The Effects of 9/11 on Canadian-U.S. Trade: An Update through 2008

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Executive Summary

This study updates the authors' (2008) statistical examination of changes in the behavior of Canada-U.S. trade following the tightening of security at the Canada-U.S. border in the wake of the terrorist attacks of September 11, 2001. In addition to an updated sample, this study uses constant-dollar "real" exports and imports rather than current-dollar values. The use of constant-dollar exports and imports identifies changes in quantities of goods crossing the border and controls for changes in the prices of those goods.

The regional analysis in this study focuses on three sets of ports rather than the ten ports in the original. The three sets of ports are the Great Lakes Gateway (Detroit, Buffalo-Niagara Falls, and Port Huron), the Cascade Gateway (represented by the Blaine Peace Arch Crossing), and a grouping of all other ports that corresponds fairly closely to the Rural Gateway category from the "Toward a New Frontier" Brookings study by Sands (2009). By using these groupings of ports, our statistical results are more directly applicable to the framework of the Sands paper.

For total U.S. exports to Canada, there are significant declines in trade volumes in at least the second half of 2001 and in 2002. There are smaller effects in 2003. For total U.S. imports from Canada, significant negative effects are found in the 4th quarter of 2001 and in 2002, 2003, 2004, and again in 2008. In general, there is greater evidence of disruption of trade flowing from Canada to the United States than from the United States to Canada. As imports from Canada promote higher real income levels in the United States through several different channels of influence, the adverse impact of border security developments on U.S. imports from Canada is of concern to Americans, as well as Canadians.

The intensity, direction, and duration of border security-related trade impacts varied across ports. Trade disruption effects seemed to be of shorter duration in the Great Lakes Gateway than in the Blaine/Cascadian Gateway. This difference could be due to the greater utilization of programs such as FAST in the Great Lakes Gateway. Shares of individual ports in total Canada-U.S. trade reveal changes in trends that roughly coincide with the post-9/11 security regime.

The results of our study indicate that increases in border costs may have had significant impacts on trade. An inference of this observation is that the long-run real living standards of both Canadians and Americans have been adversely affected by post-9/11 border security developments.

This creates a public policy imperative to reduce costs of bilateral trade without making undue sacrifices in the safety of Canadians and Americans from terrorist attacks. Further, differences in impacts on trade observed between specific ports and gateways argue for policies that reflect regional differences, including differences in the composition of trade.

Introduction

Canada and the United States are linked by the world's largest bilateral trading relationship, and this relationship has been increasingly characterized by highly-integrated trade in raw materials, intermediate goods, and final products which creates a mutual economic dependency. Notwithstanding the importance of mutually beneficial trade between Canada and the United States, a recent Brookings Institution study by Christopher Sands (2009) describes various aspects of North American political reality that foster a tendency to neglect the border spanned by this trading relationship. Such a policy of neglect can be benign or neutral in effect when there are no other agendas that target the border, but when security concerns galvanize the national political will, there is a danger that significant collateral damage may be inflicted on a crucially important trading relationship. The purpose of this study is to provide an investigation of the behavior of Canada-U.S. cross-border trade in the wake of post-9/11 border security changes.

There is evidence that heightened security measures enacted after the terrorist attacks of September 2001 have increased the costs of doing business across the Canada-U.S. border. Any such cost increases will, in turn, either lower profit-margins for sellers and/or lead to "pass-through" of price increases for imported goods to consumers, particularly for imported products having few domestically produced substitutes. To the extent that declining profitability prompts foreign firms to decrease exports, the prices of products will likely increase in the domestic market due to declining competition associated with fewer imports. Increases in security-related costs therefore drive a wedge between domestic prices of goods imported from NAFTA neighbors and the costs of production of those goods in the exporting country. This wedge acts like a tax or a tariff and has the same trade-discouraging effect as imposing a monetary penalty on trade. A consequence is that consumers in the domestic market will suffer decreases in their real purchasing power and, therefore, lower real standards of living. Another is that domestic producers will use higher cost and less efficient domestically-made inputs, thereby adversely affecting productivity levels in the domestic economy. The latter consequence further erodes real standards of living.

There are several ways to detect the trade-discouraging effects of costs related to the burdens imposed by security-related border procedures or other trade-related regulations. . For example, several observers have noted that, in recent years, the level of Canada-U.S. trade has been lower than would be expected simply based on past trends. A May 2008 *National Post* article by Goldfarb and Hodgson described this relative shortfall in Canada-U.S. trade and outlined a number of initiatives that could be taken to offset "disappearing trade with the United States and the associated impact on Canadian living standards". Figure 1 provides an illustration of this trade shortfall by dividing the (Canadian dollar) value of U.S. exports to Canada by Canadian nominal gross domestic product (GDP).

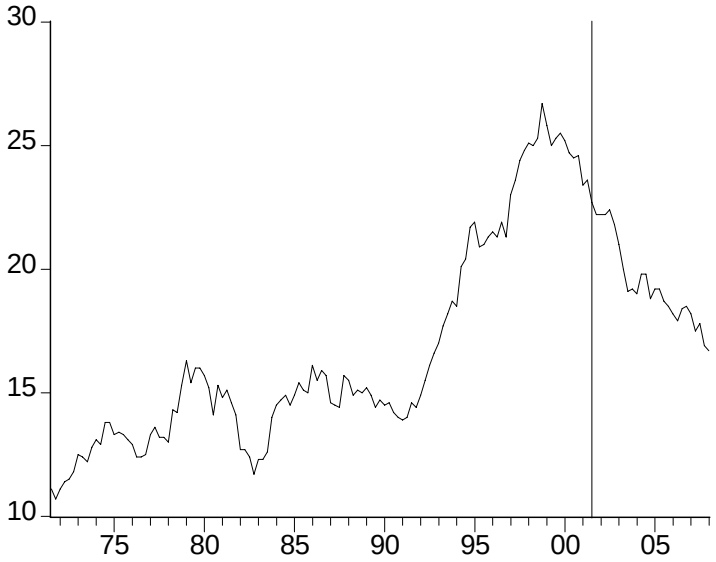


Figure 1. U.S. Exports to Canada as a fraction of Canadian GDP

Fluctuations in this ratio of U.S. exports to Canadian GDP reveal how the extent of Canada-U.S. economic integration is changing over time. For example, Figure 1 clearly reveals the strong growth of U.S. exports to Canada in the period after the 1989 Canada-U.S. Free Trade Agreement. During the first ten years of the FTA, growth of U.S. exports to Canada exceeded the growth rate of nominal GDP in Canada reflecting increased Canada-U.S. economic integration. This ratio began to fall in the late 1990s and the decline continued through the first quarter of 2008. This reversal of the 1989-1999 trend of increasing Canada-U.S trade is a cause for concern on both sides of the Canada-U.S. border, because increased integration from 1989 through 1999 was associated with positive gains from trade and the realignment of production and supply chains from a national orientation to a North American basis. If the recent declining trend continues at the same pace for several more years, this simple measure of Canada-U.S. trade integration will return to its pre-FTA levels.

While the ratio shown in Figure 1 controls for changes in the level of economic activity in the importing country (Canada in this case), the graph isn't able to indicate how much of the observed movement of the ratio is due to changes in "traditional" factors such as the Canada-U.S. exchange rate. To incorporate fully the impacts of changes in economic activity and exchange rates (the "usual suspects" in economic explanations of trade behavior), it is necessary to move from graphical analysis to statistical analysis using regression methods. Recent studies by Globerman and Storer (2008) and Grady (2008) provide evidence of a significant decline in Canada-U.S. trade in the period after 9/11, although the effect was longer lasting for U.S. imports from Canada than for Canadian imports from the United States. The analysis of Globerman and Storer looked at both aggregate and port-level trade, while Grady broke trade down by commodity classifications but not by port. The potential relevance of post-9/11 security developments is shown by the vertical line in Figure 1. This line identifies the third quarter of 2001 and separates the graph into pre- and post-9/11 periods. While the reversal of trade patterns in Figure 1 begins before 9/11, the reduction is steep and sustained immediately afterward.

The structure of the study is as follows. The first section following this introduction briefly reviews the literature on the effect of increased border security on the costs of Canada-U.S. trade and then describes Canada-U.S. trade using graphs showing the level of Canada-U.S. trade. This analysis is supplemented by a graph of the predicted time-pattern of trade shortfalls derived from a regression analysis of U.S. imports and exports. In the following section we investigate port-level effects by looking at the share of the ten largest U.S. ports of entry on the northern border to detect changes in the relative fortunes of the ports in the post-9/11 period. A concern in this port-level analysis is that the nature of trade at certain ports might be vulnerable to trade disruption and/or that post-9/11 policy responses such as the FAST program may have been more effective at mitigating delays at specific ports. Regional regression analysis is used to describe change in trade behavior at the key border corridors identified by Sands (2009). The automotive sector is then analyzed in isolation due to its high degree of trade in intermediate inputs and correspondingly elevated vulnerability to trade disruption due to security costs. A final section summarizes and interprets the empirical results obtained in the study.

The Impacts of 9/11 on Aggregate Canada-U.S. Trade

While the immediate human costs of the tragic events of 9/11 were the subject of front-page news coverage, more subtle costs have also been created by the policy response to the acts of terror on U.S. soil. The realities of the post- 9/11 world have contributed to an increased concern for security relative to international commerce with a corresponding greater emphasis placed on scrutinizing people and freight shipments entering the United States. This heightened focus on security is the source of what has come to be described as a “thickening” of the Canada-U.S. border, although increased concerns over agricultural inspections and fees have also been cited as contributing to the increase in border costs.

Researchers have attempted to measure the impact of the post-9/11 security regime on commercial shipments crossing the border. Some studies have documented an increase in the average duration and variability of border crossing times, while others have measured the effect of the longer and less predictable border crossing times on the costs of shipping goods. Survey work has described measures taken, or contemplated, by firms in response to these increased delays and associated costs (see Vance (2007) and Goldfarb (2007)). Other work has looked at changes in cross-border flows of people (Hodges (2007)) and goods (Globerman and Storer (2008)) in the aftermath of 9/11.

The goal of this study is to extend and update the results reported by Globerman and Storer (2008) in order to identify the longer-term effects of post-9/11 border security measures. As described in the technical appendix to this paper, the methodology involves the use of statistical regression analysis to relate changes in trade flows to traditional factors such as changes in the level of overall economic activity and the exchange rate. The Globerman and Storer method attributes significant post-9/11 changes in trade that are not explained by these traditional factors to policy changes in the post-9/11 security environment.

It is important to acknowledge that this evidence of a security-related effect on trade is indirect and somewhat circumstantial and, as a result, changes in other unknown (or unaccounted for) factors could actually be responsible for some of the post-9/11 effects. As a result it is important to examine as many alternative causes of the post-9/11 trade pattern as possible. For example, an increase in the competitive

position of China in the U.S. market could have contributed to a decline in the level of U.S. imports from Canada at any given combination of U.S. GDP and exchange rate values.

Before turning to the results of statistical regression analysis, it is useful to examine graphs of Canada-U.S. trade to detect potential breaks in the series following 9/11. The two panels of Figure 2 present data for surface trade between Canada and the United States that passed through the ports of entry on the land border. The top panel is for U.S. exports to Canada, while the bottom panel looks at U.S. imports from Canada. Of the two graphs, the graph for U.S. imports shows a more pronounced dip after 9/11 (identified by the vertical line). This impression is confirmed by the more formal regression results.

Figure 3 repeats the analysis of Figure 2 using trade data adjusted for price changes through the use of import and export price indices. These adjusted series isolate the impact of changes in quantities traded from changes in the value of trade caused by fluctuations of prices or exchange rates. Use of these price-adjusted data has a greater impact on the import series than on the export series, and the flattening of the import graph comparing Figures 2 and 3 reveals that much of the increase in imports observed after 2004 in Figure 2 is due to rising prices rather than increasing quantities. Price-adjusted export and import data of the type shown in Figure 3 is therefore used in the regression analysis conducted for this study.

Surface-mode trade between Canada and the United States includes shipments by truck, rail, and pipeline. Of these three transport modes, truck travel is generally believed to be the most susceptible to disruption by border delays. Accordingly, Figure 4 provides the same information as Figure 2 for shipments by truck exclusively. The change in trade behavior after 9/11 seems more pronounced for shipments by truck than for all land shipment modes, although there is also some evidence that the downward shift begins prior to the third quarter of 2001. The timing of the changes in these graphs, as well as the fact that truck trade seems to be more affected than trade in the aggregate, supports the hypothesis that post-9/11 security procedures had a negative impact on the level of Canada-U.S. trade.

