BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING STUDY

Task 10
Economic Impacts of U.S.-Mexico Binational Trade

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FINAL REPORT

Preface

U.S./Mexico Binational Border Transportation Planning and Programming Study implements a significant binational policy making document entitled “Memorandum of Understanding of the Planning Process of Land Transport on Each Side of the Border” signed by the federal governments of Mexico and the United States at the first “NAFTA Transportation Summit” held in Washington, D.C., April 29, 1994.

The purpose of this study is to provide policymakers with information needed to establish a continuous, joint, binational, transportation planning and programming process. A goal of this study is to improve the efficiency of the existing binational policy making, planning procedures and funding criteria effecting our Border Land Transportation Systems (BLTS). The BLTS should be seen as a binational transportation system made of international bridges and border crossings and its land connections to major urban and/or economic centers, principal seaports, airports, and multimodal/transfer stations and, ultimately, to its connections to national transportation facilities.

Disclaimer

The purposes of the Binational Planning and Programming Study and all of its reports were: to investigate current state and national transportation planning processes in both the United States and Mexico, to review available data on border transportation infrastructure and goods movement, and to recommend an ongoing, binational planning and programming process. The information contained in these reports was not developed to serve as the basis for making funding allocation or distribution decisions at either the federal or state level in the United States.

BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING STUDY

TASK 10 ECONOMIC IMPACTS OF U.S.-MEXICO BINATIONAL TRADE

International trade creates both positive and negative impacts for the United States and Mexico, the border states, and the local border communities. Estimates of economic benefits are reported in this document, measured on the basis of jobs supported by U.S.-Mexico trade. Costs are also reported as a function of roadway wear and tear, bridge damage, congestion, air pollution, noise and accidents. Logistics costs incurred at the border are estimated. These potentially avoidable costs include customs broker fees, duplicative inspection fees, unnecessary load transfers, and crossing delays.

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Executive Summary

The findings of Task 10 are reported in this document with the first five chapters covering U.S. economic benefits and costs and the second five chapters covering Mexico's economic benefits and costs associated with binational trade. Appendices to this report provide additional details. The benefits discussion for both countries is related to employment supported by binational trade at the nation, border state, and case study municipal level. The costs analysis for the two countries is different. The Mexican analysis addresses the cost of border transactions (delay, drayage, customs brokers, etc.) while the U.S. analysis addresses roadway consumption costs and various social and environmental costs associated with binational trade.

The Task 10 report identifies the generation of jobs supported by export trade as a frequently used indicator of benefits. This measurement was recently used in a U.S. Presidential report to Congress for identifying the economic effects of NAFTA. It is routinely measured by/for the U.S. Department of Commerce for the U.S. economy as a whole and for trade with countries of interest to include Mexico. There is no attempt or mission requirement on the part of the Department of Commerce to split their countrywide estimates out to individual states or regions.

In Mexico, there is no ongoing, routine effort to quantify the economic impacts of trade with the United States or to other countries for Mexico as a whole. The estimates and processes used in this Binational Study are thus unique and may represent a stepping off point for follow-on work.

The U.S. Department of Commerce estimates of jobs supported by foreign trade, while routinely performed, are published on an irregular basis, every one to three years. Also, the estimates lag the publication date by almost two years. The report published in November 1996, for example, covered the period through 1994. Thus there exists a lag of current national data and again, no “off the shelf” estimates are furnished attributable to individual states.

In Mexico, the reverse situation is true. INEGI routinely reports counts of employment attributable to maquiladora trade—which constitutes the bulk of both foreign export trade and industrial activity in at least four of the northern border states and all six of the case study municipalities. Thus foreign trade related employment by border state and border municipality is easily acquired.

As these situations exist, the Mexican portion of the report dealing with economic benefits expends the majority of its investigative effort and reporting on producing countrywide estimates of jobs supported by foreign trade. Very little research or effort was needed to estimate border state and border municipality job impacts. In contrast, the U.S. portion of the report dealing with economic benefits expends the majority of its investigative and reporting effort on producing border state and border municipality estimates of jobs supported by trade with Mexico. Only a small degree of effort was needed to produce more recent estimates of countrywide jobs supported by trade with Mexico.

On the costs side, again two very different sets of needs for information existed, and therefore two sets of costs impacts were produced by the study team. In the United States, the border state Departments of Transportation were interested in ascertaining the impact of trade flowing through and over their transportation network to other parts of the nation. During most of the investigation period, the subject of national allocation of transportation funding resources was being discussed in Congress, as part of the ISTEA reauthorization process. Naturally, the U.S. border states desired fair and equitable treatment in this funding allocation process, and increased trade resulting from NAFTA was a topic of much discussion.

In Mexico, the federal government manages the operation, maintenance, and improvement of the interstate transportation network, hence there is much less state led competition for funding resources. As a result, the focus of the investigation relative to Mexico's interest was on the border crossing itself, long renowned as the major bottleneck to freer, faster trade between the two nations. Here the major impediments to trade were quickly isolated to be avoidable time and money. This includes unnecessary or wasteful time spent by trucks and rail conveyances waiting to cross the border (in both directions), and unnecessary or wasteful money spent for "border transactions" such as draying truck trailers across the border and customs broker services. Again, these expenditures of perhaps avoidable time and money were viewed as restricting the opportunity for freer trade, and thus a constraint to economic prosperity.

A summary of the major findings of this economic assessment follows, organized by country of benefit and costs.

Mexico's Benefits of Binational Commerce

1. The major benefit of U.S.-Mexico binational trade is the generation of jobs in the maquiladora export industry in border states.
2. 86 percent of the total direct and indirect jobs generated by the maquiladora industry (638,000 jobs in 1995) are concentrated in the six border states. In turn, these jobs account for 74 percent of total jobs generated by foreign trade in Mexican border states.
3. Maquiladora jobs are growing by more than 10 percent per year, being heavily concentrated in the states of Baja California and Chihuahua, although recent increases are reported in the remaining border states.
4. Consequently, the local impact of this industry is significant, since in the six POE case studies the maquiladora export industry accounts for an average 40 percent of municipal jobs.
5. Faced with a long-lasting downturn of its domestic market, the traditional industry has seen a high increase in its exports to North America ($US 26.4 billion of a total $US 35.4 billion exported in 1995).
6. Hence, exports are seen as playing an increasingly significant role in job creation and preservation in this industry (665,000 jobs related to binational commerce in 1995). Contrary to the general perception, the job balance in mainstream industry is currently slightly higher than that of the maquiladora industry.
7. Additionally, mainstream industry jobs are better distributed throughout the national territory. For this reason, only 26 percent of total direct and indirect jobs generated by traditional industry exports are concentrated in the six border states, mostly in the border states where industry is historically stronger (Nuevo Leon and Coahuila).
8. Overall, including the agricultural and mining sectors, binational trade led to the creation and preservation of 1,565,000 direct and indirect jobs in 1995, i.e., 6.8 percent of the economically active population and more than 45 percent of Mexico's overall industry-generated jobs. There is a high concentration of foreign trade-related employment in the industrial production and a relatively low proportion of related services, as compared to the United States.
9. Nevertheless, the overall impact in Mexico from binational-trade-generated jobs is almost two and one-half times that of the United States (617,000 jobs in 1995) and is related to the relocation to Mexico of industrial activities and some high job-generating logistics services (cartage, customs brokers, and maneuvering charges).

10. In fact, the Mexican transportation and communications sector is one of the most benefited by binational trade, given that it maintains approximately 163,000 jobs (36 percent of total jobs generated by the cargo transportation sector).

Mexico's Costs of Binational Commerce

1. Border transaction costs consist of costs for services at the border plus additional costs resulting mainly from delays and cargo breakage.
2. Border transaction costs paid or defrayed by Mexican exporters and importers ranged from $US 1.345 to 1.673 billion in 1995.
3. These costs represent 45 percent to 56 percent of foreign trade freight charges collected in Mexico that same year.
4. It is estimated that 50 percent of these costs could be avoided by:
   - gradually decreasing customs brokers' rates for imports;
   - renegotiating commercial conditions for bringing in American cars to Mexico;
   - reducing delays at crossing points and customs compounds at some POEs.
5. For railroads, avoidable costs amount to 37 percent of border costs (up to $US 60 million in 1995). These costs mainly result from fees levied on individual cars on a daily basis.
6. The persistence of unbalanced flows tipping heavily toward the import side together with high customs rates negatively affect railroad imports.
7. In the case of cargo motor transport, a gradual standardization of border service costs is taking place between Mexico and the United States for both imports and exports.
8. Almost 50 percent of total border transaction costs emerge from delays affecting both imports and exports by truck.
9. Southbound, most delays can be traced back to Mexican customs compounds (when infrastructure is inadequate). Northbound, major delays occur at border crossings due to major flow fluctuations (at least in Nuevo Laredo and Ciudad Juarez) due to a mismatch between the staffing of American inspection booths and overall demand, rather than to inadequate infrastructure.
10. Analysis of the six border crossings studied shows a concentration of 36 percent of border transaction costs and almost 40 percent of potentially avoidable surcharges at Laredo/Nuevo Laredo, while San Diego/Tijuana and El Paso/ Juarez account for 15 percent and 12 percent of total costs, respectively.

U.S. Benefits of Binational Commerce

1. The most important benefit of international trade is its contribution to the U.S. economy in terms of increased industrial efficiency and an improved standard of living for U.S. citizens.
2. Worldwide U.S. exports of goods supported over 7.2 million jobs in 1995. About 34 percent of these export-supported jobs were directly required to produce the products while the remaining 66 percent were indirectly required upstream in the production process.
3. In 1994, before the devaluation of the peso, goods exports to Mexico supported 729,000 jobs according to the U.S. Department of Commerce. In 1995, after the devaluation, goods exports to Mexico supported 617,000 jobs, the same level as experienced in 1993, prior to NAFTA.

4. California's exports to the world supported an estimated 902,000 jobs in 1995. Of these, between 67,000 and 75,000 resulted from trade with Mexico, depending on the data source used for estimation purposes.
5. Texas' exports of goods supported 514,000 jobs statewide in 1995. Between 152,000 and 176,000 of these jobs (32 percent of the total) are attributable to exports of goods to Mexico.
6. Arizona and New Mexico have smaller work forces supported by worldwide exports, compared to California and Texas. About 81,000 jobs in Arizona are supported by trade, of which 12,000 to 17,000 are attributable to commerce with Mexico. The State of New Mexico experiences the benefits of about 18,000 workers supported by goods-related exports. Two to three thousand of these jobs result from exports of goods to Mexico.
7. At the local level, El Paso was the greatest beneficiary of export-related jobs of the six case study border cities that were studied. Some 20,000 El Paso jobs, with an annual payroll of $331 million, were supported by export trade in 1995. San Diego had the next largest number of export-supported jobs, almost 7,000, generating an annual payroll of $178 million. Laredo, the border city accommodating the largest volume of binational trade, benefited by some 4,700 jobs which generated an annual payroll of $93 million for the local economy. Each of the three other case study cities (Nogales, Brownsville, and Eagle Pass) had between 1,000 and 2,000 jobs supported by trade, according to our estimates.
8. Growth of exports allows U.S. industries to produce those goods and services for which they are best suited to produce and to import inputs to their production process best produced by foreign industries.
9. During slack periods of employment, increases in output, including exports, will increase employment over what might have otherwise been the case. When industry is operating at or near capacity, such as it was in 1995 and 1996, increase in outputs (exports) will result in smaller increases of employment. Thus, while the U.S. economy remains robust, further increases in foreign trade will result in diminishing increases in national employment.
10. Overall, the 617,000 jobs supported by trade with Mexico yielded an annual payroll of $16 billion in 1995. Income and sales taxes on this payroll was in turn available to offset costs associated with binational trade.

U.S. Costs of Binational Trade

1. In 1995, the United States imported nearly $54 billion of goods across its land border with Mexico, weighing some 20.7 million tons. Approximately 77 percent of this freight moved overland by truck, when measured on the basis of weight.
2. From an export (southbound) perspective, the United States exported $42 billion of goods across its land border with Mexico in 1995, weighing 29.3 million tons. Of this volume of freight, two-thirds (19.5 million tons), traveled overland by truck. Rail transported most of the rest (9.5 million tons).
3. Most of the two-way trade flowed across the State of Texas border with Mexico. Seventy-four percent (74%) of the truck-transported freight (26.5 million tons) moved through the Laredo and El Paso customs districts in 1995.
4. Wear and tear on the border state highway systems, resulting from U.S.-Mexico trade, amounted to $113 million in 1995. Of this amount, $53 million was attributed to trucks flowing through the border states on their way to or from states inland from the border.

5. Wear and tear on the non-border state highway systems associated with binational trade was estimated at $62 million for 1995, bringing the total roadway consumption cost to $175 million annually for the United States as a nation.
6. The marginal, social costs of binational trade were also computed. These costs addressed the impacts of congestion, accidents, air pollution, noise, and energy security attributable to binational trade. For the border states, these amounted to $68 million for 1995. Of this amount, $32 million was caused by trucks flowing through the border states with the rest being domestically borne.
7. Social costs for the non-border states, attributable to binational trade, were estimated at $37 million annually; bringing the total national cost of congestion, accidents, air pollution, noise and energy security to $105 million annually.
8. These collective costs of $280 million annually were in turn offset by the employment benefits identified above.

Report Outline

The objective of this report is to quantify and evaluate the economic impacts of the current volumes of goods transported to, from, and within the border region on the communities within that area. This report also compares these border impacts to those within the rest of the United States and Mexico.

The first five chapters of the report present information that addresses U.S. economic benefits and costs associated with binational trade. The following five chapters address Mexico's perceived benefits and costs.

The report begins with an introduction of the methodological assumptions, techniques, and sources of data used to undertake the U.S. portion of the analysis. The scope of the investigation is outlined as are the resource constraints pertinent to this study. This introduction sets forth a "top down" analysis methodology for the U.S. assessment, beginning first with an analysis of national, then state, then local economic impacts associated with binational trade. The Mexico methodology, presented in the latter one-half of the report, follows via a "bottom up" approach.

The second chapter of the report presents a summary of the national benefits of trade experienced by the United States. This analysis relies on research undertaken by the U.S. Department of Commerce to establish baseline and therefore "control total" conditions, for all states and municipalities affected by international and U.S.-Mexico binational trade.

Chapter 3 of this document identifies the portion of national benefits (of trade) that is attributable to the individual U.S. border states. The methodology used to derive these state benefits is consistent from one state to the next. By virtue of using consistent source data for multiple states, quantities presented in this chapter may differ from prior estimates reported for individual states.

The next chapter attempts to quantify the costs experienced in the United States associated with binational trade. This chapter reviews relevant methodologies and findings from prior studies, discusses the complexities of attributing costs to individual trade flows, and applies an approach previously used by Texas research institutions for the calculation of trade costs. This chapter also reviews the U.S. federal distribution of funding to states and explores the concept of funding equity.

The fifth chapter of this report presents an economic overview of the six case study U.S. border communities that have been selected for detailed investigation. This discussion is formatted to facilitate the review of local transportation, land use, and economic issues affecting binational traffic and trade.

Chapter 6 provides an introduction to the analysis of economic benefits and costs impacting Mexico. As with the United States, the most direct impact of binational trade is the creation and sustainment of jobs. With the exception of tracking the employment of maquiladora industries, very little research has preceded this binational study. The same observation is made relative to quantifying direct costs associated with binational trade.

The methodology used to undertake the analysis of Mexico's benefits and costs associated with binational trade is generally presented in Chapter 7. The lack or poor availability of data and inconsistencies among sources somewhat constrained the study team's efforts. Nevertheless, the evaluation presented in this study is considered to be a remarkable effort for improving Mexico's transport planning process.

Chapter 8 presents the assessment of Mexico's benefits resulting from binational trade at the national level. This work plows new ground as it goes beyond the investigation of maquiladora industry impact to cover export-supported jobs in traditional industry, agriculture, and mining. Relative to the United States, the total number of jobs supported by binational trade is estimated to be two and one-half times as great.

How these jobs are allocated among the border states and border municipalities is addressed in Chapter 9. As reported for the nation, estimates are made of maquiladora-supported jobs, traditional industry jobs, agricultural and mining jobs supported by trade with the United States. Coincidentally, a three to one ratio of jobs supported by trade generally holds true for the pairs of Mexico-U.S. border states.

The last chapter of the report presents an interesting and pioneering exploration of border transaction costs that, potentially, could be avoided through physical, operational, and industrial changes. This is a "must read" chapter if time permits only a casual review of this report.

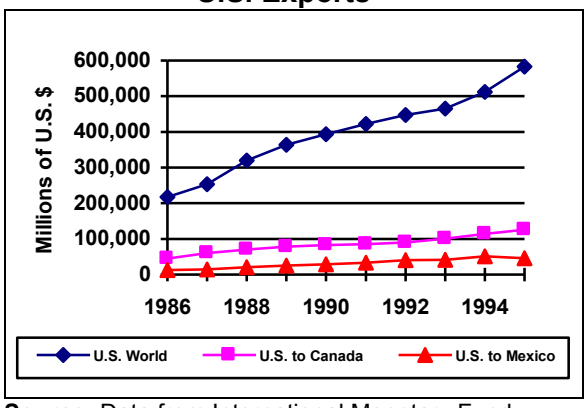
10.1 Methodology Overview of U.S. Analysis

The U.S. and Mexican border states are the geographic areas within both nations that are most affected by binational trade. These states are naturally interested in understanding the magnitude of transportation needs associated with trade, and how these needs compare to benefits derived from this trade.

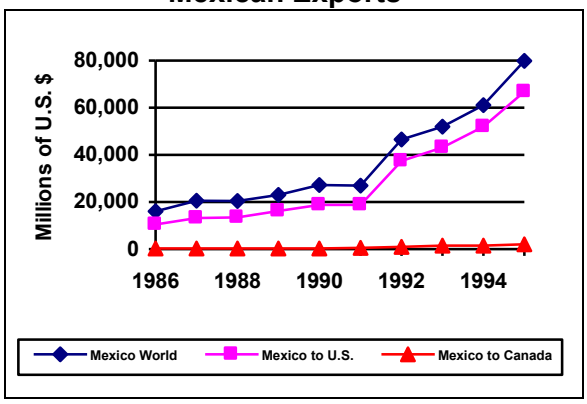
International trade is a very important agenda for both nations as it is the source of an increasing share of employment and wages which underlie gross national product. Figure 10.1 shows the trend lines for the value of merchandise exports as reported by the International Monetary Fund for both the United States and Mexico. These illustrations present world totals for the two nations. The level of exports to the NAFTA trading partners is also shown for comparison.

Figure 10.1 Exports to World and NAFTA Partners (Millions of $U.S.)

U.S. Exports



Mexican Exports



Source: Data from International Monetary Fund

Due to the importance of international trade, the United States has traced the impact of trade on its economy for some time. For a variety of reasons, employment (jobs) has been used most extensively to quantify the benefits of trade, primarily since it is measurable with some degree of accuracy. To a secondary extent, wages attributable to international trade have also been sporadically reported, reflecting various cycles of primary data collection.

Evidence of the use of jobs as a common denominator for quantifying economic benefits is seen in the following representative reports:

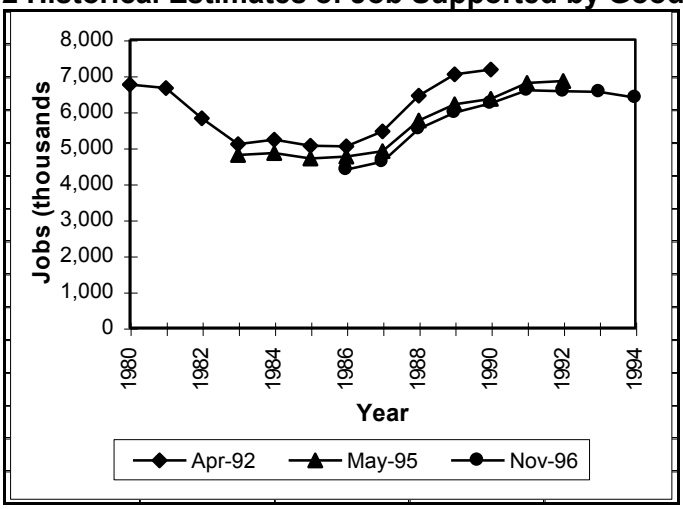
- The report entitled, "North American Free Trade Agreement-Opportunities for U.S. Industries," published by the U.S. Department of Commerce in October 1993, mentions the following as benefits of NAFTA:
    - The creation of high-wage jobs
    - Growth of the economy
    - Improved competitiveness in the global marketplace
    - Enhanced environmental protection

The first three of these noted benefits are job related.

- The report entitled, "The North American Free Trade Agreement-Implications for California," prepared by the Governor's Office of Planning and Research and published in May 1993, also mentions the creation of jobs, economic growth, and environmental protection as the primary benefits of NAFTA.
- The Arizona Department of Commerce listed the following benefits to the state's economy in its report entitled, "Economic Impact of the North American Free Trade Agreement on Arizona's Economy," published in April 1993.
    - Increased sales of products and services
    - New financial investment opportunities
    - Increased transportation infrastructure investments in Arizona
    - Increased tourism
    - Enhanced consumer purchasing power

As will be discussed in Chapter 10.2, estimates of national employment attributable to trade vary from one report to another based on the availability of data and the computational technique used in the estimation. Figure 10.2 illustrates the trend lines reported by the U.S. Department of Commerce for total U.S. employment supported by goods exports. While growth in employment over time is depicted by each successive report, the most current estimate of jobs seems to remain relatively constant at 7 million, plus or minus. This observation is noted to caution those involved with the analysis of trade impacts to benchmark their findings with the corresponding set of historical information.

Figure 10.2 Historical Estimates of Job Supported by Goods Exports



Source: U.S. Department of Commerce

A second cautionary note is provided by the authors of the national employment estimates. In the case of the U.S. Department of Commerce jobs data, the analysts noted that while their estimates are frequently quoted, they have been used inappropriately to forecast future effects on jobs caused by changes in trade or to estimate the number of jobs supported by individual industries. The Binational Study team has striven to overcome these limitations by utilizing primary source

data for the distribution of jobs by industry and venturing forth but one year (1994 to 1995) with respect to job projections.

Information not available to prior researchers has been used by this study team to estimate jobs supported by trade at an individual state level. In the case of the U.S., a recently published document[1] reports the findings of an extensive data collection effort undertaken by the Census Bureau to ascertain state-by-state, industry-by-industry estimates of employment associated with export trade. We have carefully used this data to disaggregate the country totals discussed above with respect to the U.S. southwest border states.

Once the magnitude of employment associated with export trade for each border state was determined, the next step of the investigation involved estimating the proportion of employment supported by trade with the U.S. and with Mexico.

We found that no state-by-state estimate of employment supported by trade with Mexico is routinely made. In the U.S. Department of Commerce's November 1996 report,[2] estimates of jobs supported by total U.S. goods exports to foreign markets, including Mexico, are reported. Nevertheless, the Binational Study team has been successful in closely replicating these market estimates from the bottom up, for the collective states. The process used to undertake this analysis is documented in Chapter 3 and briefly summarized below.

The U.S. Census Bureau maintains and publishes two state export data files. The first of these, the Origin of Movement (OM) series, is designed to measure the transportation origin of exports, i.e., the state from which an export product began its journey to the port of exit. The second, the Exporter Location (EL) series, which the Census Bureau began issuing in 1993, allocates exports to states and localities according to the location of the exporter of record. "Neither series provides a complete and accurate representation of the production origin of U.S. export merchandise."[3] Commerce suggests that "divergent figures of exports from a given state should be viewed as complementary, not contradictory. Taken together, the data can provide a reasonable picture of export activity in one's area."[4] Based on this guidance and problems noted earlier in the Task 8 report, we have elected to use both series to provide a range of values for state tallies of jobs supported by exports.

For each state, total jobs supported by exports to the world have been disaggregated to individual foreign markets, i.e., Mexico, based on the share of trade value exported to that market. This disaggregation was performed for each individual product classification reported by the OM and EL series data files. The results for 1995 show a significant drop in U.S. jobs supported by trade with Mexico, compared to 1994. These findings are consistent with the import/export trading patterns documented in the Task 8 report.

While U.S. and border state jobs supported by trade with Mexico declined from 1994 to 1995, overall (world) trade-related jobs increased in every border state. Depending on the export series used for the calculation, border states now support from 234,100 to 271,100 full-time equivalent jobs from their trade with Mexico.

Turning to the "costs" of binational trade, each border state has identified infrastructure needs resulting from increased population, employment, and traffic flows within the border region. These needs have been identified in the Task 2 report under deficiencies and in the Task 6 report under proposed projects. In addition to these documents, each state, municipality, and/or nation

[1] U.S. Department of Commerce, "Exports From Manufacturing Establishments: 1990 and 1991," December 1994.

[2] U.S. Department of Commerce, "U.S. Jobs Supported by Goods and Services Exports, 1983-94," November 1996.

[3] U.S. Department of Commerce, "Metropolitan Area Exports," p.120, April 1996.

[4] Ibid.

maintains a more detailed database (electronic, tabular, and/or mapped) of projects and needs awaiting funding.

Texas, for example, published a series of reports in late 1993 detailing infrastructure and public services needs for transportation, the environment, housing, education, employment and worker training, and health and human services.[5] (Many of the border states have similar assessments.) The report addressing "Trade Flows and Transportation: U.S. (Texas)-Mexico Border," identified the need for roadway mobility enhancements, pavement maintenance, bridge enhancements, new crossings, increased public transportation services, aviation, railroad, and marine port needs. The report also included a methodology for estimating truck traffic vehicle miles operating over Texas highways that are directly related to international trade with Mexico. At the time, no cost factor was applied to these commercial vehicle trade miles.

Due to the predominance of U.S.-Mexico trade flowing through Texas, the Texas Department of Transportation (TxDOT) has continued to sponsor research to identify the cost of accommodating these trade flows. Four studies investigating the "Impacts of Bigger Trucks on Texas," have recently been published as a special research project for the state and the Association of American Railroads.[6] One of these studies, "Texas Cost Allocation Analysis for Trucks Engaged in U.S./Mexico Truck Trade," is particularly relevant to the analysis desired for this study; and together with the previously referenced report, have been used as a model for computing cost impacts.

[5] Office of the Governor, by Shiner, Moselay & Assoc., Summer 1993.

[6] Ray Barnhart & Associates, "Impacts of Bigger Trucks on Texas," January 1996.

10.2 U.S. National Benefits of U.S.-Mexico Trade

This chapter presents a summary of the U.S. national benefits of trade between the United States and Mexico. This analysis relies on research undertaken by the federal government to establish baseline and "control total" conditions reflecting binational U.S.-Mexico trade.

Preceding discussions in this study (Task 8) have examined trade in terms of value of goods transported between the two nations. Here, the authors attempt to quantify the benefits of trade in a more tangible manner—its contribution to jobs in the labor force. Clearly, this measure of benefits is meaningful to both policy makers and to residents in both countries, whether they reside in U.S. or Mexican border states and beyond, or within municipalities significantly affected by border trade.

This chapter begins with a brief discussion of how international trade, particularly goods exports, effects the number and types of jobs available in the labor force. Next, figures regarding the estimated number of export-supported jobs from the United States to the rest of the world are provided. Finally, these export-supported job totals are examined in terms of U.S.- to-Mexico trade flows.

10.2.1 Benefits of U.S. International Trade

The most important benefit of international trade is its contribution to the U.S. economy in terms of increased industrial efficiency and an improved standard of living for U.S. citizens. Structural changes, resulting in increased efficiency, economies of scale, and more productive investments are encouraged by increased trade and help to enhance the competitiveness of both U.S. and foreign producers.

At both the macroeconomic and microeconomic levels, benefits from export and import growth are significant and widespread throughout the economy. U.S. export growth allows U.S. industries to produce those goods and services for which they are best suited to produce and to import goods and services best produced by foreign industries as inputs to their production process. U.S. markets also import a wide range of consumer goods that are more efficiently produced and at a lower cost elsewhere. Increased export production leads to economies of scale, a greater distribution of technology, increased producer and consumer surpluses, and an improved U.S. standard of living.

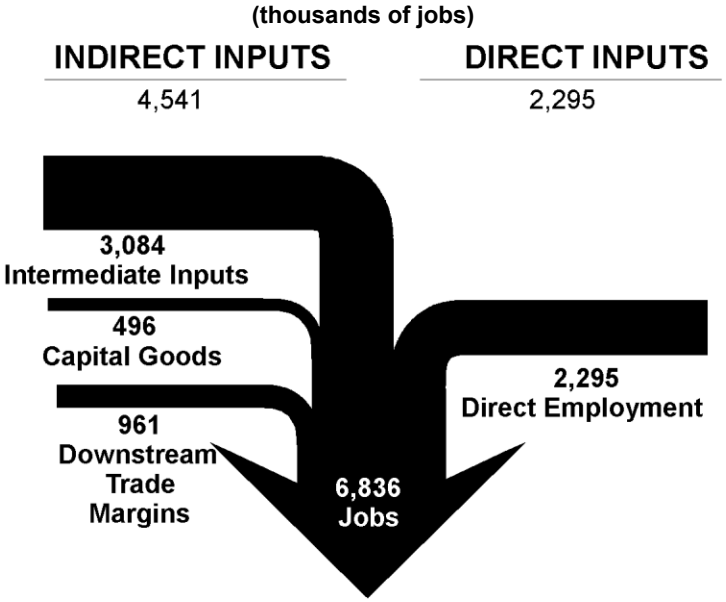
Trade benefits result not only in terms of short-term gains experienced within U.S. firms but also include more long-term gains as industries interact and foster the sharing of technology between firms, increase the demand for skilled labor, and provide an impetus for a more highly educated labor force.

It must also be understood that exports generate a large number of jobs other than those involved with firms producing final products for export and firms producing services that are directly exported to foreign nations. Based on 1996 U.S. Commerce Department estimates for 1994, about 34 percent of all export-supported jobs were directly required to produce the exported products. Conversely, 66 percent were indirectly required upstream in the production process to provide the intermediate inputs and capital goods used in producing the products, and downstream to provide the transportation and other services used in moving the ultimately produced products to their port of exportation.

The proportion of jobs indirectly required both upstream and downstream is especially large for goods exports. Here, indirect jobs account for nearly two-thirds of the total. These inputs are significantly less important for services exports.

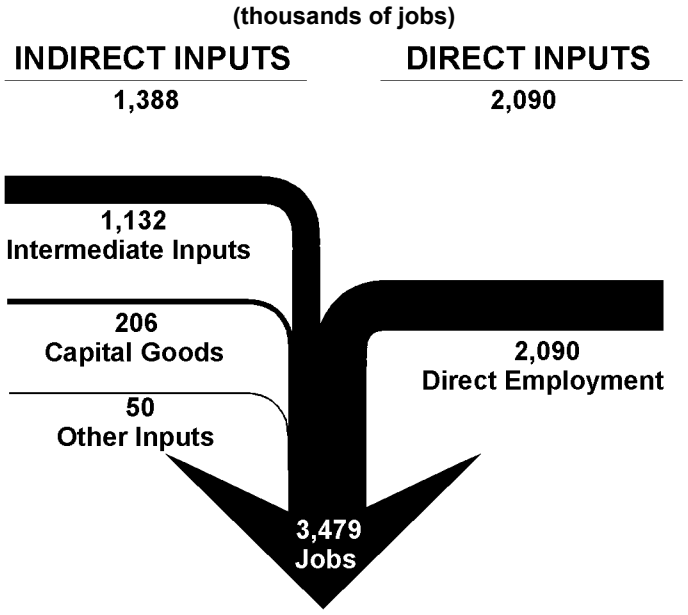
Figures 10.3 and 10.4 illustrate the proportion of total export-supported jobs comprised by both direct and indirect inputs for goods and services exports during 1994.

Figure 10.3 Sources of Jobs Supported by Goods Exports (1994)



Source: U.S. Department Commerce, 1996

Figure 10.4 Sources of Jobs Supported by Services Exports (1994)



Source: U.S. Department Commerce, 1996

10.2.2 General Relationship Between Jobs and Exports

The relationship between changes in the number of jobs supported by exports and the sources of workers filling these jobs is of continued interest. This interest has centered on the impact of increased exports on both the overall levels of employment and unemployment. In addition, the impact on the work force during periods of slack as opposed to full employment and between short-term and long-term effects are also important. Two major conclusions regarding these areas of interest can be found:

1. During slack business activity periods, any increases in output, including exports, will increase employment, decrease unemployment, and elevate labor force participation over what might have otherwise been the case.
2. When industry is operating at or near capacity, increases in output of an individual final demand product or service results in much smaller increases in employment from that source. Rather, employment is redistributed among industries toward those with higher wages.

The impact of changes in export levels in the short run are far greater than those in the long-run. This effect is caused by the time lag necessary for the effects to work through the economy and include the effects of wages, prices, and interest rates.

10.2.3 Relationship Between U.S. Jobs and U.S. Exports

U.S. exports comprise an increasingly important share of total U.S. production of goods and services. The dramatic increase in U.S. exports since 1986 has directly effected the rapid increase in the number of workers needed to produce those exports. A significant and growing share of U.S. workers are dependent upon export trade for their job security. In 1994, export-related jobs employed over 10.3 million full-time-equivalent workers. The proportion of workers producing exported goods was twice the total number of workers providing exported services.

For purposes of this study, we will focus on jobs related to the export of goods and not the export of services. Because the export of services mainly involves transportation networks only for the physical transportation of those individuals involved in a given service provision, they do not significantly affect the planning of transportation facilities between border regions, states, and municipalities or between the U.S. and Mexico as a whole.

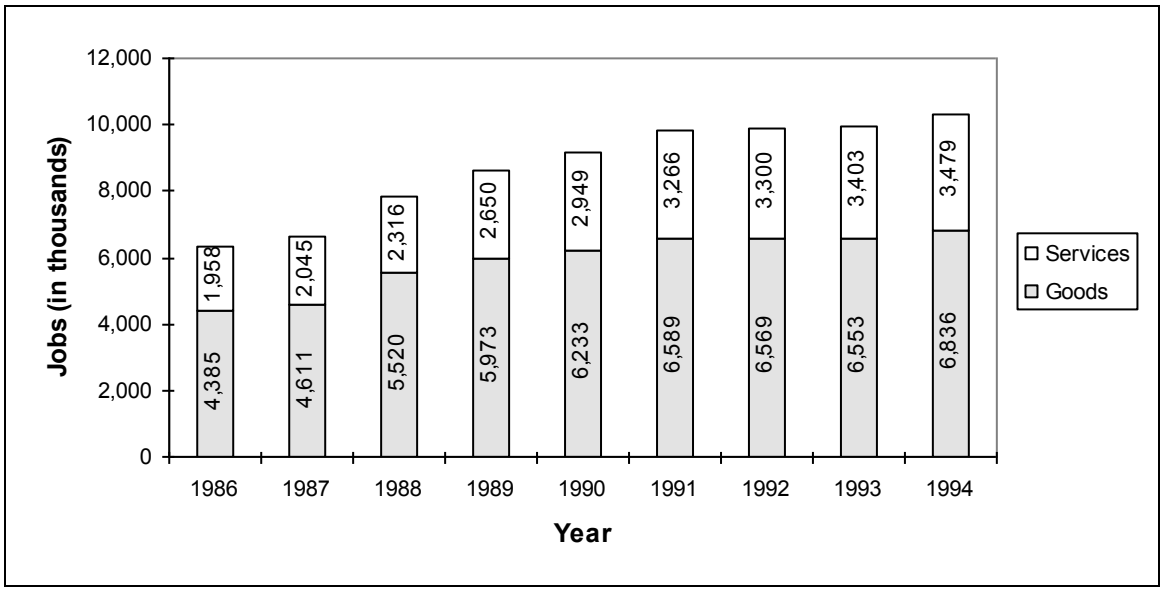
Table 10.1 and Figure 10.5 summarize and illustrate the growth in export-supported job estimates for the period 1986 through 1994.

Table 10.1
U.S. Exports of Goods and Services—Jobs Supported (1986 through 1994)

	(Jobs in thousands)		
Year	**Total Exports Jobs**	**Goods Exports Jobs**	**Services Exports Jobs**
1986	6,343	4,385	1,958
1987	6,656	4,611	2,045
1988	7,836	5,520	2,316
1989	8,623	5,973	2,650
1990	9,182	6,233	2,949
1991	9,855	6,589	3,266
1992	9,869	6,569	3,300
1993	9,956	6,553	3,403
1994	10,315	6,836	3,479

Source: U.S. Department of Commerce, 1996.

Figure 10.5 U.S. Exports of Goods and Services—Jobs Supported (1986-1994)



Source: U.S. Department of Commerce, 1996.

From Table 10.1 and Figure 10.5 it can be seen that the number of export-supported jobs grew rapidly between 1986 and 1991. During the period 1992 through 1994 the rate of growth was relatively flat for both exported goods and exported services.

It should be noted that the above estimates are slightly smaller than those published prior to 1995. These new estimates reflect changes to the underlying official data in terms of full-time-equivalent employment. The new data also reflects improved disaggregation of employment to value of production ratios within individual economic sectors.

10.2.4 Goods Export-Supported Jobs by Industry Type

In order to more closely examine the growth in export-supported jobs related to goods production, the determination of changes within particular product types is important. This importance lies in the fact that the contribution to total export-supported jobs between industries and product types varies widely. Following the methodology previously discussed in Chapter 1, estimates of total jobs supported by U.S. exports to the world were disaggregated for the period 1993 through 1995 based on two-digit SIC code groupings for manufactured products and sectoral divisions for non-manufactured products. Table 10.2 provides the results of these estimates.

Table 10.2 shows that the number of export-supported jobs related to manufactured goods are nearly equal to those related to non-manufactured goods during each of the three years observed. Growth in export-supported jobs has taken place across the board and within all major product types.

