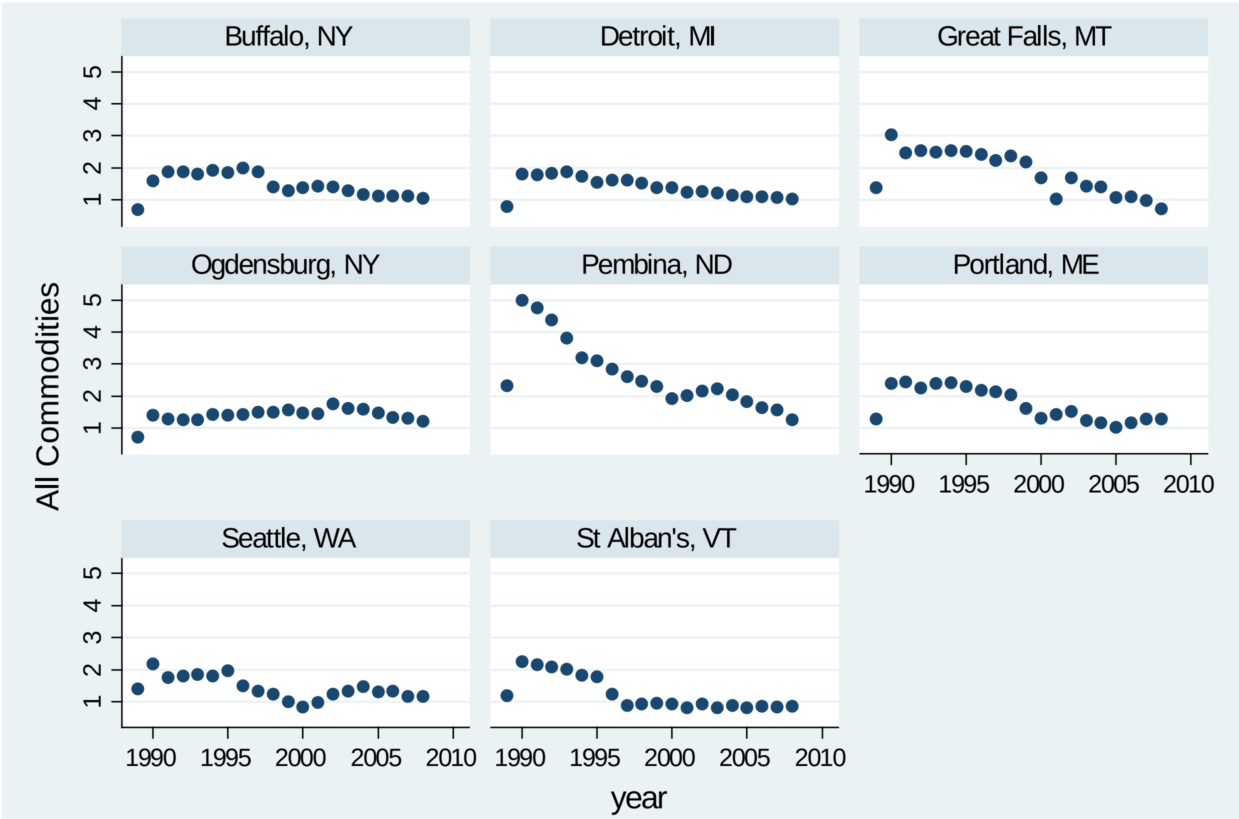

Figure 1. Transportation cost ratio for all commodities by customs district.

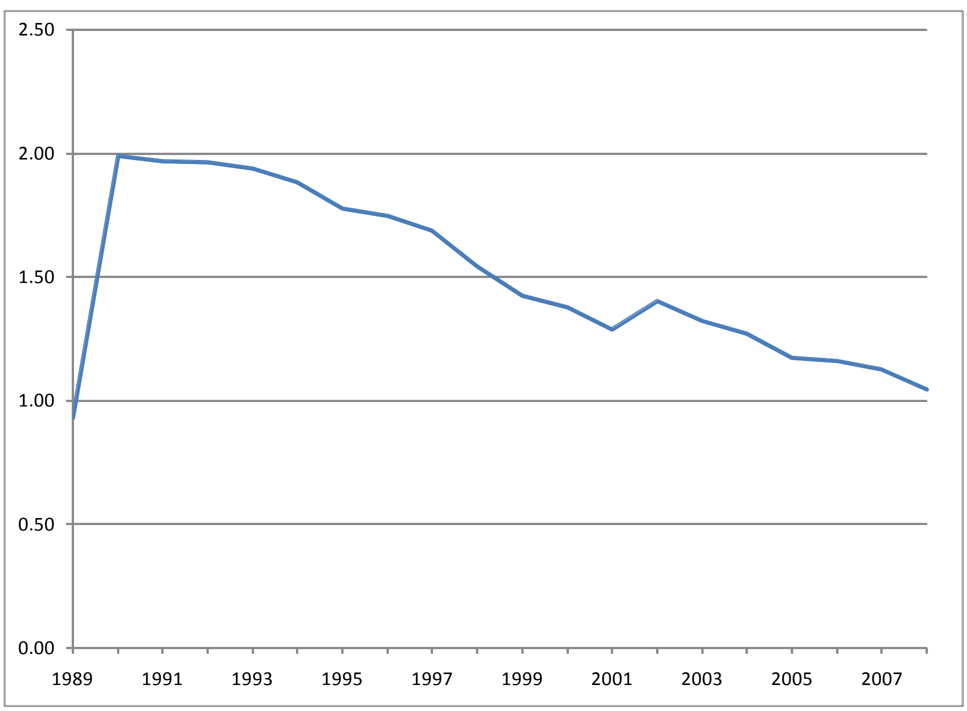

Figure 2. Transportation cost ratio for all commodities and for the top 8 customs districts.