A non-technical summary of the regression results conducted in the study is provided in Figure 5. The bars in Figure 5 measure the estimated percentage change in the level of U.S. trade with Canada in each time period relative to the pre-9/11 period, after controlling for the effects of any post-9/11 changes in real GDP and the Canada-U.S. exchange rate (the key variables included in the regressions).[1]. The blue bars are estimates for U.S. price-adjusted exports to Canada using all land modes, while the purple bars are for U.S. price-adjusted imports from Canada. For example, the first pair of bars suggests that in the third quarter of 2001, U.S. exports to Canada were down by roughly 8 percent relative to the pre-9/11 period, while imports from Canada were down by about 3 percent. The time pattern for exports shows that negative impacts on U.S. exports to Canada lessened after 9/11 and eventually became positive (although these positive effects are not different from zero using conventional statistical tests of significance). The positive effect is estimated to decline in size in 2008. The results for imports show persistent negative effects that diminish after 2003 but start to get wider again in 2007 and 2008.

The finding that U.S. imports from Canada are more affected by increased border security than U.S. exports to Canada is a general message from this study and is consistent with the view that security measures were tightened more extensively for trade entering the United States than for trade entering Canada. This observation should not be taken as a measure of comfort by U.S. policymakers. As noted earlier, both exports and imports contribute to the specialization of production in the United States which, in turn, enables U.S. households to achieve higher levels of real consumption for any given level of nominal income. Specialization of production also contributes to improved productivity on the part of U.S.-based companies which underlies U.S. economic growth. In short, both export and import shortfalls have negative consequences for the U.S. economy.

Regional and Industry-Level Trade Impacts of 9/11

(a) Graphical Analysis of Port-Level Effects

Policy makers have an interest in the effects of post-9/11 security measures at the level of individual ports of entry as well as the aggregate level, because the level of vulnerability to trade disruption might vary by port, perhaps due to differences in commodity mixes. Furthermore, post-9/11 policy responses such as the FAST program may have been more effective at mitigating delays at certain ports. Our port-level analysis is initially conducted for the ten largest ports of entry which collectively account for close to 85 percent of Canada-U.S. trade (a list of these ports is provided below). For each port, we examine changes in the amounts of imports and exports, as well as the change in the share of each port in total Canada-U.S. surface trade. The changes in shares will reveal whether there were changes in the relative positions of the ports that might be associated with differential post- 9/11 impacts.

The post-9/11 behavior of U.S. exports to Canada is examined for the ten largest ports on the northern border in the ten pairs of panels of Appendix A. These graphs provide evidence of changes in trends around the time of 9/11 for the ports of Blaine, Detroit, Alexandria Bay, Champlain/Rouses Point, and Highgate Springs. After 9/11, the share of total U.S. exports seems to rise for Blaine and Detroit, while it falls for Alexandria Bay, Champlain/Rouses Point, and Highgate Springs. The share of Detroit falls again in 2007 and 2008, presumably reflecting the decline in the automotive industry during the current economic downturn.

Similar findings are revealed by the port-level analysis of U.S. imports from Canada in Appendix B. There is evidence of a declining share of total exports for Blaine, Portal, Port Huron, Alexandria Bay, and Champlain/Rouses Point. There is a temporary rise in the share of Detroit in the immediate post-9/11 period, although the share for Detroit falls markedly in 2007 and most of 2008.

A general pattern from these results is that the largest port, Detroit, saw its share of trade increase in the aftermath of 9/11. In contrast, shares of trade fell at some of the smaller ports of entry. This finding might be explained by the fact that a large share of trade at Detroit is related to the automotive sector, where large firms can afford the fixed-cost investments needed to take full advantage of trusted-traveler programs such as FAST.

(b) Gateway-Level Analysis

We also find evidence of shifts in the trade shares of the gateway port groupings. For U.S. exports to Canada, the share of the Great Lakes Gateway rises through 1998, hits a plateau around 2000, and then begins to decline. Both Blaine and the combined group of “rural” gateways have a declining share of total U.S. exports through to about 2004 followed by a rising share. For imports from Canada, the share of the Great Lakes Gateway is fairly flat through 2000 and then begins to decline at an accelerating pace. The import share of Blaine rises through 1999 and falls thereafter.

The regression analysis conducted above for total exports can also be conducted for individual ports. Rather than conduct this analysis for the ten individual ports, the ports are grouped into the three gateway categories identified by Sands (2009): the Great Lakes Gateway, the Cascadian Gateway, and all other land ports. As explained by Sands, the ports within the Great Lakes Gateway share common characteristics such

as significant flows of trade related to manufacturing in general and to the automotive sector in particular.

Results for the three gateway groupings of ports are presented in Tables 1 and 2. Table 1 describes the estimated post-9/11 trade effects for U.S. exports to Canada, while Table 2 displays the same information for U.S. imports from Canada. For the Great Lakes Gateway, there is some evidence of negative effects on exports to Canada in 2001 and 2002 (and to some extent 2003), but the effects are more pronounced for exports by truck than for total exports. For imports from Canada, significant trade shortfalls show up in 2002 and 2003.

Imports through Blaine show evidence of negative trade effects that persist from 2002 through 2008 and grow over time. The impact of post-9/11 border security developments is less apparent for U.S. exports passing through Blaine, and there is an indication of a growing positive effect over time.

For the combined group of remaining ports, there is some evidence of reduced imports in the 4th quarter of 2001 and in 2002. Exports through those ports are not explained well by traditional trade equations and consequently we are not able to identify post-9/11 effects for exports from these ports. In fact, we find some weak evidence of increases in U.S, exports to Canada through these ports in 2006 and 2008.

c.) Analysis of the Automotive Products Sector

There are several reasons to single out the automotive products sector (Harmonized Tariff Schedule Chapter 87) for special attention in this study. First, the automotive sector is highly integrated at the continental level, and automotive products may cross the border a number of times before finally being installed in a finished product destined for sale to an end-user. As a result, automotive products are particularly susceptible to compounded effects of border delays. An offsetting factor is the high degree of concentration and large production scale in the automotive sector that can allow producers to dilute the fixed costs of participating in border security programs such as FAST. Finally, the significant negative impact of the current recession on the automakers raises specific concerns that border costs could be worsening the fortunes of a potentially highly vulnerable sector.

The results of the regression analysis for the auto sector are presented in Table 3. The first column reports estimated effects for U.S. auto exports to Canada and shows some weak negative export impacts in the second half of 2001, followed by positive effects beginning in 2003. For auto sector imports from Canada, there is evidence of negative impacts on the second half of 2001 and, to a lesser extent, in 2002, 2003, 2004, and 2008. The results do not point to the automotive sector as being negatively impacted by post-9/11 border security to an extraordinary degree. This lack of a particularly strong border effect may indicate that the sector's access to programs such as FAST mitigated the impacts of border security on automotive sector trade.

Conclusions and Implications

At the level of aggregate U.S. exports and imports, this study has found evidence of significant changes in Canada-U.S. surface trade in the years following the 9/11 terrorist attacks. Most evidence suggests that these effects declined by roughly 2004,

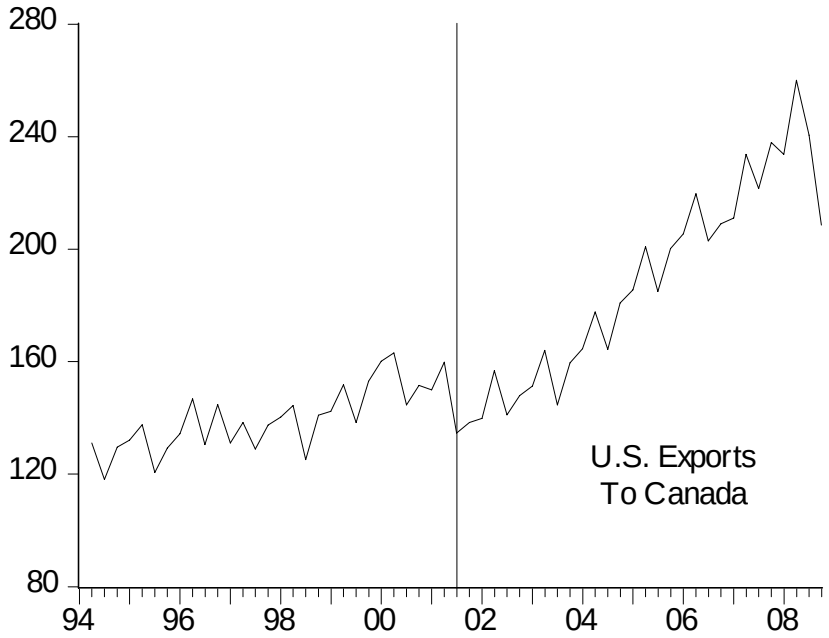
but, particularly for imports, there is some evidence of a resurgence in negative trade effects in 2008.

Analysis of port-level shares of total Canada-U.S. trade points to changes in trends at roughly the same time as the post-9/11 border security measures took effect. These patterns suggest that post-9/11 border security policies may have had differential impacts on the fortunes of different regions. The shifts in shares of some ports after 9/11 may be due to differential impacts of security measures, differences in commodity mixes, and regional variation in participation rates in programs such as FAST. Analysis of the automotive sector indicates that security effects were not long-lasting despite the high degree of trade in intermediate goods in this sector.

Another possible explanation for the changing patterns of trade found after 9/11 is that factors other than changes in border security procedures not captured in our regression analysis affected the trading environment. One possible factor is the growing emergence of China as an exporter to North America, and its entry into the WTO; However, analysis by Globerman and Storer (2009) shows very little overlap between U.S. trade with China and U.S. trade with Canada, suggesting that the emergence of China has not had a significant impact on Canada-U.S. trade volumes in the post-9/11 period.

The post-9/11 impacts on trade identified in this statistical analysis are consistent with increased costs related to border thickening. One way to mitigate any such security-related costs without reducing security would be to eliminate costly border processes that are arguably unrelated to border security such as compliance with rules of origin or divergent regulatory regimes. In addition, the differential regional impacts on trade identified in this study suggest that implementation of programs such as FAST should reflect regional realities. For example, in regions where trade is dominated by smaller firms that find the large fixed cost of FAST participation financially daunting, FAST lanes might be used to offer a service that guarantees a cap on service times in return for a real-time user fee, thereby allowing smaller firms to substitute variable costs for fixed costs.

Figure 2. All Surface Mode Aggregate U.S. Trade with Canada
(Billions of dollars, annualized rates)



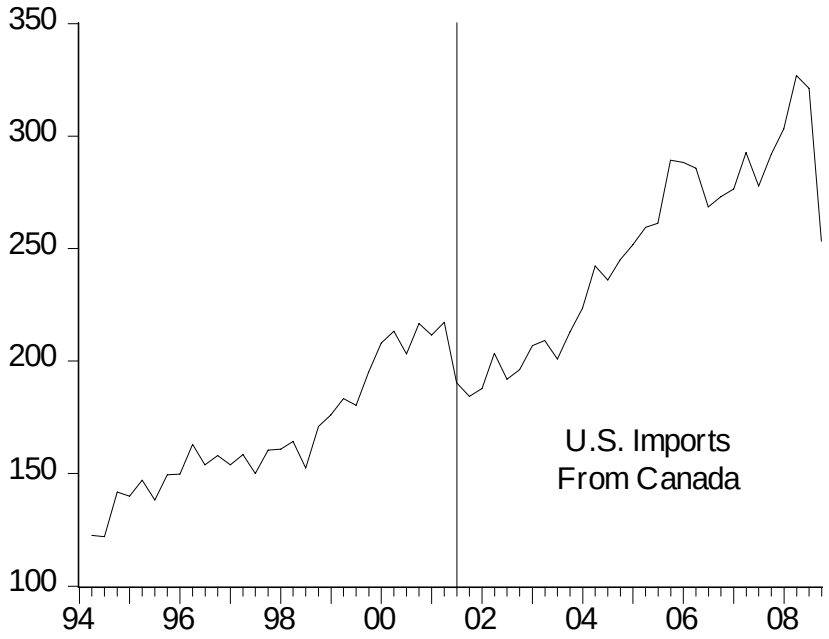


Figure 3. All Surface Mode Aggregate U.S. Trade with Canada
(Billions of real dollars, annualized rates)

