EVALUATIONS OF ECONOMIC IMPACTS OF NAFTA ON THE TRANSPORTATION SYSTEM/SECTOR OF SELECTED SOUTHERN STATES

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Introduction and Acknowledgements

The primary objective of this study is to analyze the economic impacts of the North American Free Trade Agreement (NAFTA) on the transportation system/sector and the Arkansas regional economy. The study's methodology includes trade models and regional input-output modeling. Gravity trade models were used to evaluate and forecast the trade creation and diversion effects of NAFTA. Regional input-output models were used to estimate the economic impacts associated with the NAFTA trade flows. The study's principal geographical included the states of Arkansas, Louisiana, Missouri, Mississippi, Oklahoma, Tennessee, and Texas. A regional economy was created by combining these states, and is referred to as the Region. This report is divided into five sections.

The first section of the report reviews the controversy concerning the success of NAFTA in terms of its benefits and costs on the NAFTA trading partners. Studies shedding a positive light on NAFTA trade at the national level are reviewed as well as other studies suggesting otherwise are reviewed. Several studies review the economic impact of NAFTA at the state level are also reviewed

The second section of this report reviews the statistical data that describe NAFTA trade flows between NAFTA trading partners. The availability of data limit this analysis to freight data shipped by land mode of transportation. This data along with industrial-level data are used to estimate the direct economic impacts of these trade flows on the Region.

In the third section of the report the findings from an economic impact study of the NAFTA trade flows are reported. Unfortunately, the complexities of the multitude of economic consequences of NAFTA and the lack of reliable data preclude a conclusive estimate of NAFTA impacts on the Arkansas Region. The data necessary to get a complete picture of NAFTA's economic impacts are not currently available in sufficient detail. In particular, NAFTA import data which would enable the assessment of the consequences of imports on domestic production and consumption are not available. Detailed analysis to the extent the imports are substituted for domestic production and questions concerned with trading flows impacts in areas like employment and income are beyond the scope of this study.

Appendix 1 presents a paper that appeared in the *Regional Economic Development* 2006, that was written as part of the this project.[1] NAFTA trade data disaggregated by state, industry, and transportation mode are discussed in the study. The analysis reveals that intra-trade traffic differs widely across states, industries, and transportation modes.

Appendix 2 presents a paper that examines industry–level growth since the implementation of NAFTA. Gravity models are estimated to assess trade between

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[1] Funk, Mark, Erick Elder, Vincent Yao, and Ashvin Vibhakar. Intra-NAFTA Trade and Surface Traffic: A Very Disaggregated View. Federal Reserve Bank of St. Louis, Regional Economic Development, 2006, 2(2) pp 87-99.

NAFTA trading partners at the industry level. The results show large differences in growth rates between states and industries for both exports and imports.

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Part I
IS NAFTA A SUCCESS: A NATIONAL PRECEPTIVE

At NAFTA's tenth anniversary in 2004, the Under Secretary of Commerce, Grant Aldonas, delivered a testimony before the Senate Committee on Foreign Relations, Subcommittee on International Economic Policy, Export, and Trade Promotion.[2] In his testimony, he called NAFTA a "resounding" success for its contribution to the significant economic growth rate that the nation achieved under NAFTA. "Total trade among the NAFTA partners has more than doubled from $302 billion in 1993 to $652 billion in 2003. U.S. exports to Canada and Mexico increased from $142 billion to $267 billion in NAFTA's first decade."

The Heritage Foundation study[3] published in 1997 gave NAFTA an "A" for North America's economy. More specifically, the "report card" graded the policy high on its influence on growth in U.S. exports, employment, manufacturing, improved standard of living for American workers, and the reform process in Mexico. U.S. compliance with NAFTA and U.S.-Mexican trade relations received a "B." John Sweeney, the author of the study, stated that U.S. exports grew from $602.5 billion since 1993 (the last year prior to NAFTA's implementation) to $825.9 billion. Exports to Mexico grew by 33 percent in the first three years, and 39 out of 50 states increased their market share during that period.

