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How thick is the border: the relative cost of Canadian domestic and cross-border truck-borne trade, 2004–2009

W. Mark Brown [a,*], William P. Anderson [b]

[a] Economic Analysis Division, Statistics Canada, Canada
[b] Cross-Border Institute, University of Windsor, Canada

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ABSTRACT

Despite the elimination of tariff barriers between Canada and the United States, the volume of trade between the two countries is less than would be expected in the absence of impediments. While considerable work has been done to gauge the degree of integration between the Canadian and U.S. economies through trade, relatively little analysis has parsed out the underlying costs of the border. The costs of crossing the border can be divided into formal tariff barriers, non-tariff barriers, and the cost of the transport system. This paper focuses on the latter by estimating the cost of shipping goods by truck between Canada and the U.S. during the 2004–2009 period. The incremental cost of import and export over domestic shipments is measured in both absolute and *ad valorem* terms. The latter provides an estimate of the border increment in transportation cost as a tariff equivalent. The incremental cost is further broken down into fixed and variable (line-haul) components. Higher fixed costs are consistent with border delays and border compliance costs being passed on to the consumers of trucking services. Higher line-haul costs may result from difficulties obtaining backhauls for a portion of the trip home, which may stem from trade imbalances and regulations that restrict the ability of Canadian-based carriers to transport goods between two points in the U.S.

1. Introduction

Despite the elimination of tariff barriers between Canada and the United States, the volume of trade between the two countries is far less than would be expected if tariffs were the sole impediment to trade (Anderson and Yotov, 2010). This suggests that other factors are important, such as differences in regulations, differences in tastes, and possibly transaction costs associated with moving goods across the border. According to recent estimates, the volume of trade between the two countries is equivalent to what would be expected if a 21% tariff were in force (Chaney, 2008). Such large obstacles imply a lack of market access that may affect the productivity of Canadian firms, whose size may be limited by their relatively small domestic market (Baldwin and Gu, 2009; Baldwin et al., 2012).[1]

The costs of crossing the border can be divided into formal tariff barriers, non-tariff barriers,[2] and the cost of the transport system. This paper focuses on the last factor. It investigates the cost of shipping goods between Canada and the U.S. by truck, which is the primary mode for cross-border freight. In 2009, goods shipped by truck accounted for 47% of the value of Canada's merchandise exports to the U.S. and 70% of the value of imports from the U.S.[3] Consequently, trucking costs may affect the overall degree of integration between the two markets.

The cost of trucking goods across the border is considerable. Using evidence from a combination of secondary sources and interviews, Taylor et al. (2004) estimate the total cost of crossing the border – including transportation, customs compliance, excess inventories, and a variety of other border related costs – at about 4% of the value of truck-borne trade. This is close to the average (trade-weighted) tariff rate before implementation of the

* Corresponding author at: R.H. Coats Building, 18th Floor, Section G, 100 Tunney's Pasture Driveway, Ottawa, Ontario K1A 0T6, Canada. Tel.: +1 613 951 7292.
E-mail address: mark.brown@statcan.gc.ca (W. Mark Brown).

[1] While a number of recent studies have addressed the "thickening" of the Canada–U.S. border (Sands, 2009; Kergin and Matthiesen, 2008), relatively little research has attempted to identify factors that contribute to the border effect. Taylor et al. (2004) is a notable exception.

[2] Non-tariff barriers include those that are policy-driven (for example, differences in product standards) and those related to a broader set of factors that differ between countries like language, institutions, cultural norms, and tastes (Helliwell, 1998, 2005).

[3] USDOT (U.S. Department of Transportation), 2011. Washington, D.C.: USDOT, Research and Innovation Technology Administration, Bureau of Transportation Statistics, Cross-border Freight Data. Accessed May 10th, 2011).

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Canada–U.S. Free Trade Agreement (Trefler, 2004). As Hummels (2007) notes, with declining formal barriers, transportation costs are an increasingly important component of trade costs.

The present study extends Taylor et al.'s (2004) analysis by directly measuring the cost of transporting goods across the border. It also has much in common with Conlon (1981), who measured the *ad valorem* equivalent of transportation costs in the mid-1970s. To be more precise, this paper addresses three related questions. First, and most obvious, what is the cost of shipping goods by truck between Canada and the U.S. relative to shipments within Canada? Indirect evidence indicates that the cost of shipping goods across the border may be greater than the cost of shipping the same goods domestically and that the gap may have risen with the implementation of the post-9/11 security regime. The effect of the border on Canada–U.S. trade has been a subject of research dating back to McCallum's (1995) initial assessment, which led to subsequent work by Helliwell (1998), Brown and Anderson (2002), Anderson and van Wincoop (2003), and Anderson and Yotov (2010), amongst others. They consistently find cross-border trade is lower than interstate or interprovincial trade, after controlling for the size and distance between the trading partners (Anderson and van Wincoop, 2003; Anderson and Yotov, 2010). There is also recent work that examines whether the post-9/11 security regime has reduced the volume of Canada–U.S. trade, with Globerman and Storer (2008, 2009) and Grady (2008) finding evidence of such a reduction, while Burt (2009) finds little evidence of this effect. This study takes a step back from both literatures and asks whether there is a premium paid by shippers to move goods across the Canada–U.S. border, which is one of the mechanisms by which 'border thickening' might occur.

