1-2014

Freight Transportation Costs and the Thickening of the U. S. - Mexico Border

Thomas M. Fullerton Jr.
University of Texas at El Paso, tomf@utep.edu

Adam G. Walke
University of Texas at El Paso, agwalke@utep.edu

Comments:
UTEP Border Region Modeling Project
Technical Report TX14-1
A revised version of this study is forthcoming in *Applied Economics*.

The University of Texas at El Paso
UTEP Border Region
Modeling Project

Technical Report TX14-1

Freight Transportation Costs and the Thickening of the U.S. - Mexico Border

Produced by University Communications, January 2014

The University of Texas at El Paso

Freight Transportation Costs and the Thickening of the U.S. - Mexico Border

Technical Report TX14-1
UTEP Border Region Modeling Project

This technical report is a publication of the Border Region Modeling Project and the Department of Economics & Finance at the University of Texas at El Paso. For additional Border Region information, please visit the www.academics.utep.edu/border section of the UTEP web site.

Please send comments to Border Region Modeling Project - CBA 236, Department of Economics & Finance, 500 West University, El Paso, TX 79968-0543.

UTEP Border Region Econometric Modeling Project

Corporate and Institutional Sponsors:

Hunt Communities
El Paso Water Utilities
Texas Department of Transportation
Universidad Autónoma de Ciudad Juárez
UTEP College of Business Administration
UTEP Department of Economics & Finance
UACJ Instituto de Ciencias Sociales y Administración
UTEP Center for the Study of Western Hemispheric Trade

Special thanks are given to the corporate and institutional sponsors of the UTEP Border Region Econometric Modeling Project. In particular, El Paso Water Utilities, Hunt Communities, and The University of Texas at El Paso have invested substantial time, effort, and financial resources in making this research project possible.

Continued maintenance and expansion of the UTEP business modeling system requires ongoing financial support. For information on potential means for supporting this research effort, please contact Border Region Modeling Project - CBA 236, Department of Economics & Finance, 500 West University, El Paso, TX 79968-0543.

Freight Transportation Costs and the Thickening of the U.S. - Mexico Border*

Adam G. Walke and Thomas M. Fullerton, Jr.
Department of Economics & Finance
University of Texas at El Paso
El Paso, TX 79968-0543

Telephone 915-747-7775
Facsimile 915-747-6282
agwalke@utep.edu
tomf@utep.edu

Abstract

Border regulatory requirements and administrative practices changed subsequent to the 11 September 2001 (9/11) terrorist attacks in the United States. This study examines the manners in which transportation cost data for merchandise imports from Mexico behaved before and after 2001. Evidence is obtained that confirms results earlier tabulated for imports from Canada. Empirical results further indicate that, beyond freight cost changes, growth in the value of imports from Mexico was disrupted by events associated with the aftermath of 9/11.

Key Words
Border Economics; Freight Costs; International Trade

JEL Categories
F15, Economic Integration; M21, Business Economics; R15, Regional Economics

Acknowledgements

Funding support for this research was provided by El Paso Water Utilities, Hunt Communities, Texas Department of Transportation, the UTEP Center for the Study of Western Hemispheric Trade, and a UTEP College of Business Administration Faculty Research Grant. Helpful suggestions and comments were provided by Sal Hernandez. Econometric research assistance was provided by Alejandro Ceballos, Stephanie Daw, and Alan Jiménez.

* A revised version of this study is forthcoming in ***Applied Economics***.

Introduction

The United States, Mexico, and Canada began implementing the North American Free Trade Agreement (NAFTA) with the goal of removing barriers to trade in the region. The value of United States imports from Mexico more than tripled in real terms between 1993 and 2000 (USITC, 2012). However, with the terrorist attacks of 11 September 2001 (hereafter, 9/11), national security concerns quickly overshadowed any goals of regional economic integration between the United States and its neighbors (Andreas, 2003). In the aftermath of the attacks, increased inspection times produced unprecedented bottlenecks at ports of entry (Oppel, 2001). New regulations designed to enhance border security also had the side-effect of increasing paperwork burdens for companies engaged in cross-border trade (Brooks, 2003). One of the consequences of the 9/11 attacks was thus an intensification of efforts to control all forms of trans-boundary traffic.

The number of border crossings by private individuals likely fell off in the wake of 9/11 (Fullerton, 2007), but this should not be the case for the commercial shipment of goods from Mexico to the United States. The 9/11 disruptions have, however, had major impacts on merchandise trade. Estimates of the cost of cargo vehicle delays

at ports of entry on the southern border range from US $5.8 billion to $7.5 billion per year (Accenture, 2008; Del Castillo Vera, 2009). The effect of border delays on trans-boundary commercial transactions effectively amounts to increasing the distance between exporter and importer or 'thickening' the border (Boyer, 1997; Ackleson, 2009). It is well documented that a larger distance between countries is associated with lower trade volumes (Disdier & Head, 2008). Similarly, if stringent post-9/11 border security procedures result in a thickening of the United States-Mexico border, such measures may negatively affect the volume of bilateral trade. This analysis will employ data on cross-border transportation costs to explore whether a thickening of the border has occurred.

Material that follows reviews the literature on border barriers to international trade and the impacts of the 9/11 attacks on border security and cross-border trade. Each of the subsequent two sections consists of a data and methodology sub-section followed by a presentation of empirical results. In the first of these sections, changes in the trajectory of cross-border transportation costs are analyzed in light of the new border security measures that went into effect after the 9/11 attacks. The impacts of freight transportation costs on cross-border trade are evaluated in the subsequent section. Finally the results of the analyses are summarized in a conclusion.

Literature Review

Several studies report fairly clear evidence that national boundaries pose substantial obstacles to trade (McCallum, 1995; Nitsch, 2000; Chen, 2004). Anderson and van Wincoop (2004) find that, for industrialized countries, border-related trade barriers are equivalent to a 44 percent ad-valorem tax on traded goods. In a multi-country analysis, Walkenhorst and Dihel (2006) report that, if border security measures raise frictional costs by one percent of the value of traded goods, the result is a 0.9 percent decrease in imports and a decline in welfare of $75 billion per year worldwide. While borders may represent substantial barriers to trade, Evans (2003) finds that the effect of borders on trade is not entirely the result of trade policies. About 34 percent of the border effect is traced to policy-related tariff and non-tariff barriers while 46 percent is attributed to differences between domestic and international transaction costs.

Among the factors that may inhibit trade across borders are regulatory restrictions and deficient infrastructure. Das and Pohit (2006) report that exporting a single shipment across the India-Bangladesh border takes approximately four days due partly to inadequate transportation infrastructure. Limão and Venables (2001) find that improving transportation infrastructure from median world levels to the top 25th percentile yields a 68 percent increase in trade volume. Also, some regulations on cross-border shipping may constitute policy-related barriers to trade. Haralambides and Londoño-Kent (2004), note that, partly because of limitations on the entry of Mexican trucks into the United States, shipping goods over the border may require three trucks or trailers, three or four drivers, as well as overnight cargo warehousing. The whole process may take between two and five days. Hummels (2001) calculates that the addition of one day to shipping time between two countries reduces the probability that firms will produce for export by 1.0 percent across all categories of goods and by 1.5 percent for manufactures.

Delays at ports of entry often generate secondary costs, beyond the expenses incurred by waiting in line to cross the border. As mentioned by Huang and Whalley (2008), increases in the costs of crossing borders may lead importers to reduce the frequency of shipments and, consequently, to increase inventories above optimal levels. If the goods being shipped are perishable, then excessive wait times can result in spoilage. MacPherson et al. (2006) note that an increase in border-crossing costs may also lead to inefficiency by diverting trade away from low-cost producers in

neighboring countries to higher-cost producers in home countries. Finally, if wait times are volatile, truckers may build more border-crossing time than is ultimately necessary into route planning, which inhibits taking advantage of shorter-than-expected waits (Taylor et al., 2004).

