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The Effect of Changing Canada–United States Border Costs on North American Trade Patterns and Expenditures

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This article in the *Economic Insights* series examines the impact of the Canada–United States border and the potential effects of changing the trade costs it imposes between and within the two countries at a fine geographical scale. The analysis is based on a structural gravity model of trade estimated using Statistics Canada's Surface Transportation File and the United States Census Bureau's Commodity Flow Survey. The model estimates the general equilibrium effects that Canada–United States border costs have on trade patterns and welfare, which can be illustrated at a fine regional scale. Maps are used to depict how increases and decreases in border frictions affect not only Canada–United States trade, but also domestic trade flows. The maps show considerable regional variation in both types of trade when conditions at the border change.

Introduction

World trade has expanded since the Second World War, facilitated by the ratification of multilateral and regional trade agreements. These agreements originally focused on disciplining tariffs and quotas applied to goods crossing the border. As tariffs have fallen, attention has turned more toward reducing other costs imposed by administrative borders. One of the earliest regional trade agreements was the 1988 Canada–United States Free Trade Agreement, which Mexico joined in 1994 to create the North American Free Trade Agreement (NAFTA). In 2018, NAFTA was renegotiated, with negotiations focusing less on tariff and quota reductions, and more on subtle factors that affect trade.[1] Canadian provinces have also negotiated to further reduce trade barriers within Canada, signing the Canadian Free Trade Agreement (CFTA) in 2017, an update to the Agreement on Internal Trade (AIT). There are no tariffs between provinces: the main frictions are thought to be caused by differences in regulatory frameworks and government procurement practices (Bemrose, Brown and Tweedle 2017).

Traditional trade policies such as tariffs and quotas are easy to identify and measure directly. The frictions caused by divergent regulations, red tape, border-related delivery delays and policy uncertainty facing firms are harder to measure. Moreover, trade between Canada and the United States is continental in scope, but regional in nature: the degree of trade integration between the two countries varies by subnational geography. Within this context, this article presents estimates of border-related costs between and within Canada and the United States.[2] It uses these estimates to determine how changing these costs would affect cross-border and domestic trade flows. A series of maps highlights the heterogeneous regional effects of changing border-related costs.

Bilateral trade costs

The border cost estimates reported in this article are based on Statistics Canada's Surface Transportation File (STF), which covers non-energy goods transported within Canada and to and from the United States. When combined with the U.S. domestic trade flows in the Commodity Flow Survey (CFS), the new resulting dataset covers trade within and between all provinces and states, and between 201 subprovincial and substate regions for 2012.[3]

The granularity of the data allows border-related frictions generated by two types of borders—the Canada–United States border and the unmonitored borders between provinces—to be estimated simultaneously.[4] Frictions from borders between provinces are associated with regulatory differences and subnational government procurement practices. The international border includes these frictions (likely more severely), as well as tariffs, quotas, customs inspections and other similar irritants.

1. Negotiations began in August 2017 and the Canada-United States-Mexico Agreement (CUSMA) was signed on October 1, 2018. It has not been ratified by any of the three parties at the time of writing.
2. The findings presented in this article are based on the detailed methodology and results found in the work of Brown, Dar-Brodeur and Dixon (forthcoming).
3. Hawaii and Alaska are excluded because their trade is dominated by marine and air modes of transportation, and is therefore not consistent with the truck- and rail-dominated continental trading system. The resulting dataset contains 201 regions—economic regions are used from STF data, and the metropolitan area (MA) and non-MA delineation is used for the United States in CFS data.
4. The model can also be used to estimate unmonitored state border frictions. However, these are not emphasized because other work has shown them to not be robust.