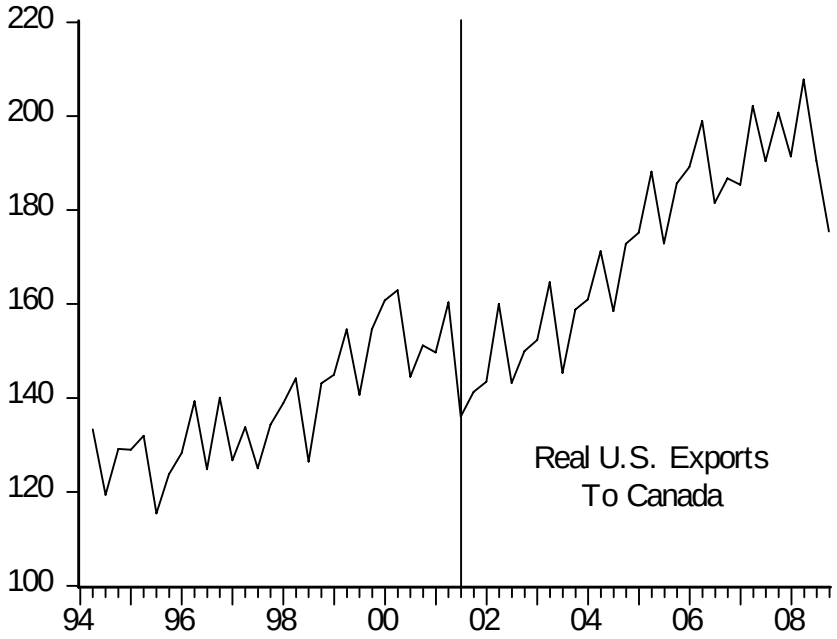
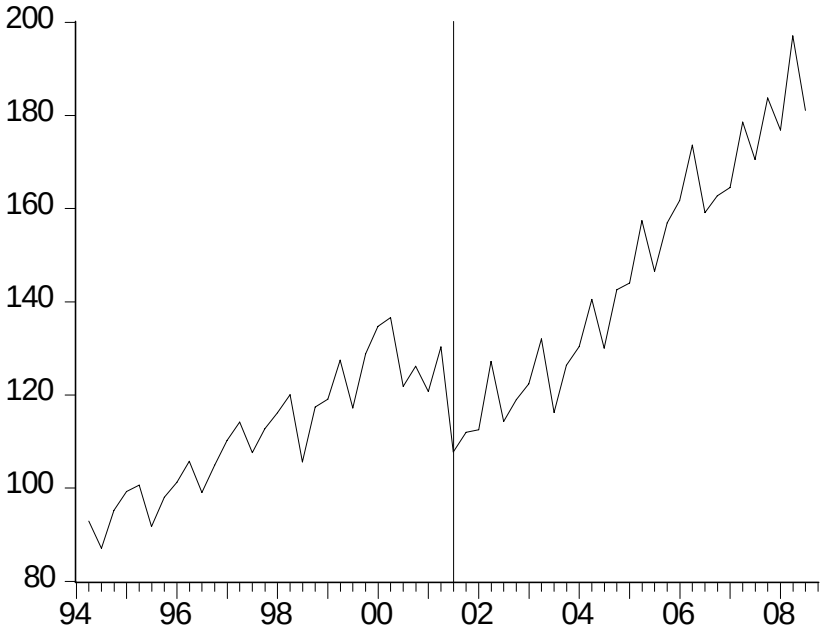


Figure 4. Truck-Mode Aggregate U.S. Surface Trade with Canada

(Billions of dollars, annualized rates)



a.) U.S. Exports to Canada by Truck

b.) U.S. Imports from Canada by Truck

Figure 5. Time Pattern of Estimated Post-9/11 Effects for U.S. Exports and Imports

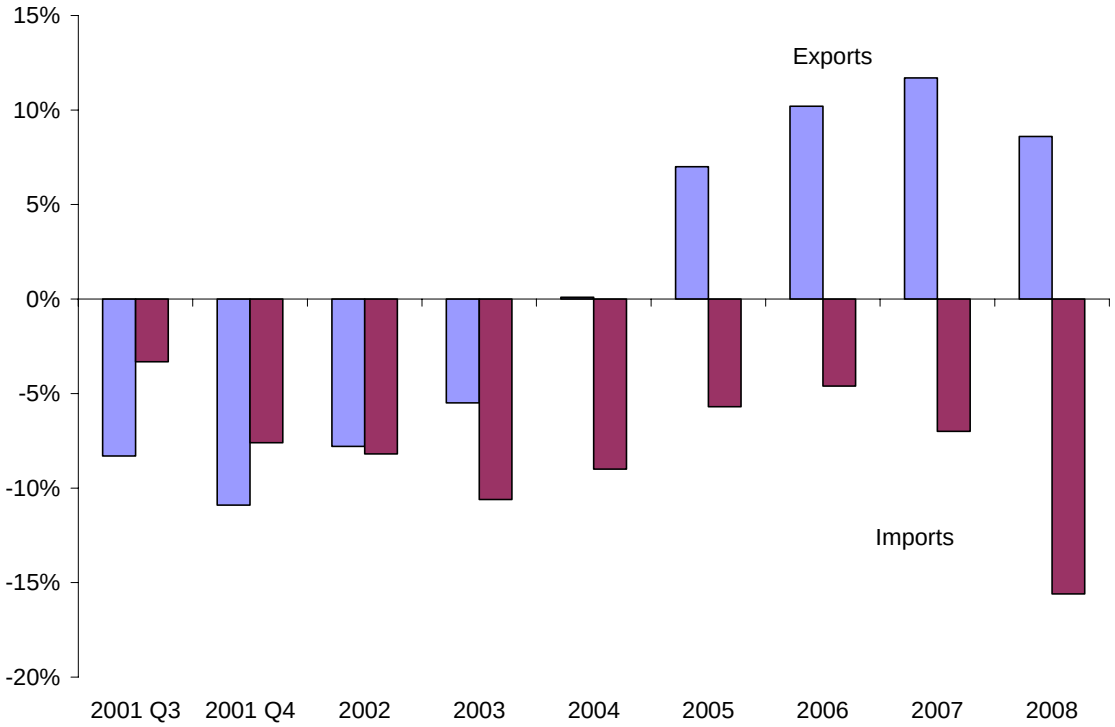


Table 1. Estimated U.S. Export Effects by Gateway

	Great Lakes Gateway: All Modes	Great Lakes Gateway: Trucks Only	Cascadian Gateway	Other Ports
2001 Q3	–	–	–	–
2001 Q4	–	–	—	–
2002	–	–	–	–
2003	–	–	+	–
2004	–	–	+	+
2005	–	–	++	+
2006	–	–	++	++
2007	–	–	++	+
2008	–	—	++	++

Table 2. Estimated U.S. Import Effects by Gateway

	Great Lakes Gateway: All Modes	Great Lakes Gateway: Trucks Only	Cascadian Gateway	Other Ports
2001 Q3	–	–	+	–
2001 Q4	–	–	–	—
2002	—	–	+	—
2003	—	–	–	–
2004	–	–	–	–
2005	+	–	–	–
2006	–	–	+	+
2007	–	–	+	–
2008	—	—	–	+

Note: Pluses and minuses indicate the sign of the individual time-period effects. Double-size plus and minus signs indicate individual effects that are statistically significant at the 5 percent level.

Table 3. Estimated U.S. Trade Effects for Automotive Products

	U.S. Exports of Automotive Products	U.S. Imports of Automotive Products
2001 Q3	–	–
2001 Q4	–	–
2002	–	—
2003	+	–
2004	+	–
2005	+	–
2006	+	–
2007	++	–
2008	+	–

Note: Pluses and minuses indicate the sign of the individual time-period effects. Double-size plus and minus signs indicate individual effects that are statistically significant at the 5 percent level.

Technical Appendix and Statistical Methodology

The core of the quantitative analysis in this study is the use of regression analysis to quantify the change in the behavior of Canada-U.S. trade flows in the aftermath of 9/11. Regression analysis involves the use of a statistical model to explain the relationship between trade flows and traditional determinants of bilateral trade such as the level of overall economic activity and relative price variables such as exchange rates.

The basic specification for United States imports from Canada is the following;

$$\ln(IM_t) = \beta_0 + \beta_1 \ln(GDP_t) + \beta_2 PFX_t + \beta_3 D2001Q3 + \beta_4 D2001Q4 + \cdots + \beta_{11} D2008$$

where IM is U.S. imports from Canada, GDP is U.S. gross domestic product, both measured in price-adjusted U.S. dollars. Similarly, the specification for the U.S. exports to Canada (EX) is:

$$\ln(EX_t) = \beta_0 + \beta_1 \ln(GDP_t) + \beta_2 PFX_t + \beta_3 D2001Q3 + \beta_4 D2001Q4 + \cdots + \beta_{11} D2008$$

For the export equation the GDP variable is real Canadian GDP. The exchange rate used in both the import and export equations is the number of Canadian dollars per U.S. dollar[2].

Changes in border procedures following 9/11 are captured in this equation by allowing for shifts of the constant term, β_0, beginning in the third quarter of 2001, The size of these constant-term shifts is measured by the coefficients β_3 through β_{11} associated with the time-period dummy variables. We allow the effect of 9/11 to vary in the post-9/11 period. While the third and fourth quarters of 2001 are allowed to have their own individual effects, changes in the constant term of the export equation are only allowed to vary by calendar year beginning in 2002. In the main body of the study, we used the coefficients from the "dummy variables" that shift the constant term to create the two bar graphs in Figure 5. The full regression results used to create Figure 5 are in Table A.1 below.

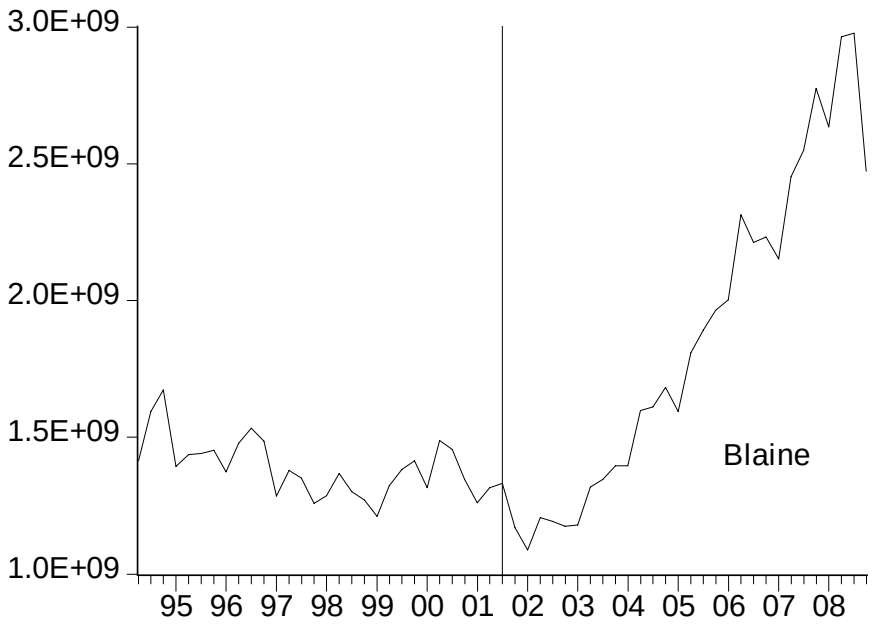
Table A-1. Effects of 9/11 for Real U.S. Exports and Imports (Trade with Canada, 1994Q1–2008Q4)

Variable Name	Exports	Imports
Log of Real GDP	0.886**	1.174**
	(0.126)	(0.128)
Nominal Exchange Rate	0.111	0.325**
	(0.124)	(0.116)
Post 9/11 Dummies:		
Q3 2001	-0.083**	-0.033
	(0.035)	(0.031)
Q4 2001	-0.109**	-0.076**
	(0.037)	(0.033)
2002	-0.077**	-0.081**
	(0.027)	(0.024)
2003	-0.055**	-0.106**
	(0.029)	(0.026)
2004	-0.001	-0.090**
	(0.034)	(0.027)
2005	0.070	-0.057
	(0.044)	(0.036)
2006	0.102	-0.046
	(0.056)	(0.047)
2007	0.117	-0.070
	(0.067)	(0.058)
2008	0.086	-0.156
	(0.075)	(0.063)
R-squared	0.969	0.958
DW	1.69	1.94
Observations	58	58

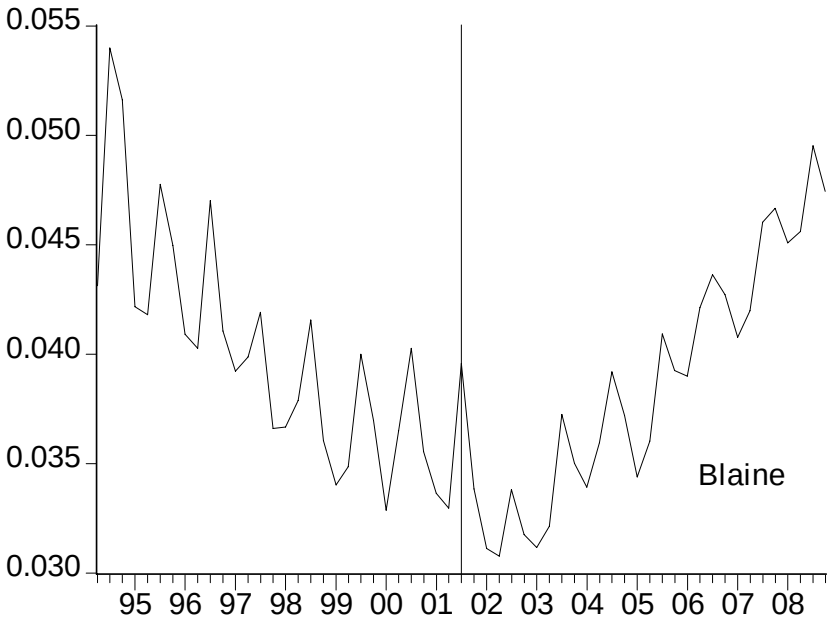
Note: Both equations include a first-order autocorrelation correction.
** indicates significance at the 1 percent level
* indicates significance at the 5 percent level