However, not everyone hails NAFTA's success. Some policy researches and economists contend that NAFTA resulted in more costs than benefits. The Economic Policy Institute in its EPI Briefing Paper[4] argues that the costs to workers outweighed the benefits in all three nations that participate in NAFTA. In the U.S., NAFTA resulted in reduced employment in high-wage goods industries. Wages of workers without college education digress downward, and over one million jobs that would have been created otherwise were lost since 1994. Approximately two thirds of the lost jobs were in the manufacturing sector. The most job opportunities were lost in California, Texas, Michigan, New York, and Ohio. The following states were hit the hardest by actual job losses: Michigan, Indiana, Mississippi, Tennessee, and Ohio. Arkansas ranked number 8 on the list, with job losses estimated at 10,321 (a 0.9 percent of total state employment). The aggregate reduced wage payments to U.S. workers were estimated to be $7.6 billion in 2004 alone.

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[2] United States. Congress. Senate. Committee on Foreign Relations. Subcommittee on International Economic Policy, Export and Trade Promotion. (2004) *NAFTA: a ten year perspective and implications for the future: hearing before the Subcommittee on International Economic Policy, Export and Trade Promotion of the Committee on Foreign Relations, United States Senate, One Hundred Eighth Congress, second session, April 20, 2004.* Washington : U.S. G.P.O. : For sale by the Supt. of Docs., U.S. G.P.O. ISBN: 0160736110; Stock no: 552-070-31879-8.

[3] Sweeney, John. *NAFTA's Three-Year Report Card: An 'A' for North America's Economy.* The Heritage Foundation: Backgrounder. No. 1117, May 16, 1997.

[4] Scott, R. E., Salas, C., & Campbell, B. (2006). *Revisiting NAFTA still not working for North America's workers.* Washington, D.C.: Economic Policy Institute. http://www.epinet.org/briefingpapers/173/bp173.pdf.

The paper further discusses NAFTA's impact on Mexico and Canada. Mexican employment increased mainly in low-wage "maquiladora" industries, but the agricultural sector suffered. Many other jobs in Mexico lost their benefits and the security they once provided to employees. In Canada, the real income stayed the same, but the social benefits the state provided to the individuals decreased since NAFTA was enacted (as measured by government transfers to individuals). These transfers fell from 11.5 percent of Canadian GDP in 1992 to 7.8 percent in 2005.

Although the way NAFTA impacted the three countries differed, each nation saw the policy hurting working people and allocating a disproportionate amount of income to the more affluent segments of the population. The authors of the paper also critique NAFTA for it lack of protection of labor and environmental standards.

Carnegie Endowment for International Peace took another hard look at NAFTA's reality in its "NAFTA's Promise and Reality" report.[5] The study's main objective was to determine how the quality of life in North America, specifically in Mexico, fared as a result of trade liberalization in North America. This study's unique approach focused on "people, their communities, and the choices they make as they attempt to negotiate their social and economic environments."[6] The researchers found that the Mexican economy was not able to keep pace with unprecedented growth in trade. NAFTA lead to an increase of 500,000 manufacturing jobs from 1994 to 2002. However, the agricultural sector lost 1.3 million jobs during the same period. Productivity growth has not translated into growth in wages, and with the peso crisis of 1994-1995, the real wages for most Mexicans today are lower than they were before NAFTA was initiated. The authors concluded that "NAFTA has accelerated Mexico's transition to a liberalized economy without creating the necessary conditions for the public and private sector to respond to the economic, social, and environmental shocks of trading with two of the biggest economies in the world."[7] Further, it was estimated that annual pollution damage ($36 billion per year) exceeded economic gains from the growth of trade and the economy as a whole.

NAFTA's and CUSTA's[8] Impact on International Trade paper by John Romalis[9] examines the impact of the policies on international trade. The author's analysis of data for commodities finds that NAFTA has had a significant impact on international trade volumes. The most significant increase in trade in the NAFTA zone was in commodities. The author's concern is the possibility that "NAFTA and CUSTA increased North American output and prices in many highly-protected sectors driving out imports from non member countries."

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[5] Audley, J. J. (2003). *Nafta's promise and reality lessons from Mexico for the hemisphere.* Washington, DC: Carnegie Endowment for International Peace. http://www.ceip.org/files/pdf/NAFTAReportIntro.pdf.
[6] See note 4, page 6.
[7] See note 4, page 7.
[8] Canada-US Free Trade Agreement (CUSTA).
[9] Romalis, J. (2005). *NAFTA's and CUSTA's Impact on International Trade.* Cambridge, Mass: National Bureau of Economic Research.