Border costs are estimated using the structural gravity model, with the results reinterpreted in tariff equivalent form as a way to quantify both tariff and non-tariff barriers comparably.[5] These borders have been estimated separately in many papers, but not together, and not with the comprehensive and regionally detailed data from both Canada and the United States used here. The model estimates that the Canada–United States border imposes an average tariff equivalent of 30% between Canadian and U.S. regions.[6] This effect is far higher than the 10% that non-tariff barriers impose on inter-provincial trade.[7] The difference between total Canada–United States border costs and provincial border costs suggests that the international border imposes an extra administrative burden of roughly 20%.

Changing border costs

Tariff equivalents are informative, but they do not capture the full impact of border frictions. A change in border costs between two regions can also affect the opportunities for producers and consumers in all other regions, particularly those close by. For instance, the cost of trading between Toronto and New York also influences the level of trade between Toronto and Montréal. More generally, changes in border-related costs between Canada and the United States will change the patterns of trade within the two countries.

This article explores two scenarios for changing border costs.

In the first scenario, the cost of trading between Canada and the United States is assumed to be equivalent to trading across provincial borders. This scenario would be consistent with Canada and the United States substantially harmonizing regulations and other trade costs, such that trading with a U.S. region is equivalent to trading with a Canadian one. This would reduce the estimated Canada–United States border effect in terms of the tariff equivalent from 30% to 10%. This scenario serves as a lower bound for a reduction in trade costs.

In the second scenario, Canada and the United States withdraw altogether from a preferential trading agreement. In this case, tariffs would return to their most-favoured-nation (MFN) levels and the bilateral trading relationship would be governed under World Trade Organization (WTO) rules. However, there are valid reasons to believe that trade costs could increase beyond the rise in tariffs. Trade agreements are often in place not only to reduce tariff barriers, but also to ensure a predictable trading environment for businesses. The loss of a preferential trading agreement would increase the level of trade policy uncertainty for exporters, who may be more exposed to various trade actions such as anti-dumping and countervailing duties. To account for these additional non-tariff barriers, this article uses an approximation of the effect NAFTA had on reducing trade costs between the two countries, beyond the reduction in tariffs implied by the trade agreement. This scenario results in a 6-percentage-point increase in trade costs to a 36% tariff equivalent.[8,9]

The counterfactual scenario results presented in Table 1 show how changing trade costs affect Canada–United States, domestic Canadian, and domestic U.S. trade, as well as the impact on total expenditures for non-energy goods (i.e., both domestic and imported). The table's first two columns show the substantial impact on bilateral trade flows between the two countries: reduced border costs lead to an 82%

Table 1
Aggregate impact of changing trade costs on exports and expenditures, 2012

	Cross-border exports		Domestic Canadian exports		Domestic U.S. exports		Total expenditures[1]	
	Canada to the United States	United States to Canada	Inter-provincial	Intra-provincial	Inter-state	Intra-state	Canada	United States
	percentage change							
Reduction in border costs	82.2	71.6	-52.0	-46.1	8.9	10.3	11.4	0.8
Increase in border costs	-23.4	-18.1	11.3	9.8	1.1	0.7	-1.8	-0.2

1. Total expenditures are used as a proxy measure of total welfare gains and losses resulting from changes in trade costs.

Sources: Statistics Canada, Surface Transportation File; and United States Census Bureau, Commodity Flow Survey.

5. See Brown, Dar-Brodeur and Dixon (forthcoming) for a thorough description of using the structural gravity model to estimate border costs and the methodology for calculating a tariff equivalence.
6. Earlier estimates by Anderson and van Wincoop (2003) put the border effect at a 30% tariff equivalent in 2003.
7. The model estimates a 10% tariff equivalent, which is slightly higher than, but not statistically distinguishable from the 7% found by Bemrose, Brown and Tweedle (2017).
8. Evidence suggests that lower trade policy uncertainty boosts business confidence. For example, when Portugal acceded to the European Commission in 1986, this instilled enough confidence in businesses for them to invest and ultimately start exporting to the European Community (Handley and Limão 2015). Similarly, before China acceded to the WTO in 2001, Chinese firms believed there was a credible threat of losing its MFN status with the United States. Joining the WTO in 2001 reduced this threat, and evidence shows that as a result, China's aggregate exports to the United States increased between 22% and 30% (Handley and Limão 2017).
9. Novy (2013) estimates trade costs between Canada and the United States fell by 12.8 percentage points from 1988 to 1998, while trade costs with a selection of developed (non-NAFTA) trading partners fell by 4.6 percentage points for Canada and 9.0 percentage points for the United States. In other words, trade costs between the two countries would likely have fallen even without a free trade agreement, although not by as much. Trade costs between Canada and the United States fell 6 percentage points more than the average decline across their non-NAFTA trading partners. This decline can be considered as the NAFTA gain.