Tighter border security is a key component of the multi-pronged United States government response to the 9/11 attacks (Andreas, 2003). In a study of the United States-Canada border, Taylor et al. (2004) note that primary truck inspection times at ports of entry increased by approximately 25 percent from mid-2001 to mid-2003. The bulk of time costs derive from secondary inspections of 20 to 40 percent of trucks, which are likewise sensitive to increased security risks. Concerns about terrorism also resulted in new trade-related regulations, such as the requirement that exporters send cargo information to the Bureau of Customs and Border Protection before shipments arrive at the border (Peterson and Treat, 2008).

The increase in border security is only one of several avenues through which 9/11 may have impacted the costs of cross-border trade. Nitsch and Schumacher (2004) note that terrorist actions can affect international trade both directly, by destroying traded goods, and indirectly, by increasing the security precautions of governments, firms, and consumers. Commercial insurance premiums may have increased due to higher perceived risks of terrorist attacks, especially in developing countries with less extensive police apparatuses (DFAT, 2004). Given the importance of fuel costs for freight transportation, however, the sharp decline in oil prices in the immediate aftermath of the 9/11 attacks may have partially shielded the international freight distribution industry from the full effects of increased border security (Walkenhorst and Dihel, 2006).

Several studies examine the impacts of the 9/11 attacks on variables such as the volumes of cross-border vehicle traffic, shipping costs, and trade. The terrorist attacks are associated with declines in cross-border vehicle traffic in several areas of the United States-Mexico border (Olmedo and Soden, 2005; Fullerton, 2007). Globerman and Storer (2011) argue that increased border security after 9/11 raised the cost of shipping goods from Canada to the United States. To assess the effects of intensified border security measures on trade, Georges and Mérette (2012) calculate tariff rates that are equivalent to the non-tariff barriers erected at the northern border after 9/11. The rates range from 0.3 to 9.6 percent, depending on the sector evaluated. Elimination of post-9/11 security measures would increase Canada's trade volume by 2.8 percent according to this study. Nguyen and Wigle (2011) find that a one-percent increase in trade costs due to border wait times results in a 3.6 percent fall in Canada's international trade.

Because post-9/11 security measures imposed costs on cross-border trade, most firms involved in international trade took steps to adapt to the new rules. Vance (2008) documents that, given the new bureaucratic hurdles erected at border crossings, some exporters chose to outsource shipping and customs responsibilities to third parties with expertise in those areas. A survey of companies engaged in trade across the United States-Canada border reveals that some firms are considering switching from foreign to domestic suppliers in response to more intensive border security (MacPherson et al., 2006). Firms that practice just-in-time (JIT) inventory management are especially vulnerable to increased border wait times (Vance, 2008; Georges and Mérette, 2012). Some firms have increased inventories as a hedge against the possibility that shipments will not arrive on time due to border delays (Taylor et al., 2004). As noted above, the increased inventories are probably at sub-optimal levels that increase costs of doing business.

Data and Methodology

Several studies note that the 9/11 attacks contributed to a thickening of international boundaries around the United States (Ackleson, 2009; Lara-Valencia, 2011). Globerman and Storer (2011) suggest using freight transportation costs to quantify impediments to cross-border commerce. One consequence of the terrorist attacks is increased transaction costs associated with international trade. Tightened security procedures at ports of entry resulted in new paperwork obligations as well as time-consuming delays that required additional expenditures on inputs like labor and fuel. Markets for freight insurance were likely affected as well. To capture these costs of cross-border transportation, the customs value of imported goods plus insurance and freight costs (the CIF value) is compared with the customs value alone (the free on board, FOB, value). The difference between these two values represents transportation costs.

The specific measure utilized in this analysis is the ratio of insurance and freight costs to the value of imports (Globerman & Storer, 2011). The manner in which it is calculated is shown in shown in Equation 1:

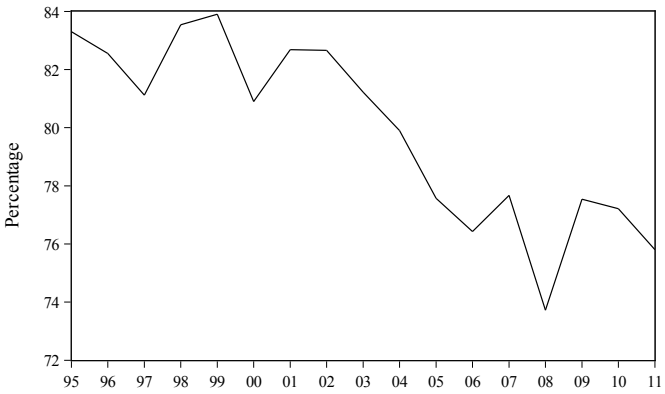
$$(1)\ R_{it} = ((CIF_{it} - FOB_{it}) / FOB_{it}) \times 100$$

In Equation 1, i is an index for each customs district and t is a time index. It is not necessary to deflate the transportation cost ratio, R, because both the numerator and the denominator are expressed in contemporaneous dollar values and the ratio of those measures is not a monetary unit. A number of other studies also use the CIF/FOB ratio to measure the cost of transporting goods (Frankel, 1997; Limão & Venables, 2001; Hummels, 2001; Bergstrand & Egger, 2006).

The impact of 9/11 on shipping costs has not been previously documented for the United States-Mexico border. This study focuses on United States imports from Mexico rather than exports because, at least initially, the most severe obstacles to cross-border trade have been imposed on northbound traffic. Mexico is the third largest source of imports to the United States, accounting for 12 percent of total imports in 2011 (USITC, 2012). The customs districts included in this analysis are those located along the border with Mexico, namely the districts of Laredo, El Paso, Nogales, and San Diego. During the sample period, an average of 79 percent of United States imports from Mexico entered the country through these four customs districts. CIF and FOB data are retrieved from the United States International Trade Commission (USITC, 2012) for the four border-region customs districts from 1990 to 2011.

In examining the impact of 9/11 on cross-border trade and shipping costs, information about the major modes of transportation utilized may be relevant. Unfortunately, the available data on the CIF values of imports are not disaggregated by mode of transportation. However, annual FOB values are available by mode from the Bureau of Transportation Statistics from 1995 forward (BTS, 2012). Chart 1 shows the share of total United States merchandise imports from Mexico that is transported overland across the border rather than being shipped by sea or air. While a large majority of imports cross the land border in all years, there appears to be a shift away from surface transportation after 9/11. Of imports shipped overland across the border, an average of 82 percent travelled by truck, 17 percent by rail, and the remainder by other means, including pipelines. These shares are relatively stable across all years for which data are available.

Chart 1: Share of Overland Imports in Total Imports from Mexico



Graphs of the transportation cost ratios for each customs district are shown in Charts 2 and 3. One striking feature of all of these graphs is that cross-border transportation costs have generally tended to decline over time. This trend may be attributed to a number of factors such as declining real input prices and increasing productivity. The correlation coefficients between the aggregate transportation cost ratio for all four districts and United States industry productivity indices are -0.79 for long-distance trucking and -0.38 for line-haul railroads (BLS, 2012). Boyer (1997) documents that the cost of long haul trucking declined as a result of deregulation of the industry in 1980 and again in 1994, new technology and management practices that ensure trucks are fully loaded on both outbound and return trips, and declining real wages of truck drivers. Lim and Lovell (2009) report that rail transportation enjoyed productivity gains from 1996 to 2003 due largely to improvements in technology.

However, as Charts 2 and 3 illustrate, the general trend towards declining costs is arrested and, in some cases, reversed following 9/11. In order to better discern the impact of the terrorist attacks on the trajectory of cross-border transportation costs, regression exercises are conducted utilizing a dummy variable consisting of zeroes from 1990 to 2000 and ones from 2001 to 2011. This variable is included to capture structural changes in the dynamics of cross-border transportation costs occasioned by administrative responses of the United States government and other institutions to the terrorist attacks. Several other studies use dichotomous variables to capture the impacts of 9/11 (Fullerton, 2007; Globerman and Storer, 2011; Georges and Mérette, 2012). The regression exercises are discussed in the following section.

