Texas-Mexico Cross Border Truck Operations: Are Mexican NAFTA Trucks Unsafe?

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Texas Department of Public Safety (DPS) border safety inspection facilities (BSIF) have been in operation, in temporary and permanent forms, since 2001. This paper presents inspection results on trucks inspected at Texas BSIFs from 2003 to 2006, comprising over 326,000 vehicle inspection records. Analysis indicated that Mexico domiciled trucks have lower out-of-service rates than U.S. trucks at most Texas/Mexico border crossings. This finding is noteworthy since border (drayage) vehicles are older on average than typical Texas highway trucks and counters the opinion that trucks from Mexico are unsafe and therefore should not be allowed to enter the U.S.

INTRODUCTION

The North American Free Trade Agreement (NAFTA) started removing trade barriers and tariffs between the U.S., Mexico, and Canada in 1994. Trade between the U.S., Mexico, and Canada continues to expand, supported by NAFTA. The value of U.S. exports and imports with Mexico and Canada has more than doubled since 1996, and most of the goods are transported by truck. NAFTA trade value was $866 billion in 2006, and trucks transported goods worth $534 billion (Sprung 2007). Trade with Mexico is valued lower than trade with Canada but was worth $272 billion in 2006.

The increase in trade has occurred even with physical trade barriers that limit Mexico-domiciled carriers to the commercial border zones. NAFTA attempted to remove these trade barriers and included staged provisions to ultimately allow trucks from both nations to operate in both countries. Cross border trucking opponents have levied concerns that trucks from Mexico are not safe because Mexico's commercial vehicle operating regulations differ from the United States, and commercial vehicle safety enforcement is not as prevalent in Mexico. The U.S. Congress has largely concurred and resisted efforts to allow Mexican commercial vehicles to operate beyond the commercial border zones. This issue has been ongoing since 1995 without resolution, although the Bush administration has worked to remove the border restriction for Mexico-domiciled trucks. In February 2007, U.S. Department of Transportation (USDOT) Secretary Mary Peters announced a pilot program that would grant 100 Mexican trucking companies operating authority throughout the U.S. Secretary Peters cited continued improvements in overall Mexican truck safety, and that the department had met the 22 safety requirements mandated by the U.S. Congress. However, the USDOT initiative is facing opposition due to safety, environmental, and labor concerns.

The central question addressed in this paper is whether trucks from Mexico can meet or exceed the safety standards set for U.S. trucks. The analysis compares Texas border safety inspection facilities (BSIF) out-of-service rates for trucks owned by U.S.- and Mexico-domiciled carriers. Safety performance is often evaluated using out-of-service rates. These rates are a percentage of inspections that have violations where the truck cannot proceed or the driver cannot operate the commercial vehicle unless the violation is addressed. Previous analyses have used out-of-service rates to answer this question. Most out-of-service rate figures are given at the national and state level rather than disaggregating the data to reflect each border crossing. The information is readily available but not typically presented. In addition, the previous studies compared the out-of-service rates for Mexican trucks inspected at the border against a U.S. national average, even though U.S. trucks are also inspected at the border. These efforts do not allow for Mexican drayage companies

to be compared directly against U.S. carriers, and current border trucking operations are different from long-haul trucking.

These problems are avoided in this paper by only comparing out-of-service rates for commercial vehicles inspected at the border. The trucks are owned by U.S. and Mexican companies operating under similar conditions, which allow Mexican carrier out-of-service rates to be compared against U.S. carrier out-of-services rates. This study calculates out-of-service rates for U.S. and Mexico carriers' drivers and vehicles at eight BSIFs along the Texas and Mexico border and determines whether the difference between the two rates is significant. Using Texas DPS commercial vehicle inspection reports from 2003 to 2006, the findings indicate that carriers from Mexico providing drayage services have improved in safety performance, and at most Texas/Mexico border crossings, Mexico-domiciled carriers have lower out-of-service rates compared to U.S. carriers. These findings do not include Mexican-domiciled carriers that only provide long-haul trucking services in the interior of Mexico. The inspections are on drayage vehicles only.

BACKGROUND

During the 1980s, economic events in Mexico contributed to the need for a common trade framework between the U.S. and Mexico. The renaissance of the Mexican economy began first with the peso devaluation in the early 1980s and was further strengthened with Mexico's entry into the General Agreement on Tariffs and Trade (GATT) in 1986. NAFTA was the final accomplishment in making trade between the nations more efficient. NAFTA mirrored a similar agreement signed between the U.S. and Canada in 1989 but with different treaty agreements, thus forming the tri-nation NAFTA, which governs trade between the three continental partners. Canada and Mexico join China as the top three trading countries with the U.S., demonstrating the strength of the trade relationship despite the growth in trade with Asian partners.