increase in exports from Canada to the United States and a 72% increase in U.S. exports to Canada. Moreover, internal trade within Canada decreases: inter-provincial trade falls by 52% (column 3) and intra-provincial trade falls by over 46% (column 4). In contrast, inter-state and intra-state trade would increase by around 10% (columns 5 and 6, respectively) in the much larger U.S. market. Overall, reduced trade costs and the reallocation of goods flows leads to increased expenditure on domestic and imported goods, up 11.4% in Canada and 0.8% in the United States.[10]

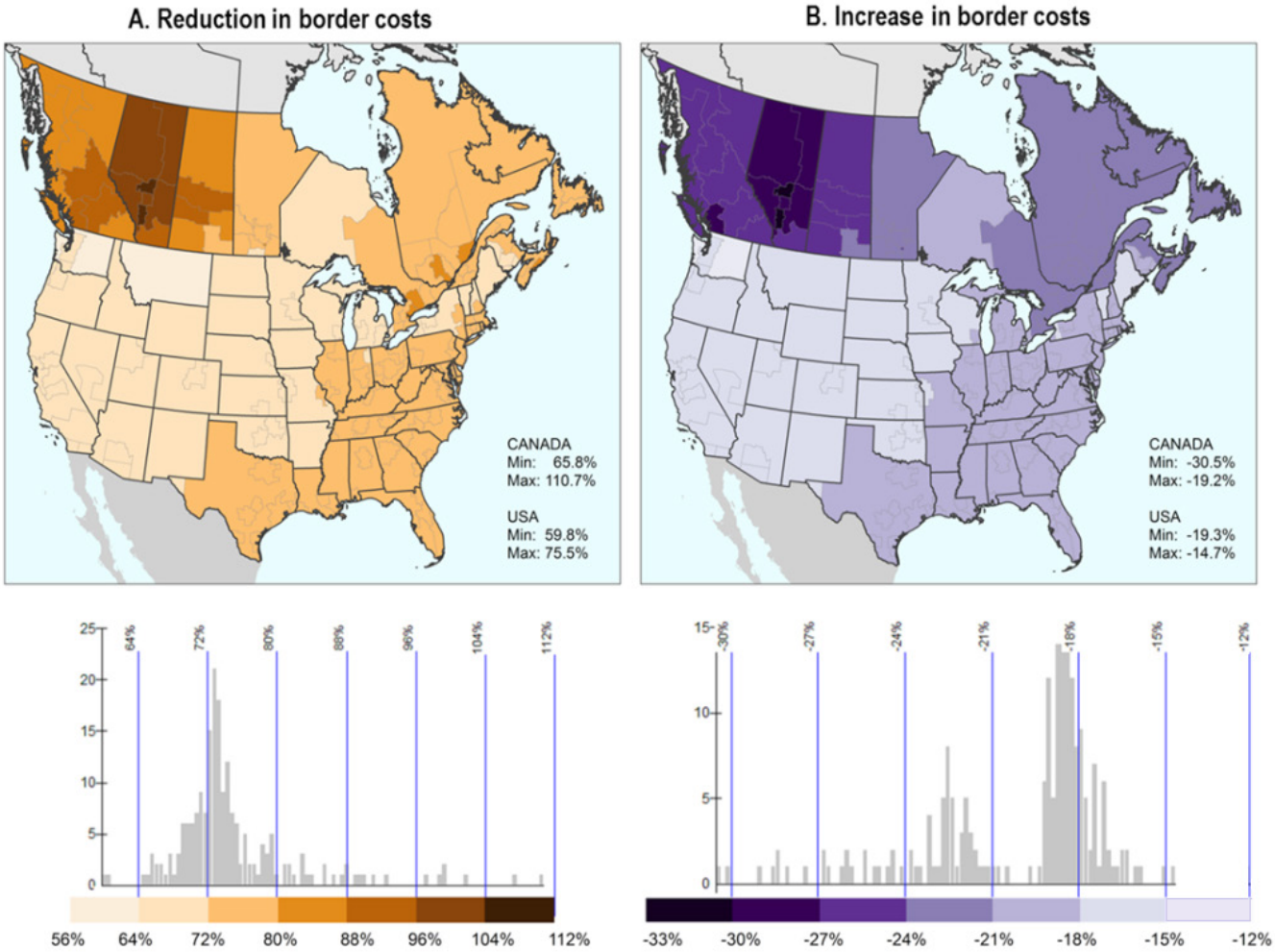
The effect of increasing border costs is presented in the bottom half of Table 1. An increase to MFN tariffs plus associated non-tariff barriers reduces Canadian exports to the United States by 23% and U.S. exports to Canada by 18%. Internal trade would increase in Canada as a substitute, with inter-provincial exports rising 11.3% and intra-provincial trade increasing by 9.8%. Domestic U.S. trade would also increase, rising 1.1% for inter-state and 0.7% for intra-state trade. But both Canadian and U.S. consumers lose consumption opportunities overall, with the value of total goods expenditures declining by 1.8% (approximately CAN$10 billion) in Canada and 0.2% (approximately CAN$7 billion) in the United States.