Appendix 1: Graphs for Port-Level U.S. Exports

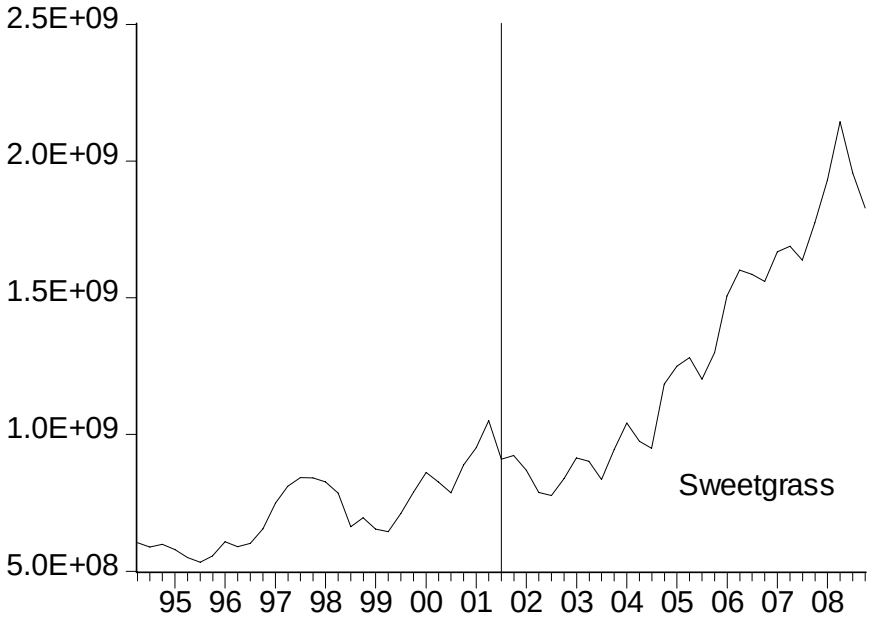
1. Blaine
2. Sweetgrass
3. Portal
4. Pembina
5. Port Huron
6. Detroit
7. Buffalo/Niagara Falls
8. Alexandria Bay
9. Champlain/Rouses Point
10. Highgate Springs



a.) U.S. Exports to Canada

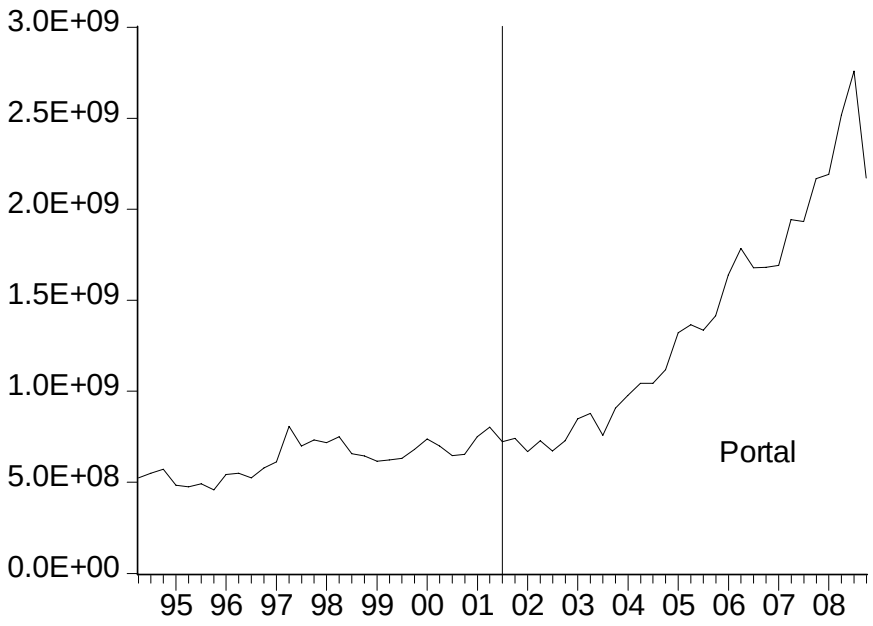


b.) Port Share of U.S. Exports



a.) U.S. Exports to Canada

b.) Port Share of U.S. Exports



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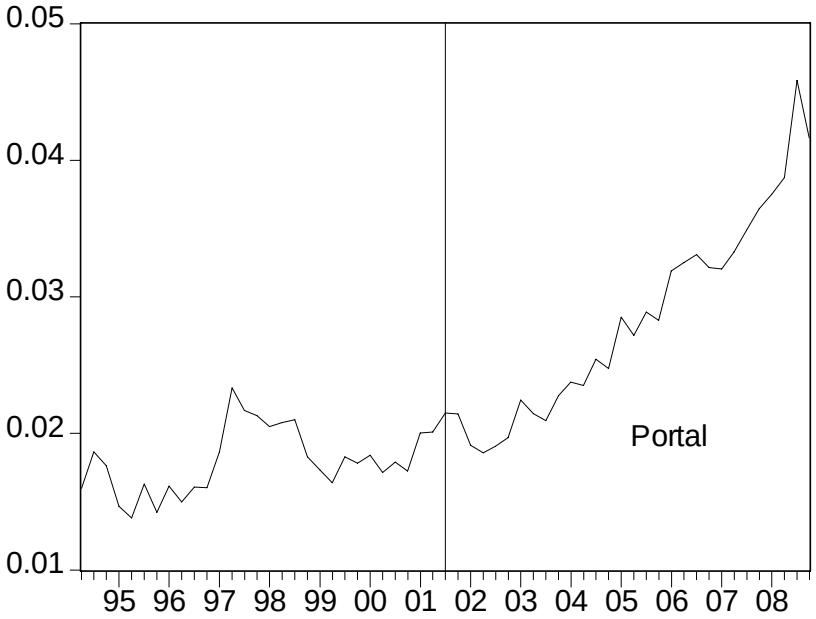

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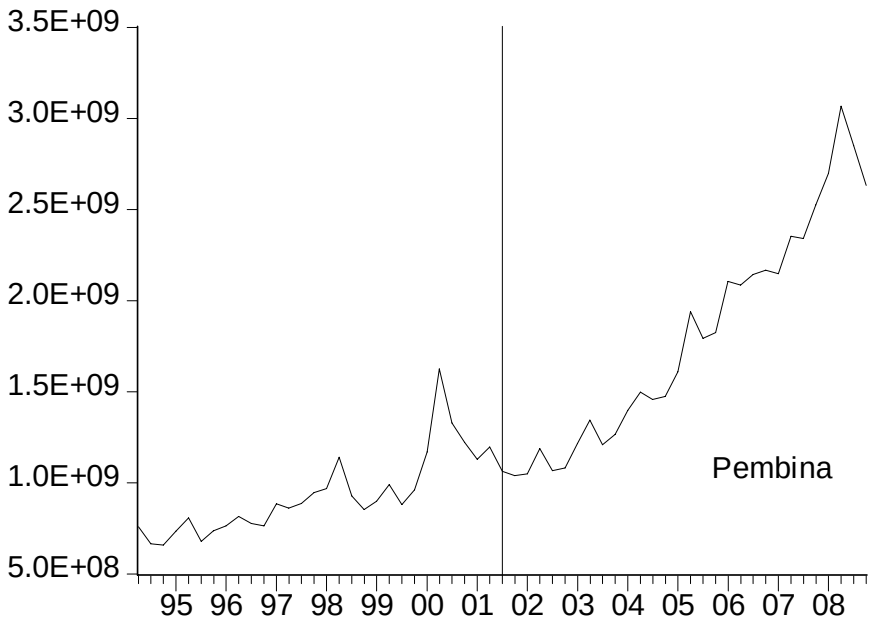

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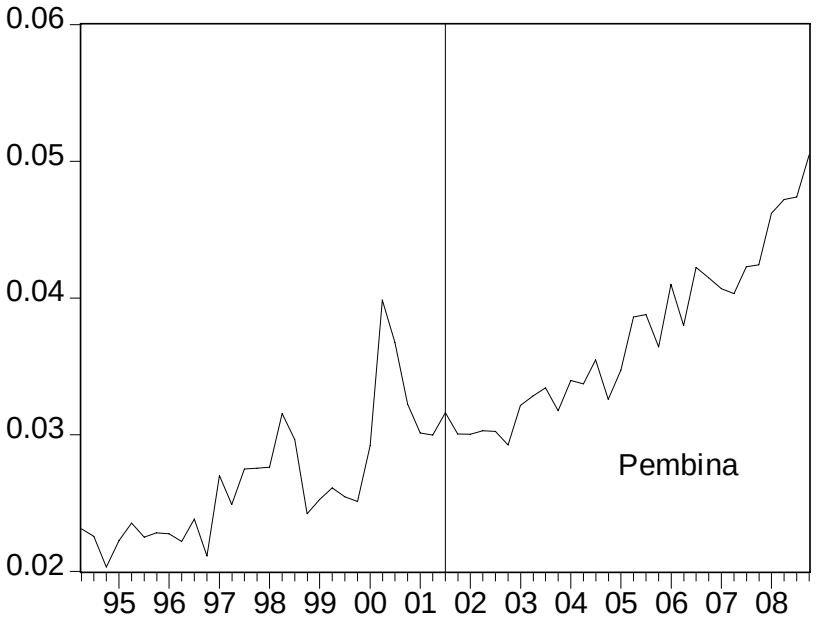

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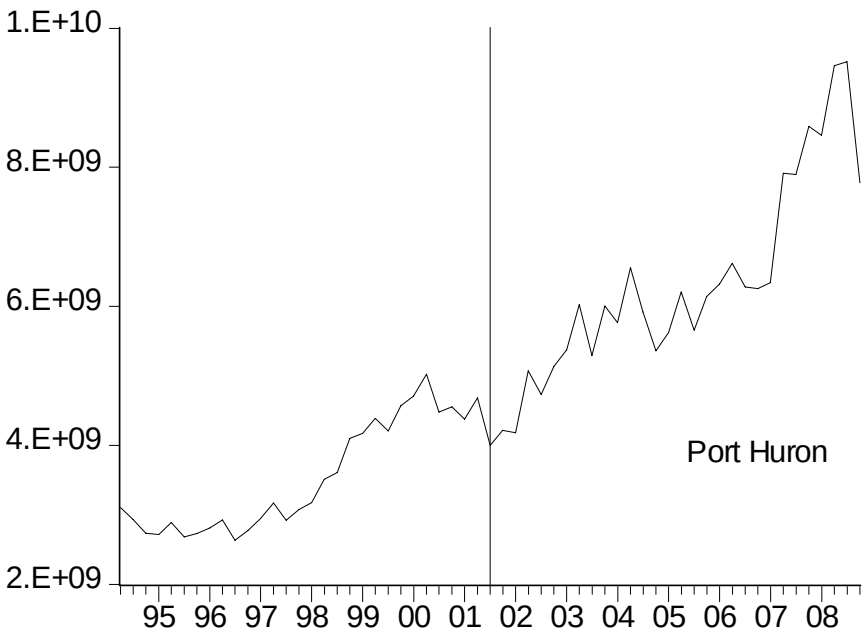

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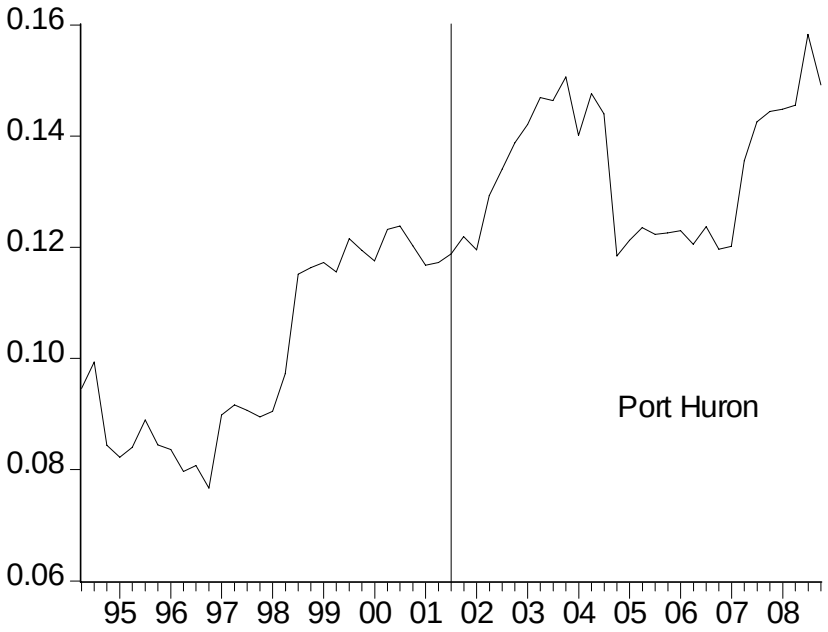