The NAFTA trade flows have two major differences with those from other countries. The first obvious difference is derived from the sharing of borders, namely that trucking is the primary mode. Second, containerized trade is not typically used to transport goods between the trade partners, and large, productive semi-trailers carry most of the commodities. The flexibility and productivity of trucking is most clearly seen along the northern border, where Canadian truckers are allowed to enter the U.S. and deliver directly to customers. They must return with an export load to Canada, as trade between two points within the U.S., or cabotage, is not permitted for Canadian carriers. This arrangement works well in principle, though in practice congestion (sometimes severe) resulting from post-9/11 security procedures has impacted supply chain reliability.

The southern border differs in many important respects because of historic differences between the U.S. and Mexico, as well as the issue of sovereignty within the NAFTA framework. NAFTA was simply a trade treaty, and the laws of each nation were unchanged by the treaty. Any changes had to emerge from various tri-nation sub-committees established to consider concerns and make recommendations. Border trucking was an important issue that was addressed between the U.S. and Mexico, and it was incorporated into the treaty. The southern border was to be gradually opened to cross border trucking, similar to the northern border, so the NAFTA borders would have a common trucking policy, allowing for transportation economies and border crossing efficiencies.

Open access at the southern border was highly contentious. The situation in the early 1990s was a product of differing import/export laws in both countries, an entrenched broker system that resisted change, poor transportation infrastructure, and trucking concerns that went beyond Mexican operators and U.S. labor that drew the attention of environmental and safety groups. The opening of the southern border to contiguous state boundary operations, and its full opening in 2000, has not taken place, despite a NAFTA arbitration panel judgment in favor of Mexico, and a 2004 decision by the U.S. Supreme Court allowing for the border to open without an environmental impact assessment.

LITERATURE REVIEW

Interest in NAFTA generated several transportation research efforts during the 1990s. Several transportation research conference sessions and published papers considered NAFTA trade volumes, corridors, and overall perspectives. The studies could largely be divided into three categories: transportation planning and infrastructure, NAFTA business practices, and truck safety. Examples from the transportation planning spectrum include the combined efforts of Figliozzi, Harrison, and McCray (2000) to develop methods for estimating truck trip volumes using truck crossing bridge counts and U.S. international trade data. McCray (1998) also divided the southern border trade flows into five regions from a dominant port and tracked routes to major destinations. He found that the top two U.S.-Mexican truck transportation corridor segments were in Texas along Interstate 35. Most U.S.-Mexico trade corridors had fewer than 600,000 trucks per year in 1996. Moving more to NAFTA business trends, Brooks (2001) gave a Canadian perspective of NAFTA by concluding that the trade agreement has brought about an increase in trade traffic but has not improved Canadian access to cargo or decreased non-tariff barriers. Giermanski's (1994) efforts to describe how lifting current cross border operating restrictions would have a negative effect on border economies is another example of NAFTA business research.

The federal government has taken a particular interest in Mexican truck safety. The cross border trucking issue has been the focus of several audits. The USDOT Inspector General (1998) used out-of-service rates in an audit of cross border trucking safety. The audit concluded that for FY1997 the Mexican truck out-of-service rate was 44%, compared to only 25% for U.S.-domiciled trucks and 17% for Canadian trucks. The report noted that the out-of-service statistic is not representative of all Mexican trucking operations, as it only includes drayage vehicles. The USDOT Inspector General recommended that an increased inspection presence was needed at the border to improve safety. Again, using the out-of-service rate figure, the USDOT Inspector General (2001) informed the U.S. Commerce, Science, and Transportation Committee that the out-of-service rates for Mexico had declined from 44% in FY1997 to 37% in FY2000. The testimony also noted that the Mexican driver out-of-service rate was 8% and comparable to U.S. drivers. A later USDOT Inspector General (2005) audit found that the Mexican vehicle out-of-service rate was 23% (FY2003) for Mexican trucks inspected at the border, and comparable to 22% for U.S. trucks nationwide. Carson (2007) submitted research to the Federal Motor Carrier Safety Administration showing that the out-of-service rate for Mexican trucks was 21% in 2006, while the out-of-service rate for U.S. trucks was 24%. These studies show a decreasing trend in Mexican out-of-service rates compared against the U.S., and most recently, the out-of-service rates are lower for Mexican carriers inspected at the border.

Research since 2001 on NAFTA trucking has concentrated on border efficiencies and security impacts, and much of it is not widely published because it related to U.S. Customs and Border Protection programs. As a consequence, discussions of the southern border are largely driven by assertions from the various protagonists, and any data used are variants of older studies reported in the 1990s. One issue central to many arguments used against opening the southern border is vehicle safety and the implication that Mexican operators will use vehicles that are less safe than those of their U.S. counterparts. Can current research shed any light on this topic?