Differences in the behavior of the ratio over time for the aggregate of customs districts, as well as across customs districts, are further illustrated through regression analysis. We first separated the sample time period into two sub-periods: 1990-2000 and 2001-2008. The time periods were chosen to correspond as closely as possible to pre- and post-9/11 border crossing conditions. For the sample of customs districts as a whole, as well as for each individual customs district, a simple linear model was estimated for each sub-period, where the dependent variable is the calculated ratio and the independent variable is a linear time trend starting with a value of unity in year 1990:

$$r_{it} = a_i + \beta_i * year \quad (2)$$

The results of the regression analysis are reported in Table 2. Specifically, the estimated coefficient β_i for the linear time trend is reported for each district for the two sub-periods. It can be seen that there was a statistically significant (at the ten-percent level) downward trend in shipping costs for seven of the eight districts in the first sub-period.[2] Conversely, Ogdensburg has a notable increasing trend in shipping costs.

The downward trend in shipping costs continues for most districts in the post-2001 period. However, the estimated negative time trend coefficient is statistically insignificant for Portland and St. Albans, and it is positive, albeit statistically insignificant, for Seattle. The smaller (in absolute value) negative estimated time trend coefficient for Pembina in the second sample period is not significantly different from zero but, when comparing the second sub-period to the first, the change in the time trend coefficient is statistically significant. Hence, for almost half the sample, the trend to lower shipping costs was slowed or even reversed in the post-2001 period. There appears to be no change in the trend for Buffalo, Detroit, and Great Falls, whereas there is a statistically significant reversal of the pre-9/11 trend towards higher shipping costs for Ogdensburg. Table 3 reports the results of the following regression model:

$$r_{it} = a_i + \beta_i * year + \gamma_i * dum01 + \delta_i * year * dum01 \quad (3)$$

[2] Clearly, the absolute values of the estimated coefficients differ across the districts; however, it cannot be determined if the differences are statistically significant.

Specifically, Table 3 reports the estimated coefficients for the regression model and their significance levels when the full sample of data from 1990-2008 is utilized.

The dependent variable is again the calculated transport cost ratio. The *year* variable is simply a linear time trend with an initial value of unity in 1990. The *dum01* variable takes a value of zero from 1990-2000 and a value of unity thereafter. The third independent variable represents the interaction term between the *year* and *dum01* variables. Its coefficient is of particular interest to us. A positive coefficient indicates that the ratio decline was slowing in the post-2001 period compared to the pre-2001 period. A negative coefficient suggests that the decline was actually faster after 2001. The significant positive values for the parameter δ confirm the findings from Table 2 for the districts of Pembina, Portland, Seattle, and St. Albans.

In summary, there is evidence of a post-9/11 slowing of the declining trend in transportation costs across our full sample of customs districts, with specific customs districts experiencing a particularly marked change in this trend relationship. Such differences suggest that post-9/11 border security-related developments imposed larger or smaller disadvantages across regions in terms of facilitating imports from Canada, depending upon the location of border crossings. However, before drawing a strong inference along these lines, we should consider whether the differences observed in Tables 2 and 3 might be explained by factors unrelated to post-9/11 border security developments. In particular, it is possible that changes in commodity mix might be contributing to changes in the transportation cost ratio over time, both in the aggregate and for individual customs districts. In the next section, we identify and assess changes over time in the mix of commodities comprising U.S. imports from Canada.

3. Changes in commodity composition

Table 4 reports data bearing upon changes in the commodity composition of U.S. imports from Canada for all customs districts in the aggregate. Specifically, it reports the two-digit HTS codes and import shares for the five leading U.S. commodity imports from Canada for selected years aggregated across all eight customs districts. Clearly, there are overlaps in commodity categories across the sample years. In particular, commodities 27 (mineral fuels), 84 (mechanical equipment) and 87 (automotive products)

Table 2. Split-sample time-trend regressions by customs district.