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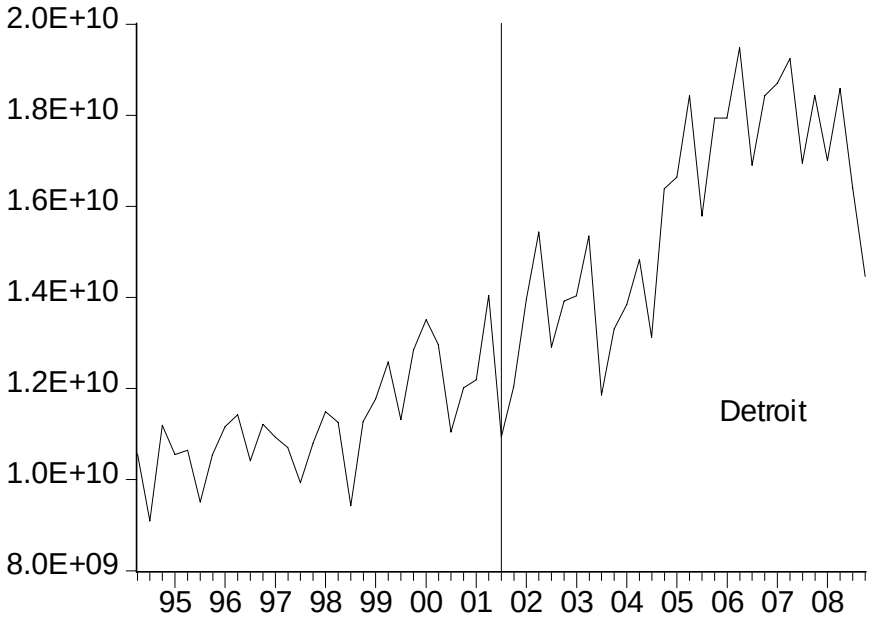

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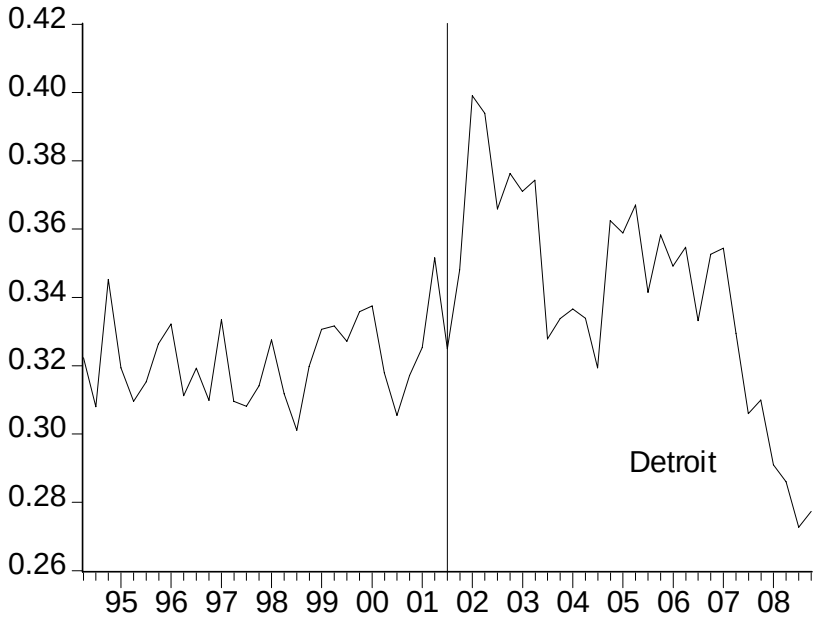

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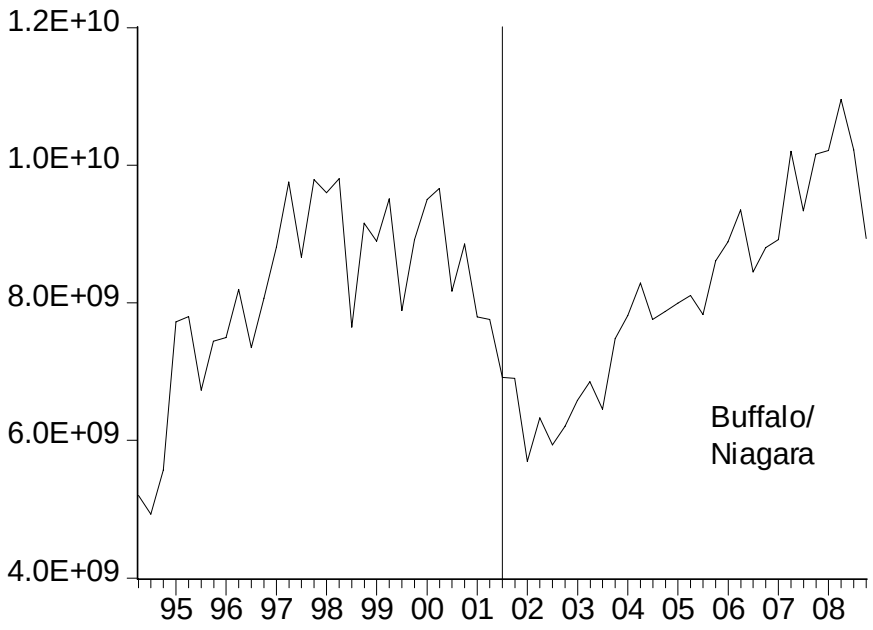

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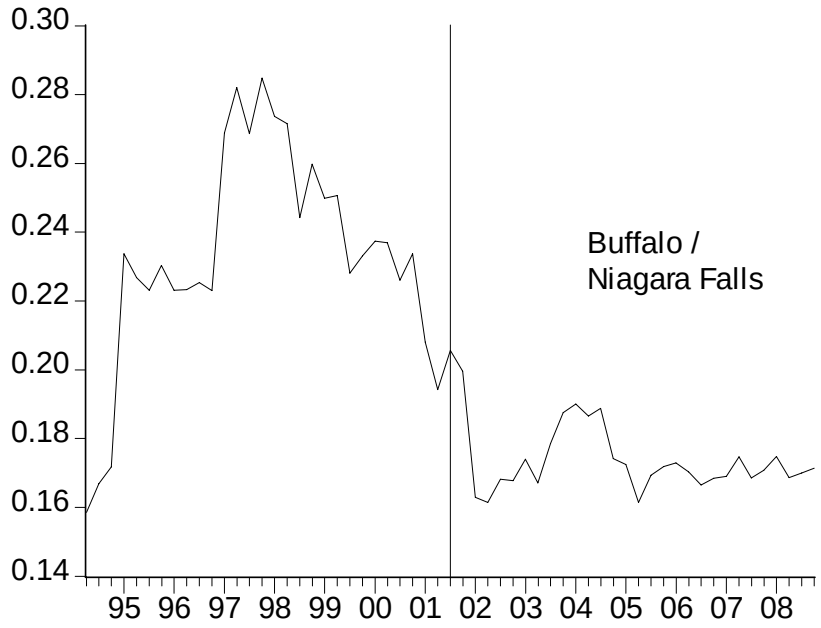

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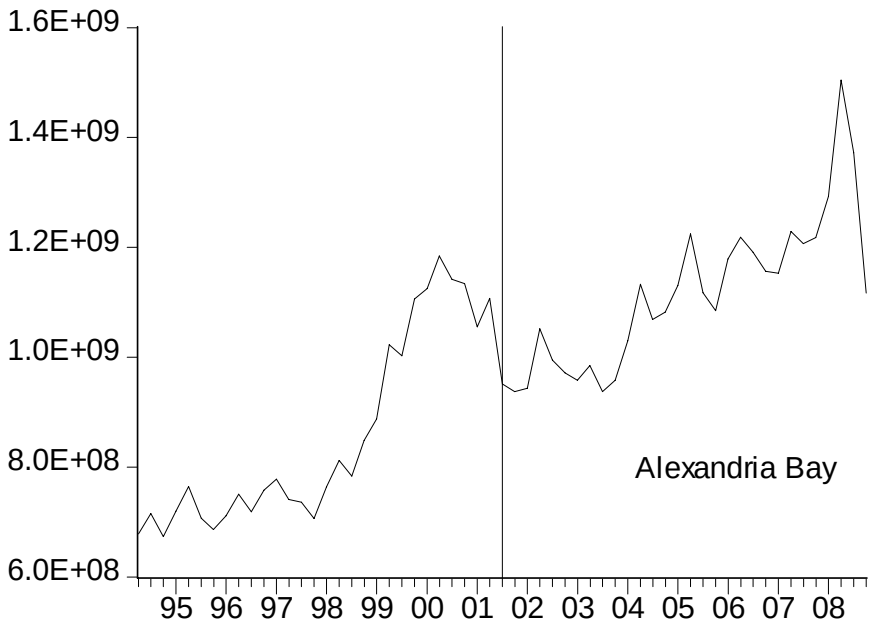

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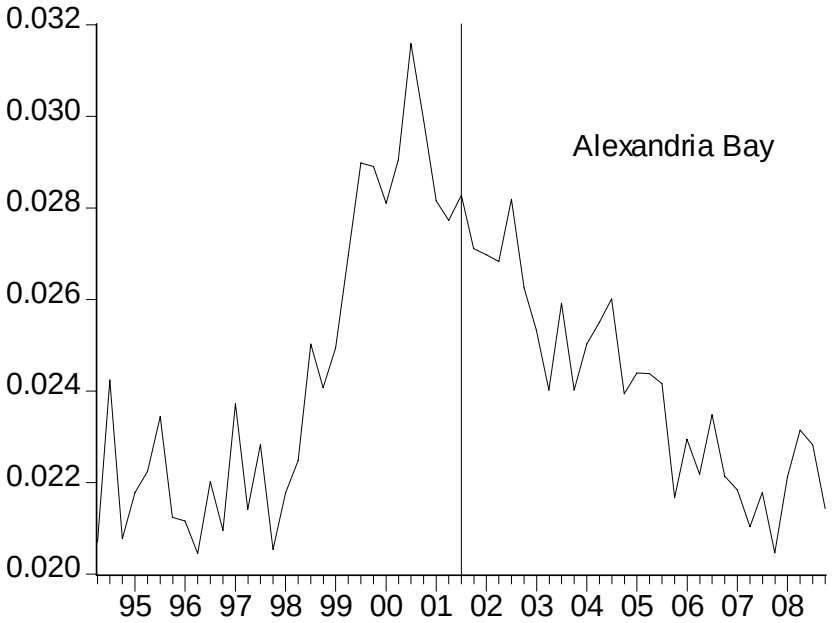

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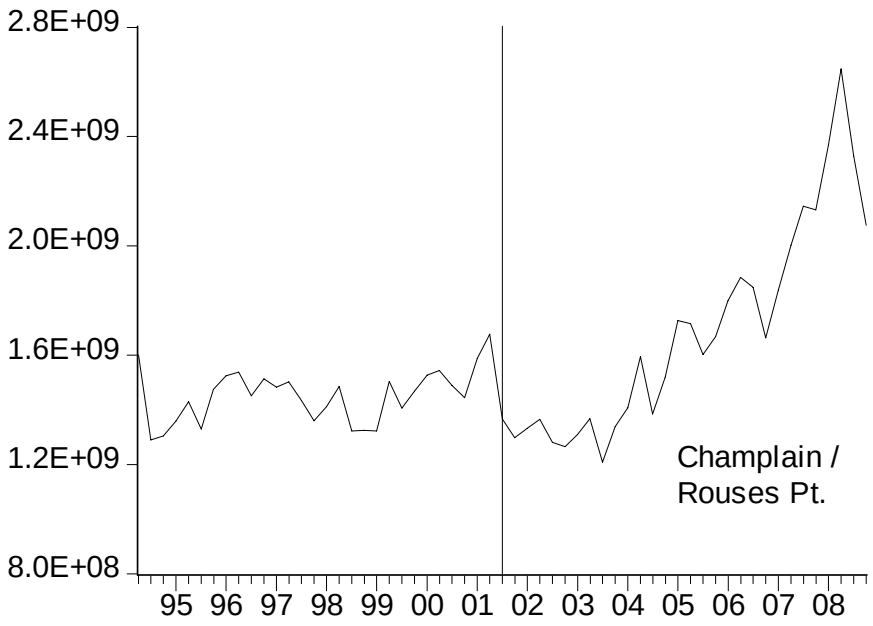