The nature of cross border trucking makes comparing Mexican and U.S. fleets difficult. Concurring with the USDOT Inspector General (1998) observation, Jamieson and Harrison (2002) concluded that comparing long-haul fleets versus drayage fleets can lead to misleading conclusions. Instead, out-of-service rate comparisons should analyze similar operational fleets. The current status of cross border trucking makes an analysis of similar type fleets challenging, but disaggregation of inspection data can be used to address this problem. This research compares out-of-service rates for U.S. and Mexican trucks that cross at Texas ports of entry. The assumption is made in this study that comparing trucks from the U.S. and Mexico operating within the commercial border zone would solve the problem noted by Jamieson and Harrison (2002).

TEXAS BORDER SAFETY INSPECTION FACILITIES

The Texas border counties that have more prominent border crossings, El Paso, Maverick, Webb, Hidalgo, and Cameron, are included in this analysis. The analysis uses inspection reports for trucks inspected at BSIFs operated by the Texas DPS. The truck volumes crossing at ports of entry in these counties have Texas leading all other southern border states in northbound crossings (see Table 1). Texas border truck crossings have increased by nearly 70% since 1995.

Table 1: Northbound United States–Mexico Truck Crossings: 1995-2006

Year	California	Arizona	New Mexico	Texas
1995	666,866	296,342	2,446	1,894,971
1996	754,636	324,235	20,843	2,154,370
1997	837,448	332,691	34,826	2,484,700
1998	865,569	349,194	30,974	2,700,806
1999	969,697	348,322	29,473	3,011,229
2000	1,031,546	344,265	36,491	3,113,277
2001	1,027,815	336,090	34,216	2,906,838
2002	1,067,411	311,907	32,603	3,014,672
2003	1,019,908	313,250	33,263	2,871,624
2004	1,110,758	323,196	33,716	3,036,018
2005	1,122,784	346,444	38,664	3,168,005
2006	1,131,483	348,490	42,231	3,216,711

The Texas DPS operates truck inspection facilities adjacent to the eight largest truck ports of entry in the state, as part of a program to ensure Mexican truck compliance with state and federal safety laws. These facilities have been in operation in temporary and permanent forms since 2001, and they are complemented by random Texas DPS vehicle inspections conducted at smaller Texas ports of entry and on the highways of the various Texas border counties. This paper evaluates the data provided by Texas DPS and attempts to determine whether the out-of-service rates for Mexican carriers are significantly different than out-of-service rates for U.S. carriers. Vehicle and driver out-of-service rates are calculated for the BSIFs at the various border bridges.

Table 2: Texas Border Ports of Entry

Port of Entry	1995	1997	1999	2001	2003	2005	2006
Brownsville	223,689	247,578	303,540	251,613	229,389	234,640	243,116
Eagle Pass	53,026	71,656	101,140	97,658	88,272	97,729	97,567
El Paso	606,742	582,707	673,003	660,583	659,614	740,654	744,951
Hidalgo	177,459	234,800	325,225	368,395	406,064	491,077	457,825
Laredo	747,241	1,251,365	1,486,489	1,403,914	1,354,229	1,455,607	1,518,989

Source: www.transtats.bts.gov/BorderCrossing.aspx

Like Texas as a whole, northbound truck crossings listed in Table 2 have increased at most sites since 1995. The Laredo ports of entry have almost as many trucks crossing at the city's two bridges designated for truck traffic—World Trade Bridge and Colombia Solidarity—as the rest of

Texas combined. El Paso and Brownsville are also major crossing locations that have more than one bridge. In addition to these major crossing points, Texas has smaller ports of entry like Eagle Pass that have only one bridge for trucks to use. Because the Texas border encompasses a larger portion of the U.S. border with Mexico, evaluating the out-of-service rates at its ports of entry provides a general portrayal of border drayage safety when inspection facilities are present.

METHODOLOGY

This research relies on out-of-service rates, a safety performance measure commonly used in the literature, to help identify whether trucks owned or leased by Mexican-domiciled carriers are performing at a safety level comparable to U.S. fleets. This safety performance measure, used in previous NAFTA safety studies, is a percentage of the total inspections of the vehicles or drivers that received a violation requiring the driver to stop operating or for the tractor or trailer to be deemed unusable until the safety issued is corrected. Rates were calculated by querying Texas DPS Commercial Vehicle Enforcement (CVE) service inspection databases.

This methodology analyzes out-of-service rates for each port of entry that has a permanent or temporary BSIF. Carriers that had trucks inspected are separated by the country of carrier ownership. These adjustments to previous out-of-service calculation rate methodologies used by the USDOT are made to determine whether Mexican-owned trucks are performing significantly different from U.S.-owned trucks and to account for concerns with comparing Mexican drayage trucks versus U.S. long-haul fleets that never cross the border. The analysis attempts to compare trucks and drivers operating within the commercial border zone facilitating cross border trade.