These results show that the effects of changing trade costs are potentially substantial, particularly for the smaller Canadian economy. However, aggregate results can mask regional variation since the degree of integration between Canada and the United States is regional in nature. A series of maps are used in the next section to illustrate the regional variation in changing border cost effects.

Regional impacts

The effect of a change in border costs on bilateral Canada–United States trade is presented in Figure 1. Overall, the regional impacts show that aggregate results obscure a pronounced east–west divide for Canada and a northwest–southeast divide for the United States. For the first scenario, in which border costs are reduced (panel A), western United States exports to

Figure 1
The change in Canada–United States trade by region due to a change in border costs



Note: Presented is the percentage change in exports from Canadian economic regions to U.S. metropolitan areas or non-metropolitan areas, and in exports from U.S. metropolitan areas or non-metropolitan areas to Canadian economic regions, based on the two scenarios changing border costs.
Sources: Statistics Canada, Surface Transportation File; and United States Census Bureau, Commodity Flow Survey.

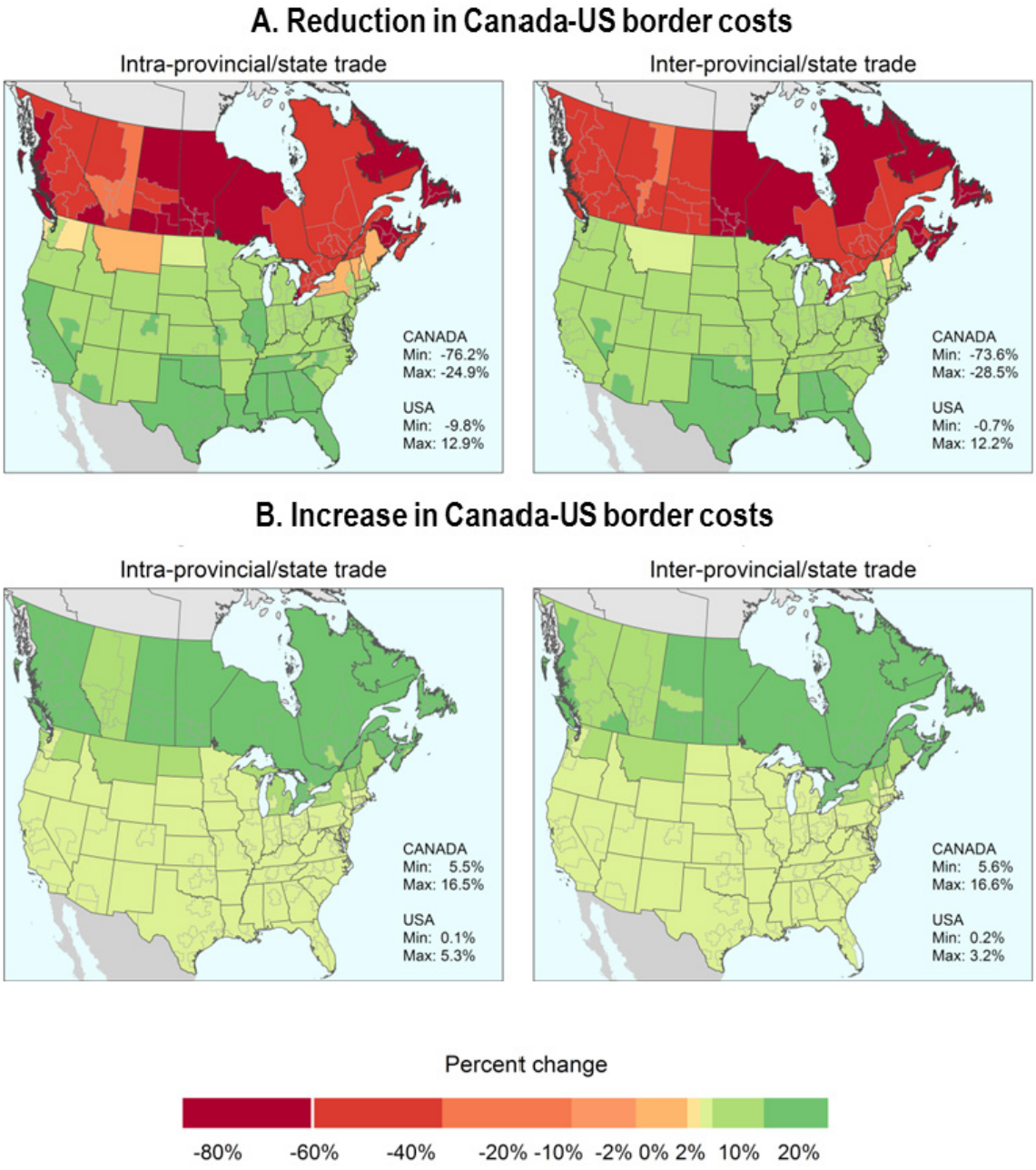
10. Lower border costs allow firms to increase profits and pay higher wages while charging lower prices to consumers, leading to higher expenditures on goods and services.

Canada increase between 56% and 72%, and exports from Texas through the Eastern Seaboard increase between 64% and 80%. In Canada, results are more pronounced for regions in energy-producing Alberta compared with similar regions in other provinces, but this is likely because the energy industry is not included in STF–CFS data.

These results are contrasted with the internal trade impacts shown in Figure 2. In the first scenario (reduced border costs, panel A), internal trade falls by about half as regions reorient their trade to the U.S. market, regardless of whether the internal trade is inter-provincial or intra-provincial. In the western provinces, this decline comes more from intra-provincial flows. The eastern provinces are more likely to switch from inter-provincial trade to international trade.

While panel B in Figure 1 illustrates the regional impacts of an increase in Canada–United States border costs on cross-border trade, panel B in Figure 2 shows that the most affected regions are disproportionately more likely to turn to intraregional or intra-provincial trade to compensate for reduced access to U.S. markets. Furthermore, eastern regions in Canada would make greater use of inter-provincial trade than western regions in response to a thickening Canada–United States border.