Among manufactured goods, the largest providers of export-supported jobs includes industrial and computer machinery and computer equipment (SIC 35) and electronic and other electrical equipment (SIC 36). This result is hardly surprising given the U.S. dominance of advanced computer technology and the rapidly growing global markets for these products. Other

Table 10.2
U.S. Export-Related Employment to the World; 1993 through 1995 (in thousands)

	Export-Related Jobs		
2-Digit SIC Code Grouping	**1993**	**1994**	**1995**
Manufacturing			
20. Food and kindred products	86.5	90.4	95.6
21. Tobacco products	8.7	9.1	9.6
22. Textile mill products	80.9	84.4	89.4
23. Apparel and other fabrics	57.3	59.8	63.3
24. Lumber and wood products, except furniture	99.0	103.3	109.4
25. Furniture and fixtures	22.7	23.7	25.1
26. Paper and allied products	82.5	86.1	91.2
27. Printing, publishing, and allied industries	116.7	121.7	128.9
28. Chemicals and allied products	209.8	219.4	231.8
29. Petroleum refining and related industries	10.8	11.3	11.9
30. Rubber and miscellaneous plastics products	151.4	158.0	167.3
31. Leather and leather products	13.7	14.3	15.2
32. Stone, clay, glass, and concrete products	48.3	50.4	53.4
33. Primary metal industries	187.8	196.0	207.5
34. Fabricated metal products	242.3	252.8	267.7
35. Industrial machinery and computer equipment	484.7	505.7	535.5
36. Electronic and other electrical equipment	458.8	478.6	506.8
37. Transportation equipment	357.2	372.6	394.6
38. Measuring, analyzing, and controlling instruments	173.2	180.7	191.4
39. Miscellaneous manufacturing industries	46.8	48.8	51.7
Auxiliary industries	247.0	257.7	272.8
Total Manufacturing Jobs	3,186.4	3,325.1	3,520.4
Non-Manufacturing			
Trade	975.8	1,001.2	1,077.1
Business Services	319.6	329.6	352.7
Transportation	324.8	340.9	358.5
Agriculture	488.4	540.3	539.4
Mining	84.8	87.5	93.7
Other	1,173.2	1,211.5	1,295.6
Total Non-Manufacturing Jobs	3,366.6	3,511.0	3,717.0
Total Export-Related Jobs	6,553.0	6,836.0	7,237.4

Source: Barton-Aschman estimates based on U.S. Commerce and MISER data.

manufactured product categories employing relatively large numbers of export-supported workers includes transportation equipment (SIC 37), fabricated metal products (SIC 34), chemical and allied products (SIC 28), and primary metals industries (SIC 33).

10.2.5 U.S. Exports to Mexico-Supported Jobs

With the total and proportional breakdown of U.S. export-supported jobs to the rest of the world established, attention turned to the proportion of this total related to U.S. exports to Mexico.

U.S. export trade with Mexico is dominated by the flow of *goods* along surface transportation routes crossing the border between the two countries. Therefore, the number of jobs supported by U.S. goods export trade with Mexico is the focus of this section. The number of jobs supported by services exports are not specifically identified as most services exports are actually direct sales of services to foreign nationals traveling in or to, or living in the United States. Examples of these service-related jobs are hotel and restaurant workers and providers of personal services such as barbers and travel agents. As these service jobs do not produce or attract significant transborder

goods movement, benefits and costs associated with services exports have not been addressed in this document.

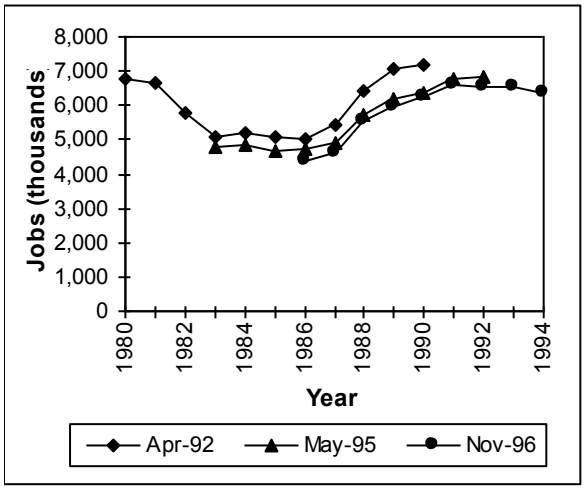
Estimates for both total U.S. and U.S.-to-Mexico goods export-supported jobs have been continually revised downward over time. Figure 10.6 illustrates the trend of these estimates using various data sources.

We have used the estimates of total U.S. jobs supported by exports to all counties of the world as control totals (Table 10.2), and following the methodology outlined in Chapter 1, have established corresponding estimates for jobs supported by U.S. goods exports to Mexico. In short, the proportion between the value of a particular product type known to be exported to Mexico, in relation to the total for the same product exported to the all countries of the world, was applied to the control total job figures to yield an estimate of export to Mexico-supported jobs by product type for the period 1993 through 1995.

It is assumed for purposes of this analysis that the individual unit value of a given product exported to Mexico does not substantially differ from the value of the same product exported to another country. For example, it is assumed that the value of a computer exported to Mexico has the same relative value as a computer exported to Canada, Germany, Japan, or elsewhere. It is further assumed that the quality of a particular exported good also does not differ greatly. For instance, there is no basis on which to assume that food products exported to Mexico consist of high-value commodities while exports to another country consist of lower-valued commodities. While these differences undoubtedly exist, we have no basis by which to differentiate employment impacts at this time.

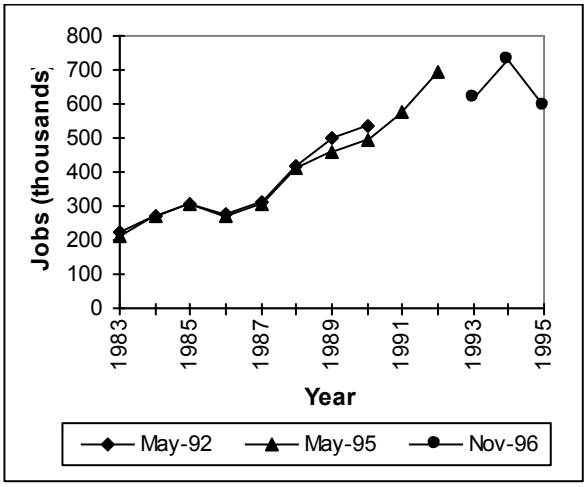
Figure 10.6 Historical Estimates of Jobs Supported by Goods Exports (U.S. Totals and U.S. to Mexico Totals)

U.S. Totals



April 1992-U.S. Jobs Supported by Merchandise Exports.
May 1995-U.S. Jobs Supported by Goods and Services Exports, 1983-1992.
Nov. 1996-U.S. Jobs Supported by Goods and Services Exports, 1983-1994 U.S. Department of Commerce

U.S. to Mexico Totals



May 1992-U.S. Jobs Supported by Merchandise Exports to Mexico.
May 1995-U.S. Jobs Supported by Goods and Services Exports 1983-1992
Nov. 1996-U.S. Jobs Supported by Goods and Services Exports, 1983-1994 U.S. Department of Commerce.
Barton-Aschman estimates for 1995.

Table 10.3
U.S. Export-Related Employment to Mexico; 1993 through 1995 (in thousands)

	Export Related Jobs		
2-Digit SIC Code Grouping	**1993**	**1994**	**1995**
Manufacturing			
20. Food and kindred products	9.5	9.3	6.9
21. Tobacco products	0.1	0.1	0.0
22. Textile mill products	11.8	12.4	13.9
23. Apparel and other fabrics	13.1	13.2	14.7
24. Lumber and wood products, except furniture	7.4	5.8	4.2
25. Furniture and fixtures	5.9	4.9	4.7
26. Paper and allied products	13.4	13.2	12.3
27. Printing, publishing, and allied industries	8.9	10.5	9.0
28. Chemicals and allied products	16.8	17.2	17.1
29. Petroleum refining and related industries	1.6	1.6	2.0
30. Rubber and miscellaneous plastics products	31.6	34.3	35.1
31. Leather and leather products	1.8	1.7	2.1
32. Stone, clay, glass, and concrete products	5.0	5.4	5.1
33. Primary metal industries	21.5	25.9	25.4
34. Fabricated metal products	38.1	44.9	42.4
35. Industrial machinery and computer equipment	36.8	38.2	33.2
36. Electronic and other electrical equipment	69.0	63.3	64.8
37. Transportation equipment	24.7	26.5	24.4
38. Measuring, analyzing, and controlling instruments	14.3	13.2	11.1
39. Miscellaneous manufacturing industries	3.9	3.9	3.0
Auxiliary industries	25.4	25.6	24.9
Total Manufacturing Jobs	360.5	371.1	356.2
Non-Manufacturing			
Trade	91.1	106.1	94.5
Business Services	18.7	35.5	19.4
Transportation	28.8	35.2	29.9
Agriculture	44.3	56.7	54.5
Mining	2.7	4.5	3.9
Other	71.0	120.0	58.9
Total Non-Manufacturing Jobs	256.6	358.0	261.0
Total Goods Export-Related Jobs	617.1	729.1	617.2

Source: Barton-Aschman estimates based on U.S. Commerce and MISER data.

Table 10.3 provides estimates of U.S. exports to Mexico-supported jobs for the period 1993 through 1995. These totals are disaggregated based on two-digit SIC code groupings for manufactured products and sectoral divisions for non-manufactured products.

Table 10.3 shows that the total number of export-supported jobs related to U.S. goods exports to Mexico increased substantially between 1993 and 1994 but then fell below the 1993 level in 1995. This decrease in the number of jobs related to U.S. goods exports to Mexico is in spite of an overall increase of export-supported jobs to the rest of the world and an overall increase in the total value of goods exported to both Mexico and the rest of the world (from 1993 to 1995).

On an individual product basis, the largest contributor to export-supported manufactured jobs is found in electronic and electrical equipment (SIC 36). Again, this is not surprising given the large increase in demand in Mexico for the more technologically advanced electronic equipment produced in the United States. Following this group of products, large numbers of jobs were associated with the export of fabricated metal products (SIC 34), industrial machinery and computers (SIC 35), rubber and miscellaneous plastics products (SIC 30), primary metals industries (SIC 33), and transportation equipment (SIC 37).

10.3 U.S. State Level Benefits of U.S.-Mexico Trade

Chapter 3 shifts the focus regarding binational trade benefits from the national level perspective to those benefits particularly attributable to individual border states in the United States. As previously discussed, the number and type of jobs available throughout the workforce of an economy provides a reasonable measure of benefits from binational trade, this being especially true in the case of goods exports. As the trends in goods export-supported jobs are more closely examined and viewed from increasingly smaller geographic perspectives, the benefits from these jobs become more apparent, easier to define, and more relevant to policy makers and local residents alike.

This chapter begins with further discussion regarding the nature of jobs as a benefit of goods export trade. A more detailed description of the methodology used in determining estimates for goods export-supported jobs precedes a section that includes the results of these estimates on a state-by-state basis for various product types. A range of estimates, based on two separate data sources, are provided for U.S. goods export-supported jobs from individual states both to the entire world and for those jobs specifically related to goods exports to Mexico. Finally, a discussion of the product types which generate the largest number of goods export-supported jobs from the United States perspective is discussed.

10.3.1 Jobs as a Benefit of Trade

International goods export trade and, more importantly, the jobs created by this trade, benefit the economies of their respective countries in a variety of ways. Jobs generate the obvious benefit of providing wages to workers employed in producing exported products. These wages translate into buying power for workers and their families and, generally, contribute to an improved standard of living in localities where they are employed. As suggested in Chapter 2, benefits of increased goods export trade also include the sharing of technology between firms, increased demand for skilled labor, and in providing an impetus for a more highly educated labor force.

A central issue which predicates a thorough discussion of benefits resulting from U.S. international goods export trade is the supposition that future increases in U.S. export trade will largely involve the production of goods requiring the higher level of technological knowledge possessed by workers in U.S. firms. Computer and electronic components are but one example of these product types. As individual firms both compete and cooperate in the production of these goods, a sharing or dissemination of the technical knowledge utilized in their development and production processes flows throughout a particular industry and beyond to other industries. This flow of information induces firms to produce more efficiently in order for their products to remain competitive in the world market.

It has been shown that wages paid to non-farm production workers in U.S. *goods* export-supported jobs are, on average, higher than those wages paid to non-farm workers in other private businesses. In fact, the U.S. Department of Commerce states that, in 1994, these wages were 13 to 20 percent higher than the national average wage of $11.12 per hour. Within “high-tech” industries, workers enjoy comparatively even higher wages, due largely to their higher skill level and educational attainment. For example, the average wages of production and non-managerial workers in high-tech firms grew at a rate one-fourth faster than wages for similar workers in other manufacturing industries in the period 1988 through 1994. By 1992, their wages were nearly one-fifth greater than those in these other industries.

As the demand for exports of these types grows, so also grows the demand for more highly skilled workers to produce them. To accommodate this labor force demand, individual workers have a vested interest in acquiring higher levels of education and firms an interest in providing more extensive training programs. The result is a higher concentration of skilled, educated workers with subsequently greater potential to secure more highly paid positions within one of these firms. And as wages increase, all other factors remaining constant, the standard of living for these workers will increase correspondingly.

It must be remembered, however, that the actual presence of jobs within a given state or municipality is dependent upon the locational decision making processes of individual firms. Except for cases where the production of a particular good requires the singular characteristics provided only by a specific geographic location, such as the location of naturally existing raw materials or conditions sufficient to produce certain agricultural products, there are many other factors considered by firms as they choose the most advantageous location for their operations. Some of these factors include the availability and cost of skilled labor, access to inputs necessary to produce a given product, existence of appropriate transportation facilities, sufficient utilities infrastructure, environmental concerns and regulations, the presence of tax or other fiscal incentives, the existing and expected future political climate, and a host of social, financial and recreational considerations for the firm's managers and employees.

Further, the continued presence of goods export-supported jobs is dependent upon both the global economy and the ability of individual firms to produce goods efficiently and competitively. The ability of an individual state or locality to attract and retain export-supported jobs therefore hinges on a variety of factors other than those associated with transportation network facilities. While the authors recognize the importance of these factors, a rigorous examination of them is beyond the scope of this study. As such, the focus of this chapter is confined to providing estimates of goods export-supported jobs as a benefit of international trade and not cause and effect reasons for the existence of these jobs in the past or in the future.

10.3.2 U.S. Goods Export-Supported Job Estimates by U.S. Border State

Presented in this section are estimates of U.S. goods export-supported jobs by U.S. border state. These estimates include job figures relating to exports to the entire world and to Mexico alone. These estimates were derived by the authors based on several data sources which are identified below. This section continues with a further discussion of the methodology (highlighted in Chapter 1) and data sources used in the derivation of these estimates and is followed by the presentation of U.S. goods export-supported job estimates by product type for individual border states during the period 1993 through 1995.

As a basis for estimating border state contributions to U.S. goods export-supported jobs, control totals for all U.S. goods export-supported jobs were determined. Three major publications were used in this regard, each published by the U.S. Department of Commerce. A 1995 publication, "U.S. Jobs Supported by Goods and Services, 1983-1992," provided U.S. totals for goods export-supported jobs at the national level. A 1994 publication, "Exports From Manufacturing Establishments: 1990 and 1991," provides national and state level estimates of export-supported job totals based on 2-digit SIC code groupings for manufactured products and sectoral divisions for non-manufactured products. These job data were reported for the years 1991 and 1992 only. At the national level, more recent estimates of goods export-supported jobs were available in a 1996 report entitled, "U.S. Jobs Supported by Goods and Services Exports, 1983-1994." However, these data did not include job figures on a state level or product type basis. In addition, the national job totals included in the latter report had been adjusted downward for reasons previously discussed.

As such, the first task in determining state goods export-supported job estimates was to reconcile the known estimates of 1991 and 1992 state level job totals to reflect the downward adjusted national totals published in 1996. Using the 1996 national estimated job totals as a benchmark, the 1991 and 1992 state job estimates for each product type were adjusted based on the proportional difference between annual totals as published in the two reports.

Using these 1991 and 1992 adjusted state-by-state, product-specific job estimates as control totals, estimates for goods export-supported job totals for each state associated with goods exports to the entire world were established. The 1992 figures for each state and within each product type were then adjusted based on the percentage change in total U.S. goods export-supported jobs between subsequent years.

Finally, the estimated state totals for goods export-supported jobs associated with exports to the entire world and by product type were adjusted to provide totals for jobs associated with goods exports to Mexico alone. These adjustments were derived using two major sources which provided the **value** of goods exported to the entire world and to Mexico for the years 1993 through 1995 by state and product type. These two sources were (1) the "Origin Of Movement" data series distributed by The University of Massachusetts Institute for Social and Economic Research (MISER), and (2) the "Exporter Location" data series published by the U.S. Department of Commerce International Trade Administration. Each data source was examined to determine the proportion of all goods within an individual product type and particular to an individual state which were exported to Mexico based on value of goods shipped. These proportional figures were applied to the estimated goods export-supported jobs for exports to the entire world for each corresponding state to establish Mexican-specific totals. Using these two separate data sources as a basis for the adjustments, the authors present a range of goods export-supported job estimates for the period 1993 through 1995.

Tables 10.4 through 10.7 present the ranged estimates of goods export-supported jobs associated with exports to both the entire world and to Mexico for each state and product type using the corresponding percentages as summarized in Tables 10.8 through 10.15. Tables 10.8 through 10.11 present the 1993 through 1995 value of goods exported to the entire world, to Mexico alone, and the proportional difference between the two figures based on the Origin of Movement data series. Tables 10.12 through 10.15 present the 1993 through 1995 value of goods exported to the entire world, to Mexico alone, and the proportional difference between the two figures based on the Exporter Location data series. Table 10.16 provides a description of two-digit SIC product codes.

Table 10.4
California Export-Related Employment to Mexico and the World; 1993 through 1995 (in thousands)

	1993			1994			1995		
	Exports to World	Exports to Mexico		Exports to World	Exports to Mexico		Exports to World	Exports to Mexico	
SIC Code	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)
Manufacturing									
20	13.91	1.22	0.68	12.83	1.09	0.72	15.37	0.96	0.59
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	1.26	0.34	0.21	1.17	0.35	0.27	1.40	0.43	0.41
23	5.90	1.23	1.13	5.44	1.15	0.99	6.52	1.02	0.99
24	7.48	3.24	3.59	6.90	2.58	2.85	8.27	2.43	2.36
25	2.42	0.61	0.53	2.24	0.57	0.53	2.68	0.37	0.34
26	4.01	1.57	1.11	3.69	1.28	0.95	4.43	1.29	1.01
27	13.28	1.57	1.15	12.25	1.24	1.27	14.67	1.48	1.45
28	12.97	1.50	1.26	11.96	1.48	1.21	14.32	1.43	1.22
29	2.00	0.25	0.26	1.85	0.30	0.39	2.21	0.29	0.49
30	16.13	5.54	4.75	14.87	5.66	5.08	17.82	6.08	5.77
31	1.37	0.18	0.14	1.26	0.15	0.10	1.51	0.10	0.08
32	4.22	0.85	0.62	3.89	0.74	0.56	4.66	0.58	0.33
33	10.33	2.29	1.91	9.53	1.55	1.52	11.41	2.06	1.97
34	25.40	5.11	4.84	23.43	5.11	4.77	28.07	5.64	5.25
35	72.10	4.53	3.46	66.50	4.70	3.39	79.66	3.80	2.96
36	93.81	8.34	7.37	86.53	8.37	6.92	103.64	8.81	8.51
37	65.67	2.23	1.65	60.57	1.71	1.32	72.55	1.76	1.36
38	39.32	2.06	1.88	36.26	1.65	1.47	43.44	1.36	1.27
39	8.64	1.70	1.20	7.97	1.58	1.18	9.55	1.29	1.03
Aux	23.51	2.26	1.82	21.68	2.12	1.71	25.97	2.05	1.80
Total Manufacturing	423.74	46.63	39.58	390.83	43.40	37.22	468.15	43.23	39.20
Non-Manufacturing									
Trade	163.69	15.76	12.68	157.89	15.44	12.44	180.85	14.25	12.53
Business Services	25.33	2.44	1.97	40.16	3.93	3.16	27.99	2.21	1.94
Transportation	36.93	3.56	2.86	37.42	3.66	2.95	40.80	3.22	2.83
Agriculture	27.32	1.08	0.85	23.10	1.10	0.70	30.18	0.93	0.89
Mining	5.94	0.43	0.36	9.51	0.86	0.53	6.57	1.11	0.35
Other	39.53	3.81	3.06	63.55	6.22	5.01	43.67	3.44	3.03
Total Non-Manufacturing	298.74	27.07	21.79	331.63	31.20	24.80	330.05	25.15	21.56
Supplemental									
Agric. Other	28.94	1.13	0.89	29.65	1.41	0.90	32.10	1.26	0.94
Other Other	64.59	6.18	4.98	66.16	6.47	5.22	71.63	5.64	4.96
Total Supplemental	93.53	7.32	5.87	95.81	7.88	6.12	103.73	6.91	5.90
Total Export Employment	816.01	81.02	67.23	818.27	82.48	68.14	901.93	75.29	66.67

Source: Estimates by Barton-Aschman derived from data provided in:
OM-Origin of Movement data; Massachusetts Institute for Social and Economic Research (MISER);
EL-Exporter Location data; U.S. Department of Commerce International Trade Administration

Table 10.5
Arizona Export-Related Employment to Mexico and the World; 1993 through 1995 (in thousands)

	1993			1994			1995		
	Exports to World	Exports to Mexico		Exports to World	Exports to Mexico		Exports to World	Exports to Mexico	
SIC Code	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)
Manufacturing									
20	0.42	0.27	0.22	0.39	0.24	0.22	0.47	0.16	0.18
21	0.11	0.10	0.11	0.10	0.10	0.10	0.12	0.11	0.12
22	0.32	0.30	0.29	0.29	0.28	0.24	0.35	0.33	0.30
23	0.21	0.19	0.16	0.19	0.17	0.13	0.23	0.17	0.11
24	0.42	0.37	0.36	0.39	0.32	0.33	0.47	0.29	0.35
25	0.11	0.09	0.10	0.10	0.08	0.07	0.12	0.09	0.09
26	0.21	0.20	0.20	0.19	0.19	0.18	0.23	0.22	0.22
27	1.26	0.26	0.23	1.17	0.31	0.27	1.40	0.33	0.21
28	0.53	0.18	0.15	0.49	0.17	0.14	0.58	0.12	0.10
29	0.05	0.02	0.04	0.05	0.03	0.04	0.06	0.04	0.04
30	0.74	0.61	0.51	0.68	0.53	0.45	0.82	0.66	0.58
31	0.11	0.03	0.04	0.10	0.05	0.05	0.12	0.04	0.04
32	0.32	0.27	0.14	0.29	0.24	0.11	0.35	0.24	0.07
33	2.32	0.48	0.33	2.14	0.60	0.36	2.56	0.49	0.36
34	1.79	1.39	1.08	1.65	1.28	0.87	1.98	1.22	0.74
35	2.95	0.86	0.89	2.72	0.83	0.80	3.26	1.09	0.84
36	12.12	1.23	1.12	11.18	1.21	1.03	13.39	1.57	1.47
37	7.17	2.35	0.47	6.61	2.82	0.42	7.92	1.47	0.25
38	3.48	0.22	0.22	3.21	0.28	0.27	3.84	0.22	0.22
39	0.84	0.14	0.16	0.78	0.15	0.18	0.93	0.28	0.22
Aux	2.53	0.66	0.47	2.33	0.64	0.41	2.79	0.60	0.44
Total Manufacturing	38.00	10.21	7.29	35.05	10.49	6.67	41.98	9.75	6.96
Non-Manufacturing									
Trade	13.11	3.39	2.45	12.65	3.44	2.20	14.49	3.14	2.26
Business Services	2.29	0.59	0.43	3.63	0.99	0.63	2.53	0.55	0.39
Transportation	3.34	0.86	0.63	3.39	0.92	0.59	3.69	0.80	0.58
Agriculture	3.15	0.91	0.67	2.67	0.63	0.52	3.48	0.24	0.28
Mining	0.63	0.00	0.12	1.00	0.06	0.12	0.69	0.04	0.04
Other	4.20	1.08	0.79	6.76	1.83	1.17	4.64	1.00	0.72
Total Non-Manufacturing	26.72	6.84	5.09	30.08	7.88	5.24	29.52	5.77	4.28
Supplemental									
Agric. Other	2.58	0.75	0.55	2.66	0.63	0.52	2.88	0.20	0.24
Other Other	5.76	1.49	1.08	5.93	1.61	1.03	6.42	1.39	1.00
Total Supplemental	8.34	2.24	1.63	8.59	2.24	1.55	9.30	1.58	1.24
Total Export Employment	73.06	19.28	14.00	73.72	20.61	13.45	80.81	17.10	12.48

Source: Estimates by Barton-Aschman derived from data provided in:
OM-Origin of Movement data; Massachusetts Institute for Social and Economic Research (MISER)
EL-Exporter Location data; U.S. Department of Commerce International Trade Administration

Table 10.6
New Mexico Export-Related Employment to Mexico and the World, 1993 through 1995 (in thousands)

	1993			1994			1995		
	Exports to World	Exports to Mexico		Exports to World	Exports to Mexico		Exports to World	Exports to Mexico	
SIC Code	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)
Manufacturing									
20	0.11	0.06	0.04	0.10	0.06	0.05	0.12	0.02	0.05
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.32	0.00	0.03	0.29	0.27	0.25	0.35	0.20	0.29
24	0.53	0.14	0.18	0.49	0.24	0.12	0.58	0.07	0.08
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.11	0.08	0.05	0.10	0.07	0.03	0.12	0.08	0.05
27	0.32	0.01	0.04	0.29	0.01	0.01	0.35	0.02	0.01
28	0.42	0.08	0.05	0.39	0.08	0.01	0.47	0.09	0.04
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.21	0.06	0.02	0.19	0.04	0.03	0.23	0.06	0.05
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.11	0.00	0.00	0.10	0.00	0.00	0.12	0.00	0.01
33	0.32	0.07	0.03	0.29	0.05	0.05	0.35	0.07	0.04
34	0.21	0.07	0.04	0.19	0.06	0.05	0.23	0.01	0.04
35	0.32	0.03	0.05	0.29	0.07	0.04	0.35	0.02	0.02
36	1.58	0.32	0.20	1.46	0.11	0.10	1.75	0.00	0.08
37	0.32	0.01	0.01	0.29	0.00	0.00	0.35	0.00	0.01
38	0.32	0.01	0.01	0.29	0.01	0.02	0.35	0.00	0.01
39	1.05	0.03	0.03	0.97	0.02	0.06	1.16	0.06	0.05
Aux	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Manufacturing	6.22	0.97	0.78	5.74	1.07	0.81	6.87	0.69	0.84
Non-Manufacturing									
Trade	3.75	0.53	1.03	3.61	0.52	0.70	4.14	0.29	0.70
Business Services	0.39	0.06	0.11	0.63	0.09	0.12	0.44	0.03	0.07
Transportation	0.55	0.08	0.15	0.55	0.08	0.11	0.60	0.04	0.10
Agriculture	1.23	0.28	0.18	1.04	0.34	0.27	1.35	0.20	0.36
Mining	0.78	0.61	0.05	1.25	1.06	0.12	0.86	0.74	0.28
Other	1.79	0.25	0.49	2.88	0.42	0.56	1.98	0.14	0.33
Total Non-Manufacturing	8.49	1.82	2.01	9.96	2.52	1.88	9.37	1.45	1.84
Supplemental									
Agric. Other	0.42	0.09	0.06	0.44	0.14	0.14	0.47	0.07	0.12
Other Other	0.94	0.13	0.26	0.97	0.14	0.25	1.05	0.07	0.18
Total Supplemental	1.36	0.23	0.32	1.41	0.28	0.40	1.52	0.15	0.30
Total Export Employment	16.07	3.01	3.11	17.10	3.87	3.09	17.77	2.29	2.99

Source: Estimates by Barton-Aschman derived from data provided in:
OM-Origin of Movement data; Massachusetts Institute for Social and Economic Research (MISER)
EL-Exporter Location data; U.S. Department of Commerce International Trade Administration

Table 10.7
Texas-Export-Related Employment to Mexico and the World; 1993 through 1995 (in thousands)

	1993			1994			1995		
	Exports to World	Exports to Mexico		Exports to World	Exports to Mexico		Exports to World	Exports to Mexico	
SIC Code	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)	Jobs	Jobs (OM)	Jobs (EL)
Manufacturing									
20	5.27	2.30	3.03	4.86	2.25	2.85	5.82	1.58	2.62
21	0.32	0.31	0.32	0.29	0.29	0.29	0.35	0.20	0.35
22	1.48	1.28	1.29	1.36	1.20	1.20	1.63	1.41	1.39
23	2.21	1.58	1.66	2.04	1.48	1.56	2.45	1.75	1.83
24	3.27	1.70	1.78	3.01	1.54	1.63	3.61	1.06	1.05
25	0.84	0.72	0.58	0.78	0.57	0.42	0.93	0.65	0.45
26	2.95	2.16	2.60	2.72	1.96	2.36	3.26	2.07	2.78
27	4.95	2.55	2.46	4.57	2.77	2.47	5.47	3.19	2.08
28	25.82	3.20	4.70	23.82	3.20	4.28	28.53	3.04	4.37
29	2.42	0.58	0.54	2.24	0.57	0.49	2.68	0.72	0.64
30	8.54	6.17	5.79	7.87	6.01	5.50	9.43	6.89	6.03
31	1.48	1.03	1.06	1.36	0.87	0.99	1.63	1.02	1.09
32	2.95	1.12	1.22	2.72	1.20	1.24	3.26	1.25	1.19
33	9.38	5.25	5.04	8.65	5.07	4.90	10.36	5.49	5.36
34	14.76	8.76	6.39	13.61	8.67	6.64	16.30	8.44	7.03
35	36.58	7.23	6.97	33.74	7.31	6.78	40.41	6.34	4.51
36	62.93	34.24	25.75	58.04	29.81	22.35	69.52	31.64	21.88
37	22.24	12.45	10.95	20.51	11.64	8.42	24.57	11.13	6.50
38	9.38	3.99	2.22	8.65	3.63	1.90	10.36	3.40	1.46
39	1.48	0.80	0.77	1.36	0.70	0.71	1.63	0.56	0.59
Aux	13.49	5.29	4.74	12.44	5.01	4.31	14.91	4.78	4.03
Total Manufacturing	232.74	102.73	89.85	214.67	95.76	81.29	257.13	96.61	77.22
Non-Manufacturing									
Trade	90.48	35.51	31.76	87.27	35.08	30.26	99.96	32.11	27.02
Business Svcs.	13.89	5.45	4.88	22.02	8.84	7.63	15.34	4.93	4.15
Transportation	20.29	7.97	7.12	20.56	8.26	7.13	22.42	7.20	6.06
Agriculture	21.19	6.87	14.63	17.92	5.57	10.72	23.41	4.95	8.80
Mining	4.77	2.95	2.18	7.63	4.35	3.12	5.27	3.55	2.47
Other	30.19	11.85	10.60	48.54	19.51	16.83	33.35	10.71	9.02
Total Non-Manufacturing	180.81	70.61	71.16	203.94	81.62	75.69	199.76	63.45	57.51
Supplemental									
Agric. Other	15.81	5.12	10.92	16.29	5.07	9.75	17.63	3.73	6.63
Other Other	35.27	13.84	12.38	36.34	14.61	12.60	39.34	12.64	10.63
Total Supp.	51.08	18.96	23.30	52.62	19.68	22.35	56.97	16.37	17.26
Total Export Employment	464.63	192.30	184.30	471.23	197.05	179.33	513.87	176.44	151.99

Source: Estimates by Barton-Aschman derived from data provided in:
OM-Origin of Movement data; Massachusetts Institute for Social and Economic Research (MISER)
EL-Exporter Location data; U.S. Department of Commerce International Trade Administration

Table 10.8
California Exports to Mexico and the World, 1993 through 1995 (Origin of Movement Series)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division A - Agriculture, Forestry, and Fishing										
1	80,363,470	2,678,675,423	3.00%	132,599,456	3,367,084,732	3.94%	91,784,314	3,240,572,973	2.83%	3.28%
2	25,886,841	137,654,894	18.81%	19,133,180	102,911,374	18.59%	6,843,201	95,338,726	7.18%	15.44%
8	2,839,821	23,225,775	12.23%	7,986,255	27,034,585	29.54%	7,542,343	24,806,053	30.41%	24.47%
9	9,190,091	160,659,085	5.72%	16,167,957	203,077,146	7.96%	5,243,135	242,177,749	2.16%	5.05%
Division Total	118,280,223	3,000,215,177	3.94%	175,886,848	3,700,107,837	4.75%	111,412,993	3,602,895,501	3.09%	3.94%
Division B - Mining										
10	25,718	15,376,543	0.17%	43,645	20,466,039	0.21%	47,152	4,007,273	1.18%	0.29%
12	52,416	115,862	45.24%	65,033	131,475	49.46%	54,915	1,136,524	4.83%	12.46%
13	4,500,567	9,939,421	45.28%	8,832,863	13,465,043	65.60%	27,749,745	37,648,291	73.71%	67.29%
14	5,787,858	117,469,071	4.93%	5,219,262	123,265,529	4.23%	5,770,603	157,001,949	3.68%	4.22%
Division Total	10,366,559	142,900,897	7.25%	14,160,803	157,328,086	9.00%	33,622,415	199,794,037	16.83%	11.63%
Division D - Manufacturing										
20	380,926,449	4,332,703,202	8.79%	429,297,281	5,056,293,231	8.49%	316,000,000	5,061,350,858	6.24%	7.79%
21	0	2,891,641	0.00%	19,974	31,735,102	0.06%	1,563,009	14,645,698	10.67%	3.21%
22	57,641,931	212,857,925	27.08%	73,345,800	244,911,495	29.95%	95,507,987	308,365,811	30.97%	29.56%
23	215,735,985	1,038,473,059	20.77%	224,344,931	1,064,093,796	21.08%	200,000,000	1,282,288,120	15.60%	18.91%
24	300,804,650	694,860,360	43.29%	233,742,926	625,031,718	37.40%	173,000,000	589,848,252	29.33%	37.05%
25	63,907,598	255,623,423	25.00%	78,717,597	307,144,092	25.63%	40,420,793	294,912,434	13.71%	21.34%
26	242,601,321	617,078,417	39.31%	279,362,776	805,245,545	34.69%	288,000,000	984,985,832	29.24%	33.65%
27	62,822,861	532,948,908	11.79%	54,012,265	533,356,490	10.13%	56,588,553	561,077,536	10.09%	10.66%
28	306,476,800	2,643,855,367	11.59%	376,091,918	3,032,395,967	12.40%	362,000,000	3,616,030,769	10.01%	11.24%
29	202,089,482	1,625,621,969	12.43%	202,462,964	1,255,051,122	16.13%	144,000,000	1,080,474,195	13.33%	13.85%
30	321,288,264	935,117,170	34.36%	427,116,181	1,121,816,010	38.07%	423,000,000	1,238,582,032	34.15%	35.55%
31	27,336,846	213,025,522	12.83%	28,263,068	241,148,903	11.72%	15,396,961	238,263,310	6.46%	10.25%
32	68,665,110	340,452,846	20.17%	67,925,687	355,237,804	19.12%	53,795,885	429,734,478	12.52%	16.92%
33	342,671,836	1,543,537,256	22.20%	309,684,499	1,899,230,790	16.31%	345,000,000	1,915,126,852	18.01%	18.61%
34	315,322,761	1,566,699,802	20.13%	324,813,623	1,489,137,748	21.81%	351,000,000	1,748,080,082	20.08%	20.63%
35	1,043,805,914	16,612,682,399	6.28%	1,346,967,985	19,048,847,040	7.07%	1,140,000,000	23,900,559,395	4.77%	5.93%
36	1,504,458,136	16,927,968,356	8.89%	2,047,456,934	21,177,323,801	9.67%	2,380,000,000	28,012,283,232	8.50%	8.97%
37	288,252,899	8,485,948,522	3.40%	266,779,694	9,424,416,585	2.83%	244,000,000	10,051,684,954	2.43%	2.86%
38	280,837,033	5,344,909,902	5.25%	267,826,397	5,873,008,998	4.56%	215,000,000	6,873,433,939	3.13%	4.22%
39	251,819,839	1,279,999,464	19.67%	312,220,594	1,572,090,421	19.86%	256,000,000	1,900,066,254	13.47%	17.26%
Division Total	6,277,465,715	65,207,255,510	9.63%	7,350,453,094	75,157,516,658	9.78%	7,100,273,188	90,101,794,033	7.88%	8.99%
Special Classifications										
91	12,081,198	761,299,719	1.59%	16,718,235	975,068,553	1.71%	41,091,928	1,525,016,761	2.69%	2.14%
92	67,315,831	391,686,193	17.19%	57,668,682	317,297,151	18.17%	22,558,025	290,233,087	7.77%	14.77%
98	0	95,540,545	0.00%	0	94,942,796	0.00%	0	111,000,000	0.00%	0.00%
Division Total	79,397,029	1,248,526,457	6.36%	74,386,917	1,387,308,500	5.36%	63,649,953	1,926,249,848	3.30%	4.77%
Division K - Nonclassifiable Shipments										
99	36,067,198	711,477,883	5.07%	42,688,038	787,705,921	5.42%	53,360,050	752,212,646	7.09%	5.87%
Grand Totals	6,521,576,724	70,310,375,924	9.28%	7,657,575,700	81,189,967,002	9.43%	7,362,318,599	96,582,946,065	7.62%	8.68%

Source: Massachusetts Institute for Social and Economic Research (MISER)