The inspection databases were queried for inspections conducted within Texas border counties. The inspection reports were grouped for each inspection facility. Mexican-domiciled carriers were in one group and U.S. carriers in the other. All companies responsible for the truck from a country other than Mexico or the U.S. were discarded from the dataset, including Canadian trucks. This step was included to limit the trucks being considered so that the original question of whether trucks from Mexico are less safe than U.S.-owned or leased trucks can be answered. Out-of-service rates were calculated according to the owner or lessee company nationality defined by the state listed in the inspection report. Two out-of-service rates were calculated: vehicle and driver. The analysis compares U.S.-based motor carrier vehicle out-of-service rates versus Mexican-based carrier vehicle out-of-service rates, and the same is done for driver out-of-service rates.

A two-tailed hypothesis test was used to determine whether the difference between the Mexico and U.S. out-of-service rates were statistically significant for each Texas BSIF. The Welch's t-test was used to compare the means of samples, with the possibility of having unequal variances and an unequal number of observations. A confidence level of 95% ($\alpha = 5\%$) was used for the two-tailed hypothesis test. The *p*-value or *t*-value can be used to express levels of significance. This paper uses the *p*-value to express varying levels of significance. If the *p*-value is less than 5%, the difference between the rates is statistically significant. Varying levels of significance are denoted in the tables by asterisks. If the *p*-value is less than 5%, then one asterisk is placed by the value. A *p*-value less than 1% has two asterisks, and a *p*-value less than 0.01% has three asterisks.

RESULTS

The results are presented for each county containing a temporary or permanent BSIF, from El Paso County in the northwest, moving southeast to counties along the border. The discussion highlights findings in the vehicle and driver out-of-service rate differences between the U.S. and Mexican trucks. The reason for differences in the out-of-service rates is described for the analysis as a whole in the conclusion. Describing why certain results are obtained for a specific crossing is not as straightforward. Texas DPS officials at several of the BSIFs were not certain why the results for the inspection facility they supervise would be different from the results at another facility. Only

conclusions that the Texas DPS facilities' supervisors affirmed are included in the final section (instead of unconfirmed conclusions for each individual bridge).

Four years of inspection data are presented for each border crossing where commercial vehicles are allowed and a temporary or permanent BSIF is present. The counties in the analysis include El Paso County, Maverick County, Webb County, Hidalgo County, and Cameron County. The results from the analysis are shown in Tables 3 through 10. Two additional analyses were done to address related inquiries of this study. Vehicle out-of-service rates were calculated using truck crossings from Table 2 as the denominator for the ratio instead of total truck inspections (see Table 11), and vehicle out-of-service rates for Mexican trucks inspected at the border were compared to U.S. trucks inspected on highways and interstates throughout Texas (see Table 12).

El Paso County

El Paso County has two BSIFs: Bridge of the Americas (BOTA) and Ysleta-Zaragoza Bridge. Table 3 and Table 4 list vehicle and driver out-of-service rates for BOTA and Ysleta-Zaragoza Bridge. In 2003 and 2004, more trucks were inspected at BOTA, but a sharp increase in trucks inspected at Ysleta-Zaragoza Bridge from 2004 to 2005 made it the more active inspection facility. The number of U.S. carrier inspections has remained largely the same since 2003, but the number of Mexican carrier inspections has more than tripled at both inspection facilities.

The inspection data indicates that vehicle out-of-service rates for El Paso County inspection facilities were higher than inspection facilities in other counties from 2003 to 2005. Vehicle out-of-service rates were as high as 0.524 and 0.521 for U.S. carriers and 0.505 and 0.518 for Mexican carriers inspected at BOTA and Ysleta-Zaragoza Bridge in 2004. In 2006, the vehicle out-of-service rates at both inspection facilities dropped to a level similar with other inspection facilities. A comparison of U.S. and Mexican trucks crossing the border at BOTA and Ysleta-Zaragoza Bridge shows that the Mexican vehicle out-of-service rate was lower than the U.S. vehicle out-of-service rate for all years, but not statistically significant until 2005. Similar to the vehicle out-of-service rates, the Mexican driver out-of-service rate was lower than the U.S. driver out-of-service rate for both El Paso County inspection facilities for all years, becoming significant in 2004 and 2005 for BOTA and in 2004 through 2006 for Ysleta-Zaragoza Bridge.

Table 3: Bridge of the Americas: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,080	6,198	0.424	0.41	.376	0.012	0.0106	.697
2004	1,112	10,616	0.524	0.505	.232	0.0279	0.0066	2.25E-5 ***
2005	770	14,732	0.426	0.366	.001***	0.0169	0.0043	.0075**
2006	1,047	18,218	0.282	0.25	.0258**	0.0086	0.0031	.558

* if *p*-value <.05, ** if *p*-value<.01, ***p-value<.001

Table 4: Ysleta-Zaragoza Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,649	4,774	0.406	0.388	.200	0.0158	0.0101	.0922
2004	424	1,739	0.521	0.518	.909	0.0259	0.0040	.00562***
2005	1,339	14,230	0.426	0.363	8.31E-6***	0.0261	0.0036	3.19E-7***
2006	1,374	19,218	0.335	0.262	3.13E-8***	0.016	0.0028	1.06E-4***