	Time Trend Variable		Regression Constant Term	
Customs District	1990-2000	2001-2008	1990-2000	2001-2008
Buffalo	-0.040 (8%)	-0.054 (<0.1%)	1.96 (<0.1%)	2.05 (<0.1%)
Detroit	-0.048 (< 0.1%)	-0.034 (<0.1%)	1.93 (< 0.1%)	1.67 (<0.1%)
Great Falls	-0.082 (0.1%)	-0.084 (6.9%)	2.90 (<0.1%)	2.48 (0.6%)
Ogdensburg	0.025** (0.4%)	-0.058** (1.9%)	1.26 (<0.1%)	2.38 (<0.1%)
Pembina	-0.307** (<0.1%)	-0.120** (0.3%)	5.15 (<0.1%)	3.70 (<0.1%)
Portland	-0.092** (<0.1%)	-0.031** (22.4%)	2.69 (<0.1%)	1.74 (0.3%)
Seattle	-0.116** (<0.1%)	0.008** (75.4%)	2.27 (<0.1%)	1.13 (2.5%)
St. Albans	-0.160** (<0.1%)	-0.002** (75.8%)	2.51 (<0.1%)	0.886 (<0.1%)
All 8 Districts	-0.065** (<0.1%)	-0.044** (<0.1%)	2.14 (<0.1%)	1.90 (<0.1%)

Notes: Percentages shown in parentheses are significance levels for the null hypothesis that the coefficient is equal to zero.
** Indicates that time trend coefficients are significantly different (10% level) between the 1990-2000 and 2001-2008 periods.

Table 3. Full time-trend regressions by customs districts.

Customs District	Constant α	Year β	Dum01 γ	Year*Dum01 δ	R-squared
Buffalo	1.96 (<0.1%)	0.09 (83.3%)	-0.040 (2.6%)	-0.014 (65.9%)	0.773
Detroit	1.93 (< 0.1%)	-0.26 (9.9%)	-0.048 (< 0.1%)	0.014 (22.3%)	0.965
Great Falls	2.90 (<0.1%)	-0.42 (44.3%)	-0.082 (0.1%)	-0.002 (95.8%)	0.923
Ogdensburg	1.26 (<0.1%)	1.12 (<0.1%)	0.025 (1.2%)	-0.084 (<0.1%)	0.645
Pembina	5.15 (<0.1%)	-1.45 (<1%)	-0.307 (<0.1%)	0.187 (<0.1%)	0.973
Portland	2.69 (<0.1%)	-0.95 (5.5%)	-0.092 (<0.1%)	0.061 (8.4%)	0.900
Seattle	2.27 (<0.1%)	-1.14 (2%)	-0.116 (<0.1%)	0.124 (<0.1%)	0.809
St. Albans	2.51 (<0.1%)	-1.62 (<0.1%)	-0.160 (<0.1%)	0.157 (<0.1%)	0.941
All 8 Districts	2.14 (<0.1%)	-0.241 (11.4%)	-0.065 (<0.1%)	0.021 (6.2%)	0.974

Notes: Percentages shown in parentheses are significance levels for the null hypothesis that the coefficient is equal to zero.
The sample size for all regressions is 19 years (1990 – 2008). The time variable is equal to 1 in 1990.

Table 4. Top five HTS import commodities (all customs districts).

Year	Commodity Code	Commodity Description	Commodity Share (%)
1991	87	Motor vehicles	28.3
	27	Mineral fuels	11.3
	84	Mechanical machinery	8.0
	48	Paper products	6.7
	85	Electrical machinery	5.4
1998	87	Motor vehicles	26.5
	84	Mechanical machinery	9.2
	27	Mineral fuels	8.4
	85	Electrical machinery	5.6
	44	Wood products	5.5
2004	87	Motor vehicles	23.1
	27	Mineral fuels	19.1
	84	Mechanical machinery	7.0
	44	Wood products	5.5
	48	Paper products	3.9
2008	27	Mineral fuels	33.3
	87	Motor vehicles	14.2
	84	Mechanical machinery	6.4
	39	Plastics	3.2
	85	Electrical machinery	3.0

combined account for almost 50% or more of total imports in each sample year. The fact that the import commodity mix over time was dominated by the same relatively small set of commodities suggests that changes in the mix of U.S. imports from Canada are unlikely to account for the less favorable decline in the transport cost ratio post-2001, as discussed earlier.

Table 5 reports the five leading HTS commodities imported into each of the individual customs districts for three representative sample years. The industries associated with the HTS codes are identified in Appendix 2. There is clear persistence in the leading import categories for most districts over the sample years. Specifically, while there are certainly changes in the reported percentages for individual commodities, and even changes in rank order over the sample years, the leading import categories are, by and large, the same for most districts over the full time period. For example, commodities 87 and 84 account for approximately 47% of imports entering the Buffalo customs district in 2000 and around 30% in 2008. Commodities 87 and 27 account for around 41% of imports into the Detroit district in 2000 and around 45% in 2008. Imports entering through Great Falls are dominated by commodity 27 in all three years. For Seattle, commodities 27 and 44 account for 55% of imports in 2000 and around 51% in 2008. For St. Albans, commodities 85 and 88 account for around 38% of imports in 2000 and around 34% in 2008. To be sure, there is less persistent dominance in a few commodity categories for Ogdensburg, Pembina, and Portland.

In short, persistent concentration over time in a few commodity imports suggests that regional differences in observed changes in the transportation cost ratio across our sample of customs districts are not primarily a function of changes in commodity composition. Some additional evidence on this possibility was obtained from a "what if" analysis that we conducted. Specifically, we identified how the transportation cost ratio for each customs district

Table 5. Top five HTS – 2 import commodities.