Table 10.9
Arizona Exports to Mexico and to the World, 1993 through 1995 (Origin of Movement Series)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division A - Agriculture, forestry, and fishing										
1	40,135,563	170,130,185	23.59%	26,971,185	187,073,097	14.42%	14,457,849	236,281,383	6.12%	13.74%
2	12,863,484	13,454,689	95.61%	22,904,600	23,164,690	98.88%	2,043,101	2,817,851	72.51%	95.88%
8	284,537	557,799	51.01%	190,199	210,933	90.17%	93,691	228,221	41.05%	57.02%
9	22,254	94,664	23.51%	55,783	289,626	19.26%	115,284	1,038,358	11.10%	13.59%
Division Total	53,305,838	184,237,337	28.93%	50,121,767	210,738,346	23.78%	16,709,925	240,365,813	6.95%	18.91%
Division B - Mining										
10	21,560	57,637,018	0.04%	3,398,146	61,593,819	5.52%	7,114,299	146,991,590	4.84%	3.96%
12	11,849	11,849	100.00%	5,717	5,717	100.00%	0	0	0.00%	100.00%
13	0	3,210	0.00%	13,405	22,243	60.27%	2,300,739	2,378,871	96.72%	96.25%
14	315,837	1,445,197	21.85%	437,293	2,197,187	19.90%	353,729	1,869,134	18.92%	20.08%
Division Total	349,246	59,097,274	0.59%	3,854,561	63,818,966	6.04%	9,768,767	151,239,595	6.46%	5.10%
Division D - Manufacturing										
20	53,045,978	82,400,180	64.38%	62,557,352	101,680,295	61.52%	19,049,127	57,242,536	33.28%	55.80%
21	450,328	450,328	100.00%	639,857	639,857	100.00%	891,000	891,000	100.00%	100.00%
22	64,857,669	68,586,668	94.56%	65,281,521	68,616,964	95.14%	68,496,236	71,552,405	95.73%	95.15%
23	128,000,000	140,246,725	91.27%	92,021,726	105,766,527	87.00%	72,446,593	104,612,219	69.25%	83.41%
24	7,932,191	9,148,852	86.70%	6,041,717	7,244,651	83.40%	4,560,237	7,439,079	61.30%	77.77%
25	25,038,832	29,254,873	85.59%	14,057,118	18,451,511	76.18%	13,719,009	17,955,802	76.40%	80.43%
26	58,795,266	62,512,867	94.05%	78,925,705	83,217,515	94.84%	110,000,000	115,324,721	95.38%	94.89%
27	3,468,129	17,345,342	19.99%	3,568,550	13,129,427	27.18%	6,039,869	25,410,342	23.77%	23.40%
28	26,270,862	78,867,559	33.31%	38,589,758	114,459,385	33.71%	28,268,447	139,121,690	20.32%	28.01%
29	2,777,188	5,526,574	50.25%	2,993,679	4,682,727	63.93%	3,673,865	5,250,218	69.98%	61.09%
30	181,000,000	220,024,885	82.26%	167,000,000	212,473,962	78.60%	156,000,000	193,235,554	80.73%	80.55%
31	2,372,186	8,955,624	26.49%	2,921,448	5,617,804	52.00%	2,119,490	5,045,630	42.01%	37.79%
32	23,790,418	28,268,757	84.16%	25,921,215	32,495,561	79.77%	19,238,040	27,414,906	70.17%	78.19%
33	86,113,795	416,980,109	20.65%	108,000,000	385,616,525	28.01%	95,781,642	501,522,319	19.10%	22.23%
34	192,000,000	247,397,786	77.61%	307,000,000	396,003,936	77.52%	243,000,000	393,112,846	61.81%	71.59%
35	241,000,000	831,227,756	28.99%	277,000,000	911,681,138	30.38%	346,000,000	1,038,981,205	33.30%	31.06%
36	329,000,000	3,224,488,627	10.20%	463,000,000	4,274,428,939	10.83%	566,000,000	4,832,947,094	11.71%	11.01%
37	379,000,000	1,159,698,538	32.68%	579,000,000	1,357,271,480	42.66%	288,000,000	1,553,390,619	18.54%	30.61%
38	26,592,843	426,448,450	6.24%	38,993,985	449,377,261	8.68%	31,310,913	530,575,331	5.90%	6.89%
39	12,596,944	74,273,765	16.96%	18,114,391	93,953,983	19.28%	29,937,207	99,513,255	30.08%	22.65%
Division Total	1,844,102,629	7,132,104,265	25.86%	2,351,628,022	8,636,809,448	27.23%	2,104,531,675	9,720,538,771	21.65%	24.72%
Special Classifications										
91	744,194	2,387,528	31.17%	2,784,429	7,667,529	36.31%	3,828,673	35,039,066	10.93%	16.32%
92	5,863,761	12,553,531	46.71%	5,237,841	12,682,874	41.30%	2,248,308	7,581,273	29.66%	40.68%
98	0	8,002,318	0.00%	0	14,739,062	0.00%	0	10,080,986	0.00%	0.00%
Division Total	6,607,955	22,943,377	28.80%	8,022,270	35,089,465	22.86%	6,076,981	52,701,325	11.53%	18.70%
Division K - Nonclassifiable Shipments										
99	23,579,224	78,979,166	29.85%	13,918,851	86,238,259	16.14%	9,572,595	56,982,971	16.80%	21.18%
Grand Total	1,927,944,892	7,477,361,419	25.78%	2,427,545,471	9,032,694,484	26.88%	2,146,659,943	9,720,538,771	21.00%	24.32%

Source: Massachusetts Institute for Social and Economic Research (MISER)

Table 10.10
New Mexico Exports to Mexico and the World, 1993 through 1995 (Origin of Movement Series)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division A - Agriculture, Forestry, and Fishing										
1	3,083,487	15,821,504	19.49%	5,309,064	16,681,837	31.83%	5,787,047	38,197,844	15.15%	20.06%
2	600,766	756,869	79.38%	457,612	580,161	78.88%	21,800	52,691	41.37%	77.73%
8	3,256	105,077	3.10%	0	52,410	0.00%	0	0	0.00%	2.07%
9	0	40,710	0.00%	0	235,985	0.00%	0	226,095	0.00%	0.00%
Division Total	3,687,509	16,724,160	22.05%	5,766,676	17,550,393	32.86%	5,808,847	38,476,630	15.10%	20.98%
Division B - Mining										
12	0	0	0.00%	0	0	0.00%	14,293,750	14,293,750	100.00%	100.00%
13	11,695,848	12,203,526	95.84%	21,111,207	21,111,207	100.00%	5,153,520	5,153,520	100.00%	98.68%
14	21,720	2,890,854	0.75%	8,520	3,605,163	0.24%	40,304	3,299,351	1.22%	0.72%
Division Total	11,717,568	15,094,380	77.63%	21,119,727	24,716,370	85.45%	19,487,574	22,746,621	85.67%	83.64%
Division D - Manufacturing										
20	2,847,417	5,582,416	51.01%	4,070,304	7,185,235	56.65%	1,061,887	4,999,611	21.24%	44.91%
21										
22	61,360	160,907	38.13%	401,043	715,093	56.08%	513,900	669,502	76.76%	63.17%
23	7,464	857,756	0.87%	6,906,612	7,618,267	90.66%	8,001,997	13,954,999	57.34%	66.50%
24	2,525,556	8,971,465	28.15%	2,657,540	5,446,665	48.79%	220,704	1,900,744	11.61%	33.11%
25	14,798	333,386	4.44%	61,613	627,001	9.83%	202,753	1,055,512	19.21%	13.85%
26	531,636	755,932	70.33%	300,842	422,811	71.15%	413,600	643,427	64.28%	68.38%
27	144,225	3,546,979	4.07%	92,674	4,204,534	2.20%	68,289	921,078	7.41%	3.52%
28	9,425,769	50,785,838	18.56%	12,938,049	66,437,783	19.47%	12,340,246	63,824,764	19.33%	19.17%
29	0	0		14,375	14,375	100.00%	8,304	8,304	100.00%	100.00%
30	833,121	3,496,244	23.83%	822,977	4,131,003	19.92%	443,655	2,008,101	22.09%	21.79%
31	0	147,222	0.00%	0	119,061	0.00%	0	290,548	0.00%	0.00%
32	182,934	32,200,670	0.57%	273,261	19,713,810	1.39%	31,260	3,160,469	0.99%	0.89%
33	405,595	1,955,421	20.74%	392,531	2,225,539	17.64%	317,965	1,726,208	18.42%	18.89%
34	462,937	1,520,973	30.44%	406,972	1,242,899	32.74%	61,509	1,575,301	3.90%	21.47%
35	13,582,323	114,305,180	11.88%	28,705,114	130,942,507	21.92%	1,602,142	26,555,873	6.03%	16.15%
36	28,204,259	136,743,753	20.63%	14,661,794	192,545,208	7.61%	535,389	190,790,284	0.28%	8.35%
37	889,067	33,118,564	2.68%	251,444	32,273,742	0.78%	196,880	25,604,764	0.77%	1.47%
38	317,811	17,474,251	1.82%	852,312	20,450,335	4.17%	485,167	33,461,605	1.45%	2.32%
39	477,082	13,319,257	3.58%	160,325	10,012,985	1.60%	487,787	10,959,544	4.45%	3.28%
Division Total	60,913,354	425,276,214	14.32%	73,969,782	506,328,853	14.61%	26,993,434	384,110,638	7.03%	12.30%
Special Classifications										
91	123,367	152,445	80.93%	816,805	854,081	95.64%	2,843,854	3,086,834	92.13%	92.44%
92	330,422	3,395,729	9.73%	219,829	14,482,860	1.52%	58,747	2,758,738	2.13%	2.95%
98	0	3,200,961	0.00%	0	5,222,400	0.00%	0	3,102,747	0.00%	0.00%
Division Total	453,789	6,749,135	6.72%	1,036,634	20,559,341	5.04%	2,902,601	8,948,319	32.44%	12.12%
Division K - Nonclassifiable Shipments										
99	3,000	417,114	0.72%	106,635	616,415	17.30%	0	2,780,599	0.00%	2.87%
Grand Totals	76,775,220	464,261,003	16.54%	101,999,454	569,771,372	17.90%	55,192,456	457,062,807	12.08%	15.69%

Source: Massachusetts Institute for Social and Economic Research (MISER)

Table 10.11
Texas Exports to Mexico and the World, 1993 through 1995 (Origin of Movement Series)

SIC Product Division/Code	1993 Total Total Value to Mexico	1993 Total Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division A - Agriculture, Forestry, and Fishing										
1	683,000,000	2,237,494,027	30.53%	633,000,000	2,256,344,485	28.05%	688,000,000	3,388,516,473	20.30%	25.42%
2	50,991,938	72,475,047	70.36%	88,629,936	125,243,163	70.77%	17,719,630	50,536,026	35.06%	63.38%
8	4,554,010	32,594,370	13.97%	4,734,385	22,317,105	21.21%	4,961,392	13,471,531	36.83%	20.84%
9	31,373,726	34,023,011	92.21%	32,912,004	36,060,631	91.27%	24,721,786	26,941,678	91.76%	91.74%
Division Total	769,919,674	2,376,586,455	32.40%	759,276,325	2,439,965,384	31.12%	735,402,808	3,479,465,708	21.14%	27.30%
Division B - Mining										
10	2,899,317	46,311,939	6.26%	4,893,344	32,584,930	15.02%	4,773,788	25,375,983	18.81%	12.05%
12	1,375,512	8,727,888	15.76%	545,227	4,080,240	13.36%	4,298,846	11,476,994	37.46%	25.61%
13	193,000,000	232,372,504	83.06%	136,000,000	167,898,960	81.00%	242,000,000	280,442,595	86.29%	83.88%
14	12,401,728	50,721,527	24.45%	15,095,404	69,885,959	21.60%	18,706,063	83,348,416	22.44%	22.65%
Division Total	209,676,557	338,133,858	62.01%	156,533,975	274,450,089	57.04%	269,778,697	400,643,988	67.34%	62.77%
Division D - Manufacturing										
20	882,000,000	2,017,124,440	43.73%	1,030,000,000	2,226,049,159	46.27%	657,000,000	2,418,363,454	27.17%	38.56%
21	21,900,589	22,389,856	97.81%	38,971,889	39,152,508	99.54%	19,375,329	34,613,629	55.98%	83.46%
22	311,000,000	358,548,834	86.74%	399,000,000	452,006,956	88.27%	425,000,000	490,024,798	86.73%	87.27%
23	587,000,000	820,875,036	71.51%	727,000,000	1,001,527,514	72.59%	825,000,000	1,155,044,908	71.43%	71.84%
24	160,000,000	307,693,364	52.00%	126,000,000	245,461,707	51.33%	54,650,235	186,230,659	29.35%	46.07%
25	499,000,000	581,312,647	85.84%	445,000,000	604,291,977	73.64%	383,000,000	550,759,201	69.54%	76.42%
26	577,000,000	790,045,151	73.03%	717,000,000	996,127,192	71.98%	698,000,000	1,098,485,962	63.54%	69.05%
27	70,075,486	136,072,603	51.50%	118,000,000	194,121,910	60.79%	131,000,000	224,863,021	58.26%	57.49%
28	1,140,000,000	9,183,781,330	12.41%	1,430,000,000	10,666,977,261	13.41%	1,560,000,000	14,630,406,716	10.66%	11.98%
29	444,000,000	1,856,958,365	23.91%	473,000,000	1,839,304,781	25.72%	585,000,000	2,176,618,522	26.88%	25.58%
30	724,000,000	1,000,658,186	72.35%	1,070,000,000	1,402,341,074	76.30%	1,030,000,000	1,410,891,749	73.00%	74.05%
31	117,000,000	167,225,983	69.97%	114,000,000	179,936,676	63.36%	158,000,000	251,113,152	62.92%	65.02%
32	137,000,000	360,672,921	37.98%	205,000,000	466,714,268	43.92%	198,000,000	519,817,262	38.09%	40.08%
33	873,000,000	1,559,316,683	55.99%	1,010,000,000	1,723,476,241	58.60%	1,140,000,000	2,150,141,292	53.02%	55.64%
34	1,180,000,000	1,987,720,967	59.36%	1,510,000,000	2,369,397,317	63.73%	1,190,000,000	2,298,926,700	51.76%	58.29%
35	1,950,000,000	9,859,150,517	19.78%	2,400,000,000	11,080,613,730	21.66%	2,000,000,000	12,742,946,740	15.69%	18.85%
36	5,140,000,000	9,446,566,728	54.41%	5,800,000,000	11,291,839,707	51.36%	6,380,000,000	14,020,210,735	45.51%	49.83%
37	3,140,000,000	5,613,105,790	55.94%	3,760,000,000	6,622,737,594	56.77%	2,220,000,000	4,897,998,651	45.32%	53.23%
38	1,050,000,000	2,469,359,608	42.52%	1,130,000,000	2,695,616,386	41.92%	868,000,000	2,642,278,820	32.85%	39.04%
39	170,000,000	314,516,418	54.05%	187,000,000	362,422,033	51.60%	99,120,353	292,139,771	33.93%	47.07%
Division Total	19,172,976,075	48,853,095,427	39.25%	22,689,971,889	56,460,115,991	40.19%	20,621,145,917	64,191,875,742	32.12%	36.86%
Special Classifications										
91	116,000,000	181,520,483	63.90%	133,000,000	222,938,488	59.66%	190,000,000	356,152,579	53.35%	57.72%
92	52,953,432	159,484,163	33.20%	73,142,765	166,343,049	43.97%	20,789,683	120,409,450	17.27%	32.92%
98	0	74,424,866	0.00%	0	78,751,241	0.00%	0	86,883,841	0.00%	0.00%
Division Total	168,953,432	415,429,512	40.67%	206,142,765	468,032,778	44.04%	210,789,683	563,445,870	37.41%	40.49%
Division K - Nonclassifiable Shipments										
99	53,403,102	210,311,537	25.39%	45,468,101	346,608,425	13.12%	28,384,810	198,282,347	14.32%	16.85%
Grand Totals	20,374,928,840	52,193,556,789	39.04%	23,857,393,055	59,989,172,667	39.77%	21,865,501,915	68,833,713,655	31.77%	36.51%

Source: Massachusetts Institute for Social and Economic Research (MISER)

Table 10.12
California Exports to Mexico and the World, 1993 through 1995 (Exporter Location Series) (Values in $1,000s)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division D - Manufacturing										
20	200,568	4,083,133	4.91%	252,346	4,531,533	5.57%	188,776	4,953,025	3.81%	4.73%
21	0	2,099	0.00%	20	1,873	1.07%	1,452	11,606	12.51%	9.45%
22	47,293	286,133	16.53%	80,561	352,205	22.87%	110,825	377,045	29.39%	23.51%
23	217,249	1,127,078	19.28%	212,939	1,164,386	18.29%	203,149	1,339,034	15.17%	17.44%
24	244,331	508,388	48.06%	195,691	473,384	41.34%	121,673	425,772	28.58%	39.91%
25	47,642	216,211	22.03%	58,298	246,769	23.62%	31,425	241,635	13.01%	19.50%
26	168,060	603,931	27.83%	212,249	818,711	25.92%	234,455	1,030,172	22.76%	25.06%
27	36,664	424,644	8.63%	47,639	458,762	10.38%	48,185	487,672	9.88%	9.66%
28	228,946	2,364,863	9.68%	277,030	2,733,019	10.14%	264,490	3,087,427	8.57%	9.41%
29	226,083	1,733,760	13.04%	273,361	1,275,452	21.43%	208,552	937,218	22.25%	17.94%
30	243,672	828,196	29.42%	333,694	975,435	34.21%	345,066	1,065,447	32.39%	32.15%
31	20,064	193,905	10.35%	15,207	214,732	7.08%	12,284	224,570	5.47%	7.51%
32	41,539	282,127	14.72%	44,668	309,508	14.43%	38,968	542,982	7.18%	11.03%
33	227,940	1,227,689	18.57%	235,520	1,470,863	16.01%	291,761	1,694,531	17.22%	17.19%
34	269,417	1,413,200	19.06%	272,852	1,341,779	20.34%	302,275	1,615,498	18.71%	19.32%
35	762,250	15,904,886	4.79%	899,520	17,651,429	5.10%	786,839	21,215,990	3.71%	4.47%
36	1,225,618	15,590,056	7.86%	1,584,985	19,800,721	8.00%	2,128,439	25,932,338	8.21%	8.05%
37	252,528	10,103,470	2.50%	257,588	11,806,721	2.18%	231,480	12,419,998	1.86%	2.16%
38	234,092	4,902,746	4.77%	220,294	5,399,063	4.08%	181,867	6,247,194	2.91%	3.84%
39	212,656	1,523,353	13.96%	261,766	1,768,486	14.80%	220,673	2,032,242	10.86%	13.06%
Manufacturing Total	4,906,612	63,319,868	7.75%	5,736,228	72,794,831	7.88%	5,952,634	85,881,396	6.93%	7.48%
Agricultural	80,880	2,620,800	3.09%	97,497	3,215,521	3.03%	90,216	3,320,945	2.72%	2.93%
Other	129,147	2,125,674	6.08%	123,255	2,180,005	5.65%	128,723	2,836,084	4.54%	5.34%
Grand Totals	5,116,639	68,066,342	7.52%	5,956,980	78,190,357	7.62%	6,171,573	92,038,425	6.71%	7.24%

Source: U.S. Department of Commerce

Table 10.13
Arizona Exports to Mexico and the World, 1993 through 1995 (Exporter Location Series) (Values in $1,000s)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division D - Manufacturing										
20	39,763	74,585	53.31%	49,607	89,050	55.71%	22,442	57,276	39.18%	50.61%
21	303	303	100.00%	631	631	100.00%	832	832	100.00%	100.00%
22	20,163	21,957	91.83%	13,713	16,647	82.38%	18,061	21,211	85.15%	86.83%
23	82,289	110,611	74.39%	60,665	87,651	69.21%	25,811	55,342	46.64%	66.55%
24	6,099	7,062	86.36%	5,121	6,087	84.13%	4,862	6,460	75.26%	82.01%
25	40,030	43,675	91.65%	18,190	24,010	75.76%	13,722	18,657	73.55%	83.32%
26	68,451	72,394	94.55%	72,060	76,669	93.99%	101,550	106,531	95.32%	94.71%
27	2,532	14,075	17.99%	2,946	12,769	23.07%	3,463	22,814	15.18%	18.01%
28	25,467	88,606	28.74%	34,899	122,367	28.52%	36,332	201,773	18.01%	23.43%
29	2,223	3,059	72.67%	1,734	2,362	73.41%	2,259	2,942	76.78%	74.33%
30	69,967	101,314	69.06%	79,635	119,116	66.85%	83,908	117,425	71.46%	69.12%
31	2,113	5,659	37.34%	2,999	6,237	48.08%	1,796	5,073	35.40%	40.71%
32	4,517	10,323	43.76%	5,205	13,926	37.38%	4,186	20,113	20.81%	31.35%
33	36,852	256,621	14.36%	41,373	244,974	16.89%	52,094	368,695	14.13%	14.97%
34	58,483	97,252	60.14%	86,302	163,725	52.71%	60,581	162,625	37.25%	48.48%
35	229,153	763,473	30.01%	242,582	826,544	29.35%	227,283	883,909	25.71%	28.26%
36	262,456	2,833,916	9.26%	334,942	3,636,535	9.21%	495,221	4,503,255	11.00%	9.96%
37	33,122	501,723	6.60%	41,895	654,999	6.40%	23,064	718,220	3.21%	5.23%
38	23,948	383,147	6.25%	36,491	431,859	8.45%	29,342	522,170	5.62%	6.71%
39	16,643	87,653	18.99%	22,540	96,376	23.39%	27,652	114,798	24.09%	22.37%
Manufacturing Total	1,024,574	5,477,408	18.71%	1,153,530	6,632,534	17.39%	1,234,461	7,910,121	15.61%	17.05%
Agricultural	30,154	141,820	21.26%	30,340	156,379	19.40%	14,826	181,469	8.17%	15.70%
Other	32,689	165,918	19.70%	22,590	181,737	12.43%	16,323	311,200	5.25%	10.87%
Grand Totals	1,087,417	5,785,146	18.80%	1,206,460	6,970,650	17.31%	1,265,610	8,402,790	15.06%	16.82%

Source: U.S. Department of Commerce

Table 10.14
New Mexico Exports to Mexico and the World, 1993 through 1995 (Exporter Location Series) (Values in $1,000s)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division D - Manufacturing										
20	1,463	4,043	36.19%	2,748	5,154	53.32%	804	1,973	40.75%	44.90%
21	0	0	0	0	0	0	0	0	0	0
22	62	330	18.79%	121	522	23.18%	502	1,006	49.90%	36.87%
23	58	629	9.22%	6,561	7,581	86.55%	7,775	9,250	84.05%	82.44%
24	1,801	5,325	33.82%	1,640	6,863	23.90%	359	2,543	14.12%	25.80%
25	62	3,236	1.92%	131	2,233	5.87%	207	756	27.38%	6.43%
26	435	836	52.03%	261	839	31.11%	395	859	45.98%	43.05%
27	107	887	12.06%	136	3,833	3.55%	42	987	4.26%	4.99%
28	1,519	13,077	11.62%	554	15,190	3.65%	1,187	14,970	7.93%	7.54%
29	67,783	67,816	99.95%	49,282	50,192	98.19%	37,842	37,877	99.91%	99.37%
30	335	4,017	8.34%	716	5,027	14.24%	915	4,351	21.03%	14.68%
31	0	276	0.00%	6	233	2.58%	72	242	29.75%	10.39%
32	75	32,379	0.23%	352	21,030	1.67%	335	4,457	7.52%	1.32%
33	218	2,096	10.40%	435	2,693	16.15%	402	3,275	12.27%	13.08%
34	351	1,834	19.14%	281	1,127	24.93%	453	2,627	17.24%	19.42%
35	11,886	70,348	16.90%	9,003	69,153	13.02%	2,353	37,890	6.21%	13.10%
36	16,037	125,331	12.80%	13,465	203,023	6.63%	9,545	214,692	4.45%	7.19%
37	308	9,287	3.32%	127	25,675	0.49%	354	13,016	2.72%	1.64%
38	303	18,271	1.66%	995	17,159	5.80%	852	21,414	3.98%	3.78%
39	480	17,220	2.79%	815	13,184	6.18%	551	13,218	4.17%	4.23%
Manufacturing Total	103,283	377,238	27.38%	87,629	450,711	19.44%	64,945	385,403	16.85%	21.09%
Agricultural	1,752	11,735	14.93%	4,167	15,958	26.11%	5,470	20,860	26.22%	23.46%
Other	756	11,062	6.83%	2,126	21,785	9.76%	6,667	20,313	32.82%	17.96%
Grand Totals	105,791	400,035	26.45%	93,922	488,454	19.23%	77,082	426,576	18.07%	21.05%

Source: U.S. Department of Commerce

Table 10.15
Texas Exports to Mexico and the World, 1993 through 1995 (Exporter Location Series) (Values in $1,000s)

SIC Product Division/Code	1993 Total Value to Mexico	1993 Total Value to World	% of 1993 World Total to Mexico	1994 Total Value to Mexico	1994 Total Value to World	% of 1994 World Total to Mexico	1995 Total Value to Mexico	1995 Total Value to World	% of 1995 World Total to Mexico	% of 1993-95 World Total to Mexico
Division D - Manufacturing										
20	783,446	1,361,726	57.53%	861,064	1,466,817	58.70%	566,031	1,257,269	45.02%	54.10%
21	20,208	20,218	99.95%	36,606	36,623	99.95%	19,291	19,406	99.41%	99.81%
22	296,682	339,235	87.46%	360,406	409,851	87.94%	368,577	433,226	85.08%	86.75%
23	558,140	744,526	74.97%	766,622	1,005,145	76.27%	717,021	957,541	74.88%	75.42%
24	141,917	260,279	54.52%	120,923	223,332	54.14%	48,232	165,533	29.14%	47.92%
25	158,375	228,900	69.19%	166,733	308,808	53.99%	133,661	278,784	47.94%	56.19%
26	570,684	647,548	88.13%	619,190	713,620	86.77%	617,190	724,718	85.16%	86.63%
27	55,049	110,751	49.71%	69,824	129,227	54.03%	48,074	126,225	38.09%	47.23%
28	1,092,040	6,001,197	18.20%	1,276,548	7,105,320	17.97%	1,376,959	8,993,587	15.31%	16.95%
29	404,380	1,820,683	22.21%	371,128	1,677,132	22.13%	489,786	2,052,315	23.87%	22.80%
30	444,787	656,133	67.79%	566,406	811,239	69.82%	491,742	769,583	63.90%	67.19%
31	74,094	103,344	71.70%	68,107	93,484	72.85%	69,583	103,917	66.96%	70.42%
32	94,566	229,300	41.24%	131,140	288,846	45.40%	111,261	304,234	36.57%	40.97%
33	559,290	1,040,190	53.77%	632,727	1,118,279	56.58%	762,995	1,476,485	51.68%	53.78%
34	422,231	975,699	43.27%	582,138	1,194,139	48.75%	509,105	1,180,415	43.13%	45.17%
35	1,505,230	7,902,529	19.05%	1,735,346	8,631,584	20.10%	1,035,484	9,287,717	11.15%	16.56%
36	2,607,972	6,374,580	40.91%	3,038,170	7,888,844	38.51%	3,158,834	10,036,072	31.47%	36.24%
37	1,562,255	3,174,334	49.22%	1,308,321	3,186,749	41.06%	663,887	2,510,387	26.45%	39.84%
38	372,067	1,571,286	23.68%	350,432	1,594,112	21.98%	245,082	1,742,548	14.06%	19.71%
39	177,562	338,834	52.40%	214,064	412,143	51.94%	130,379	359,248	36.29%	47.02%
Manufacturing Total	11,900,975	33,901,292	35.10%	13,275,895	38,295,294	34.67%	11,563,174	42,779,210	27.03%	31.95%
Agricultural	515,176	746,095	69.05%	607,592	1,014,988	59.86%	429,522	1,142,978	37.58%	53.45%
Other	444,648	975,094	45.60%	481,404	1,178,696	40.84%	596,317	1,270,455	46.94%	44.46%
Grand Totals	12,860,799	35,622,481	36.10%	14,364,891	40,488,978	35.48%	12,589,013	45,192,643	27.86%	32.82%

Source: U.S. Department of Commerce

Table 10.16
Titles and Descriptions of Industries 2-Digit Standard Industry Classification Codes

Division A Agriculture, Forestry, and Fishing
Major Group 01. Agricultural production-crops
Major Group 02. Agricultural production livestock and animal specialties
Major Group 07. Agricultural Services
Major Group 08. Forestry
Major Group 09. Fishing, hunting, and trapping

Division B Mining
Major Group 10. Metal mining
Major Group 12. Coal mining
Major Group 13. Oil and gas extraction
Major Group 14. Mining and quarrying of nonmetallic minerals, except fuels

Division C Construction
Major Group 15. Building construction-general contractors and operative builders
Major Group 16. Heavy construction other than building construction-contractors
Major Group 17. Construction-special trade contractors

Division D Manufacturing
Major Group 20. Food and kindred products
Major Group 21. Tobacco products
Major Group 22. Textile mill products
Major Group 23. Apparel and other finished products made from fabrics and similar materials
Major Group 24. Lumber and wood products, except furniture
Major Group 25. Furniture and fixtures
Major Group 26. Paper and allied products
Major Group 27. Printing, publishing, and allied industries
Major Group 28. Chemicals and allied products
Major Group 29. Petroleum refining and related industries
Major Group 30. Rubber and miscellaneous plastics products
Major Group 31. Leather and leather products
Major Group 32. Stone, clay, glass, and concrete products
Major Group 33. Primary metal industries
Major Group 34. Fabricated metal products, except machinery and transportation equipment
Major Group 35. Industrial and commercial machinery and computer equipment
Major Group 36. Electronic and other electrical equipment and components, except computer equipment
Major Group 37. Transportation equipment
Major Group 38. Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks
Major Group 39. Miscellaneous manufacturing industries

Division K Nonclassifiable establishments
Major Group 99. (military)

Note: Special Classifications
Major Group 91. Scrap and waste
Major Group 92. Second hand goods

Table 10.17
Estimated Goods Export Supported Jobs in Border States; 1993 through 1995

	Export to Mexico Supported Jobs					
	1993		1994		1995	
U.S. Border State	**(OM)**	**(EL)**	**(OM)**	**(EL)**	**(OM)**	**(EL)**
California	81.02	67.23	82.48	68.14	75.29	66.67
Arizona	19.28	14.00	20.61	13.45	17.10	12.48
New Mexico	3.01	3.11	3.87	3.09	2.29	2.99
Texas	192.30	184.30	197.05	179.33	176.44	151.99
Border State Totals	295.61	268.64	304.01	264.01	271.12	234.13

Source: Estimates by Barton-Aschman derived from data provided in:
OM-Origin of Movement data; Massachusetts Institute for Social and Economic Research (MISER)
EL-Exporter Location data; U.S. Department of Commerce International Trade Administration

In summary, Table 10.17 reports the ranges of jobs supported by goods export trade for each of the border states.

10.3.3 U.S. Goods Export to Mexico-Supported Jobs by Product Type

Similar to the case of total U.S. goods export-supported jobs, these jobs when viewed in the context of border states have experienced an increase between 1993 and 1994, followed by a decrease between 1994 and 1995. The decreases in jobs seem to have occurred across the board, regardless of product type. Nevertheless, there are still industries which contribute greatly to the number of jobs provided within each state in their goods export trade with Mexico. The following discussion highlights some of these industries on a state-by-state basis.

California

The industries with the highest total number of estimated goods export to Mexico-supported jobs include electronic and other electrical equipment (SIC 36), rubber and miscellaneous plastics products (SIC 30), fabricated metal products (SIC 34), and industrial and commercial machinery and computer equipment (SIC 35). Other large contributors are lumber and wood products (SIC 24) and primary metals (SIC 33). Firms producing electronic and other electrical equipment and firms producing industrial and commercial machinery and computer equipment are among those producing what would be considered “high-tech” export goods.

Arizona

The industries with the highest total number of estimated goods export to Mexico-supported jobs include transportation equipment (SIC 37), fabricated metal products (SIC 34) and electronic and other electrical equipment (SIC 36). Another large contributor is rubber and miscellaneous plastics products (SIC 30). Firms producing electronic and other electrical equipment are among those producing what would be considered “high-tech” export goods.

New Mexico

The industry with the highest total number of estimated goods export to Mexico-supported jobs is apparel and other fabric products (SIC 23). Other major contributors are lumber and wood products (SIC 24), chemicals and allied products (SIC 28) and paper and allied products (SIC 26). Firms producing electronic and other electrical equipment and chemicals and allied products are among those producing what would or might be considered “high-tech” export goods.

Texas

Texas is, by far, the largest contributor of goods exports to Mexico-supported jobs among the four border states. The industry with the highest total number of estimated goods export to Mexico-supported jobs is electronic and other electrical equipment (SIC 36). Other large contributors include transportation equipment (SIC 37), fabricated metal products (SIC 34), rubber and miscellaneous plastics products (SIC 30), industrial and commercial machinery and computer equipment (SIC 35), and primary metals (SIC 33). Firms producing electronic and other electrical equipment and firms producing industrial and commercial machinery and computer equipment are among those producing what would be considered “high-tech” export goods.

10.4 U.S. Border State Costs of U.S.-Mexico Binational Trade

The purpose of this section is to evaluate the costs of current cross-border trade on the economies of the states, metropolitan areas, counties and municipalities within the border area. This chapter also provides a summary evaluation of net national costs to the United States, resulting from the current flow of international trade across the border.

10.4.1 Prior Research

There has been a substantial quantity of research undertaken to address these issues on the U.S. side of the border.

From a "requirements" perspective, each border state has identified infrastructure needs resulting from increased population, employment, and traffic flows within the border region. These needs have been identified in the Task 2 report under deficiencies and in the Task 6 report under proposed projects. In addition to these documents, each state, municipality, and/or nation maintains a more detailed database (electronic, tabular, and/or mapped) of projects and needs awaiting funding.

From a "costs" perspective, in anticipation of NAFTA, several of the U.S. states compiled assessments of infrastructure needs and costs to provide input to ongoing discussions of border area and border state funding allocations for transportation needs.

Texas, for example, published a series of reports in late 1993 detailing infrastructure and public services needs for transportation, the environment, housing, education, employment and worker training, and health and human services.[7] The report addressing "Trade Flows and Transportation: U.S. (Texas)-Mexico Border," identified the need for roadway mobility enhancements, pavement maintenance, bridge enhancements, new crossings, increased public transportation services, aviation, railroad, and marine port improvements. These transportation related needs were estimated to cost $3.3 billion through the year 2010.

The same series of reports put the environmental infrastructure price tag for Texas at $2.03 billion (with an additional $2.2 billion needed in Mexico); health and human service costs at $3.7 billion through the year 2001; and additional border related funding for education at $1.9 billion through the year 2001.

A report prepared by The Arizona Department of Transportation[8] identified 10-year financial needs for state highways linking Mexico to the interstate system at $487 million, in 1993 dollars; 10-year border city and county road needs at $196 million; 10-year border region airport needs of $108 million; publicly desired rail line (privately owned) improvements totaling $74.5 million; and $3.2 million for port-of-entry facilities.

[7] Office of the Governor, by Shiner, Moseley & Assoc. Summer 1993.

[8] The Arizona Border Infrastructure Needs Assessment, The Arizona Department of Transportation, June 1993.

Caltrans District 11 undertook a similar needs assessment in 1993[9] and identified $632.5 million of unfunded highway projects and $328 million of unfunded rail projects needed to address trade and traffic flow in the border region.

Subsequent to the publication of these studies, the U.S. Department of Transportation's Volpe National Transportation Systems Center (Volpe) undertook a study[10] of the advisability and feasibility of establishing an international border highway infrastructure discretionary (funding) program. The purpose of such a program would be to enable states and federal agencies to construct, replace, and rehabilitate highway infrastructure facilities at international borders—when such investments:

- Would minimize disruptions, delays and costs to users;
- Would provide more efficient routes for international trade and commerce;
- Would remove safety hazards, structural deficiencies, physical deterioration, or functional obsolescence; or
- Were deemed important.

As a result of the Volpe study, the U.S. Department of Transportation concluded that it was not advisable to establish a discretionary border infrastructure investment program from existing funding resources. Instead, it recommended the following alternative actions:[11]

- Fully fund the ISTEA to provide needed resources for states to allocate to trade-related and other high priority projects.
- With state and local governments, private financial institutions, carriers, and other private interests, develop a range of funding options for infrastructure improvements, emphasizing non-federal, existing federal, and potential sources. Identify, and eliminate wherever possible, impediments in federal programs to innovative public/private collaborative efforts.
- As part of a future surface transportation authorization bill, develop federal -aid program options to improve transportation infrastructure related to international trade, including border approaches and access roads, and connections to port, airport, and intermodal facilities. Funding program options could include a separate trade corridor, intermodal and port of entry program or a set aside percentage of an expanded National Highway System or Surface Transportation Program.

Following the delivery of the above report to Congress, the House of Representatives directed the U.S. Department of Transportation (Federal Highway Administration, FHWA) to expand upon the Section 1089 Study; specifically to:

- Review the distribution of federal-aid highway funds to border regions;
- Reexamine the need for a dedicated border infrastructure investment program;
- Develop and report recommendations to improve the distribution of such funds;
- Give high priority to the transportation needs of border regions; and

[9] Transportation Issues Along the California/Mexico International Border, Caltrans District 11, September 1993.

[10] ISTEA Section 1089 Study: Feasibility Study for an International Border Highway Infrastructure Discretionary Program, Volpe National Transportation Systems Center, 1994.

[11] Assessment of Border Crossings and Transportation Corridors for North American Trade, Federal Highway Administration, pg. 163, January 1994.

- Work with state and local governments in border regions, including requests for information about funding distribution, to assist them with planning.