* if *p*-value <.05, ** if *p*-value<.01, ***p-value<.001

Maverick County

The Eagle Pass temporary BSIF does not have near as many inspections as most other inspection facilities. The Camino Real International Bridge inspection counts are most comparable to Free Trade Bridge, in terms of its scale of operations. The number of U.S. trucks inspected has decreased since 2004, while the number of Mexican trucks inspected has increased. The vehicle out-of-service rates are lower overall when compared to other BSIF, and similar to vehicle out-of-service rates at the Pharr-Reynosa International Bridge. In all years, the vehicle out-of-service rate was significantly lower for Mexican trucks, but the difference between the facilities started to decrease in 2005. Similarly, the driver out-of-service rate was significantly lower for Mexican drivers than U.S. drivers, but that difference is also starting to decrease. Table 5 shows the results for the Camino Real International Bridge BSIF out-of-service analysis.

Table 5: Camino Real International Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,896	2,598	0.255	0.202	3.06E-5***	0.0185	0.005	7.33E-5***
2004	2,633	4,683	0.261	0.2	3.79E-5***	0.0262	0.0064	2.87E-9***
2005	1,875	5,214	0.212	0.171	.0001***	0.0203	0.0044	2.93E-6***
2006	1,650	5,285	0.172	0.154	.028	0.0115	0.00492	.0185*

* if *p*-value <.05, ** if *p*-value<.01, ***p-value<.001

Webb County

Two BSIFs are located in Webb County: World Trade Bridge and Colombia Solidarity Bridge. Although more trucks cross at World Trade Bridge, more trucks have been inspected each year at Colombia Solidarity Bridge. The reason for this finding is probably associated with the current location of each inspection facility. The World Trade Bridge is located within the U.S. General Services Administration facility, while the Texas Department of Transportation has developed a temporary BSIF at Colombia Solidarity Bridge.

The vehicle out-of-service rate for World Trade Bridge has ranged from 16.2% to 23.6% for Mexican trucks and 18.0% to 21.1% for U.S. trucks over the study period. These results are similar to Camino Real International Bridge and Pharr-Reynosa International Bridge vehicle out-of-service rates. In 2006, the out-of-service rate for U.S. trucks at the World Trade Bridge was 18.0%, while the out-of-service rate for Mexican trucks was 16.2%. The vehicle out-of-service rate has decreased for both groups since 2004. The U.S.-Mexico difference has not been significant in any year for World Trade Bridge (see Table 6).

Colombia Solidarity Bridge analysis results were markedly different than other BSIFs, as shown in Table 7. First, the vehicle out-of-service rates for both U.S. and Mexico trucks are higher in 2006 than they were in 2003. Second, the U.S. vehicle out-of-service rate was lower in 2005 and 2006 than Mexican trucks, becoming statistically significant in 2006.

Table 6: World Trade Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,538	5,391	0.207	0.201	.639	0.0137	0.0124	.712
2004	1,068	7,661	0.211	0.236	.0628	0.0169	0.0114	.183
2005	1,350	10,870	0.203	0.183	.0827	0.0133	0.011	.484
2006	1,220	12,955	0.18	0.162	.138	0.009	0.0043	.0902

* if *p*-value <.05, ** if *p*-value<.01, ***p*-value<.001

Table 7: Colombia Solidarity Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,915	6,655	0.239	0.223	.134	0.0261	0.0123	3.98E-4***
2004	1,575	8,383	0.286	0.269	.167	0.021	0.0155	.158
2005	1,214	11,302	0.242	0.264	.0925	0.0297	0.0156	.005**
2006	1,768	13,278	0.26	0.293	.00349**	0.0283	0.0181	.0131*

* if *p*-value <.05, ** if *p*-value<.01, ***p*-value<.001

The driver out-of-service rate for both inspection facilities was similar to other crossings. The Mexico driver out-of-service rate was lower than the U.S. driver out-of-service rate for both Webb County inspection facilities for all years, but the difference in rates at World Trade Bridge was not significant. Mexican driver out-of-service rates were significantly lower in 2003, 2005, and 2006 at Colombia Solidarity Bridge.

Hidalgo County

The Pharr-Reynosa International Bridge temporary BSIF examines trucks crossing the border into Hidalgo County. The inspection facility inspects a comparatively high number of trucks. More than 15,000 trucks were inspected in 2006, as shown in Table 8. The number of U.S. truck and driver inspections decreased from 2004 to 2006. On the vehicle side, the Pharr-Reynosa International Bridge inspection analysis showed a contrast not found at most BSIFs, where the U.S. vehicle out-of-service rate was lower than the Mexican vehicle out-of-service rate. As the *p*-value indicates, the Mexican vehicle out-of-service rates were significantly higher in 2003 and 2004. Also, the out-of-service rates for both carriers are lower when compared against the vehicle out-of-service rates found at other BSIFs. The driver out-of-service rate is more consistent with other counties. The driver out-of-service rate was lower in 2004, 2005, and 2006 for drivers of Mexican carriers, but statistically significant only in 2005.