Chart 2: CIF/FOB Ratios for Border Customs Districts

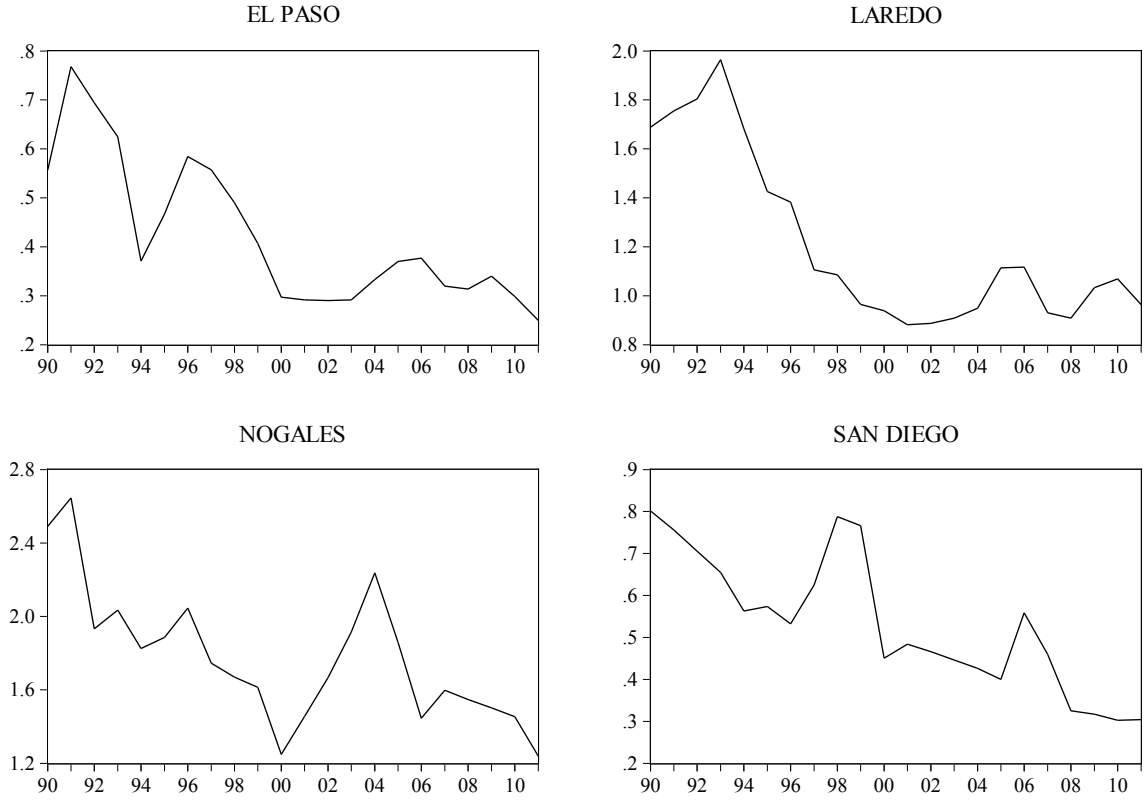
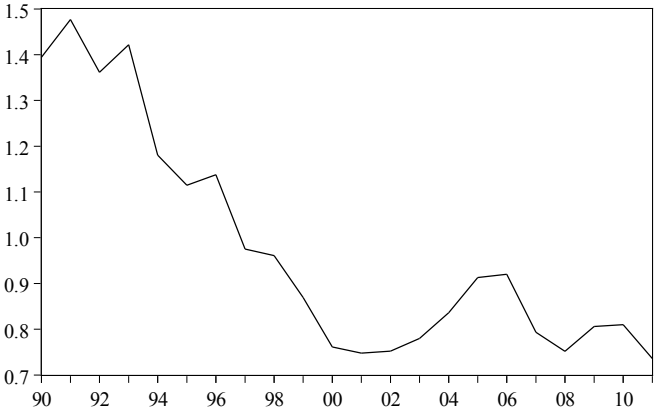


Chart 3: CIF/FOB Ratio for the Border Region



Shipping Costs and Imports

Table 1 summarizes the regression results for the border region as a whole and for each of the four customs districts in the region. Initial CIF/FOB ratios vary substantially from one customs district to another as indicated by the constant terms. The coefficients on the time trend variable are all negative as expected. The 9/11 dummy variable also carries a negative coefficient for each customs district and for the border region in general. However, this does not indicate that transportation costs dropped off sharply after 9/11. Rather, those costs fell gradually during the 1990-2000 period and the vertical intercept of the regression line is substantially lower for the period from 2001 to 2011.

In a majority of cases, the terms representing changes in the transportation cost trend after 9/11 carry positive signs, implying that the reductions in shipping costs observed prior to the terrorist attacks did not continue apace in the subsequent period. In Laredo, the coefficient on the interaction term is larger in magnitude than the trend coefficient, indicating that shipping costs actually began trending upward after 9/11. The interaction coefficient is negative only in San Diego but it is not statistically distinguishable from zero. These

results are largely similar to those reported by Globerman and Storer (2011) for the northern border of the United States.

While Table 1 shows that CIF/FOB ratios experienced pronounced changes after 9/11, it is possible that these shifts can be explained by other factors besides the barriers to cross-border commerce created in the wake of the terrorist attacks. To gauge the extent to which the dummy variable coefficients are capturing the effects of unrelated variables, it is necessary to analyze each of the determinants of the CIF/FOB ratios before and after 9/11. If systematic growth patterns in those variables are consistent with the trends observed in the transportation cost ratio, then the dummy variable coefficients may not accurately measure the impact of the terrorist attacks. Combes and Lafourcade (2005) note that transportation costs may depend on factors such as the operating costs of transportation providers, distances travelled, and the types of commodities being shipped. The following discussion considers whether such variables exerted upward pressure on shipping costs during the period from 2001 to 2011.

The operating expenses of transportation providers are affected by shifts in fuel and labor costs (Combes & Lafourcade, 2005) as well as improvements in productivity due to managerial or technological innovations (Boyer, 1997; Lim & Lovell, 2009). Real data on output per hour and unit labor costs are collected for the United States long-distance freight trucking and line-haul railroad industries (BLS, 2012). Both are found to be highly correlated with the CIF/FOB ratios. However, analysis of the trend components of these series does not reveal a post-9/11 decline in productivity or a contemporaneous increase in unit labor costs that would be expected to exert upward pressure on the transportation cost ratio. To account for the possible impact of fuel costs, real diesel prices are collected for the United States and Mexico (EIA, 2012; INEGI, 2012). Although the upward movement in United States retail diesel prices has accelerated since 2001, the pace of increase in Mexico's diesel prices decelerated slightly after 9/11. While the evidence is only suggestive, the flattening out of cross-border shipping costs does not appear to be predetermined by systematic patterns of change in the national productivity, energy cost, or labor cost variables.

Table 1: 9/11 Impact on Shipping Costs

	Total	El Paso	Laredo	Nogales	San Diego
Constant	1.572176 (<0.1%)	0.707460 (<0.1%)	2.040631 (<0.1%)	2.548302 (<0.1%)	0.740985 (<0.1%)
Trend	-0.070313 (<0.1%)	-0.029787 (0.1%)	-0.100754 (<0.1%)	-0.104438 (<0.1%)	-0.014176 (12.0%)
9/11	-0.762016 (<0.1%)	-0.373190 (1.6%)	-1.254588 (<0.1%)	-0.175151 (66.3%)	-0.011162 (94.6%)
9/11*Trend	0.069960 (<0.1%)	0.028705 (1.5%)	0.112062 (<0.1%)	0.060658 (5.9%)	-0.004749 (70.3%)

Significance levels for the null hypothesis that the parameter is equal to zero are in parentheses.

Another factor that might account for transportation cost trends is a change in the average distance over which goods are transported. The available data do not allow direct quantification of changes in transportation distances for goods imported to the United States. Globerman and Storer (2011) argue that a shift away from cross-border transportation and towards shipment by air or sea to points within the interior of the United States may indicate an increased average distance from origin to destination. Chart 1 shows that, after 2001, an increasing percentage of imports from Mexico were shipped by air and sea to points beyond the border. Even if this does constitute evidence for increased average transportation distances, it does not affect the results presented in Table 1, which are based on data for the four border customs districts, only. During the entire period for which modal split data are available (1995-2011), nearly all goods entering the border customs districts from Mexico were shipped across the land border (BTS, 2012).