	Buffalo		Detroit		Great Falls	
	HTS	**%**	**HTS**	**%**	**HTS**	**%**
1989	87	37.5	87	51.6	27	56.1
	84	11.6	84	10.9	1	1.5
	85	4.5	48	4.5	87	5.4
	75	4.1	76	2.8	44	4.8
	98	3.8	85	2.4	98	3.6
2000	87	36.7	87	32.1	27	47.7
	84	10.0	27	8.4	85	8.1
	85	5.3	84	8.3	2	7.5
	98	4.7	98	5.2	98	6.6
	39	3.5	85	4.8	44	6.3
2008	87	22.1	87	35.3	27	70.5
	27	20.2	27	10.0	84	6.2
	84	7.7	84	9.4	31	4.5
	39	4.5	76	4.8	2	2.4
	85	3.4	39	4.1	98	2.2
	Ogdensburg		**Pembina**		**Portland**	
	HTS	**%**	**HTS**	**%**	**HTS**	**%**
1989	87	17.7	27	13.7	3	38.7
	48	15.1	44	9.8	47	15.3
	76	9.4	47	9.5	27	9.0
	84	8.1	31	7.6	48	6.7
	98	4.6	84	6.5	44	5.3
2000	85	13.4	85	9.3	27	23.0
	27	10.0	27	8.7	3	20.5
	48	9.7	44	8.5	44	9.4
	76	5.8	87	6.6	47	67
	71	5.5	48	6.6	48	5.5
2008	27	19.4	27	11.3	27	41.6
	71	9.2	84	9.1	3	16.9
	76	9.5	31	7.7	48	5.8
	48	7.6	39	7.6	47	4.4
	84	5.2	10	5.1	40	4.0
	Seattle		**St. Albans**			
	HTS	**%**	**HTS**	**%**		
1989	44	27.1	85	2		
	48	13.8	48	13.8		
	27	7.6	44	7.2		
	84	5.9	84	5.8		
	87	5.8	87	5.4		
2000	27	39.6	85	21.8		
	44	15.4	88	16.3		
	98	7.0	44	7.8		
	48	5.0	27	7.0		
	84	3.6	48	6.9		
2008	27	41.1	88	26.4		
	44	9.4	27	12.0		
	48	5.2	85	8.0		
	84	4.7	84	7.7		
	98	3.4	48	6.8		

would have changed if the import commodity shares had remained unchanged from their beginning period (1990) values. A similar analysis was also conducted assessing how the transportation cost ratio for each customs district would have changed if import commodity shares in every time period were the same as in the end period (2008). In most cases, the differences between these counterfactual constant-commodity-mix ratios and the actual observed ratios are small, reinforcing our inference that changing commodity mixes within districts have made, at most, a relatively small contribution to the behavior of the transportation cost ratio over time for individual sample custom districts.

Even with a relatively constant mix of commodities over time, some customs districts might be more impacted than others by security-related border thickening due to the nature of the goods that are imported into that district from Canada. Specifically, districts that experienced a greater flattening-out of the transport cost ratio post-9/11 may have had a mix of commodity imports that was more vulnerable to border-related disruptions.

Goldfarb and Robson (2003) estimate measures of vulnerability to border disruptions for a set of commodities exported to the United States from Canada. Their measure of vulnerability takes the form of an index calibrated on a scale of 1-10. The overall index value given to a commodity is subjectively estimated based on a number of attributes of the commodity, such as whether or not it is perishable, its susceptibility to physical tampering, and so forth. The overall vulnerability of the import mix passing through each of our sample custom districts was estimated by using the commodity-level vulnerability index values as estimated by Goldfarb and Robson and then averaging those commodity-level index values using the import volumes as weights for the various commodities imported within each district.

Table 6 reports values for the Goldfarb-Robson index for the commodities that encompass the majority of Canadian exports to the United States. In turn, Table 7 reports the vulnerability of each customs district based on the calculated weighted average of the individual commodity index values. Given that the potential range for the overall index is 1 to 10, there is obviously a great deal of similarity across districts in their susceptibility to border disruptions since the index values cluster between 4.5 and 6.5. Furthermore, since the import mix for the individual customs districts are relatively stable over time, the district-level vulnerability index values are also fairly stable. Nevertheless, it is suggestive that the districts showing the greatest flattening-out of the transportation cost ratio decline after 2001, most notably Portland and Seattle, have relatively low district-level vulnerability indices. Conversely, two districts with relatively high vulnerability index values, Buffalo and Detroit, show the least evidence of a flattening-out of the transportation cost ratio after 9/11.

Table 6. Industries and overall vulnerability to border disruptions.

HTS Numbers	Goldfarb-Robson Index
1	6.4
2	6.8
3	5.4
27	2.6
31	4.8
37	6.0
39	6.0
40	5.0
44	6.0
47	5.0
48	4.8
71	5.0
75	4.6
76	4.6
84	4.6
85	6.0
87	6.6
98	6.0

In summary, our analysis indicates that differences across customs districts in the behavior of the transportation cost ratio over time are not obviously related to changes in the commodity mixes passing through those districts. Nor are the differences obviously linked to the vulnerability of the commodities passing through the districts. Another possibility is that differences in the behavior of the transport cost ratio are related to the capability of individual customs districts to respond to border security-related disruptions rather than to their specific commodity import mixes. We explore this possibility further in the next section. In particular, we assess the role that government programs implemented in the wake of 9/11 might have played in influencing the observed differences across customs districts in the behavior of transportation costs.