Second, to the extent that cross-border and domestic shipping costs differ, how much of this difference is due to fixed costs associated with the border, and how much is due to line-haul costs? Post-9/11 security measures may have increased the costs of crossing the border through longer and/or more uncertain wait times and through other border compliance costs borne by carriers (e.g., costs associated with enrolment in trusted trade programs), adding a fixed cost increment to cross-border shipments. Line-haul costs for cross-border and domestic trade may also differ because of the so-called 'backhaul' problem. When taking a contract, carriers must commit the capacity for a round trip. Prices on the high demand (fronthaul) and low demand (backhaul) legs can vary significantly, because the opportunity cost of completing a leg empty is zero. The relative demand for the export and import legs of a cross border round trip will depend on both the balance of Canada–U.S. truck borne trade (Behrens and Picard, 2011) and the regulatory environment. If Canada has a trade surplus with the U.S., the relative demand for export trips will be stronger than import trips, putting upward (downward) pressure on the prices charged by carriers for the export (import) leg of the journey. The backhaul problem may be exacerbated by regulations that prohibit Canadian firms from transporting goods between two points in the U.S. (cabotage rights), leading to longer empty (deadhead) portions of the round trip. This may lead Canadian carriers to charge higher prices for cross-border trips than for domestic trips.

Finally, what are the *ad valorem* costs associated with trucking goods domestically and across the border? Estimates of *ad valorem* costs are essential to assessing whether trucking costs have a meaningful effect on the volume of trade. For low-weight, high-value commodities (e.g., electronic equipment), trucking costs may account for a small fraction of the delivered price of a good. By contrast, for high-weight, low-value commodities (e.g., non-metallic minerals), the opposite may hold true.

To answer these questions, several datasets were combined to create a database that measures the cost of domestic and cross-border truck-borne trade, and the value of that trade. The primary source is Statistics Canada's (2010) Trucking Commodity Origin Destination (TCOD) Survey. It samples for-hire trucking firms' waybills to measure the characteristics of their shipments for domestic and cross-border shipments, primarily to the U.S. The TCOD survey provides a means to measure trucking costs; that is, the cost to shippers of moving their goods between an origin and destination. These data are combined with measures of the value of commodities per tonne from the U.S. Bureau of Transportation Statistics' TransBorder Freight Database (USBTS-TFD, 2009) and Commodity Flow Survey (CFS) to generate estimates of *ad valorem* trucking costs.

The next section describes the methods used to develop a comprehensive measure of the trucking costs. This entails a more detailed description of the TCOD survey dataset and the methods. Given that the cost of moving goods has both fixed and variable components that may differ for domestic and cross-border trade, the third section presents a multivariate analysis that takes into account potential differences between cross-border and domestic shipments to arrive at an estimate of their relative cost. These costs are then used to estimate the level and trend of the *ad valorem* cost of domestic and cross-border trade over the study period. Finally, a brief conclusion summarises the results of the analysis and outlines some caveats in interpreting the data.

2. Data development

The TCOD survey measures the output of the for-hire trucking sector *and* the volume of commodities moved by truck (Gagnon and Trépanier, N.D.). Because of the differences in methodology pre- and post-2004, this analysis is restricted to the 2004–2009 period. In subsequent work, the dataset will be extended to include pre-2004 survey estimates. This longer time series will provide an estimate of changes to the cost of crossing the border in the post-2001 security environment.

Each record in the TCOD includes shipment characteristics (e.g., revenue, weight, distance shipped, and commodity type). The revenue earned by the carrier from each shipment is used as a proxy for relative costs of domestic and cross-border transportation borne by shippers. This assumes that carriers pass the full cost of crossing the border onto shippers. We believe this is a reasonable assumption since it is unlikely that carriers would accept lower profit margins for cross-border shipments than for domestic shipments. A related question is whether a measured cross-border premium on trucking costs captures the full cost of moving goods across the border. Anderson and Coates (2010) show that a major cost factor in crossing the Canada–U.S. border is the variability in crossing times, which poses a particular problem for goods in supply chains that must be delivered within narrow time windows. There are two ways to hedge against crossing time uncertainty. The first is to build buffer time into shipping schedules, which should be reflected in carriers' revenue. The second is to maintain buffer inventories on the far side of the border, which may not be reflected. The present analysis, which is based solely on carriers' revenues, may, therefore, underestimate the full cost of cross-border goods movement.

The scope of the TCOD survey is limited to for-hire trucking firms based in Canada. Therefore, it excludes foreign-based trucking firms operating in Canada and non-trucking firms with their own fleets (own-account trucking).[4] Nonetheless, for two reasons, trucking costs derived from the TCOD survey should be representative of the trucking sector as a whole. First, the TCOD survey accounts for the majority of Canada–U.S. shipped-trade by truck.

[4] Other NAICS sectors may also provide trucking services as firms turn to bundling logistical services.