Table 2: Composition of United States Imports from Mexico through the Border Region

	Total		El Paso		Laredo		Nogales		San Diego	
	HTS	%	HTS	%	HTS	%	HTS	%	HTS	%
1990	85	33%	85	56%	85	25%	87	28%	85	37%
	87	15%	98	7%	87	22%	7	20%	84	10%
	84	9%	84	6%	84	12%	85	18%	90	6%
1995	85	31%	85	53%	87	27%	87	29%	85	39%
	87	18%	84	9%	85	21%	85	22%	84	12%
	84	11%	90	8%	84	12%	7	12%	87	7%
2000	85	30%	85	47%	87	32%	85	34%	85	40%
	87	22%	84	13%	85	20%	87	22%	84	16%
	84	13%	90	7%	84	14%	7	8%	87	6%
2005	85	29%	85	40%	87	26%	85	29%	85	44%
	87	19%	84	20%	85	20%	87	14%	84	10%
	84	15%	87	9%	84	16%	7	12%	87	7%
2010	85	27%	84	35%	87	26%	87	35%	85	49%
	87	21%	85	31%	85	20%	85	16%	90	9%
	84	18%	87	11%	84	16%	7	13%	87	8%

HTS Codes:

85: Electrical machinery and equipment; television recorders/reproducers; sound recorders/reproducers

87: Vehicles, other than railway or tramway rolling stock, and parts and accessories thereof

84: Machinery and mechanical appliances; nuclear reactors; boilers

90: Optical, photographic, cinematographic, measuring, checking, precision, medical/surgical apparatuses

7: Edible vegetables and certain roots and tubers

98: Special classification provisions: not either specified or included

Globerman and Storer (2011) also examine whether changes in the composition of the commodities imported to the United States from Canada can account for the flattening out of the downward trend in shipping costs. Because some types of commodities are more expensive to transport than others, shifts in commodity composition may affect overall transportation costs. A complete list of all commodities imported from Mexico through the border customs districts for all years would be unwieldy. Therefore, Table 2 only shows data for five selected years and for the top three Harmonized

Tariff Schedule (HTS) categories of imports ranked in terms of their respective shares of the total value of imports. The top three classifications together constitute the majority of imports for all districts and years shown.

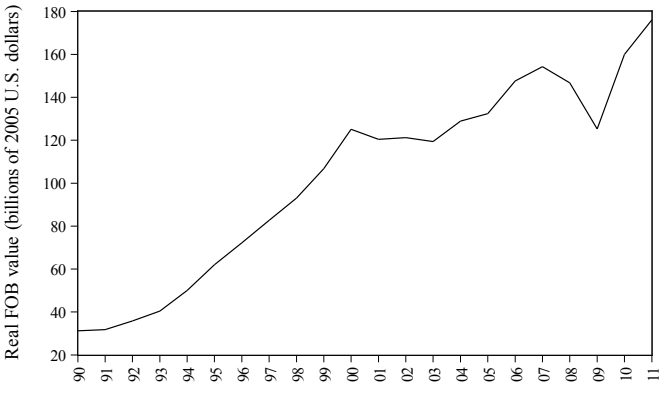
For most customs districts, and for the border region in general, the composition of imports is relatively stable over time. As shown in Table 2, the top three HTS classifications are the same for all years in the Laredo and Nogales districts and the list is modified only intermittently in the El Paso and San Diego districts. In the cases of El Paso, Laredo, and San Diego, the top three HTS merchandise trade categories reflect the extensive intra-industry manufacturing trade that occurs between Mexico and the United States (Fullerton, Sawyer, & Sprinkle, 2011). In the case of Nogales, two of the top three HTS merchandise series are related to intra-industry trade (Clark, Fullerton, & Burdorf, 2001). The remaining category is related to the high volume of fresh vegetables that is exported, primarily, from the Sinaloa region of Mexico into the western United States (Jessup & Herrington, 2005).

The results presented in Table 1 indicate that the rate of decrease in shipping costs for Mexican imports decelerated markedly after 9/11. It is possible that the some portion of that systematic shift in the transportation cost ratio may be unrelated to post-9/11 security measures. Nonetheless, the foregoing discussion suggests that the trend in cross-border shipping costs was probably not predetermined by changes in transportation operating costs, average distance travelled, or the composition of commodities being shipped. It is also important to remember that the 9/11 attacks may have affected cross-border transportation costs through multiple channels. While security measures implemented by the United States government play an important role in the thickening of the border, the responses of firms and other entities may be consequential as well. For example, it is possible that increased real or perceived risks of terrorist attacks may have resulted in higher insurance premiums for carriers of international freight (DFAT, 2004). Such costs may contribute to border thickening to the extent that trade across national boundaries is disproportionately affected. The subsequent section discusses the consequences of a thickening border for the volume of United States imports from Mexico.

Impacts on Trade

This section is primarily concerned with the real FOB values of imports entering the United States from Mexico through the four border region customs districts. Chart 4 shows the FOB data aggregated across the four customs districts and adjusted by the GDP deflator (BEA, 2012). While the real value of cross-border imports grew by 15.0 percent per year on average between 1990 and 2000, the rate of growth slowed to only 3.7 percent annually between 2001 and 2011. Proposed explanations for the moderation of growth in Mexico's exports to the United States include insufficient investment in manufacturing, due in part to the "China syndrome" developments of the early 2000s, within Mexico, plus adverse real peso/dollar exchange rate dynamics (Gallagher et al. 2008). The cost of cross-border freight transportation is another factor that may influence Mexico's competitiveness as an exporter, at least with regard to the United States market.

Chart 4: Value of Goods Imported from Mexico through Border Customs Districts



Increases in the cost of importing goods to the United States from Mexico, whether caused by heightened border security or other factors, may diminish import volumes. Limão and Venables (2001) find that doubling median world transport costs reduces the volume of international trade by 45 percent. Regression analysis is used to examine whether transportation costs impact the volume of imports crossing the border from Mexico to the United States. As in the previous section, shipping costs are measured by the CIF/FOB ratio, which encompasses costs directly related to the thickness of the border as well as other costs of moving merchandise. Though it is not possible to completely disentangle these two components using the available data, interaction terms can be included in the regression equations to examine whether the relationship between transportation costs and trade changed after 9/11 when new border security measures went into effect. Such a change could occur if the intensive screening of imports and other obstacles to trans-boundary commerce that were exacerbated after 9/11 have a different effect on trade than the standard operating costs associated with shipping goods.

As mentioned in the literature review, onerous customs procedures and uncertainty over the length of border delays often generate secondary costs in addition to direct expenditures incurred in transporting goods. Importers may respond to delays by stockpiling goods to avoid shortages in the event that planned deliveries do not arrive on time. Indeed, inventory carrying costs may rival the direct costs of border delays (Huang and Whalley, 2008). Furthermore, uncertainty regarding the length of border delays may require freight carriers to build more time than necessary into shipping schedules, a practice that tends to reduce transportation efficiency (Taylor, et al. 2004). It is also possible that the time requirements associated with new customs paperwork obligations may be substantial enough to necessitate changes in business practices such as increased reliance on external customs brokerage firms (Vance, 2008). If heightened border security generates additional costs to importers beyond routine transportation costs, the impact on trade is likely to be amplified after 9/11.