The new study[12] noted that needs for increased investment at border crossings are part of a broader national need to increase investment in infrastructure substantially. The report did not recommend a special program for border crossing infrastructure but instead recommended applying the following strategies to address border concerns:

- Ensure appropriate consideration of border concerns within the statewide planning process.
- Coordinate development of U.S. state and local plans and programs with adjacent countries, through such efforts as the Southwest Border Transportation Alliance (SWBTA), or the U.S./Mexico Joint Working Committee (JWC). Encourage the continued development of multi-state coalitions to coordinate border studies and investment plans through such efforts as the Eastern Border Transportation Coalition (EBTC).
- Continue improving the operational and institutional barriers which exist within INS and Customs to promote the efficient movement of goods and people across the border.
- Apply innovative financing tools, such as those in FHWA's Innovative Financing TE-045 Program, to meet selective improvement needs.
- Continue to rely on existing federal-aid programs, especially NHS, I-M, STP, and bridge programs, as sources of federal funds for border infrastructure improvements. Border infrastructure needs along with all other surface transportation needs will be addressed as part of ISTEA reauthorization legislation which will be transmitted to Congress next year.

As these border infrastructure needs continue to exist, and due to the predominance of U.S.-Mexico trade flowing through Texas, the Texas Department of Transportation (TxDOT) has continued to support research to identify the cost of accommodating these trade flows. Four studies investigating the "Impacts of Bigger Trucks on Texas," have recently been edited and published as a special research project for the state and the Association of American Railroads (AAR).[13] Another report entitled "Texas' Role as a U.S.-Mexico Trade Gateway"[14] attempts to quantify the amount of trade that uses Texas highway and rail infrastructure, but which has its origins or destinations outside Texas.

These research studies are specifically identified as they provide background and insight for the cost analysis performed by this study.

10.4.2 Methodology to Identify Cost Impacts of Binational Trade

A portion of the prior research noted above focused on defining the transportation infrastructure needed to correct existing deficiencies and/or to accommodate anticipated increases in trade and traffic flows. As the capital costs for constructing this infrastructure are relatively straight-forward to estimate, these costs have typically been used in the past as the measure of cost *impact*.

This methodology is known as "marginal cost with facility expansion" and assumes that traffic added by NAFTA will be accommodated by increasing the investment in the infrastructure rather than by tolerating accelerated pavement damage or increased congestion. Traffic lanes are added

[12] Highway Infrastructure Requirements at International Ports of Entry — Report to Congress, Federal Highway Administration, August 1995

[13] Ray Barnhart & Associates, "Impacts of Bigger Trucks on Texas," January 1996.

[14] Center for Transportation Research, The University of Texas at Austin, Texas' Role as a U.S.-Mexico Trade Gateway, November 1995.

or new facilities are constructed so that extra trucks and vehicles can be accommodated without impacting current users—hence there is no marginal congestion cost for example.

The recent TxDOT- and AAR-sponsored research follows the line of reasoning that Binational trade impacts occur as a result of incremental increases in traffic flows which use up residual traffic capacity, pavement and bridge life. These impacts are more correctly measured by volumes as units of capacity consumption, and life cycle costs for ongoing maintenance and rehabilitation.

The CTR report on "Texas' Role as a U.S.-Mexico Trade Gateway," for example, measured the value of trade flowing through the state, with external origins and destinations, and based on these flows presents a case for Texas to receive its fair share of funds appropriated for transportation infrastructure and Clean Air Act requirements. The report states that its findings "may be used to assert priority in terms of funding for land transport infrastructure, as well as for such problems as additional highway capacity, pavement rehabilitation and right-of-way needs, and the non-attainment of air quality standards created by mobile sources of pollution."[15]

No definitive quantification of need or cost impact is presented with these findings however.

The "Impacts of Bigger Trucks" research effort begins with a similar flow through analysis of trade but goes on to estimate the life cycle costs associated with the operation of bigger (heavier) commercial trucks over the state's highway system. Pavement maintenance and bridge reconstruction costs are specially addressed while safety, accident and traffic delays due to reconstruction are noted as valid costs outside the scope of the research effort.

This methodology is known as "short-run marginal cost" and assumes that infrastructure costs increase because the passage of the NAFTA trade trucks damage the pavement, thereby hastening the date when the road will need to be resurfaced. Similarly, congestion increases because in the short run, road capacity cannot be increased, so the passage of the additional trucks delays other vehicles.[16]

This short-run marginal cost methodology used by these recent Texas research efforts appears to address the objectives of the Binational Study, and will therefore be generally followed from a methodological perspective. "This is the approach most often recommended by economists concerned with efficiency."[17]

10.4.3 Volume as a Fundamental Measure of Binational Trade Impact

An often repeated shortcoming of trade data, insofar as transportation planning, is that the information reported is typically expressed as a value of currency. The fact that over 100 billion dollars of trade occurred between Mexico and the United States in 1994 and 1995 does little to quantify the need for transportation infrastructure, other than to observe that these values have increased significantly from prior years.

The typically reported numbers of annual conveyances crossing the border are only slightly more enlightening for determining transportation impacts. Table 10.18, extracted from the Task 3.2 report indicates a steady increase in northbound commercial vehicle volumes over the past five years for many of the ports of entry. Discounting for empties and tractor exchanges (which affect port-of entry and border city street congestion), the number of loaded trucks crossing the border is typically on the order of one-half that reported by this table for the majority of the busiest

[15] ibid, page iii.

[16] Please see "Paying Our Way: Estimating Marginal Social Costs of Freight Transportation," Transportation Research Board *Special Report 246,* 1996, pp. 41-47.

[17] ibid, p. 39.

crossings. When these annual totals of loaded trucks are considered on a daily basis, even the largest port measured by truck volume, Laredo-Nuevo Laredo, generates fewer than 2,000 northbound trucks per weekday;[18] and an equal number of southbound trucks on average. These trade flows consume approximately 15 to 20 percent of the design capacity of a typical four-lane rural interstate highway such as I-35 north of Laredo.

Assessing the "cost" of consuming this capacity is relative to the location of the impact. For roadways operating well below capacity, one could argue that there is little cost associated with NAFTA trade when measured by traffic volumes. Motorists experience little or no delay due to the presence of commercial vehicles and increased safety and accident costs are marginal.

For roadway segments operating at or near capacity, the impact of the incremental increase in NAFTA trade vehicles could be significant, if new facilities were needed to accommodate increased truck volumes and increased corridor populations supported by NAFTA trade.

Table 10.18
Northbound Commercial Vehicle (Truck) Volumes[1] By Gateway

Port	1991	1992	1993	1994	1995	Total	Percent
Cd. Juarez-El Paso	455,121	552,171	563,413	580,200	610,177	2,761,082	22.5
Nuevo Laredo-Laredo	337,866	432,061	473,480	659,924	733,783	2,637,114	21.5
Mesa de Otay-Otay Mesa	312,752	374,141	384,615	428,086	477,390	1,976,984	16.1
Matamoros-Brownsville	182,715	203,116	224,147	264,345	233,615	1,107,938	9.0
Nogales-Nogales	167,388	154,845	185,107	187,423	203,298	898,061	7.3
Mexicali-Calexico	122,174	152,317	156,381	176,825	176,420	784,117	6.4
Reynosa-Hidalgo	115,576	129,354	147,492	158,405	174,049	724,876	5.9
Piedras Negras-Eagle Pass	36,060	41,868	45,318	55,046	54,779	233,071	1.9
Tecate-Tecate	49,625	41,833	36,710	34,674	41,064	203,906	1.7
San Luis Rio Colorado-San Luis	32,456	34,847	36,620	43,356	44,214	191,493	1.6
Cd. Acuna-Del Rio	27,943	30,448	32,672	32,719	36,601	160,383	1.4
Agua Prieta-Douglas	18,744	26,113	18,300	47,522	38,242	148,921	1.2
Nvo. Progreso-Progreso	30,320	35,179	23,760	22,711	22,962	134,932	1.1
Cd. Camargo-Rio Grande	9,009	11,639	15,649	15,665	14,936	66,898	0.5
Miguel Aleman-Roma	13,825	14,881	14,110	12,273	11,426	66,515	0.5
Naco-Naco	7,683	7,082	4,521	5,043	5,789	30,118	0.2
Ojinaga-Presidio	6,215	5,712	5,606	4,764	5,291	27,588	0.2
Tijuana-San Ysidro	24,138	88	0	0	0	24,226	0.2
Gpe. Bravo-Fabens	7,208	8,587	3,199	700	269	19,963	0.2
Los Algodones-Andrade	2,042	1,577	1,420	3,114	3,818	11,971	0.2
Sonoita-Lukeville	1,501	1,765	2,278	2,419	2,665	10,628	0.1
San Jeronimo-Santa Teresa	0	0	0	4,554	5,360	9,914	0.1
Palomas-Columbus	1,353	1,311	1,345	1,351	2,087	7,447	0.1
Sasabe-Sasabe	1,376	1,333	1,691	1,308	1,180	6,888	0.1
Total	**1,965,081**	**2,264,260**	**2,379,827**	**2,744,421**	**2,901,410**	12,245,034	**100.0**

Source: U.S. Customs Service
[1] Loaded plus empties. May not match other tallies.

[18] Assumes an annualization factor of 255.

Table 10.19 examines the impact of NAFTA trade on I-35, north of Laredo, as a simplified, illustrative example of traffic capacity impacts. This table points out that south of San Antonio, I-35 operates well below capacity, even when it is assumed that all NAFTA trade trucks bound to or originating from Laredo-Nuevo Laredo use this single facility. North of San Antonio, domestic traffic volumes increase substantially due to intrastate travel markets. While NAFTA trade is a much smaller percent of this overall traffic north of San Antonio, the cumulative impact of domestic travel and international trade is greater due to the higher proportion of overall capacity being utilized.

Based on this illustrative example of quantified traffic volumes, the impact of NAFTA trade on highway capacity could be identified proportional to the mix of domestic and international traffic. Sorting out these proportions, by facility and segment would be extremely speculative however without a greatly improved monitoring and information exchange program for commercial vehicle operations, and/or vastly improved freight modeling capabilities.

Even if these information shortcomings could be overcome, traditional government cost recovery calculations (methodologies) generally exclude any cost that does not appear on a government budget, such as congestion and air pollution generated by transportation users. For this reason, these social costs will be addressed at the end of this chapter, separately.

10.4.4 Weight as a Fundamental Measure of Binational Trade Impact

Researchers, State and Federal Departments of Transportation have long realized that highway facilities are impacted far more by axle loading of weight and repetition than by volume alone. Hence pavements are typically designed to meet the number of repetitions of a standard load, typically an 18,000-pound single-axle load applied to the pavement on two sets of dual tires. This is usually referred to as the **equivalent single-axle load** (ESAL).

To determine the ESAL, the number of different types of vehicles such as cars, buses, single-unit trucks, and multiple-unit trucks expected to use the highway must be estimated. In the case of determining cost impacts of existing trade, these vehicles may be counted and weighed at the weigh stations constructed or under construction along the U.S./Mexico border.

“ESAL-miles” can then be estimated based on the observed (recorded or surveyed) distribution of trade throughout the border state, and beyond the border state to the interior of each country. A cost per ESAL-mile can then be applied to ascertain overall cost impacts to highway pavements, i.e., “road consumption costs.” A similar process is possible for examining bridge

Table 10.19
I-35 Traffic Volumes Approaching Laredo, Texas

Segment	AADT[1]	NAFTA CV-ADT[2]	NAFTA CV-PCE[3]	Adjusted ADT[4]	V/C[5]
Laredo-Cotulla	7,200	3,200	9,600	13,600	0.30
Cotulia-Pearsall	11,200	3,200	9,600	17,600	0.40
Pearsall-San Antonio	16,200	3,200	9,600	22,600	0.50
San Antonio-New Braunfels	45,000	2,400	7,200	49,800	0.83
New Braunfals-San Marcos	41,000	2,400	7,200	45,800	0.76
San Marcos-Austin	58,000	2,400	7,200	62,800	0.63

1 Source of Average Daily Traffic Volumes: TxDOT "1994 Texas Traffic Map."
2 U.S./Mexico Average Daily Truck Volumes; Assumes that 25% of the trade originates from San Antonio and/or is dispersed to other roadways.
3 Passenger car equivalents to U.S.-Mexico truck volumes.
4 Adjusted ADT does not reflect domestic truck volumes.
5 Volume-to-capacity ratio; assumes capacity of 45,000 ADT south of San Antonio, 60,000 south of San Marcos, and 100,000 south of Austin.

replacement costs although such an analysis requires a detailed assessment of inventoried bridges and their conditions.[19]

For the purpose of the Binational Study, the cost impact analysis has been undertaken following the **road consumption cost** line of reasoning (also known as marginal cost of public infrastructure). Data is available or can be computed to support this approach, and it appears to be more rational and less arbitrary than attempting to quantify roadway *capacity* consumed by international trade. Nevertheless, estimates of "social costs" of freight transportation (congestion, accidents, air pollution, energy, and noise) are addressed at the end of this chapter.

10.4.5 Freight Weight (Tons)

In the Task 8 report, the Binational Study team reported estimates of cross border tonnage computed by La Empresa based on SECOFI data. At the time, it was noted that this data reflected some limitations; principally that only 33 percent of northbound (export) records contained weight information, while 45 percent of southbound (import) records contained this data.

It was also noted in the Task 8 report that the U.S. Bureau of Transportation Statistics (BTS) had begun tabulating and reporting shipping weight, for imports (northbound trade), as of April 1995. The Binational Study team has since used this BTS information to develop estimates of tonnage for correspondence with the Mexican data.

Estimates of northbound tonnage have been prepared by expanding nine months of data for 1995 (April through December) to a full-year, 12-month, data set. This expansion was accomplished for each of the 98 individual Schedule B commodities, by mode of transport.

Estimates of southbound tonnage were then synthetically estimated, using value to weight ratios computed by mode for each of the Schedule B commodities, based on import records. No adjustment was attempted to derive different value to weight ratios for exports versus imports.[20]

Table 10.20 reports a comparison of the estimates of cross border freight tonnage as derived from Mexico and U.S. data sources. The table also provides a comparison of the value of trade reported to flow over the land border by the two countries. Given the differences in computational techniques and reporting procedures, the estimates of cross border freight weight are remarkably similar.

[19] Please see: "U.S./Mexico Truck Trade Impacts on Texas Bridges," Jose Weissmann and Rob Harrison, Center for Transportation Research, The University of Texas at Austin, December 1995.

[20] In contrast, for the California Intermodal Transportation Management System (ITMS), Reebie Associates assumed a 25 percent across-the-board reduction in values per ton for northbound shipments versus southbound (U.S. exports) shipments. Reebie stated that this assumption was checked with an economic consultant in Mexico City who confirmed that it was a reasonable approach. *ITMS Basic Documentation*, Booz•Allen & Hamilton Inc., April 8, 1996, pp. 4-12.

Table 10.20
Value and Weight of U.S.-Mexico Border Trade (1995)

	Northbound	Southbound
Value ($billions U.S.)		
Mexico (SECOFI)	51.08	39.05
U.S. (BTS)	53.65	42.22
Ratio Mexico/U.S.	0.95	0.92
Weight (Millions of Tons)		
Mexico (SECOFI/L.E.)	18.8	36.0
U.S. (BTS/B.A.)	20.8	29.3
Ratio Mexico/U.S.	0.90	1.23

Sources: SECOFI; BTS; La Empresa; Barton-Aschman

10.4.6 U.S. Imports (Northbound) Freight Weight Flows

The following information is provided to establish the tonnage of Binational trade that flows into and through the border states, for the purpose of estimating cost impacts.

Table 10.21 reports the overall value and weight of trade flowing northbound across the border, by commodity and mode. This information is compiled directly from BTS and is considered to be reliable. Please note that almost 16 million tons of trade was carried by truck while 4 million tons were transported by rail in 1995.[21]

Table 10.22 reports the overall value and weight of trade flowing northbound across the four U.S. Customs districts. This data is reported by commodity for all transport modes. Of the 20.8 million tons imported, 11.6 million tons (55.7 percent) flowed through the Laredo district; 3.2 million tons (15.2 percent) flowed through the Nogales district; 2.9 million tons (14.2 percent) flowed through the San Diego district; and 2.8 million tons (13.5 percent) flowed through the El Paso district. BTS attributed the remaining 293,000 tons, transported by land, to a non-border customs district.

[21] For 1994, FNM reported 2.4 million tons exported through the border ports of entry. No data was available for 1995. Reference Task 2 - Inventory of Existing Binational Transport Facilities, November 1996, p.36.

Table 10.21
1995 Trans-Surface Data—U.S. Imports from Mexico

Comm Code	Total Value	Total Tonnage	Truck Value	Truck Tonnage	Rail Value	Rail Tonnage	Pipeline Value	Pipeline Tonnage	Other Value	Other Tonnage
1	$547,041,191	402,181	$536,440,689	395,281	$0	0	0	0	$10,600,502	6,901
2	6,371,433	2,375	6,371,433	2,375	0	0	0	0	0	0
3	401,156,440	60,675	401,040,287	60,630	51,546	37	0	0	64,607	8
4	3,556,686	2,871	3,556,686	2,871	0	0	0	0	0	0
5	12,647,107	7,790	12,622,907	7,776	0	0	0	0	24,200	14
6	16,151,039	12,650	16,122,195	12,622	28,844	28	0	0	0	0
7	1,193,827,508	2,617,002	1,188,580,371	2,609,065	5,218,173	7,883	0	0	28,964	54
8	518,986,355	1,121,041	518,956,815	1,121,002	9,045	16	0	0	20,495	23
9	494,806,248	210,044	453,861,891	195,033	40,944,357	15,012	0	0	0	0
10	1,101,007	3,372	1,101,007	3,372	0	0	0	0	0	0
11	4,726,332	16,895	3,702,672	13,447	1,023,660	3,448	0	0	0	0
12	24,917,583	37,314	24,807,673	36,442	109,910	872	0	0	0	0
13	10,525,979	2,970	10,232,488	2,925	293,491	45	0	0	0	0
14	34,825,338	33,644	34,825,338	33,644	0	0	0	0	0	0
15	52,436,613	73,559	17,572,327	12,927	17,274,572	25,243	0	0	17,589,714	35,388
16	19,055,611	4,692	19,055,611	4,692	0	0	0	0	0	0
17	66,329,834	62,649	60,987,247	54,284	5,342,587	8,365	0	0	0	0
18	20,047,613	11,428	19,955,038	11,356	81,720	67	0	0	10,855	5
19	92,177,713	91,602	91,704,524	91,042	234,522	344	0	0	238,667	216
20	201,471,388	262,623	193,934,857	251,642	7,505,056	10,956	0	0	31,475	26
21	60,817,054	38,683	60,295,346	38,293	335,353	251	0	0	186,355	140
22	382,249,967	737,604	190,954,286	271,159	189,191,795	465,538	6577	11	2,097,309	896
23	3,964,368	9,969	981,983	2,202	2,982,385	7,767	0	0	0	0
24	2,914,511	1,902	1,452,709	717	1,448,549	1,177	0	0	13,253	8
25	44,131,702	1,017,287	10,281,297	211,141	33,850,405	806,146	0	0	0	0
26	198,426,518	96,625	115,854,632	46,321	82,571,886	50,304	0	0	0	0
27	86,758,246	791,377	25,543,374	279,759	18,617,961	73,679	25,209,361	278,077	17,387,550	159,861
28	183,175,662	482,803	65,601,464	156,210	115,381,083	263,607	2,123,021	62,893	70,094	93
29	125,724,863	115,066	89,561,646	80,682	35,763,961	34,238	0	0	399,256	146
30	6,678,018	1,416	6,678,018	1,416	0	0	0	0	0	0
31	3,021,041	10,453	2,888,224	8,921	132,817	1,532	0	0	0	0
32	31,613,665	16,751	31,420,729	16,566	192,936	184	0	0	0	0
33	42,504,938	10,356	42,299,306	10,313	105,199	22	0	0	100,433	22
34	88,322,159	83,435	85,718,688	80,310	2,603,471	3,125	0	0	0	0
35	12,748,208	6,953	12,500,115	6,828	248,093	125	0	0	0	0
36	7,553,786	1,760	7,553,786	1,760	0	0	0	0	0	0
37	64,233,271	3,868	63,674,923	3,866	0	0	0	0	558,348	2
38	67,773,069	65,431	44,157,866	38,951	23,615,203	26,480	0	0	0	0
39	647,015,019	411,351	596,049,757	364,680	50,830,795	46,590	0	0	134,467	81
40	245,899,752	133,521	244,332,847	132,588	1,530,963	927	0	0	35,942	6
41	69,184,240	13,795	68,064,786	13,685	1,119,454	110	0	0	0	0
42	143,947,748	27,454	143,190,804	27,354	150,186	25	0	0	606,758	75
43	1,489,963	204	1,489,963	204	0	0	0	0	0	0
44	300,595,297	528,465	286,822,023	490,278	13,657,415	38,168	1936	16	113,923	2
45	76,901	47	71,199	27	0	0	0	0	5,702	20
46	2,575,285	1,294	2,188,047	1,157	387,238	137	0	0	0	0
47	5,392,814	23,578	5,009,956	21,452	382,858	2,126	0	0	0	0
48	344,407,923	415,880	274,093,226	284,473	70,298,068	131,403	0	0	16,629	4
49	95,391,077	26,738	95,361,751	26,735	21,486	2	0	0	7,840	1
50	407,202	13	407,202	13	0	0	0	0	0	0
51	7,009,860	1,471	6,784,987	1,463	0	0	0	0	224,873	8
52	114,875,560	34,553	114,863,977	34,548	11,583	5	0	0	0	0
53	$586,250	2,472	$286,001	659	$300,249	1,813	0	0	$0	0
54	97,260,615	40,074	96,120,982	39,953	194,701	69	0	0	944,932	52
55	131,673,165	99,460	131,192,766	99,145	480,399	316	0	0	0	0
56	25,517,083	8,154	25,377,722	7,950	139,361	204	0	0	0	0

Table 10.21
1995 Trans-Surface Data—U.S. Imports from Mexico

Comm Code	Total Value	Total Tonnage	Truck Value	Truck Tonnage	Rail Value	Rail Tonnage	Pipeline Value	Pipeline Tonnage	Other Value	Other Tonnage
57	9,400,376	3,315	9,316,840	3,293	77,448	22	0	0	6,088	0
58	16,178,299	2,291	16,178,299	2,291	0	0	0	0	0	0
59	25,399,066	5,668	25,389,817	5,668	9,249	1	0	0	0	0
60	9,451,918	1,699	9,450,678	1,699	1,240	0	0	0	0	0
61	925,725,021	104,632	925,154,499	104,553	552,130	78	0	0	18,392	1
62	1,714,988,097	155,453	1,708,187,671	154,873	2,748,173	349	0	0	4,052,253	231
63	344,470,529	82,892	343,605,090	82,723	841,710	169	0	0	23,729	0
64	205,056,368	22,071	203,993,437	21,975	843,973	72	0	0	218,958	25
65	48,490,935	6,928	48,415,122	6,910	61,521	17	0	0	14,292	1
66	662,778	187	662,778	187	0	0	0	0	0	0
67	2,607,749	854	2,607,749	854	0	0	0	0	0	0
68	119,323,326	262,015	117,899,284	255,976	1,424,042	6,038	0	0	0	0
69	227,707,706	538,608	223,205,331	527,206	4,424,223	11,304	0	0	78,152	98
70	400,637,540	470,012	378,684,408	457,403	21,818,704	12,609	0	0	134,428	0
71	293,151,281	4,020	263,092,251	2,530	156,690	0	0	0	29,902,340	1,490
72	487,860,344	1,101,447	417,494,680	875,131	70,352,292	226,289	0	0	13,372	27
73	694,871,335	615,741	614,534,827	565,829	76,334,461	45,711	0	0	4,002,047	4,201
74	623,230,818	249,065	448,211,019	201,321	174,651,820	47,674	0	0	367,979	71
75	213,521	167	213,521	167	0	0	0	0	0	0
76	273,619,266	166,497	269,545,729	162,763	4,027,337	3,698	0	0	46,200	36
78	33,502,148	59,785	6,478,404	10,732	27,019,473	49,051	0	0	4,271	1
79	109,723,634	120,486	10,684,520	13,375	99,039,114	107,111	0	0	0	0
80	900,798	586	847,703	586	53,095	0	0	0	0	0
81	9,167,066	4,514	9,167,066	4,514	0	0	0	0	0	0
82	87,429,622	14,693	87,176,482	14,499	253,140	194	0	0	0	0
83	272,915,258	55,288	267,619,622	54,799	2,996,190	166	0	0	2,299,446	323
84	6,067,719,221	1,238,918	5,087,048,413	874,901	672,595,026	203,203	0	0	308,075,782	160,814
85	16,875,884,140	2,036,610	16,278,243,087	1,993,522	140,589,285	32,688	0	0	457,051,768	10,400
86	66,290,661	70,787	64,652,163	68,885	1,613,898	1,888	9000	4	15,600	10
87	9,510,223,857	1,925,646	2,388,462,142	632,982	7,091,251,282	1,272,440	31734	17	30,478,699	20,206
88	144,778,744	994	21,437,555	897	0	0	0	0	123,341,189	97
89	727,239	149	727,239	149	0	0	0	0	0	0
90	2,068,703,425	135,771	1,802,913,246	114,618	3,161,015	119	0	0	262,629,164	21,034
91	19,139,852	1,559	18,717,904	1,527	419,074	31	0	0	2,874	0
92	65,449,389	6,184	65,276,363	6,168	173,026	15	0	0	0	0
93	10,834,454	760	10,776,980	757	57,474	3	0	0	0	0
94	1,380,259,402	332,611	1,379,000,191	332,444	483,284	97	0	0	775,927	71
95	610,463,167	109,413	606,958,012	107,428	3,503,171	1,985	0	0	1,984	0
96	164,266,059	22,840	164,010,969	22,810	216,000	28	0	0	39,090	2
97	2,929,247	341	1,336,378	178	0	0	0	0	1,592,869	162
98	2,356,157,831	541,067	1,753,044,440	527,661	11,834,182	6,618	12853	107	591,266,356	6,681
Totals	53,648,587,302	20,770,207	42,614,980,350	15,940,993	9,138,246,078	4,058,055	27,394,482	341,126	1,867,966,392	430,033

Source: Barton-Aschman estimates based on 1995 BTS data.

Table 10.22
1995 Trans-Surface Data U.S. Imports from Mexico Through Border Districts

	DISTRICTS							
	Laredo		El Paso		Nogales		San Diego	
Comm Code	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage
1	$250,438,092	170,877	$184,510,151	125,099	$114,018,817	74,446	$1,033,457	725
2	2,840,234	1,097	1,132,501	389	2,434,344	804	0	0
3	116,429,999	18,247	0	0	236,837,462	31,746	49,296,284	7,113
4	1,943,018	1,625	82,316	61	109,586	78	1,454,101	1,120
5	11,430,181	7,297	39,133	22	879,397	480	403,944	237
6	11,131,805	9,033	830,011	599	73,271	51	4,265,656	3,188
7	185,718,306	421,791	12,583,637	25,404	707,596,004	1,375,063	291,902,133	610,858
8	152,933,217	342,285	59,407,113	118,166	235,972,166	451,684	73,200,798	150,828
9	492,298,974	216,020	3,108,370	1,218	1,697,667	644	1,928,390	793
10	101,098	321	905,865	2,555	71,229	193	32,445	95
11	1,124,510	4,136	0	0	23,931	78	3,499,705	12,440
12	7,288,433	11,298	701,832	968	7,626,135	10,151	9,452,742	13,524
13	3,604,981	1,054	0	0	0	0	6,988,976	1,891
14	30,543,683	30,574	150,747	134	1,502,839	1,287	2,940,420	2,710
15	45,779,637	69,181	76,767	104	1,961,808	2,697	1,410,505	2,058
16	5,472,926	1,396	3,599	1	7,926,537	1,730	5,752,712	1,351
17	42,017,734	40,910	10,987,262	9,599	146,635	125	13,590,619	12,461
18	15,149,049	8,947	134,281	71	42,815	22	4,904,075	2,669
19	27,082,412	27,894	1,093,695	1,001	11,908,385	10,495	52,803,890	50,087
20	156,875,149	211,573	13,106,757	15,756	4,021,431	4,670	29,090,636	36,438
21	42,784,914	28,204	918,760	538	340,865	192	17,296,017	10,507
22	303,778,118	593,934	581,808	1,057	13,778,075	25,476	60,818,578	124,092
23	256,290	649	9,243	22	3,305,290	8,103	351,594	982
24	2,456,028	1,624	466,617	287	0	0	3,005	2
25	21,438,388	497,795	9,593,580	209,603	11,464,528	258,032	1,515,709	38,919
26	23,204,089	11,485	74,287,727	33,923	101,351,684	46,664	77,865	39
27	81,254,934	782,530	77,541	685	1,950	17	2,195,506	20,341
28	163,854,527	436,851	15,284,925	38,255	130,936	332	4,097,781	11,702
29	126,366,753	118,655	112,275	96	1,747	1	5,502	5
30	4,246,802	933	90,148	18	628,971	118	1,768,568	358
31	2,318,332	8,262	349,514	1,119	154,327	482	223,093	746
32	26,317,225	14,442	391,532	191	967,540	455	4,219,378	2,135
33	28,328,999	7,154	1,286,548	289	1,490,823	322	11,763,821	2,736
34	59,875,293	58,526	888,431	774	1,180,399	993	27,057,016	24,527
35	12,732,892	7,192	30,288	15	5,493	3	96,662	50
36	7,624,748	1,840	0	0	0	0	0	0
37	64,013,067	4,001	6,542	0	0	0	701,148	40
38	65,165,679	64,239	2,468,464	2,226	409,785	369	134,365	133
39	449,865,882	295,100	61,977,197	36,425	22,238,857	12,712	116,974,615	72,118
40	210,153,427	118,209	23,385,255	11,696	2,214,527	1,067	12,403,882	6,432
41	64,352,341	13,293	3,554,804	653	64,481	11	1,847,380	352
42	48,432,716	9,578	17,424,532	3,061	39,584,504	6,693	39,413,188	7,173
43	970,075	138	512,619	65	14,142	2	6,946	1
44	36,008,018	65,417	155,307,739	252,039	5,807,428	9,132	105,416,182	178,519
45	70,766	45	5,699	3	0	0	0	0
46	1,427,468	741	1,011,323	470	3,638	2	150,021	74
47	2,409,806	10,881	834,268	3,369	1,207,605	4,733	967,022	4,091
48	168,596,000	208,415	106,643,060	119,846	26,124,780	29,092	44,075,622	53,046
49	53,840,176	15,637	19,385,248	5,004	3,256,678	809	19,771,307	5,287
50	0	0	410,977	12	0	0	0	0
51	6,938,121	1,519	10,575	2	0	0	80,298	16
52	103,061,572	32,120	12,496,475	3,461	0	0	397,079	114
53	582,956	2,476	0	0	5,631	23	248	1
54	97,836,666	41,848	87,828	33	1,139	0	48,841	19
55	129,730,012	101,523	212,719	148	16,637	11	2,945,130	2,124
56	20,615,301	6,819	3,243,059	955	316,640	90	1,576,164	481
57	3,340,929	1,221	768,850	250	4,823,515	1,509	505,962	170
58	4,612,551	677	3,053,594	398	4,463,993	560	4,155,709	561
59	5,622,508	1,300	12,798,788	2,630	4,382,793	867	2,789,792	594
60	9,480,803	1,766	0	0	9,005	1	50,784	9
61	661,347,122	77,450	102,184,154	10,636	61,066,583	6,117	109,203,123	11,775
62	709,732,721	66,680	776,001,516	64,786	94,264,118	7,575	149,741,971	12,953
63	104,056,211	25,943	129,770,258	28,758	75,860,361	16,181	37,245,272	8,553
64	177,962,938	19,848	11,455,816	1,136	181,058	17	17,323,979	1,780
65	11,245,853	1,665	9,807,770	1,290	7,819,380	990	19,990,883	2,725
66	130,916	38	495,887	129	0	0	42,139	11
67	203,152	69	2,084,715	629	32,299	9	311,705	97

Table 10.22
1995 Trans-Surface Data U.S. Imports from Mexico Through Border Districts

	DISTRICTS							
	Laredo		El Paso		Nogales		San Diego	
Comm Code	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage
68	75,247,345	171,048	11,710,707	23,697	2,313,919	4,516	31,083,207	65,284
69	190,074,027	465,524	29,955,899	65,298	3,529,664	7,418	6,181,226	14,000
70	300,173,481	364,659	39,074,621	42,265	2,111,928	2,203	62,304,566	70,383
71	236,991,002	3,384	3,829,764	50	36,873,894	469	12,684,690	168
72	431,079,909	1,000,685	9,872,719	20,670	598,104	1,228	49,182,779	109,172
73	602,399,406	552,351	30,897,823	25,304	6,817,158	5,409	58,835,294	50,744
74	342,812,240	141,143	148,662,487	55,143	107,046,667	38,841	26,978,875	10,825
75	149,930	122	0	0	60,943	42	3,969	3
76	156,948,163	98,874	16,592,269	9,304	26,711,702	14,445	75,473,101	43,945
78	31,355,649	56,314	1,508,655	2,555	178,387	312	458,436	919
79	97,624,011	107,647	11,953,725	12,490	0	0	213,997	269
80	308,758	208	274,715	165	97,403	56	224,955	141
81	8,834,555	4,507	199,523	90	117,004	51	100,901	47
82	58,270,378	10,141	7,854,774	1,216	18,044,794	2,692	3,898,195	626
83	83,883,753	17,634	45,916,574	8,572	24,929,596	4,480	120,126,297	23,263
84	3,337,341,729	705,135	1,160,108,699	221,595	502,259,094	94,315	1,060,311,534	212,564
85	5,477,132,502	688,176	6,826,945,366	759,568	1,346,345,115	144,371	3,331,728,562	384,440
86	43,805,620	48,424	33,271	33	1,552	1	22,974,966	23,514
87	6,856,498,229	1,406,836	264,533,114	50,618	1,782,651,092	347,436	553,139,336	123,740
88	1,372,475	12	0	0	0	0	143,324,333	949
89	25,113	5	25,674	5	0	0	683,198	133
90	633,944,232	43,979	1,006,245,804	61,603	81,376,613	4,828	346,851,690	21,876
91	5,942,606	501	11,141,786	836	2,860	0	2,221,216	173
92	311,087	30	9,940,455	865	3,101,423	260	52,659,008	4,748
93	10,905,203	793	0	0	30,153	2	0	0
94	319,955,952	79,896	734,114,455	162,908	31,422,014	6,710	307,364,461	70,658
95	133,134,625	24,706	62,698,611	10,354	88,339,064	14,063	330,847,660	56,653
96	74,471,828	10,729	1,758,500	225	21,647,176	2,668	67,698,474	8,981
97	1,954,967	259	191,211	23	182,194	20	373,820	43
98	799,870,613	200,607	543,168,323	138,677	264,699,594	54,030	610,129,499	134,193
Totals	25,991,666,909	11,558,614	12,829,832,224	2,812,256	6,175,311,775	3,157,073	8,651,770,587	2,949,433

Source: Barton-Aschman estimates based on 1995 BTS and 1995 Merchandise Imports data.

Nearly three-quarters (71.3 percent) of the northbound freight was transported by truck of which 8.1 million tons crossed the border in the Laredo district; 2.7 million tons crossed in the San Diego district; 2.6 million tons crossed in the Nogales district; and 2.4 million tons crossed through the El Paso district. The distribution of this tonnage by mode and district is reported in Table 10.23. This table also reports the estimated distribution of rail traffic across the districts. The study team is less confident of these details, however totals compare reasonably well with FNM data for 1994.

The above reported distribution of tonnage among districts, by mode are based on proportional values reported in the U.S. Merchandise Imports data files. Hence they should be considered as reasonable estimates of freight weights by location and mode.

To provide an indication of how much of the above traffic flows through the border states, the BTS data base was queried to uncover the value and weight of imports destined to the U.S. border states. By subtraction, the flow through trade could then be calculated.

On a *net trade flow through basis*, Table 10.24 indicates that California is a net importer of freight from Mexico, having more tonnage destined to the state (from Mexico) than entering via its border with Baja California. In other words, some of the imports destined for California flow through ports of entry in Arizona, New Mexico or Texas. For Arizona, most of the northbound trade, crossing its border with Sonora, stays within the state. Not counting pass-throughs between California and Texas, approximately 400,000 tons of imports travels over Arizona's highways to other U.S. states. For Texas, approximately one half of the tonnage imported through the state's ports of entry from Mexico pass through to other states. In 1995, this freight amounted to 5.2 million tons traversing the state's highways. Approximately one-fourth of this tonnage impacted New Mexico.

Table 10.23
1995 Imports from Mexico by Customs District (Tons)

Mode	Laredo	El Paso	Nogales	San Diego
Truck	8,149,606	2,370,881	2,587,252	2,735,190
Rail	2,768,386	391,163	547,104	162,219
Pipeline and Other	640,622	50,212	22,717	52,024
Total	11,558,614	2,812,256	3,157,073	2,949,433

Source: Barton-Aschman estimates based on 1995 BTS and 1995 Merchandise Imports data.

Table 10.24
Imports From Mexico Flowing Through Border States (1995)

	California	Arizona	New Mexico/Texas
Total Imports (1,000s Tons)			
Via Border POEs[1]	2,949	3,157	14,371
To Border State[2]	3,278	2,626	6,583
Net Flow Through	(329)	531	7,788
Truck Imports (1,000s Tons)			
Via Border POEs[1]	2,735	2,587	10,520
To Border State[2]	3,078	2,196	5,303
Net Flow Through	(343)	391	5,217

[1] via named state's POE
[2] Total imports to named state
Source: Barton-Aschman estimates based on BTS data.

10.4.7 U.S. Exports (Southbound) Freight Weight Flows

A similar process to that described for northbound flows has been followed to establish southbound freight "flow through" quantities.