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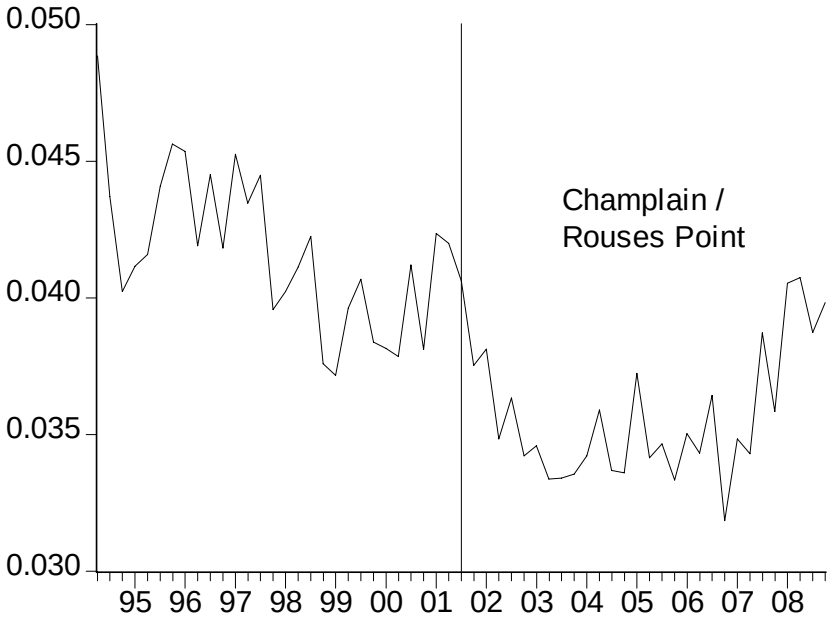
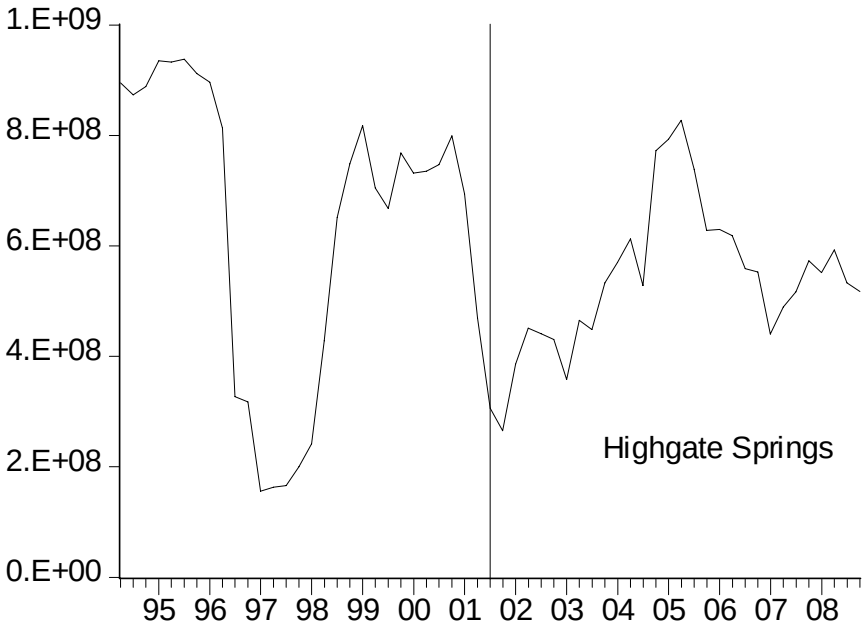


b.) Port Share of U.S. Exports



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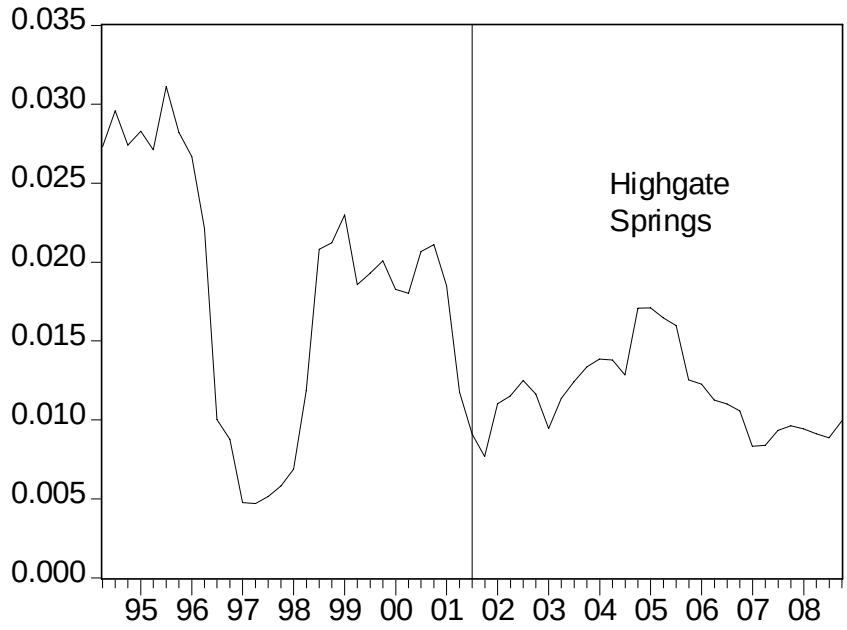
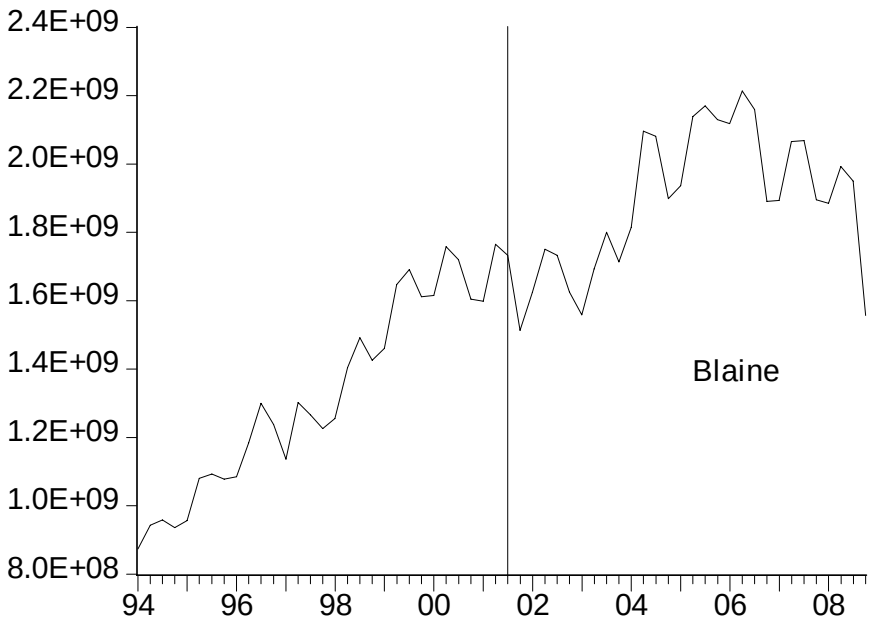


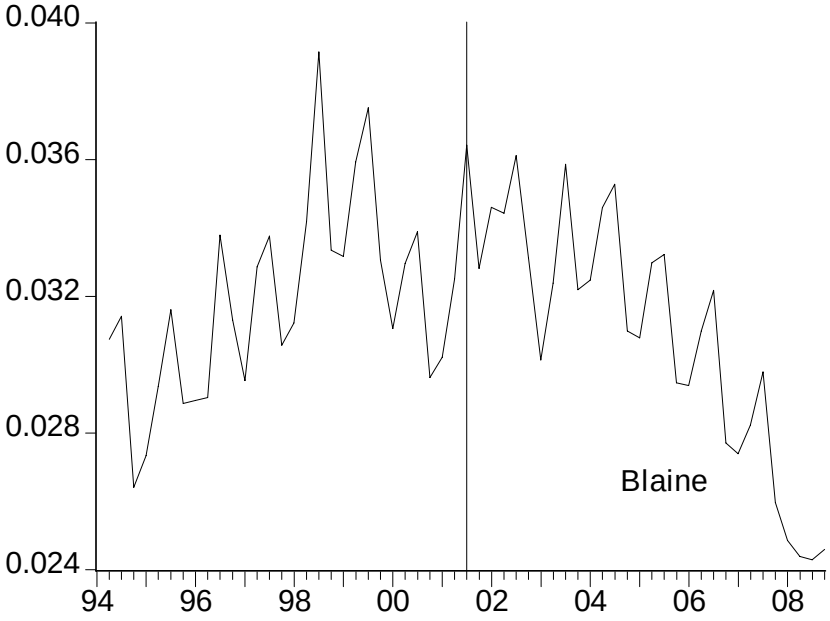
b.) Port Share of U.S. Exports

Appendix 2: Graphs for Port-Level U.S. Imports from Canada

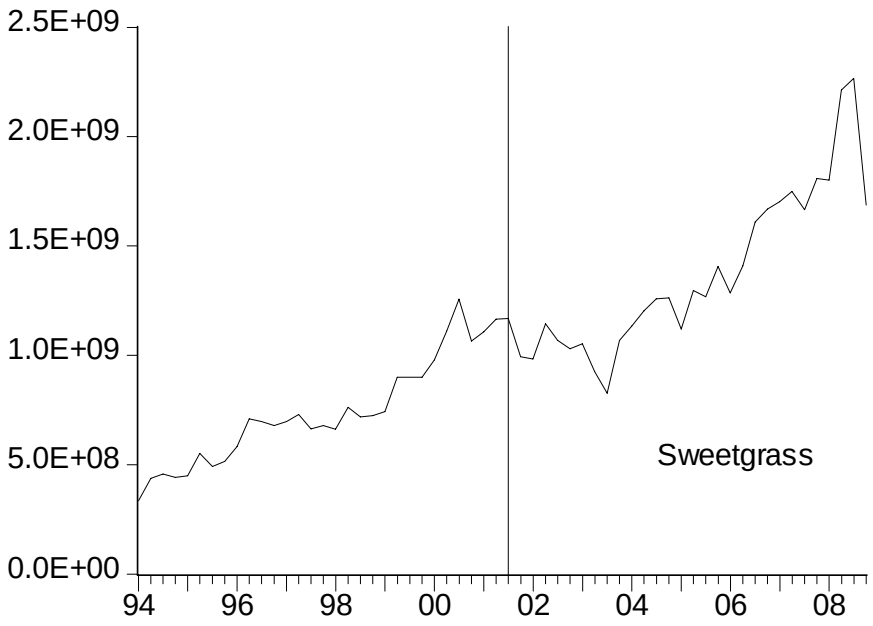
1. Blaine
2. Sweetgrass
3. Portal
4. Pembina
5. Port Huron
6. Detroit
7. Buffalo/Niagara Falls
8. Alexandria Bay
9. Champlain/Rouses Point
10. Highgate Springs