Table 7. District-level vulnerability index values.

District	2000	2002	2005	2008
Buffalo	6.5	6.2	5.8	5.5
Detroit	6.7	6.7	6.5	6.1
Great Falls	4.4	3.9	3.4	3.5
Ogdensburg	5.5	5.3	5.0	4.9
Pembina	5.5	5.4	5.2	5.0
Portland	4.7	4.6	4.2	4.2
Seattle	4.3	5.0	4.6	4.3
St Albans	6.1	6.2	6.3	5.9

Note: District-level vulnerability index values are weighted averages of Goldfarb-Robson vulnerability index values for HS-2 commodities where the weights are district-level commodity trade values. The Goldfarb-Robson values do not change over time at the commodity-level but the district-level values change as commodity weights vary from 2000 through 2002, 2005, and 2008.

4. FAST availability and utilization

In the wake of 9/11, the U.S. and Canadian governments worked together to produce the Smart Border Accord, which was signed on December 12, 2001. One program included in the Agreement was a harmonized commercial processing system known as Free and Secure Trade (FAST). The FAST Program is designed to expedite the clearance of commercial shipments at the border for preapproved participants, including importers, carriers and truck drivers. In principle, participation in FAST allows for shipments to be cleared more quickly and with more predictability as to timing, since repeated and detailed security inspections at the border are not required of FAST participants. Hence, districts in which FAST shipments account for a relatively large share of total imports should enjoy lower transportation costs than districts in which FAST shipments account for a relatively low share of imports, other things constant.

Unfortunately, published information on the share of imports eligible for FAST approval by port or district is unavailable, nor is consistent time series information readily available to allow us to identify the capacity of ports within each district to process commercial shipments under the FAST Program. From internal documents created and supplied to us by U.S. Customs and Border Protection, we are able to identify when FAST became operational in different ports, the number of commercial lanes available for use in each of those ports, and the number of lanes dedicated specifically to FAST-approved imports. These data are reported in Table 8 and provide some insight into the capabilities of ports within districts to process imports through the FAST Program.[3] Also reported in Table 8 is the percentage of shipments processed through the FAST Program as a share of total imports processed at the specific port.

Detroit and Port Huron have relatively high proportions of FAST shipments, as do the Buffalo ports. On the other hand, the two ports on the border of British Columbia and Washington State (Oroville and Blaine) have relatively low FAST proportions. These regional differences might be explained by the fact that goods crossing into the ports of Detroit, Port Huron, and Buffalo from Canada are more likely to be carried by full-load trucks that, in turn, are dedicated to carrying products manufactured by large and vertically-integrated transportation equipment manufacturers. Conversely, goods entering through the ports of Oroville and Blaine are likely to be more varied and produced by smaller, non-integrated producers. This supposition is supported by the observation that there is a greater use of less-than-carload (LTC) freight shipments in the Western ports than in the ports bordering Ontario (Bradbury and Turbeville, 2008).

Companies using LTC freight shipments are likely to find membership in FAST less advantageous than vertically integrated companies that are able to ship using full-load trucks, since shipments can only be expedited under FAST if all goods on a truck are shipped by FAST-approved companies. The carrier and the driver must also be FAST-approved (Bradbury and Turbeville, 2008). There are also substantial fixed and sunk costs associated with applying for FAST approval which makes membership in FAST less economical for smaller companies and shippers. The relatively large fixed costs associated with receiving FAST approval might help explain the much lower percentage of shipments that are FAST-approved in Oroville and Blaine compared to Detroit, Port Huron, and Buffalo. The latter districts contain the large, multinational automobile manufacturers and other large industrial companies for whom FAST membership is likely to be financially viable.

[3] It should be emphasized that estimates of the number of total lanes, FAST lanes, and FAST as a percentage of shipments are snapshots at a point in time. Hence, using one or more of these variables in time series estimates is not feasible.

Table 8. FAST lane capacity, utilization, and opening dates.

Port	District	# of Lanes	FAST Dedicated Lanes	Estimate FAST as % of all shipments	Date of opening
Detroit	Detroit	14	5	44%	Dec-02
Port Huron	Detroit	3	2	31%	Dec-02
Sault Ste. Marie	Detroit	2	0	15%	Aug-06
Buffalo/Peace Bridge	Buffalo	7	0	23%	Dec-02
Buffalo/Lewiston Bridge	Buffalo	4	1	23%	Dec-02
Champlain	Ogdensburg	5	1	17%	Dec-02
Ogdensburg	Ogdensburg	3	0	16%	Aug-06
Massena	Ogdensburg	1	0	5%	Aug-06
Alexandria Bay	Ogdensburg	3	0	20%	Jul-02
Derby Line	St. Albans	2	0	13%	Dec-02
Highgate Springs	St. Albans	1	0	9%	Dec-02
Houlton	Portland	2	0	12%	Jul-05
Oroville	Seattle	2	0	8%	Aug-06
Blaine	Seattle	3	1	8%	Nov-04
Sweet Grass	Great Falls	2	0	3%	Aug-04
Pembina	Pembina	3	0	21%	Aug-03

There is a great deal of uncertainty surrounding the effectiveness of FAST and other "Trusted Trade" programs in facilitating faster or less costly border crossings for commercial shipments. Moens (2010) suggests that many shippers who are enrolled in secure and trusted cargo and driver programs find little return for their investment in those programs. In particular, trucks and truckers enrolled in these programs find themselves in long waiting lines to get to their expedited lanes and are pulled over for inspection frequently despite their "secure" status.