Bilateral trade is also influenced by a number of variables besides freight transportation costs. The volume of imports is likely to be affected by income levels in the receiving country and the price of imports relative to domestic substitutes (Thursby & Thursby, 1984; Asseery & Peel, 1991). Another variable that may impact the volume of trade is the level of industrial production in the exporting country (Evans, 2003). The functional form employed to model cross-border shipments is shown in Equation 2:

(2) RFOB = f(USGDP, MXIPI, REX, R, R*SEP11)

where RFOB denotes the real customs value (FOB) of imports. USGDP, United States gross domestic product, is obtained from the Bureau of Economic Analysis (BEA, 2012) and MXIPI, Mexico's industrial production index, is obtained from the International Monetary Fund (IMF, 2012). R is the CIF/FOB ratio, SEP11 is a dummy variable and REX represents a real peso/dollar exchange rate index (UTEP, 2012). The latter index is based on

a real exchange rate, which is calculated by multiplying the nominal peso/dollar exchange rate by a ratio of the price level in the United States to the price level in Mexico. As such, it serves as a measure of the relative price of exports (Fullerton & Sprinkle, 2005). All data are quarterly and extend from 1990 to 2011.

The real value of imports is expected to vary positively with the national income of the importing country and with industrial production activity of the exporter. A rise in the exchange-rate-adjusted price level in the United States relative to that in Mexico is likely to increase the volume of imports in the northern country. The real exchange rate variable is therefore predicted to move in tandem with real imports. Higher transportation costs, represented by increases in the CIF/FOB ratio, are expected to impede bilateral trade. Furthermore, the hypothesized negative impact of transportation costs on trade is predicted to increase in absolute value after 9/11 as intensified border security generates an additional drag on trade beyond that associated with the standard costs of shipping goods.

Even after including the aforementioned determinants of cross-border shipments in the regression equations, some of the systematic variation in the dependent variables may not be fully explained by the regressors. Due to data constraints and persistence effects, it is not uncommon to observe serially correlated residuals in estimated models for border region, as well as international, transportation and economic time series (Fullerton, 2004). To account for autocorrelation, parameters are estimated using a nonlinear autoregressive moving average exogenous (ARMAX) methodology (Pagan, 1974). A big advantage of the ARMAX procedure is that it can handle multiple data generating processes. Autoregressive (AR) or moving average (MA) terms, or combinations of the two, may be added to the equations estimated using the functional form shown in Equation 2.

Table 3: Determinants of Cross-Border Trade Volumes

Dependent Variable: Real FOB trade volumes (in millions of 2005 dollars)

	Total	El Paso	Laredo	Nogales	San Diego
Constant	-46042.12	-13506.04	-25191.13	-6580.209	-7084.114
	(<0.1%)	(0.3%)	(<0.1%)	(<0.1%)	(<0.1%)
USGDP	3.144880	1.197149	1.935062	0.447842	0.611052
	(<0.1%)	(0.2%)	(<0.1%)	(1.8%)	(<0.1%)
MXIPI	385.0748	59.30575	205.0681	30.52401	50.77804
	(<0.1%)	(<0.1%)	(<0.1%)	(1.2%)	(<0.1%)
REX	42.69593	7.587932	5.730829	5.518675	2.169499
	(4.4%)	(12.7%)	(58.2%)	(8.7%)	(63.7%)
R	-996.8377	-386.4732	-775.5703	-238.7892	-292.1215
	(37.6%)	(39.4%)	(22.6%)	(5.0%)	(21.3%)
R*SEP11	-1625.396	-2104.651	-401.2921	-218.0840	-557.8309
	(14.1%)	(1.3%)	(47.1%)	(1.8%)	(5.3%)
AR(lag)* (9)	-0.54970	(1) 0.959016		(8) 0.903340	(1) 0.451046
	(<0.1%)	(<0.1%)		(<0.1%)	(<0.1%)
MA(lag)* (1)	0.622644		(1) 0.973383	(1) 0.434758	(9) -0.85218
	(<0.1%)		(<0.1%)	(<0.1%)	(<0.1%)
MA(lag)*			(2) 0.550053		
			(<0.1%)		
R^2	0.986090	0.984038	0.991161	0.883723	0.978612
Log likelihood	-670.0521	-610.0699	-690.4916	-556.4145	-607.4467
F-statistic	719.0311	821.9758	1281.577	78.17299	516.3695
Durbin-Watson	1.333827	1.921363	1.719400	1.920433	1.762715

Significance levels for the null hypothesis that the parameter is equal to zero are in parentheses.
* The lag length for each AR and MA term is indicated to the left of the coefficient.

When the equations are estimated using ordinary least squares, the disturbance terms in all equations are found to be autocorrelated. Accordingly, AR and MA terms are added to account for the remaining systematic variation in the error terms. The residuals of the newly estimated equations are evaluated using chi-squared Q-statistics to determine whether serial correlation remains problematic. The parameter estimates are shown in Table 3. In three of the five equations, mixed data generating processes are encountered and require utilization of both AR and MA terms. In the equation for Laredo, inclusion of two MA terms is needed to eliminate serial correlation.

The results in Table 3 indicate that an additional billion dollars of US GDP results in more than 3.1 million dollars in additional cross-border shipments of goods from Mexico in terms of 2005 price levels. Increased industrial production in Mexico is also strongly associated with higher volumes of imports through the border region. The impacts of these variables on the real value of imports is largest in the Laredo customs district, probably because more than half of all northbound cross-border trade typically passes through that district. The real exchange rate index is positively related to import volumes as expected, indicating that real depreciations of the peso relative to the dollar increase imports from Mexico. This may occur because goods produced in Mexico become cheaper relative to substitute goods produced in the United States or because the dollar-denominated wages of workers in Mexico's export-oriented manufacturing sector decline as a result of peso depreciation, which may stimulate twin plant operations (Fullerton & Torres-Ruiz, 2004; Cañas, et al., 2007). It should be noted, however, that some of the exchange rate coefficients do not satisfy the 5-percent significance criterion.

While the first three regressors are national or international macroeconomic variables, the average values of the transportation cost ratios vary from one customs district to another. To facilitate comparisons between districts, Table 4 reports the elasticities of cross-border imports with respect to transportation costs. In general, transportation costs have a much larger impact on trade in the Nogales customs district than in the others. This can be explained, in part, by the prominence of agricultural commodities among goods imported through this district (Jessup & Herrington, 2005). As shown in Table 2, vegetables and related farm products are among the top three categories of goods imported through the Nogales district. Transportation of such commodities may be especially time-sensitive due to the risk of spoilage (Das & Pohit, 2006), and long delays at ports of entry may result in additional freight and insurance costs. For most customs districts, the overall impact of transportation costs is relatively small, which is not unreasonable given that these are only a small fraction of total costs to consumers and producers.

For the analysis in this section, the key variable of interest is the interaction term representing changes in the impact of transportation costs on cross-border trade after 9/11. As shown in Table 4, the magnitude of the negative effect of shipping costs on trade is augmented after 9/11 for all customs districts. Though it is not possible to pinpoint the sources of change in the relationship between transportation costs and trade, tightened border security may provide at least a partial explanation. Longer and less predictable border delays, as well as increased customs paperwork, result in additional, secondary costs beyond expenditures on fuel, labor, warehousing, insurance, and similar routine shipping costs. Accordingly, the results in Tables 3 and 4 indicate that the full set of costs associated with moving freight across the international divide likely now constitute a greater barrier to United States-Mexico trade due to the post-9/11 intensification of border security.

Table 4 also summarizes regional variation in the extent to which 9/11 affected the relationship between transportation costs and trade. Although the impact of shipping costs is amplified substantially

in the El Paso and Nogales customs districts after 9/11, the change is muted in the case of Laredo. One possible explanation of the smaller coefficient for Laredo is that border congestion was already quite burdensome at the Laredo port of entry prior to 9/11 as prodigious traffic strained the limited capacity of the international bridges in that metropolitan economy (Edmonson, 2003; Brooks, 2008). Given pre-existing severe congestion, the additional costs imposed by tightened border security may have produced a smaller marginal effect on trade through this port of entry than what is observed in other regions. Another possible explanation is that long-distance freight transportation originating in the interior of Mexico dominates cross-border commerce through the Laredo district to a greater extent than in El Paso or southern California, where nearby maquiladora production accounts for larger shares of merchandise imports (Villa, 2006). If the contribution of distance to total transportation costs is larger in Laredo, then changes in the intensity of border security will potentially have relatively less pronounced impacts in that district.