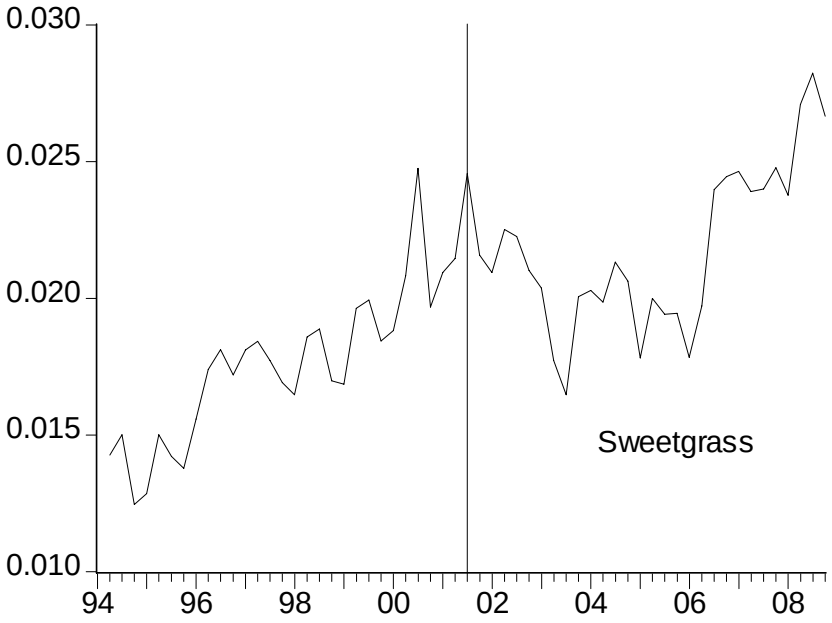
a.) U.S. Imports from Canada



b.) Port Share of U.S. Imports

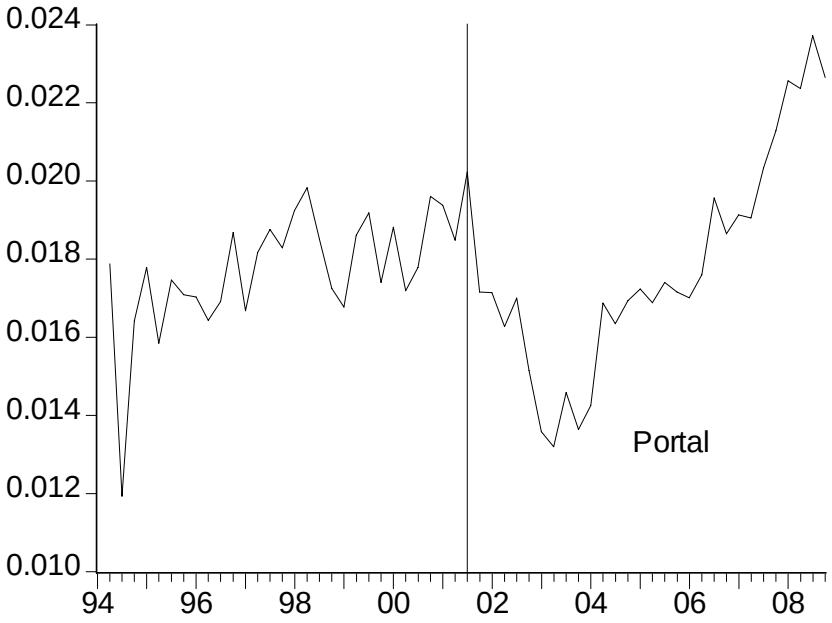


a.) U.S. Imports from Canada

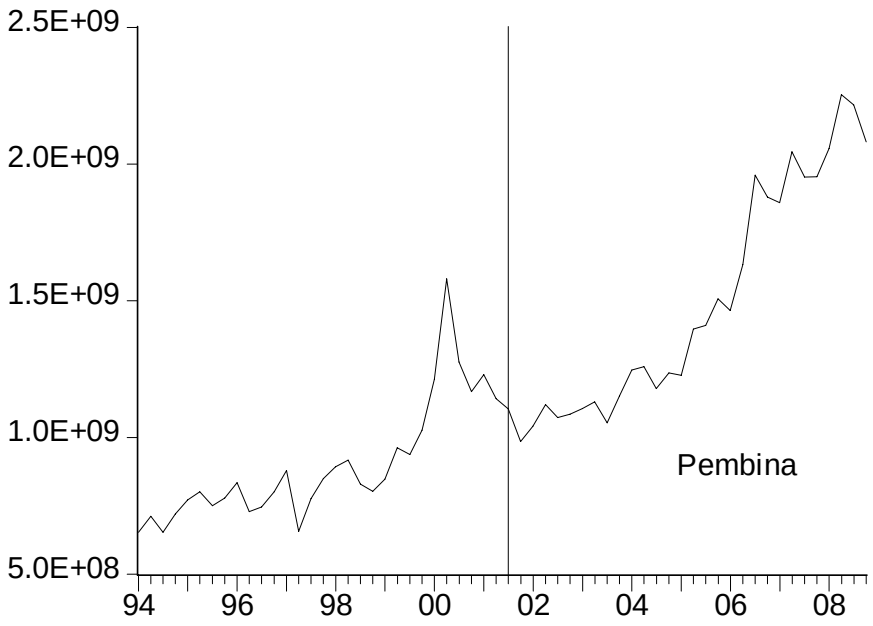


b.) Port Share of U.S. Imports

a.) U.S. Imports from Canada



b.) Port Share of U.S. Imports



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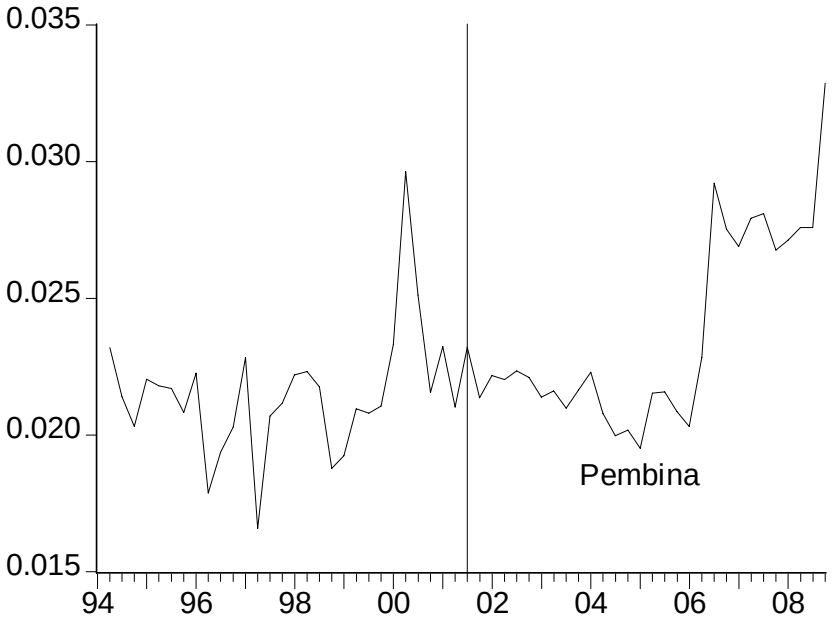

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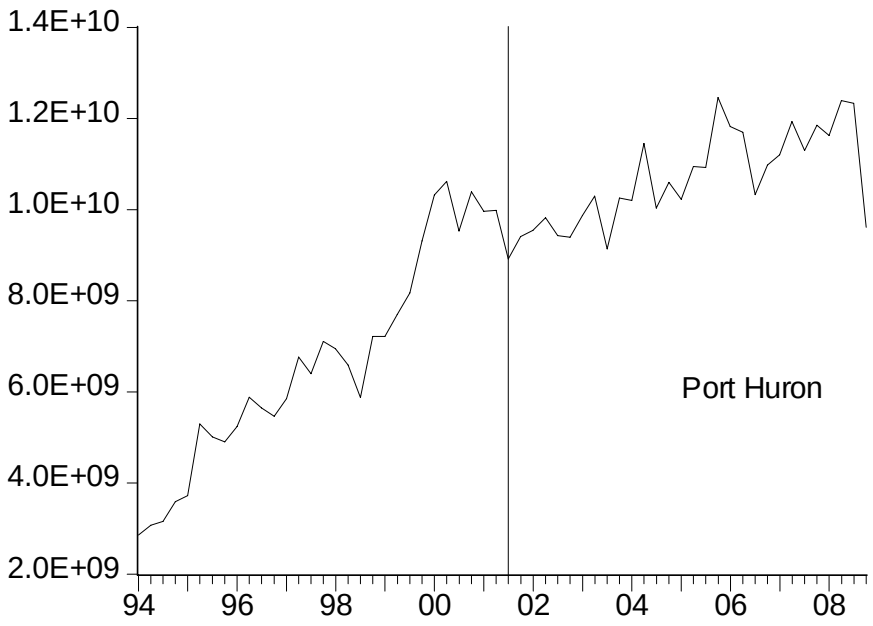
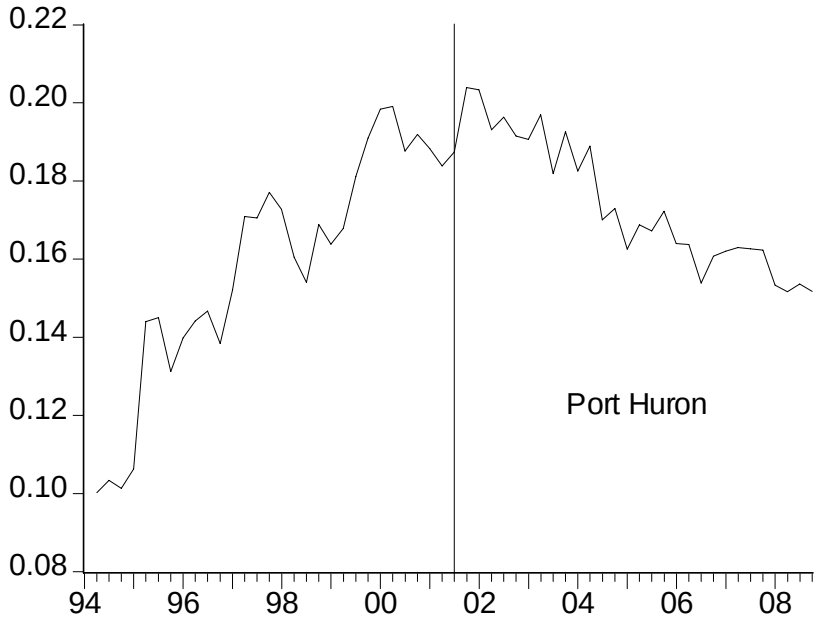


a.) U.S. Imports from Canada



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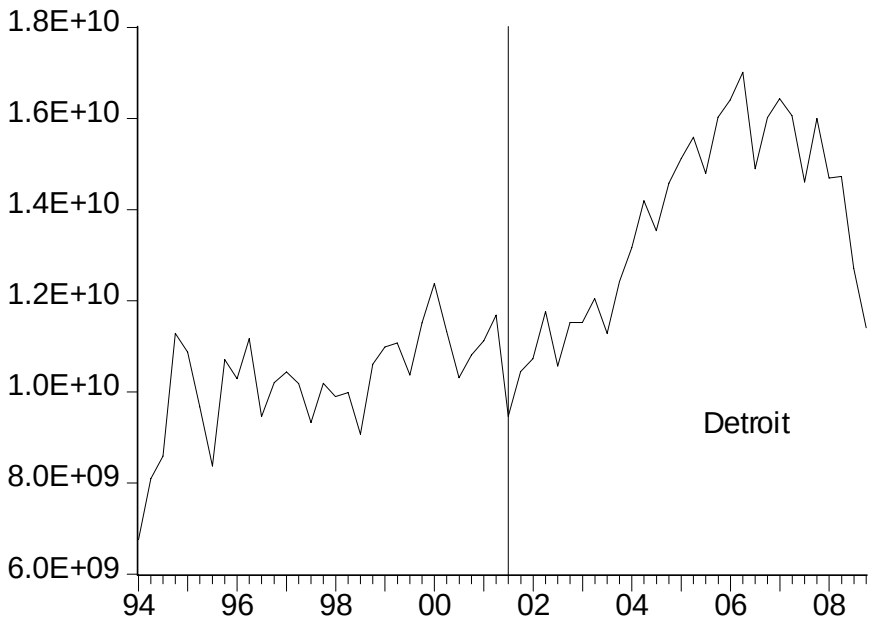

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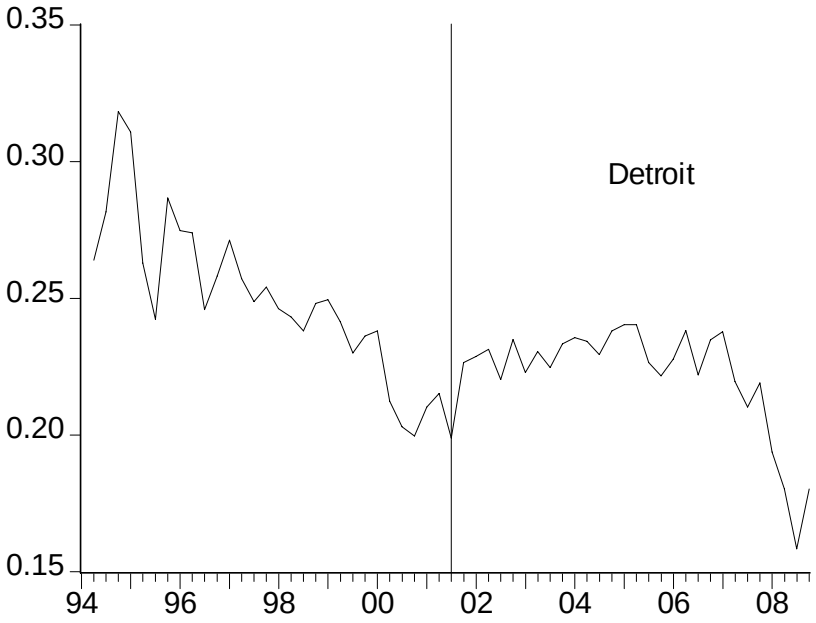