Regardless of the overall effectiveness of the FAST program, it is likely that ports with a higher proportion of FAST shipments are more capable of mitigating border-related security disruptions than are ports with a substantially lower proportion of FAST shipments. As a consequence, the latter are more likely than the former to exhibit a flattening-out of the transportation cost ratio after 2001. Indeed, the Portland and Seattle customs districts exhibit the most marked flattening-out of the transportation cost ratio.

The differences across districts in the net advantages of "Trusted Trade" programs such as FAST are reflected in changes in the utilization of truck transportation to import commodities from Canada. In 1996, the earliest year for which information is available, trucks accounted for the majority of imports entering each customs district, with the share of trucking imports being as high as 82% for Ogdensburg and as low as 55% for Great Falls. The share of shipments accounted for by truck generally declined across our sample of customs districts in the post-2001 period; however, the rate of decline varies across districts.

Table 9 reports the percent of imports by truck for 2002 and 2008 for each of the sample districts. Decreases in the percentage are quite marked for Portland, Ogdensburg, Seattle, Great Falls, and Pembina. Conversely, the decreases are modest for Detroit and Buffalo. As noted earlier, Detroit and Buffalo are characterized as having a relatively high share of FAST-approved shipments, whereas ports

Table 9. Percent of imports by truck.

	Year	
District	2002	2008
Portland	77	52
St. Albans	60	51
Ogdensburg	84	70
Buffalo	69	62
Seattle	69	42
Great Falls	35	22
Pembina	68	49
Detroit	63	61

in the Portland, Seattle, and Pembina districts have relatively low shares of FAST-approved shipments. This pattern is consistent with an inference that truck transportation in the latter customs districts was relatively disadvantaged by the economics of the FAST program compared to the former. The Portland, Seattle, and Pembina districts also show a more substantial flattening-out of the transportation cost curve in the post-2001 period compared to Detroit and Buffalo. In short, FAST and related programs appear to have had different impacts on transportation costs depending upon the importers' locations.

5. Shipping Distances and Port Concentration

One or two other possible influences on the behavior of the transportation costs over time might be considered. One is the distance of land ports within a district from the sources of origin of shipments from Canada. The greater this distance, the higher the shipping costs, other things constant. Hence, if the average shipping distance changes over time, the calculated transportation cost ratio for a customs district should also change. Average shipping distances can change because points of origination of exports from Canada move further away from the border and/or imports are increasingly processed at U.S. ports further removed from the border.

While we do not have the requisite data to draw direct inferences about the changing impact of average shipping distances on the transport cost ratio, we do know that the bulk of imports from Canada are processed at land ports located at the border. Indeed, essentially all imports were processed at the border in the cases of Ogdensburg, Buffalo, Pembina, and Detroit in 2008. For that same year, approximately 75% of imports into the Portland and St. Albans districts were cleared through ports located at the border. Around 60% of imports into the Seattle and Great Falls districts passed through border ports. Since we do not have a time series for the percent of imports cleared through ports at the border, we cannot reject the possibility that the percentages of imports clearing through border ports changed significantly over time. Nor can we reject the possibility that any such changes were not uniform across customs districts. Notwithstanding, any such changes are likely to be primarily associated with increased shipments of mineral fuels by pipeline, since commodities processed at "inland ports" are either mineral products transported by pipeline or in-bond goods. Since pipeline transport costs are relatively insensitive to distance, it is unlikely that changing shipping distances are an important influence on the transportation cost ratios calculated for our sample of customs districts.

A second possible influence on transportation costs not yet discussed is the response of firms and politicians to post-9/11 border security developments and infrastructure imperatives. We have no reliable way of quantifying such responses; however, we would argue that a higher concentration of imports by port within any customs district conditions the responses of politicians and private sector managers in important ways. For example, a concentration of imports processed by a small number of ports might provide those port administrators with the political influence needed to obtain additional customs personnel and other resources required to facilitate additional security procedures without degrading service levels. This dynamic would be strengthened if the shippers and transport companies using concentrated ports themselves enjoy political influence. A concentration of imports in specific port locations might also signal a corresponding concentration of production capacity. The close geographic proximity of participants in manufacturing value chains should enable the firms involved to coordinate responses to border-related security disruptions more effectively than firms interacting with each other over greater physical distances. In short, we would expect customs districts in which import shipments are concentrated in a few ports to show less of a flattening-out of transportation costs over time than customs districts with lower levels of port concentration.