Conclusion

By raising concerns over vulnerability to terrorism, the 9/11 attacks led to escalated security efforts along United States borders and more intensive scrutiny of imports. The formation of new barriers to cross-border travel and exchange is sometimes described metaphorically as a thickening of the border. One possible consequence of border thickening in North America may be to increase the costs of carrying out international trade. The evidence presented here, like prior research conducted for the United States-Canada border, suggests that a downward trend in transportation costs was arrested and, in some cases, partially reversed after 9/11. While changes in transportation costs may result from shifts in input prices or productivity levels, these factors do not seem to consistently explain the marked flattening out of the CIF/FOB ratio in the years following the terrorist attacks. It seems likely, given the evidence, that the intensity of security at ports of entry is an important factor shaping the trajectory of cross-border transportation costs.

Table 4: Elasticity Estimates

	Total	El Paso	Laredo	Nogales	San Diego
R	-0.0380	-0.0305	-0.0673	-0.1803	-0.0378
R*SEP11	-0.0374	-0.0947	-0.0202	-0.1214	-0.0399

Regression analysis is conducted to determine whether changes in transportation costs affect the volume of cross-border imports from Mexico. Although some of the estimated coefficients are not significant, the signs of the transportation cost coefficients indicate that increases in those costs tend to hamper Mexico's exports to the United States. While available data do not permit isolating the impact of border security on trade, interaction between the CIF/FOB ratio and the 9/11 dummy variable indicates that the tightening of security after the terrorist attacks may have amplified the impact of transportation costs on trade. This could occur if the transportation costs related to border controls represent a greater obstacle to trade than standard shipping costs associated with labor, fuel, insurance and the like. Prior studies suggest that, in addition to contributing to routine shipping costs, border security likely generates indirect costs by increasing customs paperwork and inventory levels while reducing the efficiency of cross-border freight transportation.

Taken together, the evidence suggests that heightened border security has exerted upward pressure on transportation costs since 9/11 and thereby contributed to the slowing of growth in United States imports from Mexico. The thickening of the border therefore appears to represent a drag on trans-boundary commerce. Avenues for future research might include evaluation of the strategies of importers facing heightened security along the United States - Mexico border. For example, one report suggests that imports shipped via air, water, and rail have grown at a more rapid pace than freight transported by cargo trucks (Economist, 2012), an observation that is at least partially borne out by Chart 1. Future studies might examine whether border security measures have equivalent effects on trade conducted using different modes of transportation and whether import modal choices have been altered in response to those administrative requirements. Such efforts could enhance understanding of the interaction between border security, transportation costs, and trade documented in this analysis for the United States-Mexico border.

References

Accenture. 2008. *Draft: Improving economic outcomes by reducing border delays*. New York: Accenture.

Ackleson, J. 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, J.E. & van Wincoop, E. 2004. Trade costs. *Journal of Economic Literature* 42:3, 691-751.

Andreas, P. 2003. A tale of two borders: The U.S.-Canada and U.S.-Mexico lines after 9-11. In P. Andreas and T.J. Biersteker, Ed. *The rebordering of North America: Integration and exclusion in a new security context*. New York: Routledge.

Asseery, A. & Peel, D.A. 1991. Estimates of a traditional aggregate import demand model for five countries. *Economics Letters* 35:4, 435-439.

Bergstrand, J.H. & Egger, P. 2006. Trade costs and intra-industry trade. *Review of World Economics* 142:3, 433-458.

Boyer, K.D. 1997. American trucking, NAFTA, and the cost of distance. *Annals of the American Academy of Political and Social Science* 553:1, 55-65.

Brooks, M.R. 2008. *North American freight transportation: The road to security and prosperity*. Cheltenham, UK: Edward Elgar.

Brooks, R. 2003. Shippers say new border rules could delay just-in-time cargo. *Wall Street Journal*, August 29, pg. A1.

BEA. 2012. Current dollar and "real" gross domestic product. Washington, DC: Bureau of Economic Analysis. http://www.bea.gov/national/index.htm (Accessed October 16th, 2012).

BLS. 2012. Industry productivity and costs. Washington, DC: Bureau of Labor Statistics. http://www.bls.gov/data/ (Accessed October 16th, 2012).

BTS. 2012. North American transborder freight data. Washington, D.C.: Bureau of Transportation Statistics. http://www.bts.gov/ (Accessed October 16th, 2012).

Cañas, J., Fullerton, T.M., Jr. & Smith, W.D. 2007. Maquiladora employment dynamics in Nuevo Laredo. *Growth and Change* 38:1, 23-38.

Chen, N. 2004. Intra-national versus international trade in the European Union: Why do national borders matter? *Journal of International Economics* 63:1, 93-118.

Clark, D.P., Fullerton, T.M., Jr., & Burdorf, D. 2001. Intra-industry trade between the United States and Mexico: 1993-1998. *Estudios Económicos* 16:2, 167-183.

Combes, P.-P. & Lafourcade, M. 2005. Transport costs: Measures, determinants, and regional policy implications for France. *Journal of Economic Geography* 5:3, 319-349.

Das, S. & Pohit, S. 2006. Quantifying transport, regulatory and other costs of Indian overland exports to Bangladesh. *World Economy* 29:9, 1227-1242.

Del Castillo Vera, G. Tiempos de espera en los cruces fronterizos del norte de México: Una barrera no arancelaria. *Comercio Exterior* 59:7, 551-557.

DFAT. 2004. *Combating terrorism in the transport sector: Economic costs and benefits*. Barton, Australia: Department of Foreign Affairs and Trade. http://www.dfat.gov.au/publications/index.html (Accessed on 11 October, 2012).

Disdier, A.-C. & Head, K. 2008. The puzzling persistence of the distance effect on bi-lateral trade. *Review of Economics and Statistics* 90:1, 37-48.

Economist. 2012. Questions at the border. *The Economist*, June 12th. http://www.economist.com/blogs/graphicdetail/2012/06/american-mexican-trade (Accessed November 12th, 2012).

Edmonson, R.G. 2003. Is this efficiency? The golden age may be over for Laredo, Texas, one of the largest U.S.-Mexican border crossings. *Journal of Commerce*, April 14th, p. 14.

EIA. 2012. No. 2 distillate prices by sales type. Washington, D.C.: Energy Information Administration. http://www.eia.gov/petroleum/data.cfm (Accessed November 5th, 2012).

Evans, C.L. 2003. The economic significance of national border effects. *American Economic Review* 93:4, 1291-1312.

Fullerton, T.M., Jr. 2004. Borderplex bridge and air econometric forecast accuracy. *Journal of Transportation & Statistics* 7:1, 7-21.

Fullerton, T.M., Jr. 2007. Empirical evidence regarding 9/11 impacts on the borderplex economy. *Regional & Sectoral Economic Studies* 7:2, 51-64.

Fullerton, T.M., Jr., Sawyer, W.C., & Sprinkle, R.L. 2011. Intra-industry trade in Latin America and the Caribbean. *International Trade Journal* 25, 74-111.
Fullerton, T.M., Jr., & Sprinkle, R.L. 2005. An error correction analysis of U.S.-Mexico trade flows. *International Trade Journal* 19:2, 179-192.

Fullerton, T.M., Jr., & Torres Ruiz, L.B. 2004. Maquiladora employment dynamics in Chihuahua City, Mexico. *Journal of Developing Areas* 38:1, 1-17.

Frankel, J.A. 1997. *Regional trading blocs in the world economic system*. Washington, DC: Institute for International Economics

Gallagher, K.P., Moreno-Brid, J.C. & Porzecanski, R. 2008. The dynamism of Mexican exports: Lost in (Chinese) translation? *World Development* 36:8, 1365-1380.

Georges, P. & Mérette, M. 2012. Toward a North American security perimeter? Assessing the trade, FDI, and welfare impacts of liberalizing 9/11 security measures. *Economic Modelling* 29:6, 2514-2526.

Globerman, S. & Storer, P. 2011. Regional and temporal variations in transportation costs for U.S. imports from Canada. *Journal of Regional Analysis and Policy* 41:1, 120-137.