Table 10.25 reports the overall value and weight of commodities exported to Mexico through the land border of the two countries. Just over 29 million tons were transported in 1995 by these

estimates of which 19.5 million tons was carried by truck.[22] By weight, the largest quantity of truck transported freight was categorized as Commodity Code 27, "Mineral fuels, mineral oils and products of their distillation, bituminous substances and mineral waxes." This commodity constituted 5.7 million tons of which 5 million tons moved by truck.

Table 10.26 breaks down this borderwide export tonnage by Customs District. As observed for imports, the Laredo district handled the large majority of export tonnage, estimated at 19.5 million tons for 1995 (66.5 percent). The El Paso district handled 5 million tons (17 percent) while San Diego handled 3.3 million export tons (11 percent). The Nogales district handled 5.4 percent of the export trade, measured by weight, with 1.6 million tons crossing its border with Sonora in 1995.

Table 10.25
1995 Trans-Surface Data—U.S. Exports to Mexico

Comm Code	Total Value	Total Tonnage	Truck Value	Truck Tonnage	Rail Value	Rail Tonnage	Pipeline Value	Pipeline Tonnage	Other Value	Other Tonnage
1	$30,031,188	20,377	$29,948,871	20,321	$82,317	56	$0	0	$0	0
2	350,291,571	119,069	345,194,510	117,337	4,734,310	1,609	0	0	362,751	123
3	31,150,816	4,659	30,593,799	4,258	557,017	401	0	0	0	0
4	110,310,992	81,995	58,859,710	43,751	51,412,395	38,215	0	0	38,887	29
5	30,379,270	17,280	29,983,174	17,055	396,096	225	0	0	0	0
6	22,004,399	15,864	21,985,059	15,848	7,910	8	0	0	11,430	8
7	40,835,388	79,421	34,858,463	70,371	5,918,922	8,941	0	0	58,003	108
8	95,963,876	190,565	94,927,091	188,764	953,058	1,705	0	0	83,727	96
9	6,895,314	2,723	6,726,539	2,659	108,058	40	0	0	60,717	24
10	553,038,932	1,564,310	209,546,505	592,717	341,573,034	966,164	0	0	1,919,393	5,429
11	45,476,201	152,570	25,190,243	84,244	20,273,689	68,285	0	0	12,269	41
12	425,145,786	2,199,656	171,906,604	224,842	247,971,841	1,967,735	0	0	5,267,341	7,078
13	24,999,790	5,127	11,701,682	3,081	13,218,458	2,026	0	0	79,650	21
14	7,953,115	7,077	3,909,604	3,479	4,043,511	3,598	0	0	0	0
15	276,432,498	327,189	100,108,337	67,816	173,215,058	253,118	0	0	3,109,103	6,255
16	39,013,856	8,847	38,832,533	8,806	145,703	33	0	0	35,620	8
17	61,942,011	74,477	30,165,971	24,732	31,769,589	49,740	0	0	6,451	6
18	40,341,925	21,215	40,088,325	21,006	253,600	208	0	0	0	0
19	42,209,979	38,917	41,515,203	37,951	600,568	880	0	0	94,208	85
20	30,666,464	37,053	28,728,695	34,240	1,913,360	2,793	0	0	24,409	20
21	109,134,889	63,924	108,415,806	63,386	502,170	375	0	0	216,913	163
22	62,718,177	79,803	52,306,606	68,372	3,715,128	9,142	0	0	6,696,443	2,289
23	201,671,950	486,406	71,794,378	148,251	129,283,535	336,688	0	0	594,037	1,467
24	23,073,265	11,024	19,119,081	8,687	76,588	62	0	0	3,877,596	2,275
25	73,373,740	1,517,565	46,384,117	877,755	24,462,878	582,593	0	0	2,526,745	57,217
26	54,126,729	21,021	49,434,584	18,201	4,430,738	2,699	0	0	261,407	121
27	655,257,903	5,740,223	504,537,965	5,088,471	140,501,141	556,024	966,988	10,667	9,251,809	85,061
28	331,363,563	741,053	222,602,542	488,329	94,250,748	215,331	0	0	14,510,273	37,393
29	575,692,903	490,087	473,830,778	393,063	92,645,971	89,039	49111	43	9,167,043	7,942
30	59,284,414	11,578	58,860,812	11,495	423,602	83	0	0	0	0
31	46,485,680	347,091	21,659,097	61,602	24,708,567	285,098	0	0	118,016	392
32	193,738,822	95,822	189,397,532	91,905	3,855,437	3,681	0	0	485,853	237
33	138,470,110	31,114	125,157,012	28,263	384,616	80	0	0	12,928,482	2,771
34	91,367,179	81,265	83,934,105	72,403	7,250,243	8,703	0	0	182,831	159
35	80,121,264	40,298	78,433,789	39,455	1,248,160	628	0	0	439,315	215
36	4,500,605	965	4,460,412	957	3,063	1	0	0	37,130	8
37	133,700,880	7,478	133,160,330	7,465	212,014	12	0	0	328,536	1
38	351,365,776	299,286	301,262,967	244,673	42,539,531	47,700	0	0	7,563,278	6,913
39	2,771,016,358	1,585,065	2,685,354,537	1,510,377	73,821,289	67,663	0	0	11,840,532	7,025
40	531,133,424	270,271	476,305,350	238,033	52,667,336	31,906	0	0	2,160,738	331
41	173,807,144	32,172	172,959,073	32,089	848,071	84	0	0	0	0
42	50,708,291	8,938	50,630,120	8,926	42,751	7	0	0	35,420	4
43	1,371,956	173	1,371,956	173	0	0	0	0	0	0
44	235,182,956	375,567	225,511,785	352,383	8,288,143	23,158	0	0	1,383,028	27
45	9,246,426	7,306	983,676	347	8,262,750	6,959	0	0	0	0
46	387,131	185	381,303	182	0	0	0	0	5,828	3
47	599,389,912	3,061,650	164,209,001	646,779	434,008,805	2,410,096	0	0	1,172,106	4,775
48	1,270,694,353	1,313,185	1,152,231,421	1,101,816	112,214,134	209,753	0	0	6,248,798	1,616

[22] Rail tonnage is estimated at 9.45 million tons for 1995. For 1994, FNM reported 11.08 million tons imported through the border ports of entry. No data was available for 1995 for crosschecking these estimates.

Table 10.25
1995 Trans-Surface Data—U.S. Exports to Mexico

Comm Code	Total Value	Total Tonnage	Truck Value	Truck Tonnage	Rail Value	Rail Tonnage	Pipeline Value	Pipeline Tonnage	Other Value	Other Tonnage
49	182,190,561	46,745	180,023,558	46,526	1,857,174	180	0	0	309,829	39
50	7,304,186	218	7,220,469	215	83,717	2	0	0	0	0
51	10,018,928	1,943	9,539,033	1,894	202,119	39	0	0	277,776	10
52	310,798,964	108,042	184,032,016	50,963	126,675,299	57,054	0	0	91,649	25
53	799,808	1,734	790,236	1,676	9,572	58	0	0	0	0
54	196,554,358	75,152	194,526,821	74,455	1,955,054	693	0	0	72,483	4
55	78,071,877	54,294	76,969,873	53,563	938,543	617	0	0	163,461	114
56	189,274,936	54,962	188,820,772	54,429	339,871	499	0	0	114,293	34
57	49,285,018	15,906	46,538,048	15,141	2,731,642	764	0	0	15,328	1
58	123,235,400	16,071	122,714,376	16,003	204,527	27	0	0	316,497	41
59	76,332,152	15,678	76,138,647	15,659	174,153	15	0	0	19,352	4
60	31,873,563	5,253	31,647,346	5,239	226,217	15	0	0	0	0
61	522,034,544	54,561	518,920,346	54,168	2,339,600	352	0	0	774,598	41
62	766,932,226	64,129	761,945,565	63,596	3,548,862	451	0	0	1,437,799	82
63	89,765,237	19,875	89,551,398	19,851	114,199	23	0	0	99,640	1
64	67,077,047	6,658	66,235,993	6,575	398,038	34	0	0	443,016	50
65	7,182,151	944	7,179,334	944	0	0	0	0	2,817	0
66	872,184	227	867,384	226	0	0	0	0	4,800	1
67	3,080,735	929	3,046,237	919	21,764	7	0	0	12,734	4
68	49,148,459	97,932	48,748,520	96,609	232,273	985	0	0	167,666	338
69	56,629,979	124,072	52,327,499	113,929	3,650,060	9,326	0	0	652,420	816
70	239,383,327	254,000	218,542,668	243,102	18,856,773	10,898	0	0	1,983,886	0
71	52,507,465	465	52,411,776	464	40,325	0	0	0	55,364	0
72	668,543,510	1,515,721	484,743,036	933,267	177,533,893	569,580	0	0	6,266,581	12,873
73	1,124,235,283	936,887	1,054,496,202	894,452	68,070,626	40,684	0	0	1,668,455	1,751
74	246,538,156	101,596	244,287,267	101,010	1,895,073	517	0	0	355,816	69
75	8,197,775	5,908	8,190,862	5,903	6,913	5	0	0	0	0
76	638,005,812	392,037	531,079,588	295,121	103,415,485	94,948	0	0	3,510,739	1,969
78	6,648,586	10,058	6,419,104	9,792	132,941	241	0	0	96,541	25
79	11,701,862	13,468	11,377,012	13,116	285,876	309	0	0	38,974	42
80	20,068,505	12,778	19,729,358	12,562	232,792	148	0	0	106,355	68
81	9,212,319	4,177	8,855,612	4,015	96,617	44	0	0	260,090	118
82	144,328,203	22,396	142,925,540	21,892	468,854	360	0	0	933,809	144
83	511,043,324	90,838	471,566,982	88,590	38,808,723	2,154	0	0	667,619	94
84	5,470,462,999	895,427	5,114,730,554	809,617	320,327,948	67,280	0	0	35,404,497	18,530
85	10,410,832,308	1,182,233	10,310,145,806	1,162,633	82,151,709	19,177	0	0	18,534,793	423
86	70,613,512	76,571	31,651,418	31,069	38,808,499	45,401	0	0	153,595	101
87	4,296,100,547	951,620	2,776,053,368	676,207	1,512,080,893	270,131	0	0	7,966,286	5,281
88	240,787,752	2,322	55,587,247	2,174	555,614	3	0	0	184,644,891	145
89	9,941,643	1,871	7,734,336	1,455	3,000	1	0	0	2,204,307	415
90	1,198,060,159	69,861	1,181,754,495	69,209	15,429,323	582	0	0	876,341	70
91	31,137,836	1,915	24,849,447	1,867	36,715	3	0	0	6,251,674	46
92	24,780,238	2,156	24,761,862	2,155	0	0	0	0	18,376	2
93	4,556,614	294	4,511,974	292	44,640	2	0	0	0	0
94	677,700,002	150,321	675,893,971	149,977	1,586,430	324	0	0	219,601	20
95	205,456,284	34,246	203,046,012	33,098	1,866,510	1,058	0	0	543,762	90
96	102,776,035	12,728	96,256,136	12,318	523,590	67	0	0	5,996,309	343
97	1,843,390	227	1,831,315	225	8,307	1	0	0	3,768	0
98	1,886,883,831	88,688	242,385,097	68,545	5,673,313	2,652	0	0	1,638,825,421	17,490
Totals	42,224,278,761	29,285,037	35,503,062,569	19,523,826	4,694,439,969	9,451,052	1,016,099	10,709	2,025,760,124	299,450

Source: Barton-Aschman estimates based on 1995 BTS data.

Table 10.26
1995 Trans-Surface Data U.S. Exports to Mexico Through Border Districts

	Districts							
	Laredo		El Paso		Nogales		San Diego	
Comm Code	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage
1	$20,220,628	13,720	$2,733,999	1,855	$2,868,012	1,946	$4,208,549	2,856
2	227,340,789	77,276	42,621,055	14,488	15,618,118	5,309	64,711,610	21,996
3	25,804,600	3,859	1,101,096	165	192,515	29	4,052,605	606
4	84,081,598	62,499	12,104,417	8,997	2,857,316	2,124	11,267,661	8,375
5	26,031,234	14,807	2,338,134	1,330	515,037	293	1,494,865	850
6	7,388,381	5,327	1,083,264	781	973,672	702	12,559,082	9,055
7	16,184,814	31,478	4,640,270	9,025	5,027,323	9,778	14,982,981	29,140
8	48,910,427	97,126	10,839,960	21,526	17,166,328	34,089	19,047,161	37,824
9	5,238,427	2,068	176,052	70	234,173	92	1,246,662	492
10	478,031,452	1,352,146	49,205,428	139,181	10,315,352	29,178	15,486,700	43,805
11	25,836,120	86,679	3,981,664	13,358	1,600,300	5,369	14,058,117	47,164
12	283,422,578	1,466,396	69,683,875	360,536	61,137,789	316,320	10,901,544	56,403
13	21,248,643	4,358	198,612	41	497,944	102	3,054,591	626
14	7,894,409	7,025	41,869	37	3,659	3	13,178	12
15	236,331,775	279,725	11,101,339	13,140	6,690,045	7,918	22,309,339	26,406
16	28,008,887	6,351	842,693	191	2,363,146	536	7,799,130	1,769
17	45,989,035	55,296	10,904,952	13,112	342,639	412	4,705,385	5,658
18	31,728,037	16,685	1,238,372	651	653,944	344	6,721,572	3,535
19	29,894,725	27,562	2,133,645	1,967	2,544,533	2,346	7,637,076	7,041
20	20,127,861	24,320	1,419,670	1,715	1,154,675	1,395	7,964,258	9,623
21	69,027,982	40,432	7,381,874	4,324	2,879,310	1,687	29,845,723	17,482
22	44,599,711	56,749	6,773,288	8,618	971,972	1,237	10,373,205	13,199
23	171,372,848	413,328	13,771,864	33,216	7,662,399	18,481	8,864,840	21,381
24	10,332,349	4,936	10,423,908	4,980	839,767	401	1,477,241	706
25	63,744,130	1,318,399	1,737,561	35,937	1,308,027	27,053	6,584,022	136,175
26	9,448,836	3,670	1,588,806	617	42,972,739	16,690	116,348	45
27	339,025,699	2,969,950	232,903,752	2,040,295	8,829,933	77,352	74,498,519	652,626
28	278,183,964	622,123	14,140,482	31,623	7,039,237	15,742	31,999,880	71,564
29	548,550,700	466,981	9,138,922	7,780	4,086,631	3,479	13,916,650	11,847
30	32,600,947	6,367	7,646,558	1,493	13,895,633	2,714	5,141,276	1,004
31	12,175,117	90,907	14,743,803	110,087	11,442,212	85,435	8,124,547	60,663
32	140,987,615	69,732	12,139,396	6,004	7,912,985	3,914	32,698,826	16,173
33	125,021,291	28,092	2,105,758	473	492,812	111	10,850,249	2,438
34	77,576,932	68,999	5,721,749	5,089	1,196,741	1,064	6,871,757	6,112
35	48,925,472	24,608	16,485,773	8,292	7,327,412	3,685	7,382,608	3,713
36	4,456,697	956	13,907	3	5,275	1	24,726	5
37	130,565,791	7,302	382,589	21	415,666	23	2,336,834	131
38	315,059,180	268,361	8,306,912	7,076	12,195,666	10,388	15,804,017	13,462
39	1,458,613,863	834,350	563,607,994	322,393	248,084,424	141,908	500,710,077	286,414
40	388,733,743	197,810	49,334,859	25,104	43,757,127	22,266	49,307,695	25,091
41	93,025,342	17,219	77,116,015	14,274	513,479	95	3,152,308	584
42	16,857,233	2,971	25,047,950	4,415	1,545,961	272	7,257,147	1,279
43	1,251,154	158	0	0	2,722	0	118,080	15
44	47,414,088	75,716	33,646,892	53,731	9,366,976	14,958	144,755,000	231,161
45	8,544,106	6,751	3,842	3	0	0	698,478	552
46	95,654	46	112,429	54	12,869	6	166,179	79
47	542,060,825	2,768,817	39,802,675	203,310	929,189	4,746	16,597,224	84,778
48	653,270,792	675,116	224,967,275	232,490	143,775,562	148,583	248,680,724	256,996
49	121,813,560	31,254	29,766,317	7,637	4,279,931	1,098	26,330,753	6,756
50	6,836,212	204	0	0	9,216	0	458,757	14
51	5,836,630	1,132	219,423	43	2,196,030	426	1,766,845	343
52	279,497,661	97,161	22,199,308	7,717	682,593	237	8,419,402	2,927
53	578,679	1,255	30,745	67	51,350	111	139,034	301
54	115,812,717	44,280	66,476,803	25,417	3,493,671	1,336	10,771,167	4,118
55	61,162,495	42,535	4,360,163	3,032	4,486,769	3,120	8,062,450	5,607
56	34,590,567	10,044	104,453,175	30,331	43,387,498	12,599	6,843,695	1,987
57	26,180,267	8,449	9,268,255	2,991	11,993,385	3,871	1,843,111	595
58	44,617,375	5,818	21,184,878	2,763	26,675,893	3,479	30,757,254	4,011
59	47,453,452	9,747	17,226,657	3,538	1,038,680	213	10,613,363	2,180
60	22,440,639	3,699	7,638,224	1,259	723,985	119	1,070,716	176
61	421,078,956	44,009	40,433,805	4,226	12,125,839	1,267	48,395,944	5,058
62	$310,571,592	25,969	$345,764,672	28,912	$35,104,192	2,935	$75,491,770	6,312
63	32,957,867	7,297	9,730,564	2,154	22,910,749	5,073	24,166,057	5,351
64	62,883,210	6,242	1,250,182	124	259,299	26	2,684,357	266
65	1,573,977	207	246,343	32	1,013,438	133	4,348,393	572
66	376,190	98	318,859	83	4,700	1	172,435	45
67	1,985,023	599	823,074	248	77,229	23	195,409	59

Table 10.26
1995 Trans-Surface Data U.S. Exports to Mexico Through Border Districts

	Districts							
	Laredo		El Paso		Nogales		San Diego	
Comm Code	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage	Total Value	Total Tonnage
68	28,468,461	56,726	4,641,235	9,248	2,463,409	4,909	13,575,354	27,050
69	37,787,673	82,790	7,838,956	17,175	2,063,675	4,521	8,939,674	19,586
70	114,128,304	121,097	73,583,582	78,077	18,918,396	20,074	32,753,046	34,753
71	28,795,049	255	6,799,373	60	219,813	2	16,693,231	148
72	510,197,669	1,156,719	25,708,105	58,285	32,869,202	74,521	99,768,534	226,195
73	610,578,629	508,828	255,444,593	212,876	107,947,736	89,959	150,264,325	125,223
74	145,210,685	59,840	38,474,692	15,855	18,366,563	7,569	44,486,216	18,332
75	5,837,953	4,207	430,238	310	652,899	471	1,276,684	920
76	393,680,175	241,906	107,313,839	65,941	19,949,762	12,259	117,062,036	71,931
78	3,146,993	4,761	1,048,731	1,587	1,566,628	2,370	886,234	1,341
79	3,491,865	4,019	1,286,627	1,481	116,426	134	6,806,944	7,834
80	19,010,503	12,104	21,383	14	279,874	178	756,745	482
81	8,529,261	3,867	553,022	251	15,728	7	114,309	52
82	97,070,091	15,063	19,509,368	3,027	10,242,673	1,589	17,506,071	2,716
83	237,485,132	42,213	39,497,241	7,021	128,077,622	22,766	105,983,329	18,839
84	3,673,395,996	601,276	707,781,616	115,852	510,976,766	83,639	578,308,621	94,660
85	4,039,020,991	458,663	3,539,184,545	401,903	733,434,040	83,287	2,099,192,732	238,380
86	57,786,647	62,662	9,930,296	10,768	901,629	978	1,994,940	2,163
87	3,688,910,789	817,122	55,396,658	12,271	390,863,367	86,579	160,929,733	35,647
88	131,583,732	1,269	6,288,493	61	2,104,058	20	100,811,469	972
89	7,258,548	1,366	57,814	11	443,026	83	2,182,255	411
90	621,271,884	36,228	322,668,159	18,815	68,864,107	4,016	185,256,009	10,803
91	14,366,610	884	12,173,149	749	521,617	32	4,076,460	251
92	5,740,306	500	1,868,696	163	105,235	9	17,066,000	1,485
93	2,889,165	187	50,316	3	1,570,280	101	46,853	3
94	279,923,529	62,090	310,736,203	68,925	31,656,334	7,022	55,383,936	12,285
95	75,627,328	12,606	13,941,222	2,324	23,428,141	3,905	92,459,593	15,411
96	52,166,137	6,460	5,606,506	694	10,219,397	1,266	34,783,995	4,308
97	1,580,852	194	18,542	2	4,598	1	239,398	29
98	1,470,558,490	69,119	146,300,875	6,876	94,588,529	4,446	175,435,936	8,246
Totals	25,264,982,994	19,460,568	8,002,982,719	4,995,068	3,096,165,224	1,573,358	5,860,147,823	3,256,044

Source: Barton-Aschman estimates based on 1995 BTS and 1995 Merchandise Exports data.

Relative to highway cost impacts, approximately 60 percent of the truck transported export freight flowed through the Laredo district in 1995. El Paso captured 19 percent, San Diego 15 percent and Nogales five percent of the freight tonnage transported by truck. (Please see Table 10.27) By our estimates, an even higher proportion of the rail export traffic flowed through the Laredo district in 1995 (80 percent). El Paso captured most of the remaining export traffic (12 percent) transported by rail.

As noted earlier for imports, the distributions of tonnage by district, by mode (by commodity) are based on proportional value reported in the U.S. Merchandise Exports data files. Hence they should be considered as reasonable estimates of freight weights by location and mode.

To provide an indication of how much of the above traffic flows through the border states, the study team estimated the value and weight of exports to Mexico originating in the border states. By subtraction (as for imports), the flow through trade was then calculated.

Table 10.27
1995 Exports to Mexico by Customs District (Tons)

Mode	Laredo	El Paso	Nogales	San Diego
Truck	12,160,721	3,872,334	1,033,015	3,041,199
Rail	7,227,842	1,078,054	530,333	204,941
Pipeline & Other	72,004	44,680	10,010	9,904
Total	19,460,567	4,995,068	1,573,358	3,256,044

Source: Barton-Aschman estimates based on 1995 BTS and 1995 Merchandise Exports data.

Table 10.28
Exports to Mexico Flowing Through Border States (1995)

	California	Arizona	New Mexico/Texas
Total Exports (1,000s Tons)			
Via border POEs	3,256	1,573	24,456
From border state	3,420	731	12,571
Net Flow Through	(164)	842	11,885
Truck Exports (1,000s Tons)			
Via border POEs	3,041	1,033	16,033
From border state	2,892	720	10,643
Net Flow Through	149	313	5,390

Source: Barton-Aschman estimates based on BTS data.

Table 10.28 indicates that on a *net trade flow through basis*, California produces more tonnage for export to Mexico than it transports via its own border with Baja California. When the truck mode (alone) is considered, California tranships a net of 149,000 export tons from other U.S. states to Mexico. Arizona accommodates a slightly greater portion of flow through export trade. Not counting pass throughs between border states, it accommodated 313,000 tons of flow through export trade by truck in 1995. Compared to the other southwestern border states, Texas tranships virtually all of the flow through export trade to Mexico. In 1995, the study team estimates that a net of 5.4 million tons of freight from other U.S. states flowed over Texas highways on its way to Mexico. Approximately one-eighth of the tonnage impacting Texas also impacts New Mexico.

10.4.8 Summary of Net Trade Flows

The above findings are summarized in Table 10.29 for all modes and for truck freight flows. From this table it is apparent that northbound and southbound net trade flows, to and from non border states, were relatively equal for 1995, particularly for goods transported by truck.

Table 10.29
Net Trade Flowing Through Southwest U.S. Border States (1995)

	California	Arizona	Mew Mexico	Texas
Total Trade (1,000s Tons)				
Imports	(329)	531	1,103	7,788
Exports	(164)	842	1,618	11,885
Total	(493)	1,373	2,721	19,673
Truck Trade (1,000s Tons)				
Imports	(343)	391	712	5,217
Exports	149	313	568	5,390
	(194)	704	1,280	10,607

Source: Barton-Aschman estimates based on BTS and 1993 Commodity Flow Survey data.

10.4.9 Cost of Flow Through Trade

To determine the cost of this flow through trade, the study team turned to an analysis of equivalent single-axle loads (ESALs) as noted earlier in this section under the discussion of weight as a

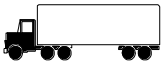
fundamental measure of Binational trade impact. Fortunately, an outstanding piece of research has recently been undertaken by the Center of Transportation Research, University of Texas at Austin, to measure actual commercial vehicle loading conditions at Laredo. This TxDOT commissioned study measured the gross vehicle weights and axle loads of over 30,000 northbound trucks passing through the Laredo port of entry in June and July of 1994.

Table 10.30 provides a recount of the truck classifications and average ESALs computed for the loaded trucks over the study's six-week data collection time period. These statistics are presented as daily averages.

The study notes[23] that use of 4-axle trucks, with two-axle tractors, is largely confined to cross border drayage operations. Once across the border, the 2-axle drayage tractors exchange their trailers with 3-axle tractors which are then used for long haul freight movements. The 4-axle trucks should therefore be viewed as transitioning to 5-axle trucks for the purpose of analyzing long distance, flow through trade.

Table 10.30 indicates that CTR computed an ESAL Factor of 0.89 for the weekday 5-axle truck population. (The composite ESAL Factor for the 4-, 5-, and 6-axle trucks can similarly be computed as 0.95 for weekday trucks.) The CTR study also reported[24] that a comparison of the ESAL factors derived for the Laredo test site was made against a two-day inventory of over 6500 truck records collected by a weigh in motion station located on I-35 south of San Antonio. The results of that comparison, reproduced below as Table 10.31 suggests that an ESAL of 0.89 is an appropriate factor to use for this analysis.

Table 10.30
Daily Distribution of Loaded Trucks*

Axle Count	Predominant Configuration	Average Daily Count	Percent of Total Count	Average Daily ESALs	Percent of Total ESALs	ESAL Factor
2		57 (12)	3.8 (2.7)	12 (6)	1.1 (2.0)	.21 (.50)
3		58 (15)	3.9 (3.3)	22 (6)	2.0 (2.0)	.38 (.40)
4		324 (107)	21.5 (23.4)	277 (110)	25.6 (36.1)	.85 (1.03)
5		732 (222)	48.5 (48.6)	655 (175)	60.5 (57.8)	.89 (.79)
6		28 (1)	1.8 (0.3)	102 (1)	9.4 (0.4)	3.64 (1.00)
	Total	1199 (357)	79.5 (78.3)	1068 (298)	98.6 (98.3)	

* Saturday figures in parenthesis
Source: Measurement and Analysis of Traffic Loads Across the Texas-Mexico Border, Center for Transportation Research.

Table 10.31
Comparison of Northbound (Laredo) Transborder Commercial ESAL Factors to I-35 ESAL Factors

Configuration (axle count)	I-35 ESAL Factor	Laredo ESAL Factor
2	.27	.21

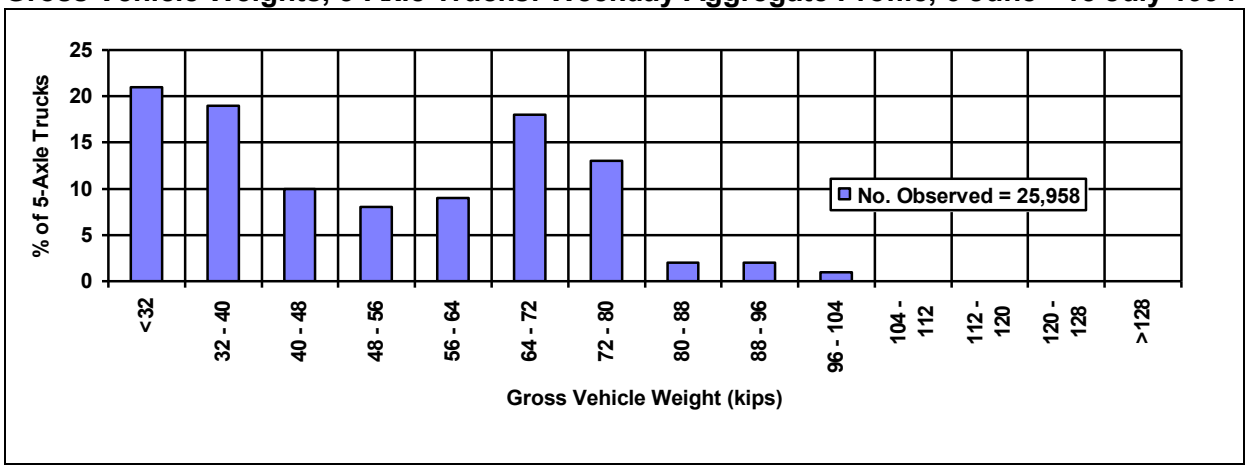
[23] ibid, p. 42

[24] ibid, p. 50

3	.26	.38
4	.46	.85
5	.83	.89
6	.66	3.64

Source: Measurement and Analysis of Traffic Loads Across The Texas-Mexico Border, Center for Transportation Research

Figure 10.7
Gross Vehicle Weights, 5-Axle Trucks: Weekday Aggregate Profile, 6 June - 15 July 1994



Source: Measurement and Analysis of Traffic Loads Across The Texas-Mexico Border, Center for Transportation Research

The same study also measured and reported gross vehicle weights (GVW) for the 5-axle truck population analyzed to compute ESALs. The percentage distribution by GVW of the nearly 26,000 trucks observed for this analysis is illustrated in Figure 10.7. Note that 5-axle trucks weighing less than 32,000 pounds were considered to be empty, while trucks weighing 32 kips (1 kip = 1,000 pounds) or more were considered to be loaded.

The Binational Study team has used this information to determine an *average payload for 5-axle trucks involved in Binational trade. This average payload is computed to be 12 tons*. This average payload corresponds closely with the truck import tonnage noted earlier in this section, and the count of loaded conveyances (less rail cars) reported in the Task 8 report (Table 8.19)[25]

Having established the flow through tonnage for each border state, the average ESAL factor for each 5-axle Binational trade truck, and the average payload per 5-axle Binational trade truck; the only missing ingredients to the cost computation were determined to be the cost per ESAL mile and the mileage associated with the flow through trade traffic.

For the cost per ESAL mile, the Binational study team elected to use cost data obtained from the Texas Highway Cost Allocation Study for 1994, given the preponderance of flow through trade associated with Texas. As utilized by the Center for Transportation Research in the research document entitled "Texas Cost Allocation Analysis for Trucks Engaged in U.S./Mexico Truck Trade,"[26] this ESAL-mile cost was computed to be $0.15. Applied to the truck weights observed in Laredo, a 5-axle truck having an average ESAL Factor of 0.89, transporting an average payload of 12 tons would thus consume $0.1335 of roadway per mile of travel.

[25] Follow on analysis of cost impacts/trade flows may wish to utilize equipment payloads by commodity type. This detail, while available for U.S. domestic moves, was not utilized for this analysis due to scope and budget limitations.

[26] Mark Euritt, Center for Transportation Research, published as study four of "Impacts of Bigger Trucks on Texas," by Ray Barnhart & Associates, December 1995.

For the mileage associated with the flow through trade traffic, the Binational Study team turned to work conducted for the State of Texas, Office of the Governor, cited earlier.[27] Shiner et al estimated the one-way mileage of non-Texas (flow through) truck traffic to be 400 miles. They determined that "most non-Texas traffic travels on I-35 or I-10. The distance along either is about 400 miles to the state line at the Red or Sabine Rivers." Texas (non flow through) truck traffic was assumed to have a one-way trip of 250 miles. "The basis for this is the fact that the most heavily impacted areas in Texas are those cities producing goods being purchased by Mexico. The approximate geographical centroid is in the Dallas-San Antonio-Houston triangle—which is about 250 miles from the major crossings in Laredo or the Rio Grande Valley."

For Arizona, the Binational Study team assumes comparable distances of 250 miles for non-Arizona (flow through) truck traffic and 180 miles for truck transported freight originating in or destined to this border state. Mileage's for California are assumed to be 200 miles for trade destined to or originating from other states; and 150 miles for freight produced or consumed by California residents.

Mileage's for New Mexico are assumed to be 250 one-way miles for computing in-state costs, and 310 one-way miles for computing flow through costs.

10.4.10 Roadway Consumption Costs

The research, trade flows and cost assumptions reported in this chapter have been compiled to develop an estimate of "Roadway Consumption Costs" to the border states resulting from trade with Mexico. These costs are reported in Table 10.32, in worksheet format. This table indicates that Texas bears the brunt of the roadway maintenance and rehabilitation costs for accommodating U.S.-Mexico binational trade. With respect to other U.S. states, it absorbs $47 million of roadway costs annually, based on 1995 trade flows. Internally, it costs Texas an additional $44 million to accommodate its own trade with Mexico. These costs are offset by the benefits associated with employing 150,000 to 175,000 residents of Texas in the production of goods exported to Mexico (please see Chapter 10.3).

10.4.11 Bridge Damage Costs

Estimating bridge damage and associated costs caused by traffic loading is significantly more complicated than estimating roadway damage; as it requires individual bridge by bridge analysis. A recent study by Weissmann and Harrison[28] reports that over 4,800 structures are

[27] "Trade Flows and Transportation: U.S. (Texas)-Mexico Border," Appendix B, Office of the Governor, by Shiner, Moseley & Associates, Summer 1993.

[28] "U.S./Mexico Truck Trade Impacts on Texas Bridges," Center for Transportation Research, Study 3 of "Impacts of Bigger Trucks on Texas," December 1995.

Table 10.32
Roadway Consumption Cost Worksheet (U.S. Border States—1995)

Trade	California	Arizona	New Mexico	Texas
Flow Through				
1. Net Through Trade (Tons) by Truck	(194,000)	704,000	1,280,000	10,607,000
2. Equivalent Loaded Trucks[1]	16,167	58,667	106,667	883,917
3. Average Miles/Truck	200	250	310	400
4. Loaded Truck Miles	3,233,300	14,666,750	33,066,650	353,566,700
5. ESAL-Miles[2]	2,877,700	13,053,400	29,429,300	314,674,300
6. 1995 Annual Cost[3]	($431,650)	$1,958,000	$4,414,400	$47,201,200
Domestic				
1. Border State Trade (Tons) by Truck	5,970,000	2,916,000	163,000	15,783,000
2. Equivalent Loaded Trucks[1]	497,500	243,000	13,600	1,315,300
3. Average Miles/Truck	150	180	250	250
4. Loaded Truck Miles	74,625,000	43,740,000	3,400,000	328,825,000
5. ESAL-Miles[2]	66,416,250	38,928,600	3,026,000	295,654,300
6. 1995 Annual Cost[3]	$9,962,450	$5,839,300	$453,900	$43,898,100

Source: Barton-Aschman Associates, Inc.
[1]Reflects average payload of 12 tons/truck
[2]Measured at 0.89 per 5-axle truck
[3]Computed at $0.15 per ESAL-miles, based on 1994 Texas Highway Costs

impacted by NAFTA truck traffic in Texas alone, comprising some 97 million square feet of deck area and carrying over 109 million vehicles daily. This CTR study investigates the impacts of bigger, heavier trucks on Texas bridges, potentially resulting from future legislation which could allow (permit) heavier axle loads. As a consequence, this research is not directly transferable to the Binational Study which has thus far analyzed costs associated with current, allowable loadings. Nevertheless, the database, simulation models, methods and techniques exist within TxDOT supported research institutions to recompute bridge damage costs using the observed truck loads and quantities of vehicles reported by this study. Future investigators (however) should be cautioned against assuming that all fully loaded trucks have a gross vehicle weight approaching 80,000 pounds, and that all tandem axle loads are 34 kips.

The Transportation Research Board document cited earlier in this chapter[29] reports that "bridge fatigue cost generally is regarded to be small relative to other highway agency costs of increased traffic. In contrast to a pavement...a bridge is designed with the expectation that it will last indefinitely, provided that it is not exposed to a single load greater than its load-bearing capacity. In reality, some bridges do fail (or reach a state at which safety demands substantial repairs) as a result of fatigue, but most bridge replacements are for reasons other than fatigue."

The report goes on the identify *nationwide* bridge fatigue costs of $50 million annually, and future bridge fatigue costs of $160 million per year as a result of aging of the stock of bridges. Based on this $160 million annual cost estimate, the average fatigue damage was determined by the TRB report authors to be $0.01 per passage of a loaded tractor-semi-trailer over a steel bridge; and an insignificant cost impact to concrete bridges.

Based on this research, no cost impact will be assigned to bridge damage by the Binational study consultants for the U.S. roadway network.

[29] Transportation Research Board, *Special Report 246,* "Paying Our Way: Estimating Marginal Social Costs of Freight Transportation, 1996, pp. 59-60.

10.4.12 External Social Costs

As noted earlier, traditional government cost recovery approaches generally exclude any cost that does not appear on government budgets, such as the congestion and air pollution generated by transportation users.

Nevertheless, the TRB study "recommends the marginal social cost approach as a generally superior guide for public policy. The marginal social cost approach advances the goal of efficient resource allocation that is at the heart of many current surface freight transportation policy debates. The case for including nongovernmental costs appears obvious, since pollution and congestion represent real burdens on society. Quantifying these nongovernmental costs is often difficult, but ignoring them would be a great mistake. Marginal social cost is the change in total social costs caused by one more unit of output—it is the cost that we want to be sure that a carrier or shipper is willing to pay."[30]

The report goes on to examine these external, social costs from a case study perspective, using a number of values of monetary cost impact for quantification purposes. The study authors note that their estimates of external costs are very uncertain however.