Table 8: Pharr-Reynosa International Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,238	5,897	0.267	0.311	.00146**	0.0323	0.0397	.191
2004	1,793	13,128	0.192	0.219	.00673**	0.0201	0.0174	.439
2005	938	15,806	0.188	0.187	.986	0.0224	0.0099	.0111**
2006	472	14,878	0.165	0.197	.072	0.0127	0.0057	.179

* if *p*-value <.05, ** if *p*-value<.01, ***p*-value<.001

Cameron County

The Veterans International Bridge at Los Tomates near Brownsville and the Free Trade Bridge at Los Indios are the two Cameron County ports of entry with temporary BSIFs. Port of entry truck inspection figures have doubled from 2003 to 2006, and both inspection facilities have similar inspection growth patterns overall. The growth for inspections performed on trucks from Mexico or the U.S. has not increased similarly for the two inspection facilities. Mexican truck inspections have grown faster than the U.S. inspections at Veterans International Bridge, while the opposite is true for Free Trade Bridge. Overall, the Veterans International Bridge inspects more trucks. In 2006, the Veterans International Bridge facility inspected over 9,000 more trucks than the Free Trade Bridge facility.

The vehicle out-of-service analysis indicates that Mexican truck inspections had a lower out-of-service rate than U.S. trucks at Veterans International Bridge and Free Trade Bridge, except in 2003. Table 9 and Table 10 show both the vehicle out-of-service rate and the driver out-of-service rate for Veterans International Bridge and Free Trade Bridge. The difference between the Mexican rate and the U.S. rate at Veterans International Bridge is widening, because the U.S. vehicle out-of-service rate has increased at the bridge since 2003, while the Mexican vehicle out-of-service rate has decreased over the same time period. In 2003, the U.S. vehicle out-of-service rate was significantly different, and lower than the Mexico vehicle out-of-service rate. The vehicle out-of-service rate was significantly different in 2005 and 2006, but the Mexican vehicle out-of-service rates were lower than the U.S. vehicle out-of-service rate in these years. The vehicle out-of-service rate is also lower for Mexican trucks than U.S. trucks at Free Trade Bridge, but the difference between the two rates has decreased. The difference between the vehicle out-of-service rates has been significant since 2004.

Table 9: Veterans International Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,785	5,483	0.263	0.297	.00527**	0.014	0.0119	.494
2004	2,512	7,612	0.323	0.305	.094	0.0303	0.0111	1.48E-7***
2005	2,107	9,315	0.348	0.29	3.55E-7***	0.0223	0.0059	8E-7***
2006	2,536	12,283	0.331	0.231	5.72E-23***	0.0296	0.0045	2.77E-13**

* if *p*-value <.05, ** if *p*-value<.01, ***p*-value<.001

The Veterans International Bridge driver out-of-service rate for Mexican trucks was lower for all years and was significant for every year after 2003. The drivers for Mexican carriers were also placed out-of-service less at the Free Trade Bridge than U.S. drivers. The Mexican driver out-of-service rate was also lower for all years, and significant for every year including 2003 (see Table 10).

Table 10: Free Trade Bridge: Out-of-Service Rates

Year	Inspections		Vehicle Out-of-Service Rates			Driver Out-of-Service Rates		
	U.S.	Mexico	U.S.	Mexico	p-value	U.S.	Mexico	p-value
2003	1,207	1,584	0.294	0.2904	.831	0.0638	0.0347	.00056***
2004	1,833	1,783	0.348	0.243	4.39E-12***	0.048	0.0213	1.07E-5***
2005	2,362	1,761	0.338	0.249	3.57E-10***	0.0453	0.0165	4.13E-8***
2006	2,985	2,515	0.249	0.19	1.85E-7***	0.0375	0.0167	1.45E-6***

* if *p*-value <.05, ** if *p*-value<.01, ***p*-value<.001

Alternative Method to Calculate Out-of-Service Rates

Traditionally, out-of-service rates are calculated by dividing the inspections that result in a vehicle or driver being placed out-of-service by the total number of inspections. The results for this type of analysis were shown in Table 3 through Table 10. The out-of-service rates ranged from 15% at Camino Real International Bridge in Maverick County to 52% at Ysleta-Zaragoza, but this rate is only for trucks that were inspected. Texas DPS personnel select some trucks for inspection because they can visually observe that the truck may be violating safety regulations. Not every truck that crosses the border is inspected, but when out-of-service rates are as high as 52%, the perception among the public is that one of every two trucks crossing the border is being placed out-of-service. The correct interpretation is that one out of every two trucks that have a secondary inspection are deemed out-of-service. Introducing a new out-of-service rate could help address the confusion. Table 11 shows out-of-service calculations for the border counties as a percentage of total truck crossings, instead of total inspections.