Haralambides, H.E. & Londoño-Kent, M.P. 2004. Supply chain bottlenecks: border crossing inefficiencies between Mexico and the United States. *International Journal of Transport Economics* 31:2, 183-195.

Huang H. & Whalley, J. 2008. Baumol-Tobin and the welfare costs of national security border delays. *Economics Letters* 99:2, 290-292.

Hummels, D. 2001. Time as a trade barrier. Mimeo, Department of Economics. West Lafayette: Purdue University.

INEGI. 2012. Precio de productos petrolíferos: PEMEX diesel. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía. http://www.inegi.org.mx/sistemas/bie/ (Accessed November 5th, 2012).

IMF. 2012. International financial statistics. Washington, DC: International Monetary Fund. http://elibrary-data.imf.org/ (Accessed November 7th, 2012).

Jessup, E., & Herrington, R. 2005. Estimating the impact of seasonal truck shortages on the movement of time-sensitive, perishable products. *Transportation Research Record* 1906, 81-88.

Lara-Valencia, F. 2011. The "thickening" of the US-Mexico border: Prospects for cross-border networking and cooperation. *Journal of Borderlands Studies* 26:3, 251-264.

Lim, H.L. & Lovell, C.A.K. 2009. Profit and productivity of US class I railroads. *Managerial and Decision Economics* 30:7, 423-442.

Limão, N. & Venables, A.J. 2001. Infrastructure, geographical disadvantage, transport costs, and trade. *World Bank Economic Review* 15:3, 451-479.

MacPherson, A.D., McConnell, J.E., Vance, A. & Vanchan, V. 2006. The impact of U.S. government antiterrorism policies on Canada-U.S. cross-border commerce: An exploratory study from western New York and southern Ontario. *The Professional Geographer* 58:3, 266-277.

McCallum, J. 1995. National borders matter: Canada-U.S. regional trade patterns. *American Economic Review* 85:3, 615-623.

Nguyen, T.T. & Wigle, R.M. 2011. Border delays re-emerging priority: Within-country dimensions for Canada. *Canadian Public Policy* 37:1, 49-59.

Nitsch, V. 2000. National borders and international trade: Evidence from the European Union. *Canadian Journal of Economics* 33:4, 1091-1105.

Nitsch, V. & Schumacher, D. 2004. Terrorism and international trade: An empirical investigation. *European Journal of Political Economy* 20:2, 423-433.

Olmedo, C. & Soden, D.L. 2005. Terrorism's role in re-shaping border crossings: 11 September and the US borders. *Geopolitics* 10:4, 741-766.

Oppel, R.A. Jr. 2001. A nation challenged: The borders; New security clogs U.S. borders. *New York Times*, September 20, pg. C1.

Pagan, A.R. 1974. A generalised approach to the treatment of autocorrelation. *Australian Economic Papers* 13:23, 267-280.

Peterson, J. & Treat, A. 2008. The post-9/11 global framework for cargo security. *Journal of International Commerce and Economics* March, 1-30.

Taylor, J.C., Robideaux, D.R. & Jackson, G.C. 2004. U.S.-Canada transportation and logistics: Border impacts and costs, causes, and possible solutions. *Transportation Journal* 43:4, 5-21.

Thursby, J. & Thursby, M. 1984. How reliable are simple, single equation specifications of import demand? *Review of Economics and Statistics* 66:1, 120-128.

USITC. 2012. Interactive tariff and trade dataweb. Washington, DC: United States International Trade Commission. http://dataweb.usitc.gov/ (Accessed October 15th, 2012).

UTEP. 2012. Border Region Modeling Project data. El Paso, TX: University of Texas at El Paso. http://academics.utep.edu/border/. (Accessed November 7th, 2012).

Vance, A. 2008. Strategic responses by Canadian and U.S. exporters to increased U.S. border security measures. *Economic Development Quarterly* 22:3, 239-251.

Villa, J.C. 2006. Status of the U.S.-Mexico commercial border crossing process: Analysis of recent studies and research. *Transportation Research Record* 1966, 10-15.

Walkenhorst, P. & Dihel, N. 2006. Trade impacts of increased border security concerns. *International Trade Journal* 20:1, 1-31.

The University of Texas at El Paso

Announces

Borderplex Economic Outlook: 2013-2015

UTEP is pleased to announce the 2013 edition of its primary source of border business information. Topics covered include demography, employment, personal income, retail sales, residential real estate, transportation, international commerce, and municipal water consumption. Forecasts are generated utilizing the 255-equation UTEP Border Region Econometric Model developed under the auspices of a corporate research gift from El Paso Electric Company.

The authors of this publication are UTEP Professor & Trade in the Americas Chair Tom Fullerton and UTEP Associate Economist Adam Walke. Dr. Fullerton holds degrees from UTEP, Iowa State University, Wharton School of Finance at the University of Pennsylvania, and University of Florida. Prior experience includes positions as Economist in the Executive Office of the Governor of Idaho, International Economist in the Latin America Service of Wharton Econometrics, and Senior Economist at the Bureau of Economic and Business Research at the University of Florida. Adam Walke holds an M.S. in Economics from UTEP and has published research on energy economics, mass transit demand, and cross-border regional growth patterns.

The border business outlook for 2013 through 2015 can be purchased for $10 per copy. Please indicate to what address the report(s) should be mailed (also include telephone, fax, and email address):

_____
_____
_____
_____
_____
_____
_____

Send checks made out to University of Texas at El Paso for $10 to:

Border Region Modeling Project - CBA 236
UTEP Department of Economics & Finance
500 West University Avenue
El Paso, TX 79968-0543

Request information from 915-747-7775 or agwalke@utep.edu if payment in pesos is preferred.

The University of Texas at El Paso

Announces

Borderplex Long-Term Economic Trends to 2029

UTEP is pleased to announce the availability of an electronic version of the 2010 edition of its primary source of long-term border business outlook information. Topics covered include detailed economic projections for El Paso, Las Cruces, Ciudad Juárez, and Chihuahua City. Forecasts are generated utilizing the 225-equation UTEP Border Region Econometric Model developed under the auspices of a 12-year corporate research support program from El Paso Electric Company.

The authors of this publication are UTEP Professor & Trade in the Americas Chair Tom Fullerton and former UTEP Associate Economist Angel Molina. Dr. Fullerton holds degrees from UTEP, Iowa State University, Wharton School of Finance at the University of Pennsylvania, and University of Florida. Prior experience includes positions as Economist in the Executive Office of the Governor of Idaho, International Economist in the Latin America Service of Wharton Econometrics, and Senior Economist at the Bureau of Economic and Business Research at the University of Florida. Angel Molina holds an M.S. Economics degree from UTEP and has conducted econometric research on international bridge traffic, peso exchange rate fluctuations, and cross-border economic growth patterns.

The long-term border business outlook through 2029 can be purchased for $10 per copy. Please indicate to what address the report(s) should be mailed (also include telephone, fax, and email address):

_____
_____
_____
_____
_____
_____
_____
_____

Send checks made out to University of Texas at El Paso for $10 to:

Border Region Modeling Project - CBA 236
UTEP Department of Economics & Finance
500 West University Avenue
El Paso, TX 79968-0543

Request information at 915-747-7775 or agwalke@miners.utep.edu if payment in pesos is preferred.

The UTEP Border Region Modeling Project & UACJ Press

Announce the Availability of

Basic Border Econometrics

The University of Texas at El Paso Border Region Modeling Project is pleased to announce Basic Border Econometrics, a publication from Universidad Autónoma de Ciudad Juárez. Editors of this new collection are Martha Patricia Barraza de Anda of the Department of Economics at Universidad Autónoma de Ciudad Juárez and Tom Fullerton of the Department of Economics & Finance at the University of Texas at El Paso.

Professor Barraza is an award winning economist who has taught at several universities in Mexico and has published in academic research journals in Mexico, Europe, and the United States. Dr. Barraza currently serves as Research Provost at UACJ. Professor Fullerton has authored econometric studies published in academic research journals of North America, Europe, South America, Asia, Africa, and Australia. Dr. Fullerton has delivered economics lectures in Canada, Colombia, Ecuador, Finland, Germany, Japan, Korea, Mexico, the United Kingdom, the United States, and Venezuela.