"Accident costs are uncertain because the effect of truck traffic on risks of other drivers is poorly understood and because little information is available on the fraction of total accident costs that is borne by truck owners. Pollution costs are uncertain because the modeling of the relationship between emissions and exposure in the case studies is simplistic and because the health effects of particulates are poorly understood. The conceptual basis for defining the energy external cost is controversial. Finally, highway congestion cost is uncertain because data on the relationship between speed on a road and truck traffic are poor."[31]

The social cost values reported and used in the case studies are summarized in Table 10.33. As indicated, in total, they range from four cents per kilometer (or seven cents per mile) for trucks operating in rural areas to three times these values for trucks operating through urban areas. The authors caution repeatedly that these values are simplistic and/or they are highly sensitive to the underlying assumptions used. Nevertheless, they do represent the product of a credible research effort that can be applied to the Binational Study.

Table 10.34 takes this next step to apply these social cost values to the data/assumptions used earlier to calculate roadway consumption costs. This table indicates (logically) that Texas bears the brunt of the marginal social costs for accommodating U.S.-Mexico binational trade. With respect to other U.S. states, it absorbs $28 million of social costs annually, based on 1995 trade flows. Internally, residents of Texas face an additional $26 million of costs relative to accidents, air pollution, and congestion created by U.S.-Mexico trade.

[30] Ibid, pp. 43-44.

[31] Ibid, p. 91.

Table 10.33
Marginal Social Unit Costs of Truck Freight Transport ($/truckload per km/mile)

	Operating Environment	
Marginal External Cost	**Rural**	**Urban**
Congestion	.0075/.01	.02/.03
Accidents	.02/.03	.05/.09
Air Pollution	.01/.02	.03/.05
Energy Security	.004/.007	.004/.007
Noise		
Non Freeway	0	.04/.065
Freeway/Expressway	0	.012/.02
Total Social Costs		
Non Freeway	.0415/.067	.144/.242
Freeway/Expressway	.0415/.067	.116/.197

Source: TRB *Special Report 246,* "Paying Our Way: Estimating Marginal Social Costs of Freight Transportation," 1996.

Table 10.34
Marginal Social Cost Worksheet (U.S. Border States—1995)

	Trade	California	Arizona	New Mexico	Texas
	Flow Through				
1	Net Through Trade (Tons) by Truck	-194,000	704,000	1,280,000	10,607,000
2	Equivalent Loaded Trucks[1]	16,167	58,667	106,667	883,917
3	Average Miles/Truck	200	250	310	400
4	Loaded Truck Miles	3,233,300	14,666,750	33,066,650	353,566,700
5	1995 Annual Cost[2]	($258,650)	$1,173,300	$2,645,300	$28,285,300
	Domestic				
1	Border State Trade (Tons) by Truck	5,970,000	2,916,000	163,000	15,783,000
2	Equivalent Loaded Trucks[1]	497,500	243,000	13,600	1,315,300
3	Average Miles/Truck	150	180	250	250
4	Loaded Truck Miles	74,625,000	43,740,000	3,400,000	328,825,000
5	1995 Annual Cost[2]	$5,970,000	$3,499,200	$272,000	$26,306,000

Source: Barton-Aschman Associates, Inc.
[1] Reflects average payload of 12 tons/truck
[2] Assumes 10 percent urban, 90 percent rural mileage

10.4.13 Net National Costs

Using the methodologies reported above for determining the "Cost of Flow Through Trade" and "External Social Costs" similar computations were made for the rest of the nation, excluding the southwest border states. We examined John McCray's recent analysis of 1994 truck flows[32] that suggests a "center of gravity" of non border state Binational trade to be in the vicinity of Nashville, Tennessee, some 400 to 500 miles from Texas. If an average of 500 miles of travel to the Texas border is assumed, this truck mileage would result in an annual roadway consumption cost of $62 million and an annual social cost of $37 million for the non border states to accommodate U.S.-Mexico trade, as shown in Table 10.35.

Coupling this $99 million with the $181 million of border state costs reported in Tables 10.32 and 10.34 yields an annual national roadway consumption and social cost of $280 million to accommodate U.S.-Mexico trade, not including bridge damage costs or port of entry operations.

[32] John McCray, U.S./Mexico Truck Trade Corridors in Texas, Study Number One of Impacts of Bigger Trucks on Texas, December 1995.

Table 10.35
Roadway Consumption and Social Cost Worksheet (U.S. Non Border States - 1995)

Binational Trade		Non Border States
1. Binational Trade (Tons) by Truck		11,117,000
2. Equivalent Loaded Trucks[1]		926,417
3. Average Miles/Truck[2]		500
4. Loaded Truck Miles		463,208,300
5. ESAL-Miles[3]		412,255,400
6. 1995 Annual Roadway Consumption Cost[4]	$	61,838,300
7. 1995 Annual Social Cost[5]	$	37,056,700

Source: Barton-Aschman Associates, Inc.
[1] Reflects average payload of 12 tons/truck
[2] Assumption
[3] Measured at $0.89 per 5-axle truck
[4] Computed at $0.15 per ESAL-mile, based on 1994 Texas Highway Costs
[5] Computed at $0.08 per loaded truck mile

These "costs" are in turn offset by the contribution to the economy resulting from some 600,000 U.S. jobs supported by trade with Mexico (Please see Section 10.2). According to the U.S. Department of Commerce, "the average hourly earning paid non-farm workers in jobs directly and indirectly supported by all U.S. goods exports averaged $12.57 (per hour in 1994)."[33] If this average wage holds true for manufacturers exporting goods to Mexico, these 600,000 jobs yield an annual payroll of approximately $16 billion in 1995. Income and sales taxes on this payroll is in turn available to offset a portion of these roadway consumption and social costs; as are fuel taxes, vehicle registration fees, mileage taxes and excise taxes on equipment purchases.

10.4.14 Border State Funding Equity

In the "Prior Research" section of this chapter, it was noted that the FHWA undertook a follow on study to Section 1089 of ISTEA in 1995 to analyze funding equity for border states among other issues. The study team for this effort consisted of FHWA and members of the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on planning. Relevant findings of their reports to Congress are provided below.

"Congress directed the Federal Highway Administration (FHWA) to review the distribution of federal-aid highway funds to border regions, to develop and report recommendations to improve the distribution of such funds, to give a high priority to the transportation needs of border regions, and to work with state and local governments in border regions to assist them with transportation planning.[34]

"Between 90 and 95 percent of federal-aid highway funds are apportioned to the states on the basis of congressionally mandated formulas that consider system size and condition, vehicle miles of travel, lane-miles, and other objective factors, such as population and land area. The remaining 5 to 10 percent of funds are allotted through discretionary programs. Although suballocations have been used by the states to target federal-aid funds for specific types of programs in selected subareas of states, this has not been the case with international ports of entry. Prior to ISTEA, federal law did not require international ports of entry to be explicitly considered in the planning process of state DOTs for the development of state transportation plans, although some states have allocated federal-aid funds in recognition of the importance of border crossings to certain states' economies.[35]

[33] U.S. Jobs Supported by Goods and Services Exports, 1983-94, U.S. Department of Commerce, November 1996, p. 7.

[34] Highway Infrastructure Requirements at International Ports of Entry-Report to Congress, Federal Highway Administration, August 1995, p. 1.

[35] Ibid, p. 22.

“States have acknowledged and are attempting to address border-related needs, along with other widespread and well documented infrastructure concerns. For the period 1996 through 2000, border states have programmed $970 million for border approach projects, an increase of $200 million over the previous five-year period.[36] It is anticipated that this investment, while not sufficient to cover all anticipated needs, can be expected to greatly improve conditions for accommodating international trade flows at many major crossings.

“Notwithstanding the significant increase in programmed funds for border improvements, the Department (USDOT) supports its original finding that further selective improvements to existing border approaches are warranted, particularly in and approaching heavily congested border communities. These include intermodal connections within and adjacent to border communities and connections between the highway trunk network and toll facilities, as well as certain international bridges."

The specific aspects of this support are currently being negotiated as part of the ISTEA reauthorization process. The administration's NEXTEA proposal, announced in March 1997, would provide $45 million annually ($270 million over six years) for planning and implementation grants to improve border crossings and to develop major trade corridors, especially north/south routes. States and MPOs would be encouraged to work with one another and either Canada or Mexico to devise plans to reduce delays and speed trade flows.

Other proposals have been made by congressional representatives for even larger NAFTA-related transportation funding. When resolved, the transportation funding reauthorization act will establish border state funding equity.

[36] Note: For the southwestern U.S. border states, these programmed funds are $647 million and an increase of $235 million, respectively.

10.5 Border Trade and the U.S. Local Border Economies

Previous sections of this report have examined the impacts of cross border trade on the national economy of the United States and the economies of the border states. This chapter analyzes impacts of trade on the local border economies, the regions of both nations where ground transport of goods is concentrated in a limited number of crossing points or ports of entry. The objective is to contribute to the evaluation of the benefits and costs of trade by determining whether border economies have a higher concentration of jobs, payroll and establishments devoted to manufacture, wholesale, and transportation of traded goods, compared to other areas not located at the border.

The analysis is based on 10-year trends (1980 through 1990) as well as more recent data on economic indicators such as personal income, tax base, demographics, educational levels, and the industrial structure of the border economies including the type of commodities and services that form the economic base. Economic impacts on the local economies from trade are estimated from review of trade-related industries located within the border communities including manufacturing, wholesale activity, and transportation. Indicators examined include employment, payroll (as a component of personal income) and number of establishments.

10.5.1 Summary of Findings

Six case study cities were analyzed. The most significant findings of the analysis for the United States are shown in Table 10.36. On the U.S. side, the results suggest that border trade is a major contributor to the economic structure of Nogales, El Paso, Eagle Pass, and Laredo, accounting for more than 10 percent of employment in the total economy of each. Trade supports about two percent of the employment of Brownsville, and less than one percent of San Diego employment. Among the case study cities on the U.S. side, trade creates the largest payroll in El Paso (more than $330 million) and supports the largest number of firms in Laredo (555).

Chapter 10.3 provided estimates of employment in border states related to trade with Mexico. The 1,767 trade-related jobs in Nogales make up 12.6 percent of Arizona's jobs supported by trade with Mexico, based on the estimates from the Exporter Location data from the U.S. Department of Commerce. The 19,965 El Paso trade jobs account for 11 percent of the jobs created in Texas by trade with Mexico. The 6,675 trade jobs in San Diego, although less than one percent of employment in the metropolitan area, nonetheless account for nine percent of California's jobs supported by trade with Mexico.

While border cities have experienced rapid growth since 1987 in sectors related to trade with Mexico, levels of income remain below the state average in the border communities, and unemployment rates are consistently very high. With the exception of San Diego, the tax base is low in these communities, especially when measured as a per capita figure. Educational levels are lower than the rest of the state, but enrollments in public schools are increasing rapidly as population grows.

Table 10.36
Summary Impact of Trade on Case Study Border Cities

Indicator	San Diego	Nogales	El Paso	Eagle Pass	Laredo	Brownsville
Manufacturing for Export	Optical Equipment, Toys and Games		Clothing, Plastics	Clothing/Iron and Steel		Vehicles and Parts
Wholesale of Traded Goods		Fruits and Vegetables	Clothing Plastics		General Wholesale	Groceries and Cereals
Transport of Traded Goods		Freight Arrangement	General Transport	Freight Arrangement	Trucking and Freight Arrangement	General Transport
Trade Jobs	6,675	1,767	19,965	1,092	4,695	1,467
Trade Jobs Share of City Economy	0.8%	17.0%	11.1%	17.1%	10.8%	2.1%
City Share of State Mexico Trade Jobs	9.0%	12.6%	11.0%	0.6%	2.6%	0.6%
Trade Payroll ($000)	$178,268	$49,776	$331,083	$20,697	$92,965	$41,721
Trade Firms	99	142	283	55	555	102
Unemployment Rate: 1994	7.2%	19.0%	10.0%	27.0%	9.3%	12.1%

Note: Shaded areas show the major source of economics benefits supported by trade for each city
Source: Arizona State University

The major source of economic activity related to trade with Mexico is manufacturing in four of the case study cities: San Diego (optical equipment, toys and games), El Paso (clothing, plastics), Eagle Pass (clothing, iron and steel) and Brownsville (vehicles and parts). In Nogales, the wholesale and transportation sectors are dominant sources of jobs, particularly dealing with trade in fruits and vegetables. In Laredo, the most important category of economic activity supported by trade with Mexico is transportation and freight arrangement.

Summary information for each border city is set out in the paragraphs below. A more complete analysis of economic- and trade-related factors affecting each border community is presented in the “Case Study Appendix” to this report.

San Diego

San Diego is the largest of the case study cities examined. The San Diego economy has grown faster than California as a whole, but the economy of San Diego and California weakened significantly in the early 1990s even while U.S. trade with Mexico increased. The San Diego economy has a high concentration of two types of goods that account for a significant volume of trade with Mexico. Eleven percent of California optical and measuring equipment production is located in San Diego and 21 percent of toys and games manufacturing is there. San Diego does

not have a high concentration of wholesale or transportation activity. An estimated 6,675 jobs were supported by border trade in 1994, equivalent to less than one percent of the economy.

Nogales

Nogales, Arizona, has limited manufacturing activity. However, the area has a very high concentration of wholesale fruit and vegetable firms and employment. One out of three Arizona jobs in this sector are in Nogales. An estimated 1,185 jobs in this sector existed to support border trade. The Nogales economy also accounted for one out of three Arizona freight arrangement jobs. Altogether, economic activity in sectors related to trade provided 17 percent of the jobs in the Nogales area and 28 percent of the payroll in 1994.

El Paso

There were 28,000 workers in the El Paso economy employed in the production of the top 10 manufactured products exported through the El Paso Customs District. The largest employment category was clothing manufacturing, followed by wadding and felt products. The El Paso clothing sector accounted for 30 percent of the Texas total of all workers in the industry. Plastic products are also important in El Paso. Although El Paso accounts for 2.8 percent of all Texas jobs, the area provides 7 percent of all plastics jobs in the state. In addition to manufacturing, significant wholesale activity in clothing and plastics is present in El Paso. It was estimated that 19,966 jobs in El Paso were supported by border trade, or 11 percent of total employment in 1994.

Eagle Pass

The Eagle Pass economy, although small, has been characterized by rapid growth since 1990. Employment has grown nearly twice as fast as the rest of Texas and four times faster than the nation as a whole over the period. A key driver of this growth has been the transportation sector, which has seen employment grow by 53 percent between 1990 and 1994. Meanwhile, in the rest of Texas, employment in the transportation sector increased approximately 14 percent during this time. The number of Eagle Pass trucking and warehousing firms increased by 150 percent, rising from 22 in 1990 to 55 in 1994. The largest source of trade-related employment in Eagle Pass is clothing manufacturing, with nearly 700 jobs. Combined local jobs related to trade (1,092) were estimated to account for 17 percent of all Eagle Pass employment (6,398) in 1994.

Laredo

The Laredo economy has been influenced strongly by its border location and trade with Mexico. The population of Webb County increased by one third over the 1980 through 1990 period and grew by more than 20 percent between 1990 and 1994. Although a large amount of traded goods measured by both volume and value passes through the Laredo Customs District, the Web County area is not a manufacturing center and the proportion of Laredo employment accounted for by manufacturing has been declining in recent years. The most significant trade-related employment sector is transportation. This sector is important due to its size and rate of growth. Between 1980 and 1990, trucking, warehousing and freight arrangement added 3,651 jobs in Laredo, a 269 percent rate of growth. The transportation jobs created in the Laredo area accounted for one out of three such new jobs in the entire state. The sector added an additional 2,000 jobs between 1990 and 1994, growing by 42.5 percent in just four years. The Laredo share of Texas freight arrangement jobs was 35 percent in 1994. The concentration coefficient for freight arrangement is 51. The interpretation is that employment in freight is 50 times greater than necessary to serve the local economy. The estimated magnitude of trade-related activity is 4,695

jobs and payroll of $93 million in 555 firms, accounting for more than 10 percent of the Laredo economy.

Brownsville

The Brownsville area has a labor force of approximately 70,000 persons and accounts for about one percent of all Texas employment. While employment growth was slow relative to the rest of Texas during the 1980s, job creation accelerated after 1987 as Mexican trade increased. Manufacturing as a source of employment has decreased in importance. Manufacturing employment in goods which are among leading exports to Mexico accounted for 3,985 jobs in 1990 and decreased to 2,679 jobs in 1994. SIC 371, vehicles and parts, was the largest single category, with 873 workers in six firms. The wholesale trade activity most related to international trade is in groceries and cereal products, which had 985 workers in 60 establishments in 1994. Although employment in this sector also fell compared to 1990, the overall share of such employment was approximately double the level necessary to serve the local population. Growth in trucking and warehousing employment between 1994 and 1994 was three times the rate of the rest of the state and more than four times faster than at the national level. In 1990 there were 799 employees in trucking and warehousing, working at 88 establishments. By 1994 employment had increased by 34 percent, to 1,075, and the number of firms had risen to 121, a growth rate of 37 percent. Freight arrangement employed 324 workers in 1990, and increased to 516 in 1994, an increase of nearly 60 percent. Border trade activity supported an estimated 1,467 jobs, equivalent to two percent or all Brownsville employment in 1994.

10.6 Introduction to the Mexican Analysis of Impacts

The commercial trade between the United States and Mexico has significant macroeconomic effects both at federal level and in border states. Following are some of the costs and benefits generated by binational trade:

10.6.1 Direct Benefits From U.S.-Mexico Binational Commerce

The major benefit of U.S.-Mexico binational trade is the generation of net direct jobs, especially in the maquiladora industry in the border states. This industry has a significant socioeconomic impact on four of the six Mexican ports of entry (POEs) included in the case studies; namely, Ciudad Juarez, Matamoros, Nuevo Laredo, and Tijuana. In addition, it is a significant source of employment in other border cities (Mexicali and Reynosa) and in municipalities of certain non-border states (mainly, Aguascalientes, Guanajuato, Jalisco, Querétaro, and San Luis Potosí).

In addition to the maquiladora industry whose sole focus is foreign trade, there are other major traditional[37] manufacturing industry sectors with a high export component, such as automotive and auto part manufactures, electrical equipment and non-electrical machines, the chemical industry, plastics in particular, and basic metallurgic industries such as iron and nonferrous metal smelting. These industries allocate a large proportion of their production facilities to foreign trade activities, mostly with the United States.

Likewise, direct industry-related employment linked to foreign trade encourages indirect employment among suppliers of the export industry and service providers such as carriers and storage companies, insurance and bond companies, and financial and professional services, in addition to the economic boon resulting from the income earned by employees of foreign trade companies wherever they are located.

Nevertheless, both the exponential growth of the maquiladora export industry and the higher import component of the traditional manufacturing industry's output have led in recent years to a steady displacement of domestic suppliers from their own market. For this reason, the multiplier effect of foreign trade on overall employment is increasingly small in Mexico. This trend could worsen in coming years, especially by the year 2003, when all maquiladora companies will benefit from the domestic supplier statute; in other words, they will be allowed to sell part of their production in the domestic market. It is also likely that most transportation, storage, and related services needs will continue to be met by domestic operators in coordination with American operators; hence, the impact of binational commerce on employment in these sectors will continue to grow.

This task is the first large-scale effort by Mexico to conduct an updated evaluation of direct and indirect employment generated by foreign trade, in particular by the binational commerce with the United States. For practical reasons, a difference is drawn between job-generation in border states and in the rest of the country. Along the same lines, a comparison is presented between the United States and Mexico in terms of jobs created, emphasizing that the benefits of binational trade in these terms are much greater for Mexico. Finally, a detailed discussion of indirect jobs created in the transportation, storage, and related service sectors in both countries is presented because of its greater significance for purposes of this Study.

[37] In this report the term traditional manufacturing industry refers to industrial activity whose production is aimed at both domestic and foreign markets, as opposed to maquiladora industries whose special tariff-exempt import status mandates that their entire output be re-exported.

10.6.2. Direct Costs of U.S.-Mexico Binational Commerce

First of all, U.S.-Mexico binational trade entails high operational costs at the border for the private operators involved with this trade. These costs are partly the result of border services and charges for cargo breakbulk, both northbound and southbound, despite the gradual increase of pre-shipment practices which reduce cargo inspection and border crossing times. Also, financial agents bear implicit costs that are due to major delays in customs compounds and border crossings.

One of the main achievements of this study is that it quantifies such surcharges and shows that a significant portion thereof is due to operational restrictions imposed at customs booths and compounds which could be dealt with in the short term. However, it is worth mentioning that the current breakbulk of cargo during traditional import and export movements also generates intermediary business in border cities (transfer services, warehouse workers, bank branches, etc.). Therefore, optimization of logistics operations at the border would entail not only significant savings for logistics operators and/or carriers, but likely job losses in the medium term.

Secondly, the steady growth of cargo volume of binational trade leads to increasing border-related infrastructure investment and maintenance costs, at least in Matamoros, Nuevo Laredo, Ciudad Juarez, Piedras Negras, and Tijuana—cities through which over 75 percent of cross-border movements by land are concentrated. A prototypical evaluation of the costs of current deteriorating road infrastructures was addressed earlier in this report. This information complements the scope of Tasks 2 and 6 where an infrastructure and investment project inventory was established.

Finally, U.S.-Mexico binational trade also entails social costs for borderland communities resulting from: overcrowded urban areas, air pollution caused by motor vehicles, vehicular accidents, noise pollution damage, etc. Marginal social costs owing to U.S.-Mexico trade have been evaluated on the American side. Equivalent quantitative and statistical bases are nonexistent on the Mexican side. For this reason, within the scope of this task, only the social costs for the northern side of the border are discussed. It is necessary to conduct complementary studies to obtain a similar evaluation for each one of the six border states of the Mexican Republic.

This portion of the Task 10 report includes the following chapters:

10.7 General methodology

10.8 Benefits of binational trade at national level

10.9 Benefits of binational trade for border states

10.10 Border costs of binational trade

The discussion presented in Chapter 10.10 discusses border operational costs for users. Road deterioration costs in Mexico will be addressed in the Task 14 report.

Detailed quantitative results are included in the Appendices of this report.

10.7 General Methodology of the Mexican Analysis

The following is a summary of the methodology used:

10.7.1 Economic Information Available in Mexico is Not Homogeneous

Statistical information from the Department of Commerce and Industrial Development (SECOFI, Secretaría de Comercio y Fomento Industrial) on industrial activity by sector includes, according to the type of publication, a series of 1980 or 1993 prices. Likewise, there is very detailed nationwide information on maquiladora industry activities by sector, but public access to the same kind of information at state or municipal level is restricted and sometimes partial.

In the case of the traditional manufacturing industry, there is no direct information on its foreign trade activities. Both the System of National Accounts (SCN, Sistema de Cuentas Nacionales) and the periodic Industrial Census refer to general economic activity by sector, but they do not include the proportion of intermediate consumption covered by imports.[38] The proportion of the gross output value devoted to exports by economic sector is also not published.

In addition, the information available on foreign trade published by the Banco de México (Bank of Mexico, BANXICO), the Banco Mexicano del Comercio Exterior (Mexican Bank of Foreign Trade, BANCOMEXT), and SECOFI refers to tariff categories. Hence, it is necessary to match products with economic sectors, both at the national level and by federal agency, in order to produce indirect statistical data from these official sources.

10.7.2 Disparities in Available Data Lead to Numerous Repetitive Estimates

The Appendices of this report include a catalog of foreign trade products and a sample matrix showing the product-sector interrelation for the 1988-1995 period, at the national level. Several other matrices were prepared, using three main indicators:

- Gross production value
- Intermediate consumption
- Gross value added

For each one of these indicators, the proportion of each industrial sector within the national activity had to be inferred using census and SCN information, in order to distribute product imports and exports among the various economic sectors. Likewise, identical matrices were created for each one of the border states including two additional indicators (average number of employees per year and total remuneration). Hence, a statistical basis was indirectly obtained whereby foreign trade flows (expressed in product categories) could be assigned to each participating economic sector.

Once these flows are assigned, it is relatively easy to evaluate the benefits of foreign trade in terms of direct employment for each economic sector. However, serious methodological difficulties emerge once again in dealing with indirect jobs generated by foreign trade and

[38] In fact, this kind of information is only accessible to the public as an aggregate; likewise, statistics are grouped in nine major industrial divisions in the Anuarios Estadísticos "La Economía Mexicana en Cifras" (Statistical Yearbooks "The Mexican Economy in Numbers"), published by the Banco Nafin or the projections of the econometric model of the CIEMEX WHARTON group.

binational U.S.-Mexico commercial activities, since, as mentioned above, they can only be measured indirectly from existing official information sources.

In the case of the maquiladora industry, the Task 14 report includes a detailed discussion of the specific methodology used by the Colegio de la Frontera Norte (COLEF), known as the Urban Economic Base Model (UEB Model) developed by the University of Wisconsin and several research institutes in the United States.

In the case of the traditional manufacturing industry, the national planning system does not have any updated input-output matrices. The 1994 Economic Census provided an opportunity to create a matrix of inter-industry transactions[39] that was used to establish a new series of prices and indicators in 1993 constant pesos to replace the old series in 1980 pesos. However, this matrix was never updated, as far as could be determined; hence, input-output matrices had to be inferred for the 1993-1995 period from the evolution of relative inter-sectorial prices on the one hand, and the import component by economic sector on the other.

The last time input-output matrices were updated by Mexico's federal agencies was in the 1983-1985 period. They include a series of 1980 constant prices. These matrices were too obsolete to be used in this study, and for this reason, indirect jobs generated by foreign and binational trade for each border state had to be deduced from the national figures for each economic sector.

10.7.3 Existing Information on Jobs Generated by Foreign Trade is Scarce and Outdated

Two macroeconomic studies were carried out during the 1991-1992 period when the North American Free Trade Agreement (NAFTA) was being negotiated.[40] In addition, COLEF conducted some research work on the maquiladora export industry encompassing the 1987-1989 period. Furthermore, BANXICO has partial data on industry-related jobs from Mexican groups listed on the Mexican Stock Exchange (BMV, Bolsa Mexicana de Valores).

As stated earlier, the major methodological difficulty is evaluating indirect employment generation as it relates to the evolution of Mexican foreign trade. In fact, pre-existing inter-industry relations are deeply and rapidly altered by structural changes taking place in the national economy. Consequently, it is extremely difficult to obtain a timely and updated statistical framework. The import content in each economic sector experienced dramatic increases since 1989-1990, and the economic liberalization has tended to accelerate the nationwide breakdown of export production, as well as facilitate the direct substitution of national products with imported consumer goods.

The maquiladora industry in Mexico has never been a backward integrator of industrial processes. It uses a low level of domestic supplies and, consequently, it generates very few related indirect jobs. Year after year, domestic supplies going to the maquiladora industry range from 6 to 10 percent of its gross output value, and they consist mainly of fuel, water, and packaging materials. In fact, the supply of domestic parts and intermediate goods never exceeds 2 percent of the gross output value in any field of activity of the maquiladora export industry. Therefore, the increasing share of this industry in Mexican foreign trade tends to reduce the multiplying effect of foreign trade on the generation of both direct and indirect employment.

For several years now, the same phenomenon has been noted in the traditional manufacturing industry. Its consequences in terms of the breakdown of national production could be greater

[39] These matrices, also known as input-output semi-matrices, set the technical ratios that characterize the proportion of the Gross Output Value that each purchasing sector devotes to inputs supplied by the selling sectors. However, they do not include the import component of intermediate consumption, net subsidy taxes, and chargeable banking services.

[40] One was conducted by Booz•Allen, a consulting firm, and the other one by the International Institute for Economic Affairs.

than those of the maquiladora industry, since imports tend to replace numerous existing networks of suppliers, producers, and trading companies. Moreover, in contrast to the maquiladora industry, the traditional manufacturing industry continues to operate basically for the domestic market, but with a growing influx of imported inputs which go into its production process.

10.7.4 The Evaluation Presented in This Study is a Remarkable Effort to Improve the Available Instruments to Plan Mexico's Transportation Sector

In addition to a detailed evaluation of the economic benefits of Mexican foreign trade in terms of employment, a conceptual and methodological effort was made to determine, within the framework of Task 10, the operating costs associated with U.S.-Mexico trade through Mexico's northern border.

These costs were established as overall border transaction costs. In other words, actual costs for border services, both northbound and southbound, and either for traditional or preprocessed shipments,[41] were determined for each mode of transportation (motor transport and railroad). In addition, implicit costs borne by private companies due to delays while waiting in line and in customs compounds were also evaluated.

These latter costs are not necessarily related to a transport agreement (e.g., surcharges or per diem fees for time or mileage, which are common practice in railroad transportation), but they are extra costs incurred by private companies involved in U.S.-Mexico binational trade. In turn, these "inefficiency costs" influence the overall process, since they are carried over to the prices paid by end users.

The above costs were estimated from field surveys conducted in four of the six POE case studies; namely, Laredo, El Paso, Nogales, and Eagle Pass. The procedure used to extend these results to the rest of the northern borderland is discussed in Chapter 10.10.

Delay-related costs were included in the cost-benefit analysis of the U.S.-Mexico binational trade for three general reasons:

- to quantify additional costs that no other prior study had identified as such, even though there existed an empirical suspicion that they might be significant;
- to introduce quantitative criteria for overall logistical operations costs to complete classical analyses of an infrastructure's physical capacity;
- to have additional selection criteria for new projects in the overall border area transportation planning process, because it is necessary to look into the ability to reduce some border transaction costs and the specific requirements for infrastructure and information systems investments, in addition to the traditional technical and economic feasibility criteria currently used.

Hence, any savings in border transaction costs (for instance, a reduction in delays crossing the border) is an additional benefit that should be included in the cash flow of any new project in addition to the typical flow of revenues and expenses over time. This is needed to do a thorough evaluation of the project's intrinsic qualities for everyone concerned as well as for future users of this new infrastructure.

[41] Preprocessed shipments refer to merchandise whose documents have been processed beforehand and whose customs duties and tariffs have been paid before crossing the border. They include cargo shipments from the maquiladora industry and from companies with a high export component (ALTEX companies, for their acronym in Spanish) or companies enrolled in the Program of Temporary Imports for the Export Industry (PITEX companies, for their acronym in Spanish). In this case, the costs of services negotiated with customs brokers and eventually with transfer companies and warehouse workers are below the maximum authorized rates, while the reduction in processing times leads to major cost savings on account of less delays at the border.

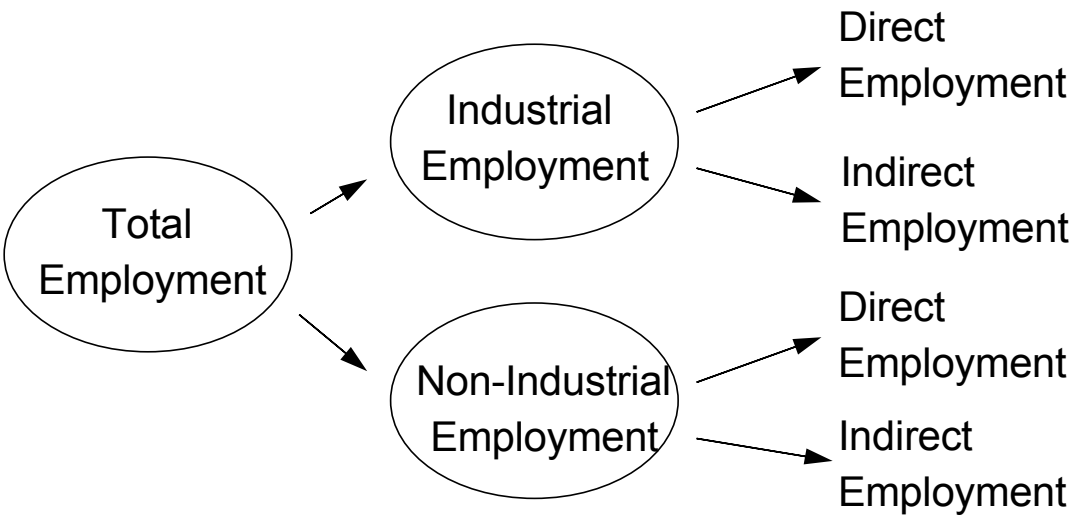
For more detail on methodology used in this task, please see the Task 14 report.

10.8 Mexico's Benefits of Binational Commerce at National Level

The Task 14 report includes a discussion of the methodology used to evaluate the benefits of binational trade in terms of job generation. Appendices to this report include detailed results for the maquiladora industry and the traditional manufacturing industry.

The national and local impact (on the economy of the six border states) was measured following the procedure illustrated on Figure 10.7 and described below:

Figure 10.8
Evaluation of the Impact of Binational Trade on Job Generation



10.8.1 Importance of Binational Commerce In Mexico's Foreign Trade

National exports have increased from $US 51.885 billion in 1993 to 79.54 billion in 1995. In 1996, exports reached an all-time record high of $US 98 billion (34 percent of the GDP). Out of this total, commodity exports (agricultural, mining, and energy products) have grown less than the national average ($US 12.98 million in 1995 vs. 7.2 million in 1993). Thus, the export boom was mainly driven by the manufacturing industry, with the trends reported in Table 10.37.

Table 10.37
Mexican Export Manufactures (in $US billions)

	1993	1994	1995	1996	Annual Growth Rate (%)
Maquiladora	21.85	26.27	31.10	38.50	+20.8
Traditional	19.83	24.14	35.45	44.50	+30.9
Industry Total	41.68	50.39	66.55	83.00	+25.8
Total Exports	51.89	60.88	79.54	98.00	+23.6
% Manuf./Exports	80.3	82.8	83.7	84.6	
% Maquila/Total	52.5	52.1	46.7	46.4	

Source: Foreign trade statistical summary, Bancomext, 1993-1996.

It should be pointed out that in recent years the traditional manufacturing industry has been the most dynamic engine of the national economy, aside from the maquiladora industry. This is a major qualitative change, since it reverses the historic trend since the mid-1980s of a more dynamic maquiladora industry. It is yet to be seen whether the new trend is confirmed; it could imply that the geographical diversification of products and markets undertaken in recent years is beginning to bear fruit.

Another significant structural change is the impressive investment of industrial trade balances for the last two years, as shown in Table 10.38.

Once again, it is clear that the traditional manufacturing industry is more dynamic, but the current surplus balance could rapidly change, given that this sector depends largely on the import of capital goods whose flow has seen a 30 percent reduction since 1994. In fact, a 17 percent upswing in productive investment is foreseen for 1997 which could lead to an increase in capital goods imports by $US 1.5 billion, an amount equivalent to the trade surplus of the traditional manufacturing industry in 1996.[42]

The boom of Mexican foreign trade since 1994 is largely due to the rapid increase of the binational commerce with the United States. The practical difficulties of accurately assessing the size of bilateral commerce from official statistics available for foreign trade are of two types:

- Temporary import and export categories are used to record both the physical movement of goods under special classifications and the value of transport equipment entering both sides of the border. It is impossible to separate this latter concept when the information is consolidated by product category and origin-destination, and this is the reason why official Mexican statistics records on foreign and binational trade are inflated as compared to American statistics.
- Records of products with origin-destination in the United States do not reflect the reality of trade exchange between both countries, since they include products whose final origin-destination is not the North American territory.

Therefore, results are not comparable between the two countries. They may even differ according to the national data source used (e.g., SECOFI and BANXICO, in the case of Mexico). Despite these difficulties, it can be estimated that U.S.-Mexico binational trade accounted for 82 to 84 percent of Mexico's overall trade in 1995, as broken down in Table 10.39.

Table 10.38
Trade Balance in the Manufacturing Industry (in $US billions)

	1993	1994	1995	1996	1993-1996 Variation
Maquiladora	+5.41	+5.80	+4.92	+5.00	-0.41
Traditional	-19.83	-24.27	+2.16	+1.40	+21.23
Industry Balance	-14.42	-18.47	+7.08	+6.40	+20.83
Trade Balance	-13.48	-18.46	+7.10	+5.80	+19.28

Source: Foreign trade statistical summary, Bancomext, 1993-1996.

[42] Source: Banamex and GEA, from 1997 Economic Policy Criteria, published by the Department of the Treasury and Public Credit (SHCP, for its acronym in Spanish), 28 November, 1996.

Table 10.39
1995 Mexico-United States Binational Trade (in $US billions)

	Reported Value	% Foreign Trade
Exports (Northbound)		
Agricultural/Mining	3.33	76.4%
Maquiladora	30.74	98.3%
Traditional Industry & Construction.	26.36	74.2%
Total Without Oil	60.41	84.9%
Oil and Oil Derivatives	6.02	73.4%
Total With Oil	66.45	83.7%
Imports (Southbound)		
Agriculture/Mining	2.29	91.2%
Maquiladora	24.40	98.8%
Traditional Industry & Construction	29.12	71.9%
Total Without Oil	55.81	81.4%
Oil and Oil Derivatives	1.41	93.4%
Total With Oil	57.22	81.8%

Source: SECOFI's foreign trade database.

The main difference compared to the data furnished by BANXICO has to do with the traditional manufacturing industry's trade balance, both overall and for bilateral trade. Likewise, the maquiladora industry's positive balance is higher according to SECOFI's official statistics.

10.8.2 Benefits of the Maquiladora Industry at National Level

Direct Jobs Generated by the Maquiladora Industry at National Level

Table 10.40 shows the main macroeconomic indicators of the national maquiladora industry, expressed in billions of 1993 constant pesos. There is a low rate of national integration, given that national suppliers contributed only 8 percent of total inputs in 1995. There is also a gradual decrease in the share of added value in overall production (less than 20 percent of the 1995 gross output value, compared to 27.5 percent in 1988).

The structure of maquiladora production activities has changed little since 1988, except in garment and other manufactures. The predominant activities are the assembly of electronic and other equipment (34 percent of output), engines and auto parts (21 percent of output), and machinery and electrical equipment (11 percent of output). Thus 75 percent of the maquiladora industry's activity in 1995 was concentrated in 5 industry sectors (out of 49 at national level).