Because of data constraints, the method does not allow for carrier groups based on nationality to be compared for analysis at the bridge level. Northbound crossing data does not differentiate between U.S.- and Mexican-domiciled carriers, or what bridge the truck crossed. A northbound crossing figure does not indicate whether the truck crossed at World Trade Bridge or Columbia Solidarity Bridge, but only that the truck crossed in Laredo. The table also shows calculations for how many trucks are inspected as a percentage of total northbound crossings.

The 2006 vehicle inspection rates ranged from 1.92% in Laredo (Webb County) to 8.36% in Brownsville (Cameron County). The rates show that less than 10% of all northbound truck crossings are being selected for secondary inspection at all Texas ports of entry. Trucks that cross the border and enter the BSIF receive a primary inspection, but only those trucks that the inspector perceives might have a possible violation, or have not been inspected recently, are sent to receive a secondary inspection. Accordingly, vehicle out-of-service rates, as a percentage of total crossings, range from 0.44% in Laredo to 2.01% in Brownsville. These values are much lower than the traditionally calculated out-of-service rate, but they provide a value that is more intuitive for the public.

Table 11: Alternative Vehicle-Out-Service Rate and Vehicle Inspection Rate Calculations

County	Year	Northbound Truck Crossings	Out-of-Service Trucks	Inspections	Vehicle Out-of-Service Rate	Vehicle Inspection Rate
Cameron	2003	229,389	2,910	10,059	1.27%	4.39%
	2004	226,289	4,206	13,740	1.86%	6.07%
	2005	234,640	4,668	15,545	1.99%	6.63%
	2006	243,116	4,892	20,319	2.01%	8.36%
El Paso	2003	659,614	5,521	13,701	0.84%	2.08%
	2004	719,545	7,071	13,891	0.98%	1.93%
	2005	740,654	11,445	31,071	1.55%	4.20%
	2006	744,951	10,327	39,857	1.39%	5.35%
Hidalgo	2003	406,064	2,164	7,135	0.53%	1.76%
	2004	454,351	3,218	14,921	0.71%	3.28%
	2005	491,077	3,138	16,744	0.64%	3.41%
	2006	457,825	3,004	15,350	0.66%	3.35%
Maverick	2003	88,272	1,009	4,494	1.14%	5.09%
	2004	100,100	1,625	7,316	1.62%	7.31%
	2005	97,729	1,287	7,089	1.32%	7.25%
	2006	97,567	1,097	6,935	1.12%	7.11%
Webb	2003	1,354,229	3,343	15,499	0.25%	1.14%
	2004	1,391,850	4,738	18,687	0.34%	1.34%
	2005	1,455,607	5,540	24,736	0.38%	1.70%
	2006	1,518,989	6,672	29,221	0.44%	1.92%

POLICY IMPLICATIONS AND CONCLUSIONS

This study has led to several conclusions supported by accounts from drayage industry members and Texas DPS officials and corroborated by past border research. The findings can be generalized in three categories: operations, Texas DPS commercial vehicle enforcement, and safety. The safety section outlines what can be determined, generally, based on the analysis results and presents why Mexican truck carriers have performed similar to or better than U.S. carriers, when only 10 years ago Mexican carriers were performing significantly worse than U.S. carriers. The operations category emphasizes how the dray industry has changed over the past decade, and how this change is captured in 2003 to 2006 inspection data. A closing comment discusses how these results inform the current commercial vehicle safety strategy supported by the USDOT and deployed by Texas DPS.

Operations

Border drayage operations have changed significantly over the past 10 years. Most U.S. carriers are no longer performing cross border drayage service and have yielded that market to Mexican carriers. Economic differences between trucking operations in the U.S. and Mexico have driven theses changes. First, Mexican carriers can provide services at cheaper rates than the U.S. carriers.

Mexican drayage companies are able to get return loads easier than United States companies. The end result is that U.S. carriers are pushed out of the market. Maintenance costs are a second factor that provides benefits to Mexican carriers. Maintaining vehicles is less expensive in Mexico than in the U.S., which is partially why Mexican drayage carrier rates are lower than their U.S. competition.

The economic factors are causing U.S. carriers to leave the market. The question is whether the inspection data in any way supports this observation by comparing Mexican truck inspection counts to U.S. truck inspection counts. As truck inspections are performed randomly without preference for carrier nationality, the inspection counts would not be biased towards Mexican or U.S. trucks. A review of the inspection counts shows that many more Mexican trucks are being inspected than U.S. trucks, and the difference between the two has increased since 2003. Only Free Trade Bridge in Cameron County is not inspecting more Mexican trucks than U.S. trucks. This finding supports the observation that cross border drayage is becoming a service provided largely by Mexican carriers.