In fact, there are fairly substantial differences across customs districts in the concentration of shipments through individual ports. For example, essentially all imports into the Buffalo district enter through a single port (Buffalo-Niagara Falls). In the case of Detroit, three ports account for virtually all of that district's imports (Detroit, Port Huron, and Sault Ste. Marie). On the other hand, imports to the Portland and Seattle districts are distributed across a significantly larger number of ports. As discussed in an earlier section of this report, the latter two districts show a noticeable flattening-out of the post-9/11 transportation cost ratio, whereas the first two districts exhibited no such flattening-out. This limited evidence is consistent with variations in port concentration playing some role in explaining the observed post-9/11 differences in district-level transport cost trends.

6. Overall conclusions

This study adds to accumulated evidence of a thickening of the border for Canadian exports to the U.S. in the post-9/11 period. Specifically, we show that a trend of declining transportation costs for U.S. imports from Canada that was quite marked in the period from 1990-2001 slowed significantly after 2001. To our knowledge, this is the first study that directly examines transportation cost changes over time for Canada-U.S. trade flows. Hence, it represents a new source of evidence on the widely discussed "thickening" of the Canada-U.S. border.

Perhaps of even greater interest, our study documents that changes in transportation costs over time differ across U.S. customs districts receiving imports from Canada. Specifically, the flattening-out of the declining transportation cost ratio trend after 2001 is statistically significant for some customs districts but not for others. For example, the transportation cost ratio decline slowed significantly in the cases of Seattle and Portland customs districts but did not slow significantly for the districts of Detroit and Buffalo. In this context, our study provides some evidence that the post-9/11 thickening of the border is not uniform across the entire Canada-U.S. border. Rather, post-9/11 developments seem to have caused regionally-differentiated impacts across border crossing locations.

Two factors that seemingly help explain the regionally-differentiated impacts are the concentration of trade within a small number of ports and the availability and ostensible benefit of the FAST program for individual customs districts. Both of these factors are "policy related" in the sense that they either reflect explicit policy choices (in the case of FAST) or the level of political influence (in the case of port concentration). Thus, our overall story is one of regional variations in transport cost changes that were induced by developments triggered by 9/11, but whose relative regional impacts were then mitigated or reversed by policy-related responses. For example, one might have expected the Detroit district to have suffered a greater deterioration of transport costs after 9/11 than the Seattle district based on comparisons of district-level vulnerability to disruption. In fact, the regionally differentiated impacts of policies such as FAST seem to have been more than enough to offset regional differences in *ex ante* vulnerability to disruption.

The analysis provided in this paper confirms the view that there are important regional differences in the characteristics of cross-border transportation costs. Our results also show that border policies result in differential regional impacts, even if they are implemented in a single national program; in fact, the uniform national program may be a cause of the differential regional impacts. Taken together, our findings suggest that some regional "fine-tuning" of border policies might be necessary to ensure an efficient and equitable outcome of those policies across the various ports and districts on the Canada-U.S. border.

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References

Ackleson, Jason. 2009. From Thin to Thick (and Back Again?): The Politics and Policies of the Contemporary U.S.-Canada Border. *American Review of Canadian Studies* 39(4):336-351.

Anderson, James and Eric van Wincoop. 2004. Trade Costs. *Journal of Economic Literature* 42:691-751.

Bonsor, Norman. 2004. Fixing the Potholes in North American Transportation Systems. *Choices* 10(8):1-18.

Bradbury, Susan and Daniel Turbeville. 2008. Are Enhanced Trade and Enhanced Security Mutually Exclusive? *American Review of Canadian Studies* 38(3):317-340.

DAMF Consulting. 2005. *The Economic Impact of Post-September 11, 2001; U.S. Border Security Measures on the Canadian Trucking Industry*. Montreal.

Frankel, Jeffrey. 1997. *Regional Trading Blocs in the World Economic System*. Washington, D.C.: Institute for International Economics.

Globerman, Steven and Paul Storer. 2008. *The Impacts of 9/11 on Canada-U.S. Trade*. Toronto: University of Toronto Press.

Globerman, Steven and Paul Storer. 2009. Border Security and Canadian Exports to the United States: Evidence and Policy Implications. *Canadian Public Policy* 35(2):171-186.

Goldfarb, Danielle and William Robson. 2003. Risky Business: U.S. Border Security and the Threat to Canadian Exports. *The Border Papers* No. 177, Toronto: C.D. How Institute.

Goodchild, Anne, Steven Globerman and Susan Albrecht. 2008. Service Time Variability at Blaine,Washington Border Crossing and Impact on Regional Supply Chains. *Transportation Research Record* No. 2066:71-78.

Hart, Michael. 2010. A Matter of Trust: Expanding the Preclearance of Commerce between Canada and the United States. *The Border Papers* No. 309, Toronto: C.D. Howe Institute.

Hummels, David. 2007. Transportation Costs and International Trade in the Second Era of Globalization. *Journal of Economic Perspectives* 21(3):131-154.

Lee, Linda, Pierre Martin, Stella Ouellet and Francois Vaillancourt. 2005. American Border Security Measures: Potential Economic Impacts and Policy Responses from a Quebec Perspective. Unpublished manuscript, University of Montreal.

Lim, Siew Hoon and C.A. Knox Lovell. 2009. Profit and Productivity of U.S. Class I Railroads. *Managerial and Decision Economics* 30:423-442.

