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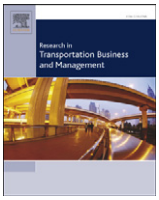

Economic implications of the Canada–U.S. border bridges: Applying a binational local economic model for international freight movements ☆

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ABSTRACT

This study provides an approach to measuring the local economic costs stemming from delays on bridges connecting the U.S. and Canada. We focused on two of the busiest bridges in the U.S. and Canada that connect the Buffalo–Niagara metropolitan region and Ontario province, using an approach that combines spatial networks and local economic impact models to estimate the economic costs of border delays on the local economies of the border regions. We estimated that the local economic impacts of delays on the Canada–U.S. border bridges in the range of $36,000 to $110,000 per day in total, indicating that a 1 percent increase of delay cost can produce 1.33 percent economic costs in total at the bridge connecting Buffalo and Ontario. Furthermore, the binational economic model provides information on which industries are most impacted from shipping delays on the bridges via supply chain, based on various scenarios. Our modeling approach and scenario development process have important implications for border-traffic planning analysis and border-city economies because they allow numerous simulation tests with respect to changes of international freight transportation costs and patterns for key economic sectors.

1. Introduction

Border crossings are critical to the economies of border regions, where trucking is a dominant mode of shipping. Once a bridge is closed or its capacity is diminished, freight shipping via other bridges in the transportation network could be seriously impacted. This could set off economic ripple effects via various inter-industrial linkages involved in the production process. Considering that Canada and the U.S. enjoy the biggest trade relationship in the world, significant disruption of these trade linkages could have tremendous consequences for global trade. This study focuses on a case study of Canada–U.S. highway crossings.

Since the terrorist attacks of 9/11, concern about highway networks coming under a man-made attack on transportation infrastructure has increased due to the sizable economic impacts such an occurrence could have. Indeed, estimating freight movements and shipping costs in border regions when such an event occurs is essential for planning governmental investments in each country. A combined transportation system and economic model focused at a local level can analyze local impacts that are not otherwise easily simulated. Although cross-border trade has been formally treated and studied historically by focusing on trade magnitudes (Anderson & Smith 1999; McCallum 1995), there is a dearth of studies that measure how freight trade disruptions can simultaneously impact proximate local regions of both countries. Different economic sector systems of each country must be compatible and combined with the highway network systems connecting the two countries. Complex and disaggregated models can lead to a better understanding of how economic impacts resulting from traffic pattern changes on the border bridges affect local economies in both countries. While it is worthwhile to construct an advanced model involving all of the various U.S. regions and Canada, this study first develops a binational price-type local economic model connecting Ontario and New

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York State as a test case after converting ton values to the number of trucks.

We are particularly interested in the role of bridges limited to Ontario province and the Buffalo–Niagara (BN) metropolitan region to identify local-level economic effects. The BN model, which is spatially decomposed to the zip code level and then integrated to a one-region model, is proposed to be consistent with the Ontario model for this study.

This study will contribute to the literature on binational and regional economic modeling theory and transportation network analysis, especially elements focused on the economic role of border bridges. It expands the understanding of local-level economic implications of major Canada–U.S. border bridges by suggesting a local economic tool to measure the economic importance of those bridges, especially involving the BN region proximate to the Province of Ontario.

2. Background

Canada and the U.S. are the biggest bilateral trade partners in the world. Trade between the two countries reached $645.7 billion in 2010, representing $1.8 billion worth of goods and services crossing the border every day. About 13 percent of Canadian jobs and more than 8 million U.S. jobs depend on the bilateral trade (Canada's Economic Action Plan 2012).

Separated by the Great Lakes and waterways, the Province of Ontario and the BN region have a significant portion of trade activities with the U.S. by way of freight transportation via the border bridges connecting the two countries. The BN area experiences more than 12 million vehicles traveling annually between the two countries through the Buffalo–Niagara Gateway (GBNRTC, 2010). In 2010, the total number of passengers, crew, and pedestrians entering the U.S. through the Gateway was about 13 million people, which took 21.63 percent of the total entry number of all the U.S.–Canadian borders. The top three major U.S. gateways (Buffalo–Niagara Falls; Detroit; and Blaine) had about 45 percent of total U.S.–Canada crossings.

Fig. 1 shows a binational highway network connected by border bridges in the BN region and the Ontario Province: the Peace and Lewiston–Queenston Bridges. If these bridges work improperly, it can impact not only New York and Ontario that are directly connected by the bridges, but also other remote states due to the interconnection of freight-carrying highways and economic networks.

As demonstrated in Fig. 2, truck shipments are especially dominant in freight flows between Canada and the U.S. through the Buffalo–Niagara Falls Port of entry. Since the economic recession of 2004, the number of loaded truck containers declined until 2009 and has since increased. The most recent number of loaded containers is about 640,000.