Table 10.40
Activity of the Maquiladora Industry at National Level (Billions of 1993 pesos)

	1988	1990	1993	1995	Annual Growth (%)
Gross Value (1)	42.088	51.350	73.264	96.155	+12.4
Total Inputs	31.299	37.507	56.000	77.029	+13.6
Value Added (2)	11.561	14.454	17.264	19.126	+7.4
Total Jobs	369.489	446.436	542.074	609.309	+7.4
(1)/(2)	27.47%	28.15%	23.56%	19.89%	
% Imported Inputs	90.72	90.07	91.74	92.02	

Source: Sistema Nacional de Cuentas, INEGI, 1988-1995

In terms of direct industry-related jobs, the maquiladora industry showed a growing trend, with 609,000 permanent jobs created by the end of 1995. This is a 7.4 percent average growth rate per annum since 1988, placing the maquiladora industry as the virtually sole source of new industry-related jobs, since the traditional manufacturing industry has reduced its payrolls to levels below those of the early 1980s in some cases.

A parallel can be drawn between the personnel reduction in some traditional industrial sectors[43] and the exponential growth of direct jobs by the maquiladora industry in the same sectors. This "maquilarization" phenomenon tended to increase with the trade liberalization brought about by the free trade agreement. Thus, it is difficult to ascertain the overall balance of the binational trade in terms of net generation of industry-related jobs.

Indirect Jobs Generated by the Maquiladora Industry at National Level

In Mexico, the multiplier effect of the maquiladora industry on other activity sectors is very small. In 1995, the overall multiplier factor was 1.21 (i.e., 0.21 direct job per each direct job in this industry). This means that, at the national level, maquiladora activities generated 123,000 permanent indirect jobs. Of these, some 52,000 were for industry suppliers and 71,000 were for service providers (mainly water and power, packaging, and transportation).

Total Jobs Generated by the Maquiladora Industry

It is concluded that as a whole the maquiladora industry had generated 732,000 direct and indirect jobs by the end of 1995, a little over 3 percent of national employment and about 24 percent of industry-related employment.

INEGI's statistics on the performance of the maquiladora industry show that total direct employment amounted to 751,000 full-time jobs by the end of 1996. If the 1995 multiplier factor (1.21) is used, then total jobs generated by this industry would be 905,000 in 1996 (i.e., 3.8 percent of national employment and 31 percent of total industry-generated employment).

This means that in 1996 the maquiladora industry hit a record high in terms of payroll (+23.6 percent annual growth). It is unlikely that this pace can be sustained over several years, however. It is the perception that this industry could create between 100,000 and 125,000 direct permanent jobs per year until the year 2000.[44] Under these conditions, the number of direct jobs could reach 1.2 million by that year (1.45 million total jobs if indirect jobs are included). In other words, maquiladora would account for more than 5 percent of national employment and 45 percent of the total industry-generated employment.

These figures emphasize the extremely dynamic nature of the maquiladora industry—a fact that, in turn, has a major impact on traffic flows on both sides of the border. Likewise, it seems that the Mexican maquiladora industry is highly productive, since less than 4 percent of the country's labor force is able to generate 48 percent of Mexico's national exports, or 15 percent of 1995's estimated GDP.

10.8.3 Benefits of Binational Trade in Other Sectors at National Level

The impact of binational trade on job generation was analyzed for the following economic sectors:

- The primary sector: Agriculture and mining

[43] In such industries as lumber, yarns and garments, derivative chemistry, metal furniture, home appliances, and electronic equipment.

[44] Source: CIEMEX-WHARTON. "Analysis of the Economic Juncture in Mexico," April-May, 1997.

- The secondary sector: Traditional manufacturing industry

In every case, direct and indirect jobs (both industry- and non-industry-related) were estimated separately.

Direct and Indirect Jobs in the Agricultural and Mining Activity

These two sectors contribute only 4 percent of imports and 5 percent of total exports. Therefore, the impact of their trade with the United States in terms of employment generation is low. In 1995, direct jobs generated from binational trade in both sectors were estimated at 25,000. In turn, they generated about 30,000 indirect jobs: 13,000 for industrial suppliers (basically fertilizers, machinery and transportation equipment) and 17,000 for the transportation, storage, and financial services sectors.

Overall, with a trade value of $US 5.5 million in 1995, a total of 55,000 direct and indirect jobs were maintained thanks to binational commerce, i.e., a little over 1 percent of total employment in both sectors.

Direct and Indirect Jobs in Traditional Industry

The impact of foreign and binational trade was analyzed for each one of the 49 branches of activity that make up the Mexican industrial sector. It is estimated that in 1995 Mexican foreign trade generated approximately 665,000 direct jobs in the traditional industry, of which almost 300,000 were concentrated on the "metal products, machinery, and equipment" branch (8th Major Division). Likewise, the textile and chemical industries made a significant contribution with more than 100,000 foreign-trade-related direct jobs in each division.

Out of this total, binational trade generated and maintained 545,000 direct jobs, i.e., a little over 25 percent of the traditional industry's total labor force. These jobs generated 216,000 indirect jobs, broken down as follows:

- 73,000 for industrial suppliers
- 65,000 for transportation and storage
- 29,000 for related services
- 49,000 for other services

The effect of this industry on foreign trade is remarkably higher than that of the maquiladora industry (overall multiplier factor of 1.40). Hence, even though its export rate to the United States is identical to that of the maquiladora industry, the traditional industry shows a more positive total employment balance (761,000 compared to 732,000).

Table 10.41 summarizes 1995 figures in thousands of jobs. The binational trade with the United States generated 1,565,000 direct and indirect jobs, i.e., 6.8 percent of national employment, and about 45 percent of total industry-related employment (traditional industry + maquiladora

Table 10.41
Overall Benefits of Binational Trade at National Level (1995)

Industry-Related Jobs	
Maquiladora-Generated Direct Jobs	609
Maquiladora-Generated Indirect Jobs	52
Traditional Industry-Generated Direct Jobs	545
Traditional Industry-Generated Indirect Jobs	73
Indirect Jobs in Other Sectors	13
Total Industry-Related Jobs	1292
Nonindustry-Related Jobs	
Transportation and Storage	116
Transport-Related Services	47
Financial and Professional Services	68
Direct and Indirect Jobs in Other Sectors	42
Total Nonindustry-Related Jobs	273
Total Binational Trade	**1565**

industry). These numbers are akin to the macroeconomic significance of commerce with the United States which accounted for over 20 percent of Mexico's GDP in 1995.

Table 10.42 shows a comparison between the United States and Mexico.

The socioeconomic impact of binational trade is much higher in Mexico, as less than 0.5 percent of the U.S. labor force depends on trade with Mexico. Furthermore, the structure by type of employment is radically different. In Mexico, the largest impact is on the industrial sector (1,292,000 direct and indirect jobs), compared with only 320,000 permanent industry-related jobs in the United States.

In terms of non-industry-related jobs, the impact of binational trade is similar for both countries; however, they are not in the same type of activities. Mexico's concentration of non-industry-related jobs is in cartage and storage. As seen in Table 10.41, the Mexican transportation sector is highly benefited by binational commerce, as a little over 36 percent of total jobs in the carrier industry are for binational trade.

In contrast, cartage and storage activities play a lesser role in the United States (only 30,000 jobs); however, the United States controls the chains of logistics companies which interconnect both countries. In fact, American services related to binational trade have the highest added value (with 114,000 total jobs), while these market segments are relatively newer in Mexico.

Table 10.42
Jobs Supported by the Binational Trade in 1995

	United States	Mexico
Industry-Related Jobs	**320**	**1,292**
Maquiladora Industry		661
Non-Industry-Related Jobs	**261**	**273**
Transportation and Storage	30	116
Transport-Related Services	95	47
Financial and Professional Services	19	68
Other Sectors	117	42
Total	617	1,607
% Total Employment	**0.5%**	**6.8%**

In short, an analysis of the socioeconomic impact of binational trade between the two countries leads to the following overall conclusions on jobs in the United States and Mexico:

Socioeconomic	United States	Mexico
Overall Impact	Marginal	Moderate
Regional Impact	Variable	Significant
Multiplier Effect	Moderate-High	Low
Degree of Specialization	Related Services	Maquila, assembly, and cartage

10.9 Benefits of Binational Trade on Border States

10.9.1 Importance of Binational Trade in the Border States' Foreign Trade

The National Bank of Foreign Trade's (BANCOMEXT) statistics do not break down foreign trade results by federal agencies. However, they do record foreign trade operations with the United States, which constitutes a valuable source of data in addition to SECOFI's.

Within the scope of this study, the most significant topic is monetary and physical flows of binational trade crossing the U.S.-Mexico border. Another major point is to identify the participation of each individual Mexican border state in the generation of these land flows of foreign trade.

Therefore, historical series of binational trade published by BANCOMEXT were considered only to detect possible inconsistencies with SECOFI's database and to correct them.[45] The analysis by federal agency was conducted based on SECOFI's data collected for Task 8. Likewise, air and maritime foreign trade movements with the United States were identified, since these binational trade flows do not cross the northern border.

Table 10.43 summarizes data compared for 1995.

It should be noted that, in 1995, 58 to 63 percent of binational trade flow (excluding oil and oil derivatives) occurred with the six Mexican border states. This means that nearly 68 percent of trade flows were concentrated through the U.S.-Mexican Border. Likewise, they accounted for 52 percent of total Mexican exports and 47 percent of total imports, during the same year.

Table 10.43
U.S.-Mexico Trade Through the Northern Border (in $US billions - 1995)

	Binational	Border	Border States	% Binational
Exports (Northbound)				
Agricultural/Mining	3.33	2.80	1.79	53.8
Maquiladora	30.74	30.72	29.27	95.2
Traditional Industry & Construction.	26.36	21.19	6.77	25.7
Total Without Oil	60.41	54.71	37.83	62.6
Oil and Oil Derivatives_	6.02	0.26	0.26	4.3
Total With Oil	66.45	54.97	38.09	57.3
Imports (Southbound)				
Agriculture/Mining	2.29	1.50	0.69	30.1
Maquiladora	24.40	23.47	22.92	93.7
Traditional Industry & Construction	29.12	23.69	8.74	30.0
Total Without Oil	55.81	48.66	32.35	58.0
Oil and Oil Derivatives	1.41	0.65	0.39	27.7
Total With Oil	57.22	49.31	32.74	57.2

Source: SECOFI's foreign trade database.

The share of border states in binational trade through the Northern Border varies between sectors. It is almost nonexistent for oil products and relatively modest for traditional manufactured goods,

[45] Specifically, SECOFI's statistical series differ from BANCOMEXT's in oil and oil derivative foreign trade data. They also differ in the way they account for temporary imports and exports by type of product. In the former situation, consistency was sought by comparing data available with Pemex Proceedings. In the latter, observed differences were of a lesser degree, and they can be included with the declared value for bonds of transportation equipment entering both sides of the border.

compared to their relative significance in the country's industrialization process. In contrast, the share of these states is very high for commodities (agricultural and mining products), and they are predominant in the maquiladora industry.

10.9.2 Benefits of the Maquiladora Industry in the Border States

The maquiladora industry is a major industrial activity in foreign trade, in at least four of the border states and in the six case study municipalities. A relatively complete set of information is available for the 1988-1995 period.

Direct Jobs Generated by the Maquiladora Industry in the Borderland

The main macroeconomic indicators of the northern border maquiladora industry (expressed in billions of 1993 constant pesos) are shown in Table 10.44.

Rapid growth is noted in the maquiladora industry in the border municipalities, while geographical diversification outside the border area moves relatively slowly. Likewise, direct job generation grew steadily; consequently, border cities have the lowest unemployment rates in Mexico.

A continuous decrease in the rate of national integration is also noted. If the domestic intermediate consumption of energy and transportation is subtracted from the equation, the share of domestic suppliers in the provision of raw materials or inputs for purposes of production ranges from 1.5 to 1.8 percent of total supplies. Furthermore, the added value portion of the total output value has been decreasing since 1993. This phenomenon can be ascribed to the development of high-tech sectors importing large quantities of inputs not likely to be purchased domestically, such as the automobile, electronics, and electric assembly industries, rather than to the increased cost of imported inputs.

Table 10.45 shows the distribution of the gross production value and direct jobs by branch of activity. Additional detail is provided in the Appendix.

Table 10.44
Activity on the Northern Border Maquiladora Industry (Billions of 1993 Pesos)

	1988	1990	1993	1995	Annual Growth (%)
Gross Value (1)	33,506	39,917	55,442	82,531	+13.7
Total Inputs	27,584	32,107	46,147	72,402	+14.7
Value Added (2)	5,922	7,810	9,295	10,129	+7.9
Total Jobs	278,850	340,722	388,348	436,355	+6.6
(1)/(2)	17.67%	19.56%	16.77%	12.27%	
% Imported Inputs	20.95	90.30	91.05	92.58	
% National Total					
Gross Value	80.92	79.29	81.01	77.28	
Jobs	73.50	73.58	72.53	73.72	

Note: The data on direct jobs mentioned here refers only to border municipalities studied (6 POEs). This is why total jobs differ from those stated later in this report.

Source: Sistema Nacional de Cuentas, INEGI, 1988-1995

Table 10.45
Distribution by Sectors of the Borderland Maquiladora Industry (%)

	1988 Gross Production Value	1988 Jobs	1995 Gross Production Value	1995 Jobs
Food	0.85	1.27	0.64	0.67
Textiles	4.02	7.46	3.43	6.20
Leather and Shoes	0.97	0.02	0.46	0.02
Furniture	6.16	6.54	6.50	7.73
Chemicals	0.34	0.43	1.71	2.68
Non-Electrical Equipment	2.03	1.80	1.34	1.30
Electrical Equipment	55.52	43.08	50.98	42.42
Transportation Equipment	28.94	27.52	24.63	23.15
Other Manufacturing	0.99	6.85	9.12	12.02
Services	0.18	5.03	1.19	4.21

Source: Sistema de Cuentas Nacionales, INEGI, 1988-1995

A greater concentration in the maquiladora industry compared to the national level is seen in two main subgroups: (1) electrical and electronic equipment; and (2) auto parts. A marginal diversification trend is also noticeable in the relative growth sectors such as metal furniture, chemicals, and other manufactures (toys, sports goods).

These characteristics are also seen at the national level, although the first two subgroups are not as heavily represented. This indicates that electrical, electronic, and auto equipment transnational corporations have concentrated their production units as close as possible to the northern border to facilitate their overall logistical management.

In the future, a more marked geographical diversification is likely to be seen inland, partly because establishment costs close to the borderland will increase rapidly (land, water supply, roadways). State by State employment statistics indicate that this phenomenon is already taking place. In terms of the gross output value, inland areas of Mexico have been increasingly dynamically in 1995, and the same is true for 1996.

A more detailed analysis by border state shows the following:

- 95 to 98 percent of maquiladora exports are concentrated in the six border states. In turn, more than 97 percent of these exports go to the United States.
- The states of Chihuahua and Baja California have, respectively, 40 percent and 25 percent of the nation's maquiladora activity, way ahead of Tamaulipas and Sonora. However, two states where this industry started more recently (Nuevo Leon and Coahuila) show accelerated growth of the maquiladora industry.
- In terms of direct jobs, the same order of importance among border states is maintained. As a whole, border states had 529,000 maquiladora industry-related jobs, i.e., 87 percent of direct jobs in this sector nationwide, at the end of 1995.

Indirect Jobs Generated by the Maquiladora Industry in the Borderland

If the same multiplier factor is used as for the national level, it can be estimated that, in 1995, 109,000 indirect jobs were generated, of which 46,000 correspond to industry suppliers and 63,000 to sundry service providers.

Table 10.46
Jobs Generated by the Maquiladora Industry (in thousands)

	Direct Jobs	Indirect Jobs	Total
Chihuahua	224	53	277
Baja California	142	22	164
Tamaulipas	79	19	98
Nuevo Leon	31	6	37
Sonora	29	5	34
Coahuila	24	4	28
Total Borderland	529	109	638
Total Nationwide	609	123	732
% Borderland/Nationwide			**87.0%**

Total Jobs Generated by the Maquiladora Industry in the Borderland

The total number of permanent jobs generated by the maquiladora industry in the six border states in 1995 was 638,000. Statistical information for 1996 is not complete since INEGI's data for the border municipalities is published belatedly. However, due to the lower activity level in the border maquiladora industry vis-à-vis inland industry, it can be estimated, based on partial data gathered in Chihuahua and Baja California that the maquiladora industry's payroll probably increased 18 percent to 20 percent in 1996. Therefore, direct employment could have reached 635,000 permanent jobs and total employment 768,000 jobs by year end.

The distribution of direct, indirect, and total jobs by border state for 1995 is shown in Table 10.46.

The proportion of total jobs in the states of Baja California and Chihuahua is even greater than their relative share in the output of the national maquiladora industry. However, it is likely that in the short term, a new balance will be established among border states, given the strong growth in Coahuila and Nuevo Leon, and, to a lesser degree, in Tamaulipas.

Jobs Generated by the Maquiladora Industry in the Case-Study Border Municipalities

Using COLEF's methodology described in the Task 14 report for the 1988-1995 period, the share of the maquiladora industry in local job generation can be determined for the six POE case studies. The analysis, however, was limited to direct and indirect jobs generated by those sectors directly supplying maquiladora plants. Consequently, figures resulting from urban services benefiting from the economic boon of the maquiladora industry's workers and their local suppliers are not included in Table 10.47.

Table 10.47
1988-1995 Job Generation of the Maquiladora Industry in the Case Study Border Municipalities (1,000s)

	1988			1995		
	Direct	Indirect	Total	Direct	Indirect	Total
Ciudad Juarez	111	26	137	142	33	175
Tijuana	50	8	58	89	14	103
Matamoros	32	7	39	41	9	50
Nogales	23	4	27	21	4	25
Nuevo Laredo	11	3	14	16	4	20
Piedras Negras	7	1	8	10	1	11
Total	234	49	287	319	65	384
Multiplier Effect			1.23			1.20

Source: Colegio de la Frontera Norte, Tijuana, 1987-1989 and estimates for 1995

The local impact of the maquiladora industry is remarkable, especially in Ciudad Juarez and Tijuana, and also in Matamoros and Nogales. In 1995, the share of job generation at the municipal level was as follows:

Ciudad Juarez:	51.6%
Tijuana:	33.4%
Matamoros:	39.1%
Nogales:	63.5%
Nuevo Laredo:	19.0%
Piedras Negras:	29.7%
Average for the six POEs:	40.4%

10.9.3 Benefits of Binational Trade on Other Sectors in the Border States

Direct and Indirect Jobs in Agricultural and Mining Activity

Out of the total 55,000 direct and indirect jobs generated in 1995 by binational trade in the agricultural and mining sectors, 25,000 are located in the six border states (47 percent). This high share is due to the mining tradition in the northern part of the country, as well as the major agricultural output in the states of Sonora, Chihuahua, and Coahuila.

Although the contribution of these two sectors is marginal, it has a significant multiplier effect on employment, since direct jobs related to binational trade only account for 11,000 permanent positions. Indirect jobs are concentrated in the fertilizer and machinery sectors (10,000 indirect jobs) and transportation and storage (approximately 4,000 indirect jobs).

Direct and Indirect Jobs in Traditional Industry

In 1995, Mexican foreign trade generated close to 156,000 direct jobs in the traditional industry sector of the six border states, or a little over 23 percent of total industry-related jobs.

In contrast to the maquiladora export industry, the two states with the longest industrial tradition are predominant for these types of jobs, especially in the metal fabrication industry. Nuevo Leon and Coahuila have 53 percent of the traditional industry jobs generated by foreign trade in the border cities. Likewise, almost 90 percent of these foreign trade activities are with the United States through the northern border.

Thus, it may be estimated that binational trade encouraged the creation and maintenance of 141,000 direct jobs in the traditional industry at the borderland, i.e., 21 percent of the total industry-related employment. In addition, these jobs generated around 58,000 indirect jobs in 1995, distributed as follows:

- 25,000 jobs for industrial suppliers
- 17,000 jobs for transportation and storage
- 7,000 jobs for related services
- 9,000 jobs for other services

As was seen at national level, the effect of the traditional industry's foreign trade on indirect-job generation in the six border states is considerably higher than that of the maquiladora industry (overall employment multiplier factor of around 1.40).

Table 10.48
Jobs Generated by the Traditional Industry (in thousands)

	Direct Jobs	Indirect Jobs	Total
Chihuahua	14	4	18
Baja California	23	8	31
Tamaulipas	20	7	27
Nuevo Leon	49	25	74
Sonora	11	4	15
Coahuila	24	10	34
Total Borderland	141	58	199
Total Nationwide	545	216	761
% Borderland/Nationwide			**26.0%**

Table 10.48 summarizes the information regarding job generation in the traditional industries for each of the border states. The numbers illustrate the predominance of border states having the longest industrial tradition.

10.9.4 Total Benefits of Binational Trade in the Border States

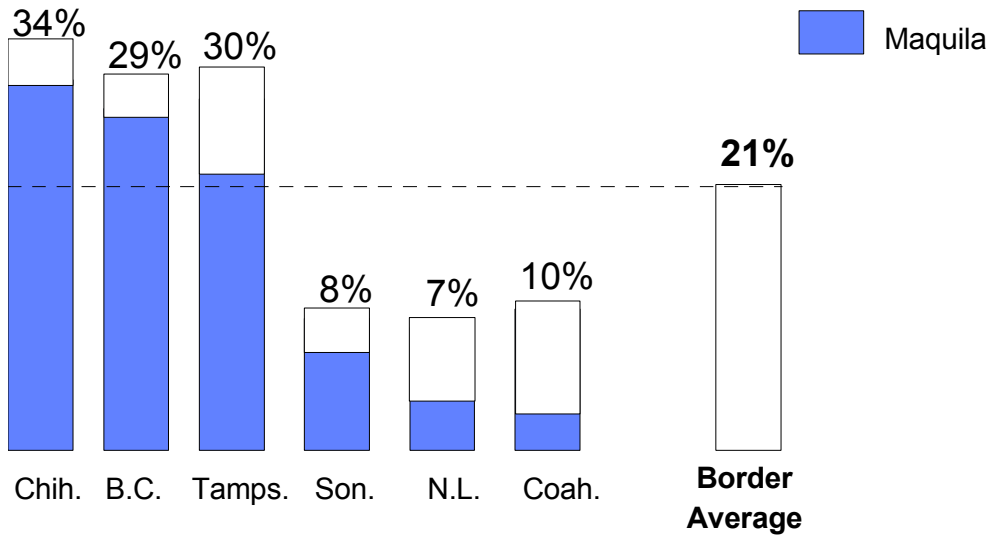
From the foregoing analysis it may be inferred that the overall impact of binational commerce on borderland economies is represented by 862,000 direct and indirect jobs, broken down as follows:

- Total agriculture and mining = 25,000 jobs = 3% of benefits
- Total maquiladora industry = 638,000 jobs = 74% of benefits
- Total traditional industry = 199,000 jobs = 23% of benefits

The high contribution of the maquiladora industry within the border states' economies indicates that benefits in terms of binational trade-generated jobs make up a significant portion of local employment in three of the six states studied, as shown in Figure 10.8.

Also, it is to be noted that binational trade accounts for almost 21 percent of total employment for the six border states, while its contribution to national employment is less than 7 percent. By the same token, even the lower impact seen in Coahuila, Nuevo Leon, and Sonora is still higher than the national average.

Figure 10.9
Share of Binational Trade in the Generation of Employment in Border States



10.10 Border Costs of Binational Commerce

Cost-benefit analyses, both of individual projects and of any set of infrastructure projects, call for a rigorous definition of reference costs. In fact, what may be considered a cost of binational trade for users of the various POEs very often coincides with tangible local benefits (e.g., employment in services related to cargo breakbulk at the border). Consequently, any improvement may entail an economic benefit for the users of infrastructures and logistics services and a "social cost" for the local economies through the possible loss of employment or toll revenues.

Three major categories of costs affecting financial agents involved in binational trade flows may be distinguished:

Border Transaction Costs. These consist of a series of fixed or negotiated fees for each logistical service at the border and various implicit costs resulting from the way in which ports of entry (POEs) operate, e.g., delays, penalties for overtime, etc.

Costs to Preserve Current Infrastructure. These are the costs of consumption (deterioration) of access bridges and roads to each POE, as well as other issues to be considered in the technical-economic analyses of new infrastructure projects.

Social Costs of Binational Trade. Since most POEs are located in urban areas, the constant movement of heavy vehicles and railroad cars is detrimental to the local community due to congestion, noise levels, accidents, etc.

Each of these costs result from different causes, and may involve a variety of sources or situations. Knowledge of border service costs facilitates the detection of anomalous situations (e.g., monopolistic fees) that can be corrected. Nevertheless, avoidable costs depend on the interplay of market forces between suppliers and users of logistical services. Therefore, public authorities have very little room for action outside the regulating framework which establishes general conditions for economic competition.

The same situation does not hold true for delay costs which, in most cases, do not result in the payment of actual fees, but which do represent a specific "inefficiency cost" at each POE. These costs are related to the physical capacity of the existing infrastructure and/or the way the crossing point is operated. Some of these costs can be avoided. Therefore, if accurately estimated, they can become useful instruments not only to quantify the benefits of future projects, that would solve some of the existing problems in the current use of the infrastructure, but also because they have to be determined on a case-by-case fashion in order to establish criteria for accepting or rejecting new projects. In other words, determination of these costs is directly related to the transportation planning process, since the first priority for any government transportation authority is to define and select viable infrastructure projects.

The same holds true for infrastructure deterioration costs, as they have to be benchmarked against the available budget. Therefore, a detailed analysis of financing possibilities is mandatory either within or outside the budget (recovery fees, shared risks, etc.).

Finally, learning about social costs associated with each POE's current operation helps in determining the possible environmental impact (in the broadest sense of the word) of any new project. Again, this is a significant factor for purposes of cross-border transportation and logistics planning.

Table 10.49
Economic and Social Cost Factors of Binational Trade

Border Costs	• Costs for services • Costs for delays
Infrastructure Maintenance	• Highways • Bridges
Social Costs	• Traffic Congestion • Pollution, etc.

Table 10.49 lists the costs that need to be identified and quantified for an overall cost-benefit analysis. Within the framework of this report, current border costs related to land transportation of merchandise between Mexico and the United States are discussed in this section. Costs for infrastructure maintenance (highways and border bridges) are also analyzed. However, the social costs related with the Binational Trade are not estimated, on the Mexican side, as general economic information on these specific topics is not so extensive as in United States, both at national and border states level.

10.10.1 Border Costs of Railroad Transportation of Cargo

Cost and Rate Structure in Cross-Border Movements

The Task 14 report discusses in detail the results of a market research study conducted among major users and customs brokers working in four of the six case study POEs. Table 10.50 shows the main findings of this market research, with regards to cost and rate structure in railways cross-border movements.
Whatever the type of movement (traditional or preprocessed), relatively high costs and fees are the norm for railroad imports from the United States. On the contrary, for exports to the United States, railroad transportation is much more economical than motor transportation.

Surcharges are levied on (southbound) railroad imports for various reasons, including:

- High customs user fees (0.79 percent ad valorem) in addition to the fees charged by Mexican customs brokers (also on a percentage basis).
- Very high daily (per diem) rail car fees by American freight forwarders.[46]
- Lack of coordination among regulating authorities. For example, agricultural imports are subjected to plant health controls and possible car fumigation, even though the Mexican importer has complied with all necessary formalities on the American side.
- Delays in border crossings for a large proportion of cars resulting from paperwork processing times, and especially from schedule restrictions on the use of border infrastructure (night crossings).

[46] Before 1981, agreements similar to those used for domestic transportation within the United States existed between railroad companies on both sides of the border (charges of five to ten US dollars per day per car). Due to numerous delays in payment by FNM, the rules were changed, and now a flat rate is charged directly to the Mexican importer, ranging from 50 US dollars/car in the border strip to 150 US dollars/car for cargo going to the central part of the country and 250 US dollars/car for cargo going to the south and southeast areas. Even though some major users manage to negotiate rates based on mileage, charges may be up to three times higher than those charged between railroad companies in the United States.

Table 10.50
Railroad Border Costs and Rates (1995)

	$US /car	
	Imports (Southbound)	**Exports (Northbound)**
Border services in United States	$115 - 266 +0.25% ad val.	$20 - 25
(of which *per-diem*)	(100 - 250)	
Border Services in Mexico	$15 - 44 +0.79% ad val.	$14 - 16 +0.53% ad val.
Total	**$130 - 310** **+1.04% ad val.**	**$34 - 41** **+0.53% ad val.**

Source: La Empresa, based on border services market study

Border Transaction Costs

Using FNM's statistics on car flows at each POE and using SECOFI's data on the value of railroad-borne merchandise, it was determined that for 1995 overall railroad border transaction costs ranged from $127 ($U.S.) million per year to $159 ($U.S.) million per year, summarized in Table 10.51.

Figures 10.10 and 10.11 shows that up to 56 percent of the railroad costs experienced at the border are concentrated in Nuevo Laredo, and that three crossings (Nuevo Laredo, Matamoros, and Piedras Negras) accounted for 86 percent of total costs in 1995. Per diem and delay costs account for up to 33 percent of border railroad costs, indicating a broad margin for cost reduction on the import side.

Avoidable Costs

The methodology for assessing avoidable costs at the border, both for imports and exports, is discussed in the Task 14 report. The main hypotheses are a reduction in per diem fees to an average of $100 ($U.S.)/car (at present, the going rate is $150 ($U.S.)/car), a reduction of import costs (D.T.A. customs users fees), and the reduction of border service costs through the introduction of differential rates for preprocessed shipments (PITEX and ALTEX).

Based on current unit costs, avoidable costs would then be within the range of $46 to $59 million ($U.S.)/year, i.e., 36 to 37 percent of total border costs. It should be clear that these estimates are hypothetical, since per diem car use costs could be lowered even more if they were to be made compatible with commonly charged U.S rates or fees charged for cross-border movements between the United States and Canada.

Table 10.51
Railroad Border Transaction Costs (1995)

	$US Millions/Year	
	Imports (Southbound)	**Exports (Northbound)**
Border services	$44.0 - 47.1	$58.8 - 59.8
Daily car use fees	17.8 - 44.1	
Delays at the crossing	4.4 - 5.0	2.4 - 2.7
Total	**$66.1 - 96.2**	**$61.3 - 62.5**
Cost/car ($US)	375 - 546	380 - 387

Figure 10.10
Railroad Border Logistic Costs by POE´s (1995)

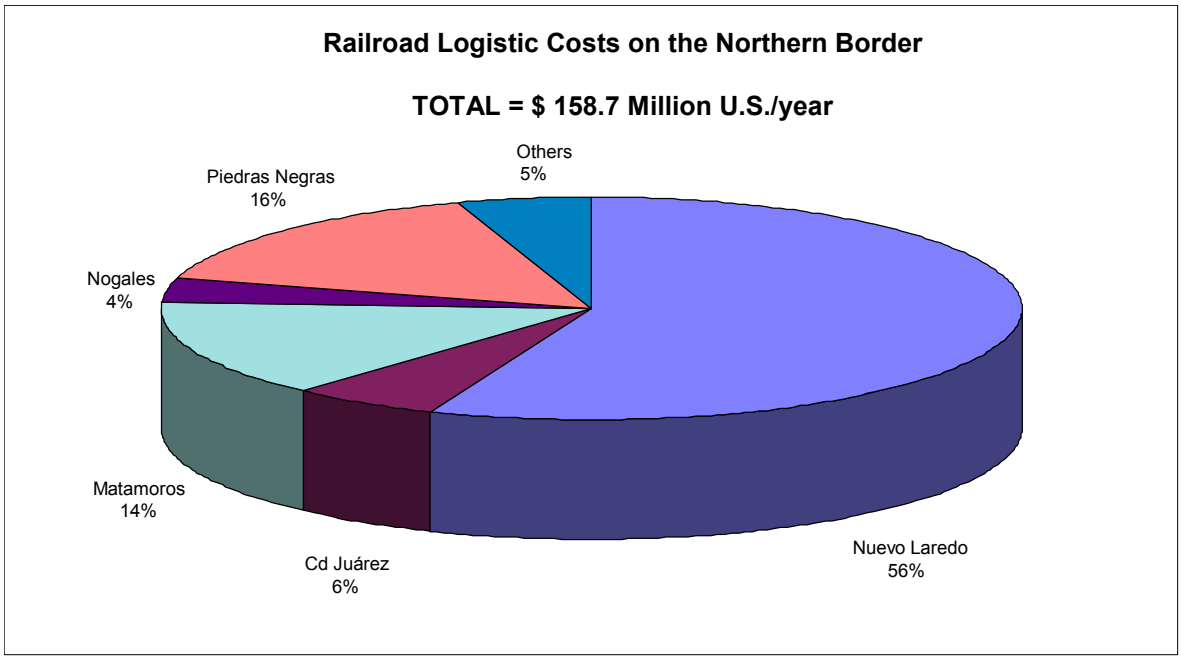
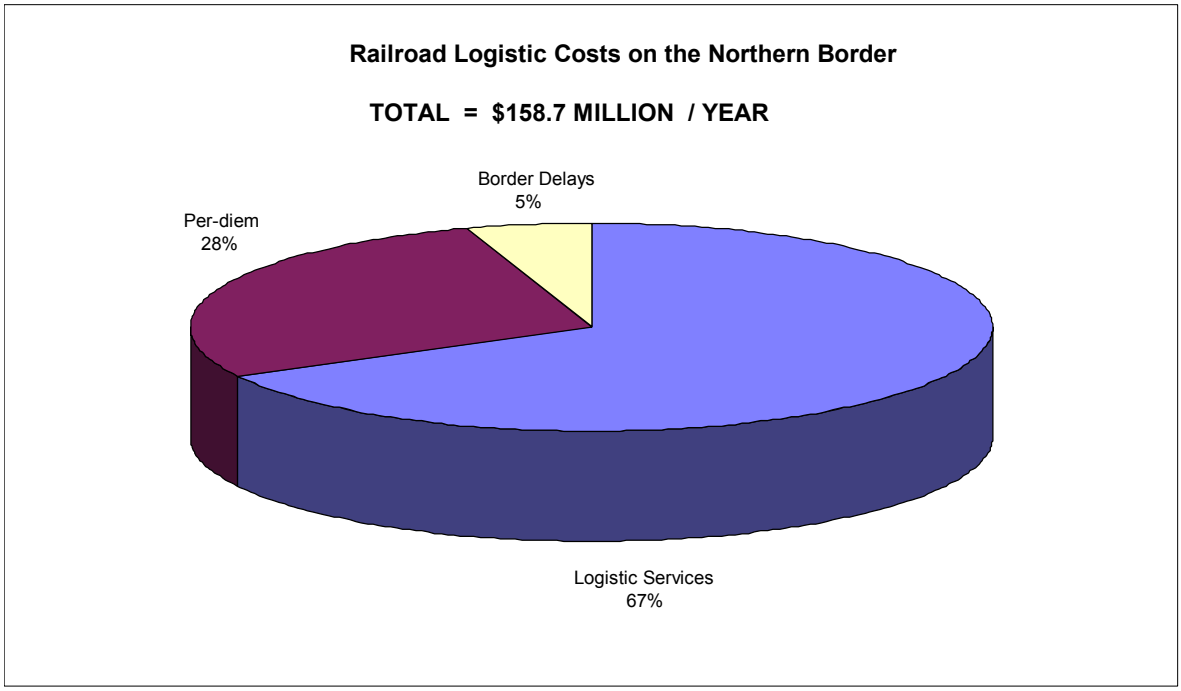


Figure 10.11
Railroad Border Logistic Costs by Category of Costs (1995)



Moreover, even though per diem fees are significant, the largest cost-reduction potential for railroad costs at the border is in related costs—specifically, customs broker costs which are incurred on both sides of the border, and costs for truck maneuvers (trailer drayage) and cargo relocation at the border crossings. Delay costs have a relatively small potential for reduction as these costs are not very significant compared to the overall border transaction costs, as shown below in Figure 10.12.

Cost and Rate Structure in Cross-Border Movements

In contrast with the railroad situation, rates and costs for border services related to motor carrier transportation are highly diversified both by POE and type of movement. Table 10.52 shows the main results obtained from the border services market research.

Rates charged for preprocessed shipments (maquiladora, PITEX, ALTEX) are significantly lower than traditional import and export rates. Furthermore, in this case rates and costs charged in Mexico tend to be similar to those incurred in the United States.

In the six POEs studied, surcharges levied on the Mexican side are only 12 to 15 percent higher than those levied on the U.S. side. Moreover, certain services are considerably less expensive in Mexico (maneuvers, tranfers in Nuevo Laredo and Colombia, etc.). Nonetheless, there is room for significant cost reductions at the border.