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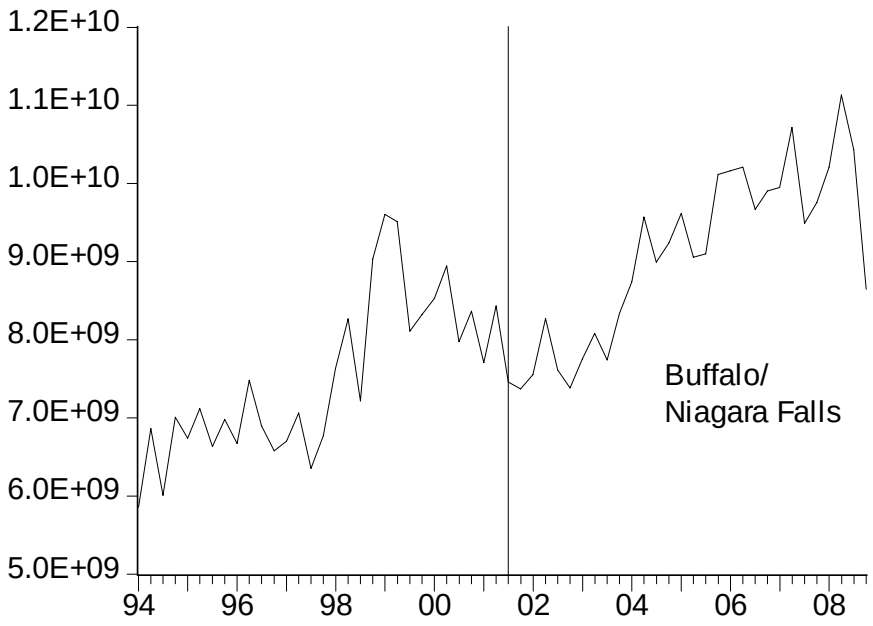
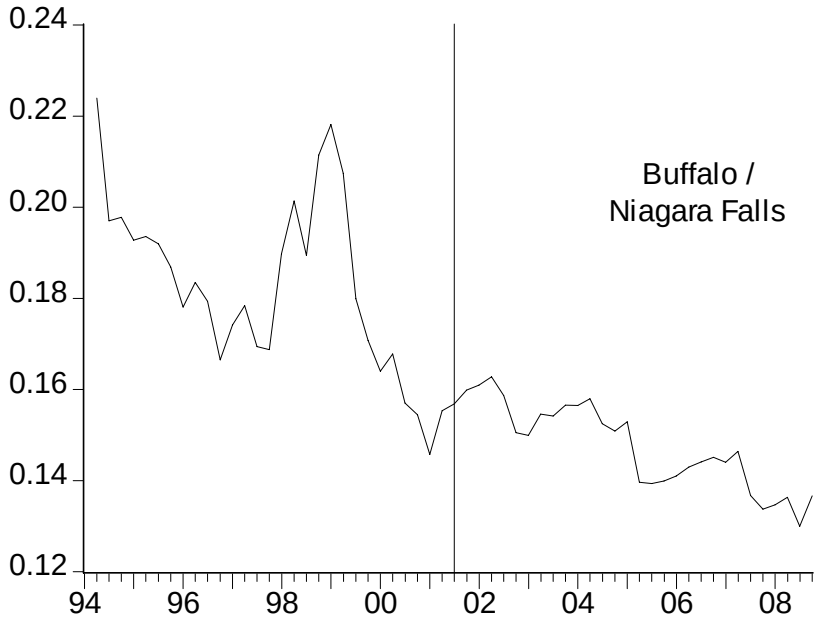


a.) U.S. Imports from Canada



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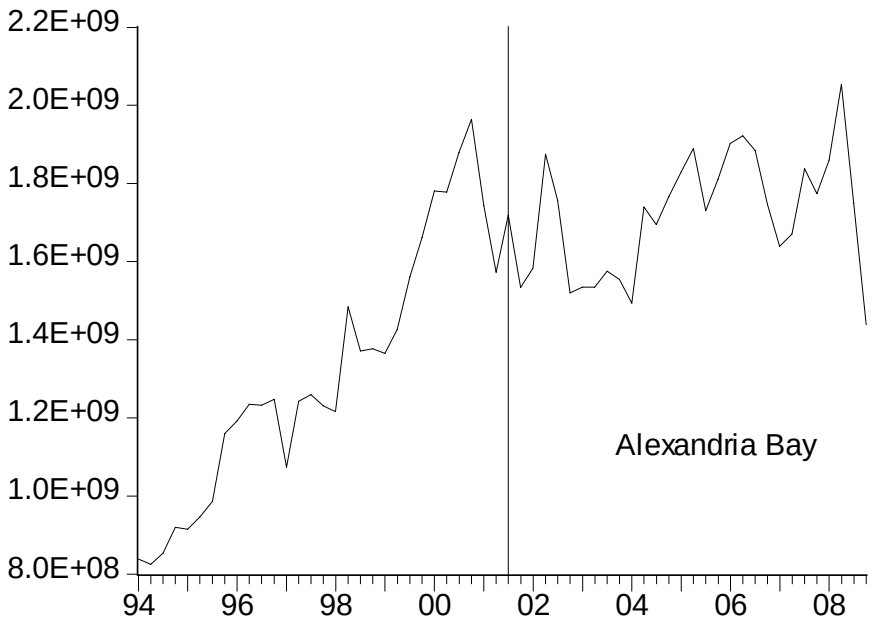
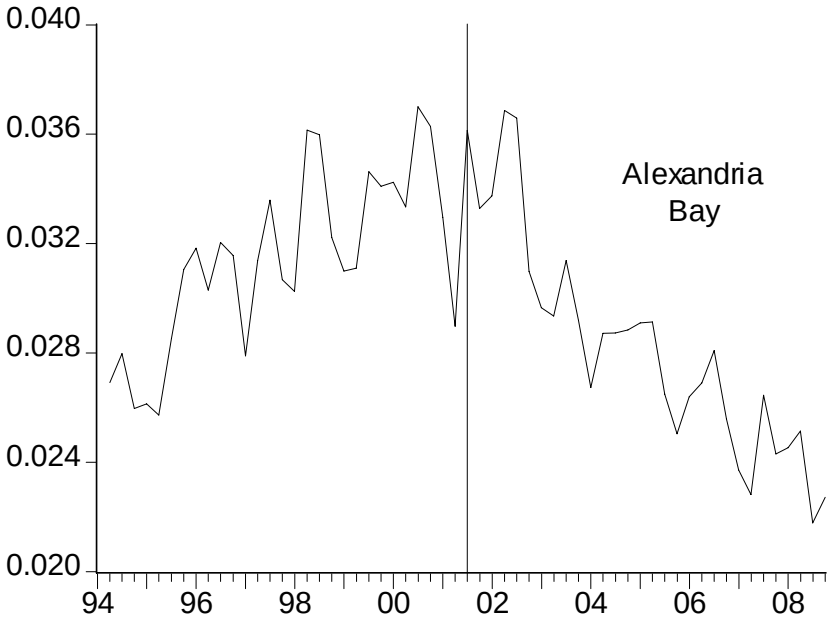


a.) U.S. Imports from Canada



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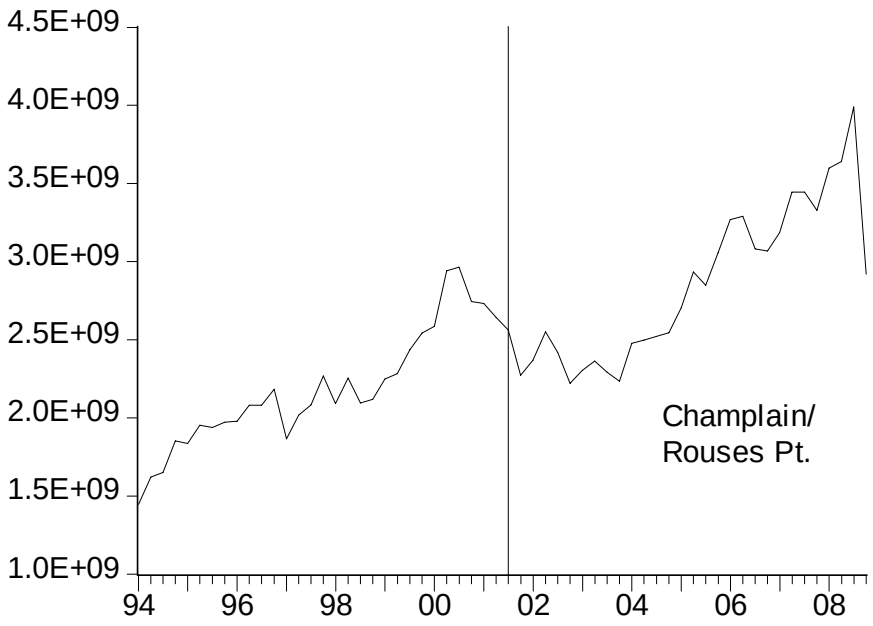
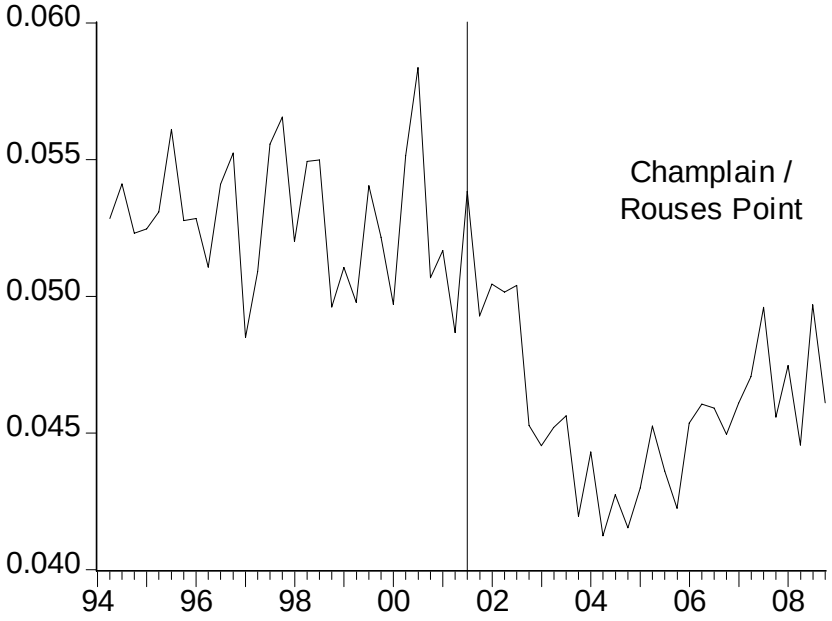
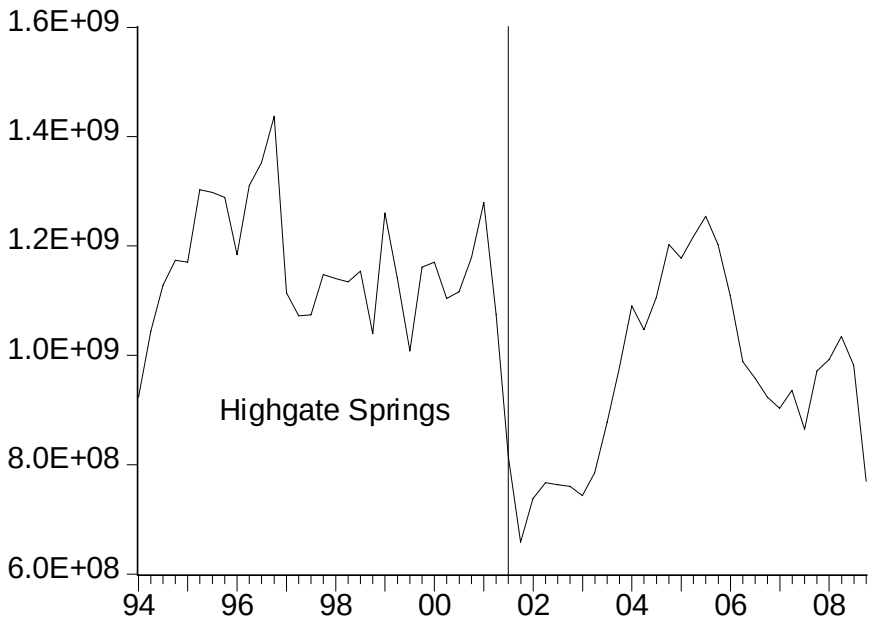


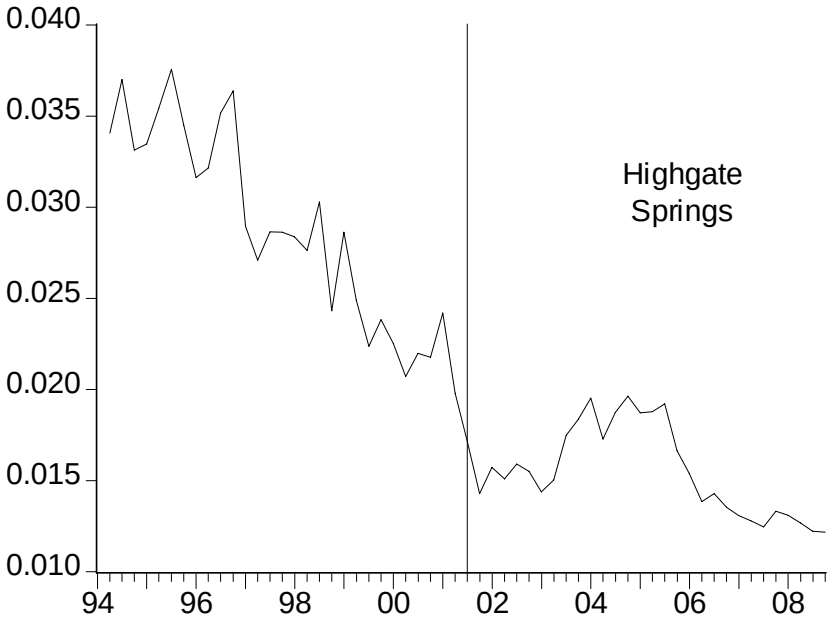
a.) U.S. Imports from Canada



b.) Port Share of U.S. Imports



a.) U.S. Imports from Canada



b.) Port Share of U.S. Imports

[1] The technical appendix to this study explains the regression methodology and the sources of the data shown in Figures 5. At this point, it is useful to note that the regression model holds constant the influence of changes in aggregate demand and the Canada-U.S. exchange rate on bilateral trade flows. Time dummy variables are used to identify the influence of post-9/11 security developments on trade.

[2] In order to avoid possible reverse causality from the trade series to GDP, we used a lagged value of real GDP. We compared ordinary least squares and instrumental variables estimates to evaluate the adequacy of this adjustment.

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