It is not common to find a study of border delay effects on both economies before the 9/11 event. Since that event, border delay impacts seemed to focus on intensified border inspection for national security. Studies have started with the costs related to transportation time (KPMG, 2002; Roberts et al. 2013; Texas Transportation Institute & Battelle Memorial Institute 2002; Windsor Chamber of Commerce 2002) and expanded to measure how the time delayed at borders affects a national economy.

For example, Taylor, Robideaux, and Jackson (2003) estimated the costs of border management and trade policies on both the U.S. and Canadian economies to be US$7.52 to US$13.20 billion annually. Walkenhorst and Dihel (2006) applied economic data to the measurement of economic impacts of border delays. Applying the Global Trade Analysis Project (GTAP) tool, a multi-national computable general equilibrium (CGE) model, they simulated border delay impacts: border delays could raise the cost of trade by between 0.5 percent and 1.6 percent, resulting in a reduction of global trade of about 1 percent per a 1 percent increase in trade cost. More recently, Nguyen and Wigle (2011) considered inter-industrial and inter-regional relations for the analysis of border delays, constructing a Canadian CGE model.

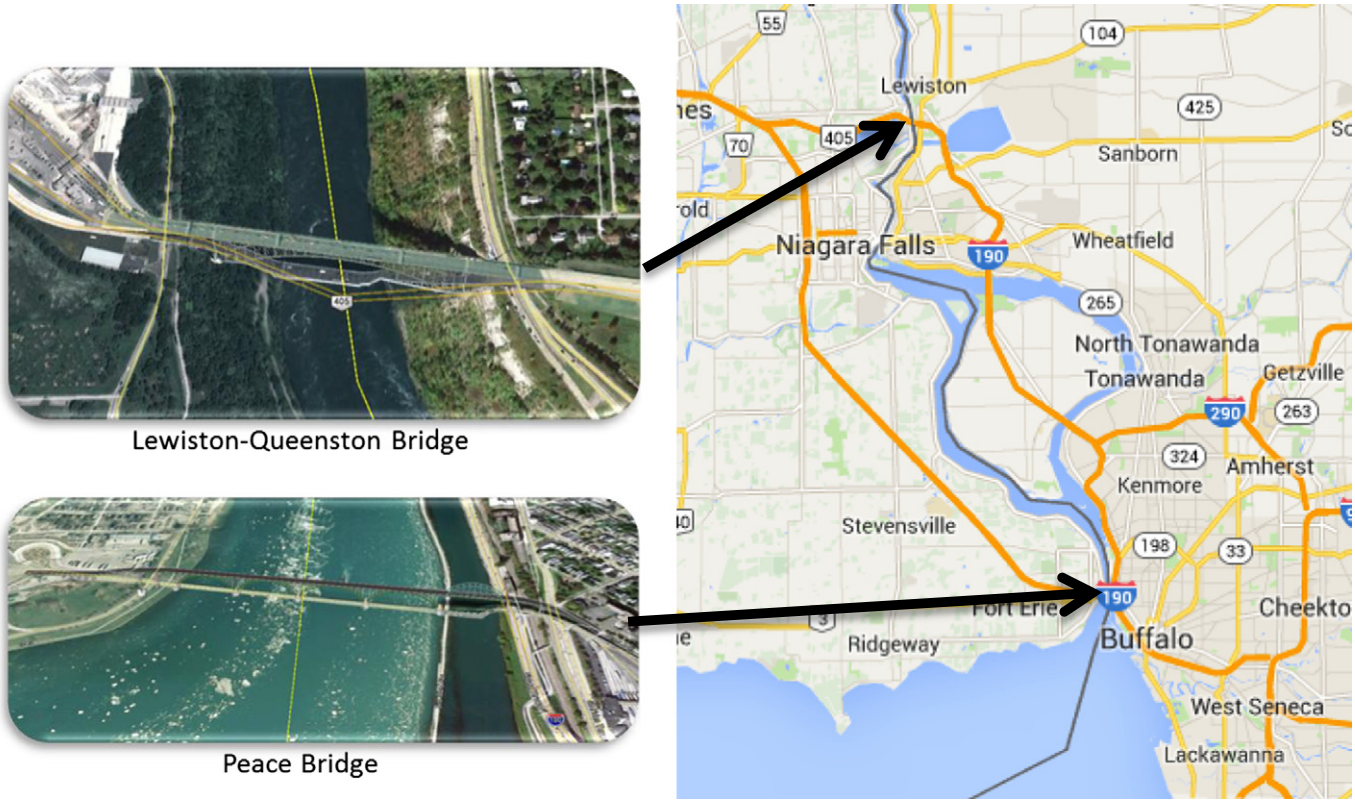

Fig. 1. Highway Network between Buffalo–Niagara Falls and Ontario [source: Google Map].