Border economics is a field in which many contradictory claims are often voiced, but careful empirical documentation is rarely attempted. Basic Border Econometrics is a unique collection of ten separate studies that empirically assess carefully assembled data and econometric evidence for a variety of different topics. Among the latter are peso fluctuations and cross-border retail impacts, border crime and boundary enforcement, educational attainment and border income performance, pre- and post-NAFTA retail patterns, self-employed Mexican-American earnings, maquiladora employment patterns, merchandise trade flows, and Texas border business cycles.

Contributors to the book include economic researchers from the University of Texas at El Paso, New Mexico State University, University of Texas Pan American, Texas A&M International University, El Colegio de la Frontera Norte, and the Federal Reserve Bank of Dallas. Their research interests cover a wide range of fields and provide multi-faceted angles from which to examine border economic trends and issues.

A limited number of Basic Border Econometrics can be purchased for $10 per copy. Please contact Professor Servando Pineda of Universidad Autónoma de Ciudad Juárez at spineda@uacj.mx to order copies of the book. Additional information for placing orders is also available from Professor Martha Patricia Barraza de Anda at mbarraza@uacj.mx.

Texas Western Press

Announces the Availability of

Inflationary Studies for Latin America

Texas Western Press of the University of Texas at El Paso is pleased to announce Inflationary Studies for Latin America, a joint publication with Universidad Autónoma de Ciudad Juárez. Editors of this new collection are Cuautémoc Calderón Villarreal of the Department of Economics at Universidad Autónoma de Ciudad Juárez and Tom Fullerton of the Department of Economics and Finance at the University of Texas at El Paso. The forward to this book is by Abel Beltrán del Río, President and Founder of CIEMEX-WEFA.

Professor Calderón is an award winning economist who has taught and published in Mexico, France, and the United States. Dr. Calderón spent a year as a Fulbright Scholar at the University of Texas at El Paso. Professor Fullerton has published research articles in North America, Europe, Africa, South America, and Asia. The author of several econometric forecasts regarding impacts of the Brady Initiative for Debt Relief in Latin America, Dr. Fullerton has delivered economics lectures in Canada, Colombia, Ecuador, Finland, Germany, Japan, Korea, Mexico, the United States, and Venezuela.

Inflationary Studies for Latin America can be purchased for $12.50 per copy. Please indicate to what address the book(s) should be mailed (please include telephone, fax, and email address):

_____
_____
_____
_____
_____
_____
_____

Send checks made out to Texas Western Press for $12.50 to:

Bobbi Gonzales, Associate Director
Texas Western Press
Hertzog Building
500 West University Avenue
El Paso, TX 79968-0633

Request information from tomf@utep.edu if payment in pesos is preferred.

The University of Texas at El Paso Technical Report Series:

TX97-1: *Currency Movements and International Border Crossings*
TX97-2: *New Directions in Latin American Macroeconometrics*
TX97-3: *Multimodal Approaches to Land Use Planning*
TX97-4: *Empirical Models for Secondary Market Debt Prices*
TX97-5: *Latin American Progress Under Structural Reform*
TX97-6: *Functional Form for United States-Mexico Trade Equations*
TX98-1: *Border Region Commercial Electricity Demand*
TX98-2: *Currency Devaluation and Cross-Border Competition*
TX98-3: *Logistics Strategy and Performance in a Cross-Border Environment*
TX99-1: *Inflationary Pressure Determinants in Mexico*
TX99-2: *Latin American Trade Elasticities*
CSWHT00-1: *Tariff Elimination Staging Categories and NAFTA*
TX00-1: *Borderplex Business Forecasting Analysis*
TX01-1: *Menu Prices and the Peso*
TX01-2: *Education and Border Income Performance*
TX02-1: *Regional Econometric Assessment of Borderplex Water Consumption*
TX02-2: *Empirical Evidence on the El Paso Property Tax Abatement Program*
TX03-1: *Security Measures, Public Policy, Immigration, and Trade with Mexico*
TX03-2: *Recent Trends in Border Economic Analysis*
TX04-1: *El Paso Customs District Cross-Border Trade Flows*
TX04-2: *Borderplex Bridge and Air Econometric Forecast Accuracy: 1998-2003*
TX05-1: *Short-Term Water Consumption Patterns in El Paso*
TX05-2: *Menu Price and Peso Interactions: 1997-2002*
TX06-1: *Water Transfer Policies in El Paso*
TX06-2: *Short-Term Water Consumption Patterns in Ciudad Juárez*
TX07-1: *El Paso Retail Forecast Accuracy*
TX07-2: *Borderplex Population and Migration Modeling*
TX08-1: *Borderplex 9/11 Economic Impacts*
TX08-2: *El Paso Real Estate Forecast Accuracy: 1998-2003*
TX09-1: *Tolls, Exchange Rates, and Borderplex Bridge Traffic*
TX09-2: *Menu Price and Peso Interactions: 1997-2008*
TX10-1: *Are Brand Name Medicine Prices Really Lower in Ciudad Juárez?*
TX10-2: *Border Metropolitan Water Forecast Accuracy*
TX11-1: *Cross Border Business Cycle Impacts on El Paso Housing: 1970-2003*
TX11-2: *Retail Peso Exchange Rate Discounts and Premia in El Paso*
TX12-1: *Borderplex Panel Evidence on Restaurant Price and Exchange Rate Dynamics*
TX12-2: *Dinámica del Consumo de Gasolina en Ciudad Juárez: 2001-2009*
TX13-1: *Physical Infrastructure and Economic Growth in El Paso: 1976-2009*
TX13-2: *Tolls, Exchange Rates, and Northbound International Bridge Traffic: 1990-2006*
TX14-1: *Freight Transportation Costs and the Thickening of the U.S.-Mexico Border*

The University of Texas at El Paso Border Business Forecast Series:

SR98-1: *El Paso Economic Outlook: 1998-2000*
SR99-1: *Borderplex Economic Outlook: 1999-2001*
SR00-1: *Borderplex Economic Outlook: 2000-2002*
SR01-1: *Borderplex Long-Term Economic Trends to 2020*
SR01-2: *Borderplex Economic Outlook: 2001-2003*
SR02-1: *Borderplex Long-Term Economic Trends to 2021*
SR02-2: *Borderplex Economic Outlook: 2002-2004*
SR03-1: *Borderplex Long-Term Economic Trends to 2022*
SR03-2: *Borderplex Economic Outlook: 2003-2005*
SR04-1: *Borderplex Long-Term Economic Trends to 2023*
SR04-2: *Borderplex Economic Outlook: 2004-2006*
SR05-1: *Borderplex Long-Term Economic Trends to 2024*
SR05-2: *Borderplex Economic Outlook: 2005-2007*
SR06-1: *Borderplex Long-Term Economic Trends to 2025*
SR06-2: *Borderplex Economic Outlook: 2006-2008*
SR07-1: *Borderplex Long-Term Economic Trends to 2026*
SR07-2: *Borderplex Economic Outlook: 2007-2009*
SR08-1: *Borderplex Long-Term Economic Trends to 2027*
SR08-2: *Borderplex Economic Outlook: 2008-2010*
SR09-1: *Borderplex Long-Term Economic Trends to 2028*
SR09-2: *Borderplex Economic Outlook: 2009-2011*
SR10-1: *Borderplex Long-Term Economic Trends to 2029*
SR10-2: *Borderplex Economic Outlook: 2010-2012*
SR11-1: *Borderplex Economic Outlook: 2011-2013*
SR12-1: *Borderplex Economic Outlook: 2012-2014*
SR13-1: *Borderplex Economic Outlook: 2013-2015*

Technical Report TX14-1 is a publication of the Border Region Modeling Project and the Department of Economics & Finance at the University of Texas at El Paso. For additional **Border Region** information, please visit the **www.academics.utep.edu/border** section of the UTEP web site.

Border Region Modeling Project – CBA 236
UTEP Department of Economics & Finance
500 West University Avenue
El Paso, TX 79968-0543

www.utep.edu