Figure 2
Predicted change in domestic trade resulting from a change in Canada–United States border costs



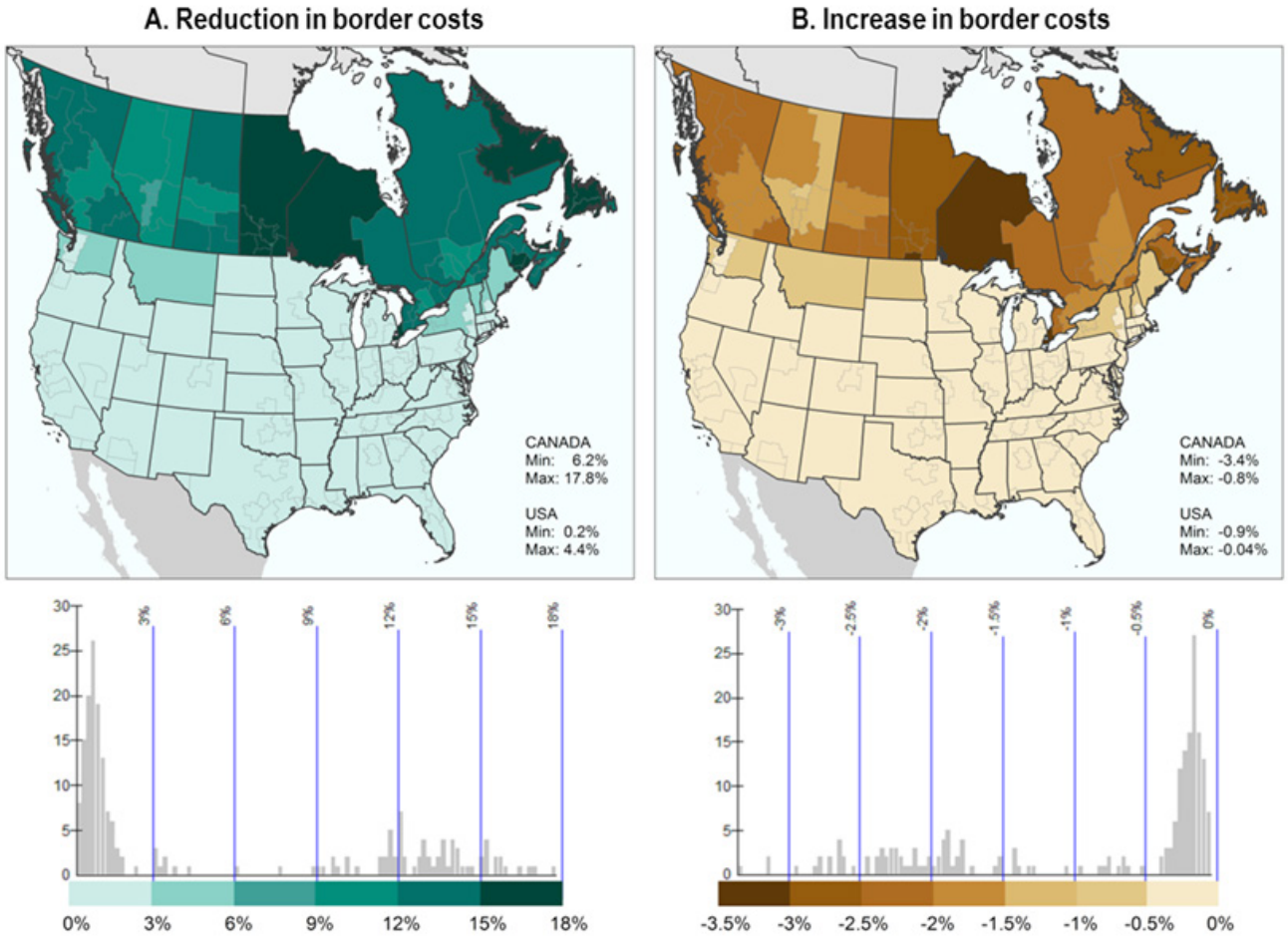
Note: Presented is the percentage change in regional trade by either inter-region or intra-region domestic trade flows.
Sources: Statistics Canada, Surface Transportation File; and United States Census Bureau, Commodity Flow Survey.