Texas Commercial Vehicle Safety Enforcement Strategy

The U.S. Congress has continued to express concern over the open border, and it has called for increased inspectors and permanent facilities to make sure Mexican trucks and drivers are in compliance with U.S. commercial vehicle law. The USDOT has responded with increased border enforcement. Funds have also been granted to border states to staff BSIFs. The Texas DPS and the Texas Department of Transportation has met those demands and developed plans for permanent facilities staffed by state employees. Staff levels have increased since 2003, allowing more inspections to be conducted, which is demonstrated in the analysis results.

The Texas DPS has a multi-faceted commercial vehicle safety program. Texas DPS CVE troopers and staff conduct roadside inspections, carrier audits, facility inspections like at a BSIF, and sting operations, where several troopers work a stretch of highway together to bring extra attention to truck safety where the sting operations occur. The question is whether more funds and assets should be used at BSIFs instead of for other CVE missions. The results from this study do not indicate that more border safety inspection personnel are necessary because Mexican drayage carriers are performing similar to U.S. carriers that cross at the border or that operate only in the interior U.S. Table 12 lists the out-of-service rates for all Mexican trucks inspected at the eight BSIFs included in the analysis against inspections in Texas, excluding border counties. In 2006, the Mexican vehicle out-of-service rate was lower than the vehicle out-of-service rate for all vehicles inspected in Texas, excluding U.S.-Mexico border counties.

Table 12: Vehicle Out-of-Service Rates: Texas Border vs. Non-border Counties

Year	Mexican Vehicle Out-of-Service	Inspections	Texas Vehicle Out-of-Service Rate Excluding Border Counties	Inspections
2003	0.2956	38,580	0.2400	189,459
2004	0.3039	55,605	0.2575	212,973
2005	0.2704	83,230	0.2441	213,836
2006	0.2293	98,630	0.2354	247,611

These findings indicate that the Texas DPS CVE border inspection program has contributed to improved safety performance for Mexican trucks crossing the border. More resources may not be needed at this time, as a balance has been reached between the safety performance of trucks from Mexico and the U.S. inspected at the port of entry and compared against trucks inspected away

from the border in Texas. An analysis similar to the method introduced in this paper may need to be conducted annually to monitor whether Mexican carrier safety deviates from the performance shown from 2003 to 2006.

Safety

The safety analysis in this report indicates that Mexican drayage trucks and drivers have a better safety performance than their U.S. counterparts inspected at BSIF. The U.S. vehicle out-of-service rate was higher at six of eight BSIFs in 2003. In 2004, the U.S. vehicle out-of-service rate was higher at five of eight BSIF. The U.S. vehicle out-of-service was greater than the Mexico vehicle out-of-service rates at seven of eight BSIF in 2005, and six of eight BSIF in 2006. The results only show that the border safety inspection program has been effective to the point that a population of foreign vehicles that once performed unacceptably on inspections is now performing better than U.S. carriers. Mexican trucks that provide cross border drayage services have a lower out-of-service rate than U.S. trucks inspected at most BSIFs.

Driver out-of-service rates might need to be interpreted differently, because drivers restricted to operating within 100 miles of their company terminal or headquarters do not have to have a logbook. This law applies to most Mexican drivers inspected at the BSIF. Logbook violations are a common reason that a driver would receive an out-of-service violation. Further analysis would be needed to evaluate how drivers from both U.S. and Mexican carriers compare on violations that lead to driver out-of-service status in order to draw more definite conclusions.

The primary reason for the findings described above is that Mexican carriers are inspected frequently and have every incentive to minimize productivity losses. Mexican drivers and vehicles cross the border more frequently than do U.S. carriers. Some drivers working for Mexican carriers cross multiple times a day. Over the course of a day, and eventually weeks, the inspectors familiarize themselves with the drivers, and the carriers and drivers become more familiar with regulations. These factors decrease the likelihood that a truck or driver crossing many times a week will have a safety violation identified during an inspection that would lead to an out-of-service violation. The second reason out-of-service rates have decreased is that violations penalize the carrier and affect productivity. Keeping a vehicle in service is in the economic interest of every carrier.

Other analysis of U.S.-Mexico cross border trucking is also finding evidence that Mexican trucks operating in the U.S., or are inspected at the border, are performing no worse than U.S. trucks in safety inspections. Analysis by a motor carrier online newspaper, *The Trucker*, found that Mexican-domiciled carriers participating in the U.S. pilot program have better out-of-service rates than U.S. trucks inspected across the U.S. (Finney 2008). The Mexican vehicle out-of-service rate was 10.5% over a period of 24 months ending on April 22, 2008, versus 10.9% for U.S. motor carriers. Again, these are trucks participating in the U.S.-Mexico cross border pilot program. Once the pilot program is complete in September 2008, the USDOT Inspector General (2008) will present a report on carrier performance that will further describe U.S. versus Mexico safety performance for carriers participating in the pilot program. An interim report could not make any statistical conclusions on truck safety, because participation in the program and the resulting inspections counts were below expectations.

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