Lovecraft, Amy. 2007. Transnational Environmental Management: U.S. Canadian Institutions at the Interlocal Scale. *American Review of Canadian Studies* 32:218-245.

MacPherson, A., J.E. McConnell, A. Vance, and V. Vanchan. 2006. The Impact of US Government Anti-terrorism Policies on Canada-US Cross-border Commerce: An Exploratory Study from Western New York and Southern Ontario. *Professional Geographer* 58:266-277.

Moens, Alexander. 2010. *Skating on Thin Ice: Canadian American Relations in 2010 and 2011*. Vancouver: The Fraser Institute.

Sands, Christopher. 2009. *Toward a New Frontier: Improving the U.S.-Canadian Border.* Washington D.C.: The Brookings Institution.

Taylor, John, Douglas Robideaux and George Jackson. 2004. U.S.-Canada Transportation and Logistics: Border Impacts and Costs, Causes, and Possible Solutions. *Transportation Journal* 43(2):5-21.

Appendix 1. Customs Districts and Ports.

District	Port Name	
Portland, ME	Portland, ME Bangor, ME Eastport, ME Jackman, ME Vanceboro, ME Houlton, ME Fort Fairfield, ME Van Buren, ME Madawaska, ME Fort Kent, ME Bath, ME	Bar Harbor, ME Calais, ME Limestone, ME Rockland, ME Jonesport, ME Bridgewater, ME Portsmouth, NH Belfast, ME Searsport, ME Lebanon, Airport, NH Manchester User Fee Airport, NH
St. Albans, VT	St. Albans, VT Richford, VT Beecher Falls, VT Burlington, VT	Derby Line, VT Norton, VT Highgate Springs/Alburg
Ogdensburg, NY	Ogdensburg, NY Massena, NY Cape Vincent, NY Alexandria Bay, NY	Champlain-Rouses Point, NY Clayton, NY Trout River, NY
Buffalo, NY	Buffalo-Niagara Falls, NY Rochester, NY Oswego, NY Sodus Point, NY Syracuse, NY	Utica, NY TNT Skypak Swift Sure Courier Service Binghampton Regional Airport, NY
Seattle, WA	Seattle, WA Tacoma, WA Aberdeen, WA Blaine, WA Bellingham, WA Everett, WA Port Angeles, WA Port Townsend, WA Sumas, WA Anacortes, WA Nighthawk, WA Danville, WA Ferry, WA Friday Harbor, WA Boundary, WA Laurier, WA Point Roberts, WA	Kenmore Air Harbor, WA Oroville, WA Frontier, WA Spokane, WA Lynden, WA Metaline Falls, WA Olympia, WA Neah Bay, WA Seattle-Tacoma International Airport U.P.S Avion Brokers & SEATAC DHL Worldwide Express Airborne Express & SEATAC Yakima Air Terminal Grant County Airport UPS Courier Hub

Appendix 1 (continued). Customs Districts and Ports.

District	Port Name	
Great Falls, MT	Raymond, MT	Roosville, MT
	Easport, ID	Morgan, MT
	Salt Lake City, UT	Whitlash, MT
	Great Falls, MT	Del Bonita, MT
	Butte, MT	Wildhorse, MT
	Turner, MT	Kalispell Airport, MT
	Denver, CO	Willow Creek,
	Porthill, ID	Havre, MT
	Scoby, MT	Natrona County
	Sweetgrass, MT	International Airport
	Whitetail, MT	Arapahoe County
	Piegan, MT	Public Airport, CO
	Opheim, MT	Eagle County Regional Airport, CO
Pembina, ND	Pembina, ND	Westhope, ND
	Portal, ND	Noonan, ND
	Neche, ND	Carbury, ND
	St. John, ND	Dunseith, ND
	Northgate, ND	Warroad, MN
	Walhalla, ND	Baudette, MN
	Hannah, ND	Pinecreek, MN
	Sarles, ND	Roseau, MN
	Ambrose, ND	Grand Forks, ND
	Fargo, ND	Crane Lake, MN
	Antler, ND	Lancaster, MN
	Sherwood, ND	Williston Airport, ND
	Hansboro, ND	Minot Airport, ND
	Maida, ND	Hector International Airport, ND
	Fortuna, ND	
Detroit, MI	Detroit, MI	Escanaba, MI
	Port Huron, MI	Marquette, MI
	Sault Ste. Marie, MI	Algonac, MI
	Saginaw/Bay City, MI	Muskegon, MI
	Battle Creek, MI	Grand Haven, MI
	Grand Rapids, MI	Rogers City, MI
	Detroit Metropolitan Airport, MI	Detour, MI

Appendix 2. List of HTS Numbers and the Corresponding Commodity.

HTS Number	Commodity
1	Live animals
2	Meat
3	Fish and shellfish
10	Cereals
27	Mineral fuels
31	Fertilizers
37	Photographic or cinematographic products
39	Plastics
40	Rubber Products
44	Wood products
47	Pulp products
48	Paper products
71	Precious stones and metals
75	Nickel products
76	Aluminum products
84	Mechanical machinery
85	Electrical machinery
87	Motor vehicles
88	Aircraft and Spacecraft
98	Special categories