One interesting result is that the contraction in international trade appears to be matched with increases in inter-state trade of up to 2.5% for large regions of northern and middle states in the United States, from California to the east coast (panel B, Figure 2). The northernmost states in the west and northeast would increase intra-state and inter-state trade by between 2.5% and nearly 5.5% to compensate for reduced access to Canadian markets.

The regional consequences for expenditures are presented in Figure 3. The uneven impacts are most visible in the United States, where the low aggregate figure for reduced border costs obscures a pronounced north–south divide (panel A). Regions in the northeastern corner of the United States, including Montana, experience gains up to 10 times higher than regions in the south. Regions in the states bordering Canada and the Midwest states adjacent to them also experience gains that are higher than the national average. There is also substate variation. For example, New York State would gain 1.9% in overall expenditure because of increasing access to the Canadian market. However, the Buffalo region gains 3.8%, twice the statewide number, with Rochester and the rest of upstate New York also gaining over 3%.

For the second scenario (increased Canada–United States border costs, panel B), the consequences for Canada's border regions are much larger than for their American counterparts, with expenditures falling between 1.5% and 3.5%. The centre of the country appears to be most affected: an arc from Manitoba around the Great Lakes and down to the tip of southwestern Ontario shows the greatest relative gains and losses when border costs change.

Figure 3
Predicted change in regional expenditures resulting from a change in Canada–United States border costs



Note: Presented is the percentage change in regional expenditures for changes in Canada–United States border-related costs for 2012.
Sources: Statistics Canada, Surface Transportation File; and United States Census Bureau, Commodity Flow Survey.

Conclusion

Canada and the United States share one of the most important trading relationships in the world. The uncertainty generated by the 2018 renegotiation of the North American Free Trade Agreement has highlighted the need to understand how a changing Canada–United States border affects firms and consumers within the two countries. This article uses the Surface Transportation File (Canada) and the 2012 Commodity Flow Survey (United States) to indirectly quantify the cost of the border and map its regional implications.

The estimated total impact of the border on trade in 2012 was consistent with previous work, showing that Canada–United States border costs far exceed average tariffs and quotas, and thereby indicating that non-tariff barriers are the leading sources of trade frictions. Using these border costs as a benchmark, the region-specific impacts of the border are illustrated by exploring a pair of counterfactual changes to border costs.

In the first scenario, the cost of trade between Canada and the United States is reduced to that of inter-provincial trade in Canada, which substantially affects cross-border trade for both countries. As a result, the value of intra-provincial and inter-provincial trade declines by about half in Canada as regions reorient their trade to the U.S. market. In the west, this decline comes more from intra-provincial flows. The eastern provinces are more likely to switch from inter-provincial trade to international trade.

Increasing border costs are associated with approximate declines of 23% in Canadian exports and 18% in U.S. exports. These falls reduce total expenditures by CAN$10 billion in Canada and by CAN$7 billion in the United States. While U.S. losses are collectively small, they are felt more keenly across the northern states. Regions within states found along the Canada–United States border are affected the most. National averages obscure substantial regional variation resulting from changing trade costs. The data, estimation and resulting maps detail which regions face the largest adjustments to North American trade flows (e.g., western Canada and eastern United States), and which regions stand to gain or lose from changing trade barriers.[11]

■

11. It is important to emphasize that the results presented are based on static general equilibrium impacts from the structural gravity model. A dynamic model that accounts for capital accumulation, firm size changes and reorganization effects as a result of a change in trade costs is a natural extension. Furthermore, any Melitz-style productivity differences between firms, the effects of competition, and any exchange rate responses to changing trade patterns have not been accounted for.

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