Figure 10.12
Railroad Avoidable Costs on the Border (1995)

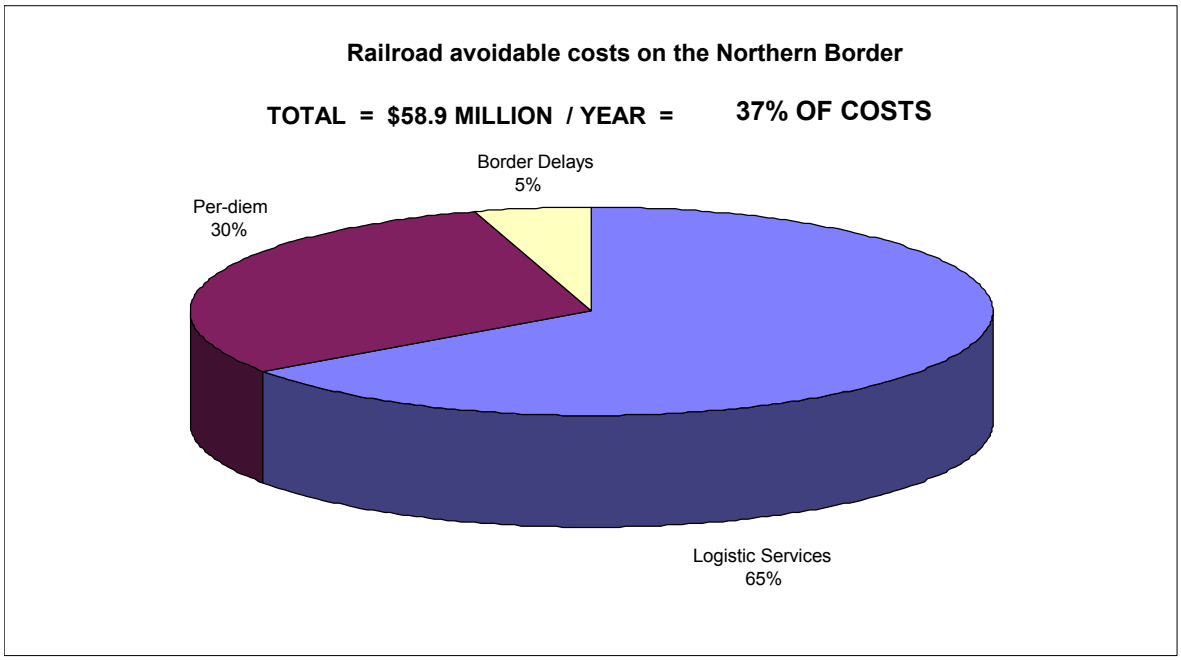


Table 10.52
Border Costs and Rates for Motor Carrier (1995)

	$US /Truck	
	Imports (Southbound)	**Exports (Northbound)**
Border services in United States	$165 - 200 +0.30-0.45% ad val.	$75 - 115
Border Services in Mexico	$3 - 14	$104 - 134 +0.13-0.18% ad val.
Total	**$168 - 214 +0.30-0.45% ad val.**	**$179 - 249 +0.13-0.18% ad val.**

Source: La Empresa, based on border services market study

10.10.2 Border Costs of Motor Carrier Transportation

Motor carrier transportation on both sides of the border also bears sizable costs as a result of delays. Southbound (Mexican imports), once the truck trailer has left the custom's broker yard, the most critical problem is due to delays in the Mexican customs compounds. The average inspection times for inspected trucks are greater than those in the U.S. In some cases, there are space limitations in the compounds (namely Nuevo Laredo, Piedras Negras, and Nogales).

Even though there are no restrictions in the physical facilities (at crossing points and check points) for northbound trucks (Mexican exports), traffic lines are erratic and inconsistent, especially in Nuevo Laredo and Ciudad Juárez (see Task 9, "Case Studies"). In most cases, overcrowded lines result from underutilized capacity (several lanes closed). This leads to significant delay costs affecting the overall vehicular flow.

In short, although border service rates tend to be similar for both northbound and southbound truck movements, a certain degree of asymmetry still exists as a result of different styles of operation at each crossing. This, in turn, leads to differences in surcharges borne by cargo motor carriers (and ultimately shippers) on both sides of the border. This is in total contrast to the railroad situation since, at the present time, Mexican exports by motor transport suffer more as a result of border crossing delays than do railcar exports.

Border Transaction Costs

Based on several statistical reports on the flow of cargo trucks through the POEs[47] and taking into account the value of goods carried by motor transport as reported by SECOFI, it was determined that in 1995, overall border transaction costs for motor carrier (truck) transportation ranged from $1.218 billion ($U.S.) to $1.548 billion ($U.S.) per year, broken down as shown in Table 10.53.

These overall figures cover a wide range of situations. Thus, in the extreme case of Nuevo Laredo, delay costs (northbound) account for 17 percent of border costs, compared with 7 to 9 percent at the most in other POEs. Also, these delay costs do not include the time consumed by

[47] Federal Toll Highways and Bridges (CAPUFE, Caminos y Puentes Federales), Secretariat of the Treasury and Public Credit (SHCP, Secretaría de Hacienda Crédito Público), and Origin-destination and weight-dimension studies from the Secretariat of Communications and Transportation (SCT, Secretaría de Comunicaciones y Transporte).

the truck trailers as they are exchanged from long-haul truck carriers to border transfer (drayage) carriers, or time expended at customs broker yards.

Table 10.53
Motor Carrier Border Transaction Costs

	$US Millions/Year	
	Mexican Imports	**Mexican Exports**
Logistics services	$581.0 - 661.7	$575.4 - 742.6
Crossing Delays	17.0 - 42.6	29.4 - 76.6
Delays at the compounds	9.2 - 15.0	5.5 - 9.6
Total	**$607.7 - 719.3**	**$610.3 - 828.8**
Cost/vehicle ($US)	$246 - 292	$215 - 293

Likewise, the aforementioned unit costs are not directly comparable with railroad costs, since in 1995, average cargo weight per truck [48] (of all sizes), based on SECOFI data, was 12 tons (with a maximum of 17 tons for exports through Nogales), whereas average cargo weight per railroad car was 48 tons (with a maximum of 69 tons for imports through Piedras Negras).

Therefore, the average unit cost would be $17 to $24 ($U.S.)/ton of actual cargo for motor transportation and $8 to $12 ($U.S.)/ton of actual cargo for railroad. Nevertheless, these overall results need to be considered with caution, as there are significant variations by type of movement, and the average value of railroad-carried goods is much lower.

Overall, motor carrier border costs are more evenly distributed among the different POEs than railroad costs, as shown below in Figures 10.13 and 10.14. Nuevo Laredo accounts for up to 33 percent of these costs, and 62 percent of total costs are concentrated at the three largest crossings (Nuevo Laredo, Tijuana, and Ciudad Juarez). By the same token, average delay costs are less than 10 percent of total border transaction costs when two-way cargo movements are considered.

Avoidable Costs

It is likely that rates and average costs for border services will decrease even further as preprocessing practices become more widespread. In order to estimate avoidable costs in this area, it was assumed that the difference between service costs for imports and exports would gradually decrease until reaching the lowest export rates.

Likewise, it could be reasonably hypothesized that the most critical crossing times could be reduced by about one hour per truck and that customs inspection times on the Mexican side could decrease by one to two hours. Finally, it is expected that transfers (trailer drayage) will tend to disappear in Nuevo Laredo and Colombia.

Under these plausible conditions, border costs ranging from $526 to $806 million ($U.S.)/year could be saved, i.e., 43 to 52 percent of current costs. Similar to railroad transportation, the highest avoidable costs are for border services (mainly customs brokers and transfers of cargo -- see Figure 10.15).

[48] Section 10.4.9 reported the average payload for equivalent 5-axle trucks to be 12 tons. The 10 ton calculation reflects the inclusion of two-and three-axle trucks used for transporting smaller payloads.

Figure 10.13
Motor Carrier Border Logistic Cost by POE´s (1995)

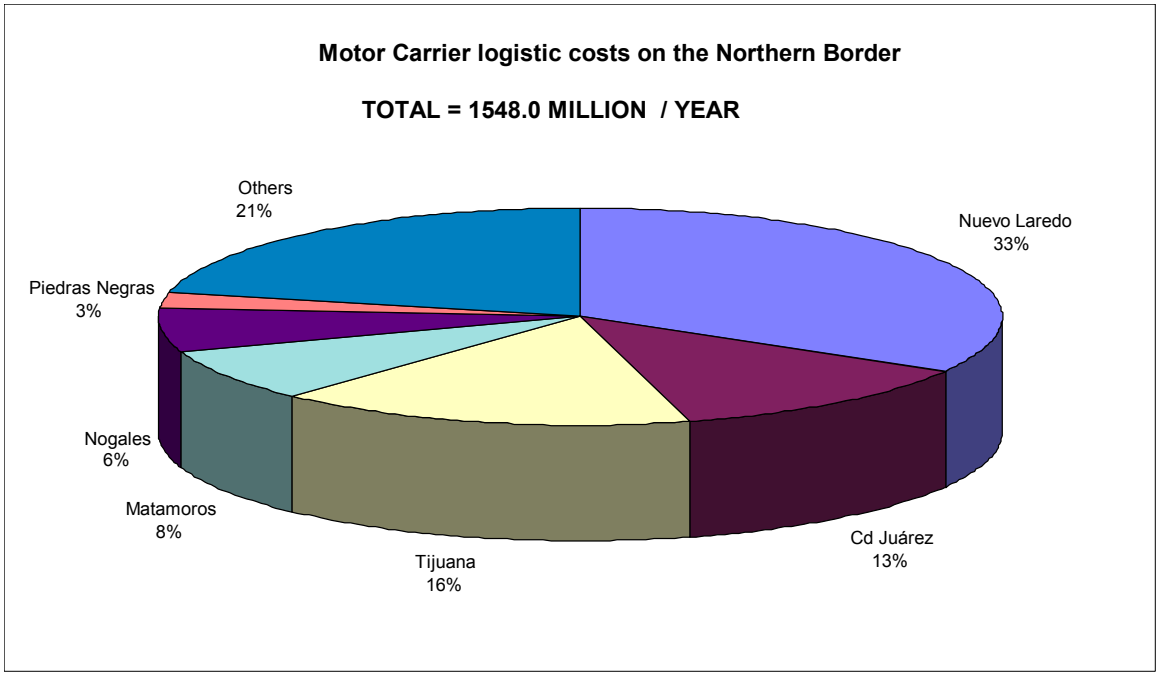


Figure 10.14
Motor Carrier Border Logistic Cost by Category of Costs (1995)

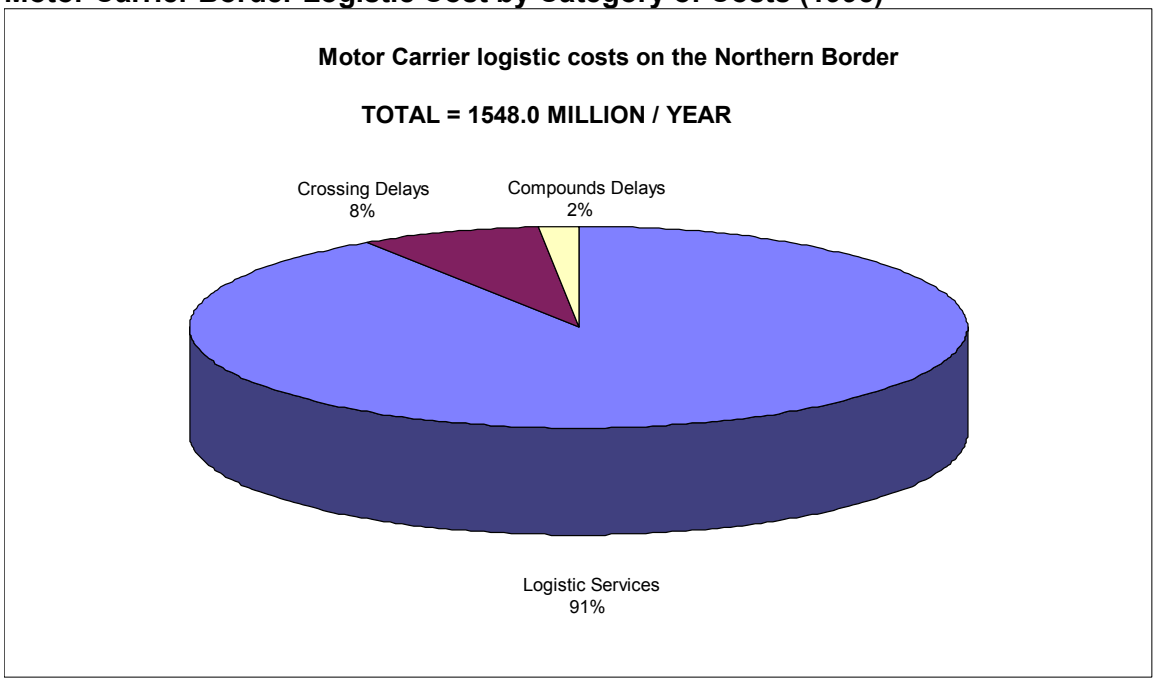
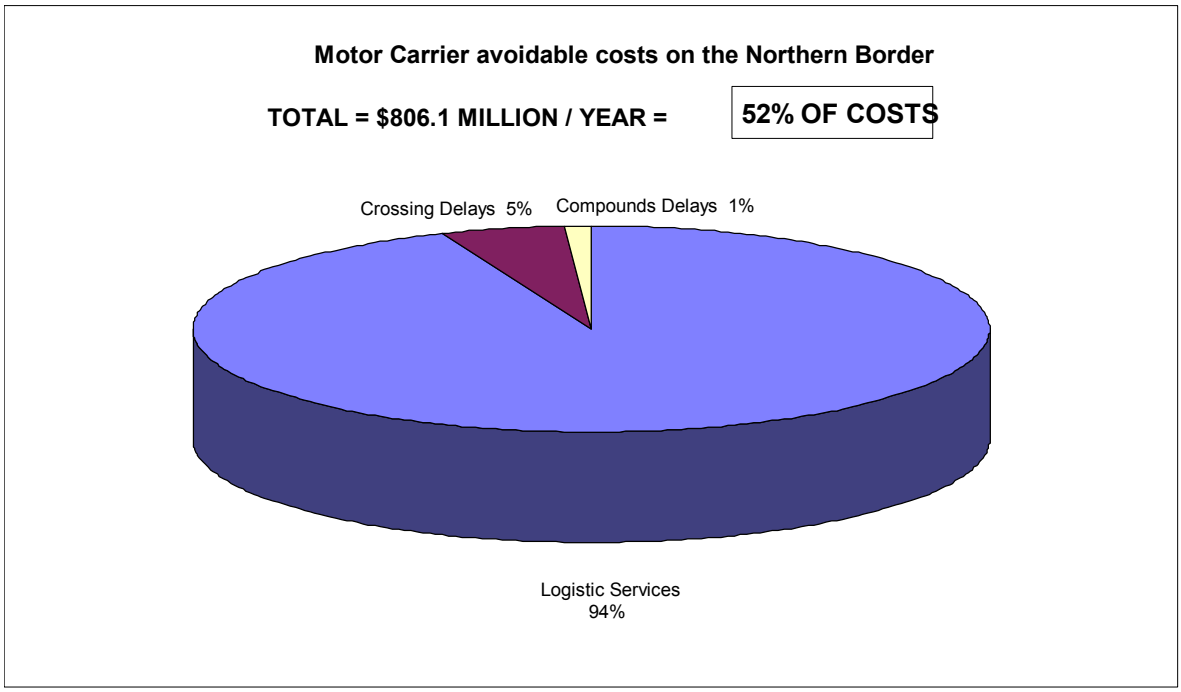


Figure 10.15
Motor Carrier Avoidable Costs on the Border (1995)



10.10.3 Total Border Costs

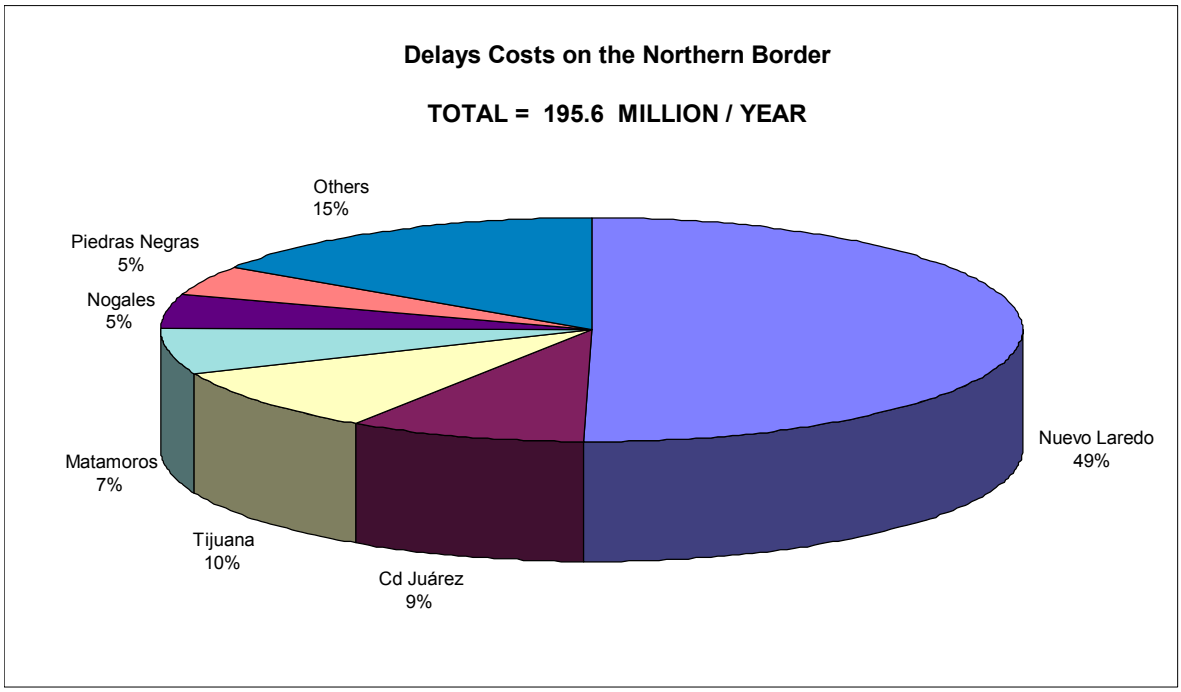
Overall Costs

Overall border transaction costs (border services plus delays and per diem fees) have been estimated as ranging from $1.345 to $1.673 billion ($U.S.) in 1995. Cargo motor transportation accounts for 88 percent of the total.

As a result of its significance in the cross-border cargo movement and its difficult operational conditions at the present time, 36 percent of total costs are incurred at Nuevo Laredo. The second POE in importance would be Tijuana (15 percent), followed by Ciudad Juarez (12 percent). This is the same order as seen for motor transport alone, which seems normal, given the predominant weight of this mode of transportation in the binational trade flows.

Almost half of all delay and daily fee costs (for the six case study locations) on the U.S.-Mexican border are also incurred at Nuevo Laredo, as a result of continuous traffic lines at the Laredo II bridge crossing and the heavy concentration of railroad transits at this border crossing, as shown below in Figure 10.16.

Figure 10.16
Overall Border Delays Costs by POE´s (1995)



Percentage values tend to underestimate the importance of these costs in absolute terms, however. They amount to a maximum surcharge of $96 million ($U.S.)/year due to delays and daily fees. Delay and rail car per diem use fee costs at Nuevo Laredo amounted to $94 million ($U.S.)—a figure equivalent (but not directly comparable) to the investment cost for a new bridge.

Delays resulting from the current operation of the border bridges, rather than from inadequacies in the facilities, amounted to 62 to 64 percent of total delay costs, i.e., up to $125 million ($U.S.)/year. This factor is indicative of the maximum savings that could be achieved in the relative short term, with more consistent operations and a relatively low investment in infrastructure.

Finally, avoidable costs could be of up to $865 million ($U.S.)/year, based on service costs and merchandise flow information available for 1995; slightly over one-half of the total border costs, as shown in Figure 10.17.

- The greatest potential for savings is in customs brokers' rate and fee schedules, since shipment preprocessing practices cut down on the number of transactions needing to be conducted at the border itself.
- The second area for potential savings comes from gradually eliminating transfers (trailer drayage) in Nuevo Laredo and Colombia which amount to an annual cost of $98 million ($U.S.).
- The third priority area would be a reduction of per diem fees for railroad freight and of crossing and compound delays for motor transport. However, as measures to solve these third-priority issues are not very costly, they might be the first to be implemented.

Macroeconomic Significance

The aforementioned overall border transaction costs are modest when compared to the value of binational commerce through the northern border ($104.28 billion [$U.S.] in 1995). Comparing the overall value of trade to border transaction costs is of little value, however.

Table 10.54 shows that total invoiced amounts for motor and railroad transportation for binational trade are estimated as $2.97 billion ($U.S.) at 1995 prices. This amount represents total freight charged in the Mexican territory to move goods through any route for purposes of binational trade.

Hence, overall border transaction costs for Mexican importers and exporters account for 45 percent to 56 percent of the total land freight billing for binational trade charged in Mexico. This cost affects all goods producers or consumers and represents several times the cost of maintaining border infrastructure.

In the mid-term, avoidable costs could be realized in part through organizational measures or institutional changes (e.g., implementing data processing systems, eliminating multiple transactions, adjusting inspection booth schedules, modifying pre-inspection load verification requirements, etc.). In the short term, the large gap in costs between POEs belonging to the same logistical system (e.g., Nuevo Laredo vs. Colombia) could be diminished by reorganizing vehicular traffic flows.

Table 10.54
Relative Value of Border Logistics Costs (1995)

Factor	Values (US $ Billions)	Percent
Value of Binational Trade	$104.28	
Transported by Truck	90.08	
Rail	13.94	
Other Modes	0.26	
Mexico's Overall Freight Costs	$9.90	
Transported by Truck	6.74	68.1%
Transported by Rail	1.23	12.4
Mexico's Freight Costs for Binational Trade	$2.97	
Transported by Truck	2.70	
Transported by Rail	0.27	
Border Logistics Costs	$1.34 - 1.67	
Value as a Percent of Binational Trade		1.3 - 1.6%
Value as a Percent of Mexico's Freight Costs		13.6 - 16.9
Value as a Percent of Binational Freight Costs		45.4 - 56.4

Source: La Empresa

10.10.4. Border Infrastructure Conservation (Maintenance and Rehabilitation) Costs

Methodology for the Evaluation of Border Infrastructure Conservation Costs

This section parallels the same general methodology presented for the United States in Chapter 10.4 of this report. Due to the importance of the traffic flows generated in the border cities, it was decided to differentiate vehicular traffic at the ports of entries into the following categories: urban traffic, intrastate traffic (within the border state), and interstate traffic (to all other states).

Based on the Studies of Origin-Destination and Weight , carried out by SCT between 1992 and 1995, it was determined that the average effective cargo per 5-axle truck is slightly less than 12 tons per trip, which gives an ESAL factor of 0.87, very near to the observed value in the United States (0.89). However, it should be noted that the variation in average ESAL is from 0.49 in Nuevo Laredo to 1.67 in Matamoros.

The cost per km-ESAL was calculated using the established 1991 values documented in the study of *Weights and Dimensions of the Vehicles that Travel the National Highways* prepared by the Institute of Mexican Transportation (Instituto Mexicano del Transporte - IMT). At that time, the cost of conservation (maintenance plus rehabilitation) of the federal highway system reached 84 Pesos per km-ESAL. However, the highways with the highest roadway (design) specifications, such as the federal network in the U.S.-Mexican border region, these costs reached up to 124 Pesos per km-ESAL.

Taking into consideration the cost of inflation, accumulated since 1990, and the changes in the relationship (valuation) between the Peso and the U.S. dollar; the average conservation cost for the federal highways per km-ESAL reached 34.55 Pesos in 1995 (5.5 U.S. $ per km-ESAL). This cost is nearly three times smaller than the value calculated for the United States in Chapter 10.4.

The same IMT study also makes reference to a cost for bridge damage of 1,094 Pesos per km-ESAL at the end of 1990. With the same adjustments mentioned above applied to determine 1995 prices, and taking into consideration that the average length of the border crossing bridges is between 150 and 200 meters, the cost of bridge damage reached 50.71 pesos per vehicle-ESAL in 1995 (8 U.S. $ per vehicle-ESAL). This represents a value significantly higher than that estimated for the United States.

Finally, based on the origin and destination analysis of the movements that cross the border, it was determined that the average urban trip length varies between 6 km in Piedras Negras to 16-18 km in Nuevo Laredo and Tijuana. At the same time, it was the following average interurban (intrastate and interstate) trip lengths for were developed:

Interstate Flows	
Tijuana	175 km
Nogales	379 km
Cd Juarez	441 km
Piedras Negras	259 km
Nuevo Laredo	57 km
Matamoros	183 km

Intrastate Flows

Tijuana	991 km
Nogales	989 km
Cd Juarez	521 km
Piedras Negras	392 km
Nuevo Laredo	718 km
Matamoros	290 km

Based on the above trip lengths and taking into consideration the annual vehicular flows in both directions at each POE case study location, it is possible to estimate a total of vehicle-km and equivalent vehicle-km ESAL in the different geographic areas.

Costs of Infrastructure Conservation at the Ports of Entry

Table 10.55 summarizes the results of the cost analysis for each POE case study.

The annual conservation costs of the border roadways and bridges related to the damage caused by (border) truck traffic rose to just above 54 million U.S. $ in 1995 based on the registered vehicle flow at the six case study border crossings. Of this total, Nuevo Laredo had the largest share of the cost at 46% of the annual total followed by Matamoros with approximately 24%.

The cost of the damage to the local roadway network and border bridges represented on average 15% of the annual total cost (a little more than 8 million U.S. $ annually), most of which is attributed to the border bridges (5.75 million U.S. $ annually). The impact due to intrastate flow generated by binational commerce on the federal roadways in the border states was on the

Table 10.55
Costs of Infrastructure Conservation for Roadways and Bridges at the Ports of Entry (1995)

	Conservation Cost ($ millions per year)					
Port of Entry	**Tijuana**	**Nogales**	**Cd Juarez**	**P.Negras**	**N.Laredo**	**Matamoros**
Urban Flow						
Km-ESAL (millions)	16.24	3.04	2.97	0.48	10.32	8.26
Annual Cost 1995 [1]	*0.89*	*0.17*	*1.08*	*0.10*	*3.06*	*2.72*
Intrastate Flow						
Km-ESAL (millions)	9.0	33.87	15.23	2.18	29.72	117.20
Annual Costs 1995	*0.49*	*1.86*	*0.84*	*0.12*	*1.63*	*6.43*
Interstate Flow						
Km-ESAL (millions)	50.95	88.51	17.98	3.31	376.70	73.87
Annual Costs 1995	*2.79*	*4.85*	*0.99*	*0.18*	*20.66*	*4.05*
% in border State	18%	38%	83%	66%	8%	62%
Total Cost 1995	4.18	6.88	2.90	0.40	25.35	13.20

Source: La Empresa estimations based on information from IMT, SECOFI, and SCT
[1] - Includes the cost of border crossing bridge damage in Cd. Juarez, Piedras Negras, Nuevo Laredo and Matamoros.

order of 21% of the total annual cost for damage (11.75 million U.S $ annually). In addition to this cost, it is necessary to add the annual costs for highway damage in the border states due to

commercial trucks with origins and destinations in other states. This cost was estimated to be 7.45 million U.S. $ annually in 1995 (or 14% of the total damage costs).

Based on this analysis, the total damage cost generated by the flow of commercial trucks in the six Ports of Entry evaluated grew to just over 27 million U.S. $ annually, or 49% of the national cost. The remaining 51% (27.5 million U.S. $ annually) corresponds to damage which occurs in non-border states.

Costs of Infrastructure Conservation by Border State

To obtain the annual conservation costs of the border roadways and bridges by border state, it was necessary to estimate the participation of the six POE case studies in the total state flow and use this as the basis to extrapolate to the state level. At the same time a specific analysis of vehicular flow and area of influence of the border crossing at Colombia, was carried out with the objective of obtaining estimates for the state of Nuevo Leon. The values obtained were deducted from the total for Nuevo Laredo, Tamaulipas. Table 10.56 shows a summary of the results obtained for each POE case study.

The annual cost of the conservation of the border roadways and bridges to compensate for the damage caused by commercial truck traffic related to binational trade, rose to a little more than 56 million U.S. $ in 1995 based on vehicular flow in the six border states. Of this total, the State of Tamaulipas (which contains the POEs of Nuevo Laredo and Matamoros among others) accounted for 65 % of the annual damage to roadways and bridges. The second highest state was Sonora with just over 13% of the total.

Table 10.56
Costs of Infrastructure Conservation for Roadways and Bridges by Border State(1995)

	Conservation Costs ($ millions per year)					
Border State	**Baja California**	**Sonora**	**Chihuahua**	**Coahuila**	**Nuevo Leon**	**Tamaulipas**
Urban Flow						
Km-ESAL (millions)	17.11	3.21	3.01	0.50	1.91	18.62
Annual Cost 1995 [1]	*0.94*	*0.18*	*1.10*	*0.10*	*0.57*	*5.80*
Intrastate Flow						
Km-ESAL (millions)	9.48	35.74	15.44	2.27	5.50	148.71
Annual Cost 1995	*0.52*	*1.96*	*0.85*	*0.12*	*0.30*	*8.16*
Interstate Flow						
Km-ESAL (millions)	53.66	93.39	18.23	3.44	69.67	411.58
Annual Cost 1995	*2.94*	*5.12*	*1.00*	*0.19*	*3.82*	*22.57*
% border state	18%	38%	83%	66%	37%	19%
Total Cost 1995	4.40	7.26	2.94	0.42	4.69	36.53

Source: La Empresa estimations based on information from IMT, SECOFI, and SCT

[1] - Includes the cost of border crossing bridge damage in Cd. Juarez, Piedras Negras, Nuevo Laredo and Matamoros.

Note: The data from Nuevo Leon refer to the POE of Colombia, which were deducted from the totals of Nuevo Laredo, Tamaulipas

The cost of the damage in the local roadway network and the border bridges represented on average 16% of the total annual cost (with nearly 9 million U.S. $ annually), most of which is

attributed to the border bridges (6.25 million U.S.$ annually). In particular, the indicated impact for Nuevo Laredo corresponds to the annual damage at the Colombia Bridge which is located outside of the urban area.

The impact due to intrastate flow generated by binational commerce on the federal roadways in the border states was on the order of 21% of the total annual cost for damage (12 million U.S $ annually). To this cost, it is necessary to add the annual costs for highway damage in the border states due to the commercial trucks with origins and destinations in other states. This cost was estimated to be 9 million U.S. $ annually in 1995 (16% of the total damage costs).

In such a manner, the total damage cost caused by the flow of commercial traffic grew to nearly 30 million U.S. $ annually, for the six border states, of which more than 75% of the total is located within the six POE case study areas. The remainder (26 million U.S. $ annually) corresponds to damage in non-border states.

Appendix A
Commodity Codes

CODE	DESCRIPTION OFCOMMODITY CODES AT TWO-DIGIT LEVEL
01	Live Animals
02	Meat And Edible Meat Offal
03	Fish And Crustaceans, Molluscs And Other Aquatic Invertebrates
04	Dairy Produce; Birds' Eggs; Natural Honey; Edible Products Of Animal Origin, Not Elsewhere Specified Or Included
05	Products Of Animal Origin, Not Elsewhere Specified Or Included
06	Live Trees And Other Plants; Bulbs, Roots And The Like; Cut Flowers And Ornamental Foliage
07	Edible Vegetables And Certain Roots And Tubers
08	Edible Fruit And Nuts; Peel Of Citrus Fruit Or Melons
09	Coffee, Tea, Mate And Spices
10	Cereals
11	Products Of The Milling Industry; Malt; Starches; Inulin; Wheat Gluten
12	Oil Seeds And Oleaginous Fruits; Miscellaneous Grains; Seeds And Fruit; Industrial Or Medicinal Plants; Straw And Fodder
13	Lac; Gums; Resins And Other Vegetable Saps And Extract
14	Vegetable Plaiting Materials; Vegetable Products Not Elsewhere Specified Or Included
15	Animal Or Vegetable Fats And Oils And Their Cleavage Products; Prepared Edible Fats; Animal Or Vegetable Waxes
16	Preparations Of Meat, Of Fish, Or Of Crustaceans, Molluscs Or Other Aquatic Invertebrates
17	Sugars And Sugar Confectionary
18	Cocoa And Cocoa Preparations
19	Preparations Of Cereals, Flour, Starch Or Milk; Bakers' Wares
20	Preparations Of Vegetables, Fruit, Nuts, Or Other Parts Of Plants
21	Miscellaneous Edible Preparations
22	Beverages, Spirits And Vinegar
23	Residues And Waste From The Food Industries; Prepared Animal Feed
24	Tobacco And Manufactured Tobacco Substitutes
25	Salt; Sulfur; Earths And Stone; Plastering Materials, Lime And Cement
26	Ores, Slag And Ash
27	Mineral Fuels, Mineral Oils And Products Of Their Distillation; Bituminous Substances; Mineral Waxes
28	Inorganic Chemicals; Organic Or Inorganic Compounds Of Precious Metals, Of Rare-Earth Metals, Of Radioactive Elements Or Of Isotopes
29	Organic Chemicals
30	Pharmaceutical Products
31	Fertilizers
32	Tanning Or Dyeing Extracts; Tannins And Their Derivatives; Dyes, Pigments And Other Coloring Matter; Paints And Varnishes; Putty And Other Mastics; Inks
33	Essential Oils And Resinoids; Perfumery, Cosmetic Or Toilet Preparations
34	Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes, Polishing Or Scouring Preparations, Candles And Similar Articles, Modeling Pastes, "Dental Waxes" And Dental Preparations With A Basis Of Plaster Of Plaster
35	Albuminoidal Substances; Modified Starches; Glues; Enzymes
36	Explosives; Pyrotechnic Products; Matches; Pyrophoric Alloys; Certain Combustible Preparations
37	Photographic Or Cinematographic Goods
38	Miscellaneous Chemical Products
39	Plastics And Articles Thereof
40	Rubber And Articles Thereof
41	Raw Hides And Skins (Other Than Furskins) And Leather
42	Articles Of Leather; Saddlery And Harness; Travel Goods, Handbags And Similar Containers; Articles Of Animal Gut (Other Than Silkworm Gut)
43	Furskins And Artificial Fur; Manufactures Thereof
44	Wood And Articles Of Wood; Wood Charcoal
45	Cork And Articles Of Cork
46	Manufactures Of Straw, Of Esparto Or Of Other Plaiting Materials; Basketware And Wickerwork
47	Pulp Of Wood Or Of Other Fibrous Cellulosic Material; Waste And Scrap Of Paper Or Paperboard
48	Paper And Paperboard; Articles Of Paper Pulp, Of Paper Or Of Paperboard
49	Printed Books, Newspapers, Pictures And Other Products Of The Printing Industry; Manuscripts, Typescripts And Plans
50	Silk
51	Wool, Fine Or Coarse Animal Hair; Horsehair Yarn And Woven Fabric

CODE	DESCRIPTION OFCOMMODITY CODES AT TWO-DIGIT LEVEL
52	Cotton
53	Other Vegetable Textile Fibers; Paper Yarn And Woven Fabrics Of Paper Yarn
54	Man-Made Filaments
55	Man-Made Staple Fibers
56	Wadding, Felt And Nonwovens; Special Yarns; Twine, Cordage, Ropes And Cables And Articles Thereof
57	Carpets And Other Textile Floor Coverings
58	Special Woven Fabrics; Tufted Textile Fabrics; Lace; Tapestries; Trimmings; Embroidery
59	Impregnated, Coated, Covered Or Laminated Textile Fabrics; Textile Articles Of A Kind Suitable For Industrial Use
60	Knitted Or Crocheted Fabrics
61	Articles Of Apparel And Clothing Accessories, Knitted Or Crocheted
62	Articles Of Apparel And Clothing Accessories, Not Knitted Or Crocheted
63	Other Made-Up Textile Articles; Needle Craft Sets; Worn Clothing And Worn Textile Articles; Rags
64	Footwear, Gaiters And The Like; Parts Of Such Articles
65	Headgear And Parts Thereof
66	Umbrellas, Sun Umbrellas, Walking Sticks, Seatsticks, Whips, Riding Crops And Parts Thereof
67	Prepared Feathers And Down And Articles Made Of Feathers Or Of Down; Artificial Flowers; Articles Of Human Hair
68	Articles Of Stone, Plaster, Cement, Asbestos, Mica Or Similar Materials
69	Ceramic Products
70	Glass And Glassware
71	Natural Or Cultured Pearls, Precious Or Semiprecious Stones, Precious Metals; Metals Clad With Precious Metal, And Articles Thereof; Imitation Jewelry; Coin
72	Iron And Steel
73	Articles Of Iron Or Steel
74	Copper And Articles Thereof
75	Nickel And Articles Thereof
76	Aluminum And Articles Thereof
77	Reserved For Possible Future Use
78	Lead And Articles Thereof
79	Zinc And Articles Thereof
80	Tin And Articles Thereof
81	Other Base Metals; Cermets; Articles Thereof
82	Tools, Implements, Cutlery, Spoons And Forks, Of Base Metal; Parts Thereof Of Base Metal
83	Miscellaneous Articles Of Base Metal
84	Nuclear Reactors, Boilers, Machinery And Mechanical Appliances; Parts Thereof
85	Electrical Machinery And Equipment And Parts Thereof; Sound Recorders And Reproducers, Television Image And Sound Recorders And Reproducers, And Parts And Accessories Of Such Articles
86	Railway Or Tramway Locomotives, Rolling Stock And Parts Thereof; Railway Or Tramway Track Fixtures And Fittings And Parts Thereof; Mechanical (Including Electromechanical) Traffic Signaling Equipment Of All Kinds
87	Vehicles, Other Than Railway Or Tramway Rolling Stock, And Parts And Accessories Thereof
88	Aircraft, Spacecraft, And Parts Thereof
89	Ships, Boats, And Floating Structures
90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical Or Surgical Instruments And Apparatus; Parts And Accessories Thereof
91	Clocks And Watches And Parts Thereof
92	Musical Instruments; Parts And Accessories Of Such Articles
93	Arms And Ammunition; Parts And Accessories Thereof
94	Furniture; Bedding, Mattress Supports, Cushions And Similar Stuffed Furnishings; Lamps And Lighting Fittings, Not Elsewhere Specified Or Included; Illuminated Signs, Illuminated Nameplates And The Like; Prefabricated Buildings
95	Toys, Games And Sports Equipment; Parts And Accessories Thereof
96	Miscellaneous Manufactured Articles
97	Works Of Art, Collectors' Pieces And Antiques
98	Special Classification Provisions
99	(Imports Only) Temporary Legislation; Temporary Modifications Established Pursuant To Trade Legislation; Additional Import Restrictions Established Pursuant To Section 22 Of The Agricultural Adjustment Act, As Needed