There is a number of studies that were written by policy institutes across the nation to evaluate NAFTA's impact on individual states. One of the first state-level studies was done in 1997 by the Allegheny Institute for Public Policy. The Allegheny Institute for Public Policy studied NAFTA's three year-effect on Pennsylvania. Following this study in 1999, the Texas Public Policy Foundation analyzed NAFTA's impact on Texas.[10] During the same year, three other state studies were published by the following institutions: The Mackinac Center in Michigan, Arizona's Goldwater Institute, and Florida's James Madison Institute. Of these, the Florida report showed the least impressive impact. Among the more recent economic impact studies, which will be discussed in greater detail, are research studies undertaken by the Wisconsin Policy Research Institute (2000), The American Graduate School of International Management at Thunderbird in Arizona (2003), and Alabama's Troy University (2006).

The Wisconsin study[11] examined the treaty's positive and negative impact on companies and workers from NAFTA's initiation until 1998. The "negative" information was gathered by tracking those claiming injury from the agreement as recorded by the Department of Labor statistics. Further, state export data were used to track changes in trade activities across the state's industries and the state as a whole that resulted from NAFTA's implementation. The author concluded that NAFTA had a "moderately positive effect on Wisconsin's economy as a whole, while being remarkably beneficial to the state's export sector in particular."[12] As a result of NAFTA, the state's exports to Mexico and Canada increased by 78 and 77.6 percent, respectively over the five-year study period. This meant a cumulative gain of $5.3 billion in exports based on the Department of Commerce data. The largest exporting sector to Mexico was paper products. The two largest exporting sectors to Canada were industrial machinery and computers. The Kenosha area in Wisconsin saw the largest percentage growth in overall exports among all U.S. regions. Since NAFTA's initiation, this region's total exports to NAFTA nations increased by 745 percent.

"Economic Impact of the Mexico-Arizona Relationship"[13] (2001) was a study undertaken by Thunderbird University in Arizona. The study focusesd mainly on the state's bilateral relationship with Mexico and estimated it to be worth more than $13.6 billion per year; $8 billion for Arizona and $5.5 billion for Mexico. "The state's leading markets were the NAFTA partners (Mexico with 21% and Canada with 15% of 2000 exports). The state's leading export category – computers and electronic products – accounted for $5.1 billion, or slightly more than 50% of Arizona's total merchandise exports in 2000."[14] Arizona ranked 4th among all U.S. states both in exports and imports

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[11] Kengor, P. (2000). The effect of NAFTA on Wisconsin. Wisconsin Policy Research Institute report, v. 13, no. 2. Thiensville, WI: Wisconsin Policy Research Institute.
[12] See note 9, page 1.
[13] Thunderbird Business Research Center, Thunderbird Mexican Association (Phoenix, Ariz.), & Mexico. (2003). *Economic impact of the Mexico-Arizona relationship.* Phoenix, Ariz: Thunderbrid, The American Graduate School of International Management, Thunderbird Mexican Association.

[14] See note 11, page 9.

to Mexico in 2001. Approximately 50,000 jobs in Arizona were tied to exports to Mexico, most of which were connected to maquiladora activity.

Like any governmental initiative, NAFTA has its pros and cons. However, by studying the details of how NAFTA affected the state of Alabama (2006), one should be able to predict its impact on Arkansas. [15] Arkansas and Alabama, both located in the South with a similar land area, have a fairly low per capita money income of $16,904 and $18,189 respectively.[16] The states industry composition is almost identical as well, with the highest number of people employed in educational, health and social services, manufacturing, retail trade, and construction. Arkansas' fifth industry in terms of employment was transportation and warehousing, and utilities, whereas Alabama's fifth largest industry is professional, scientific, management, administrative, and waste management services.[17]

"The Economic Impact of NAFTA: A Case Study of Alabama"[18] examined exports from Alabama to Canada and Mexico over a ten-year period since NAFTA's initiation and concluded that the policy had a positive economic impact on the state, especially its export-oriented industries and overall employment levels. High-value added sectors, such as transportation, computer, and electronic equipment saw the highest increase in exports due to NAFTA. In addition to that, high export levels of chemicals and primary metal fabrication were also reported during 2004. Trade flows to NAFTA partner nations more than doubled since 1994, accounting for approximately 2.3 percent of the Gross Domestic Product. Employment statistics indicated that there were approximately 9,600 jobs created that can be directly attributed to NAFTA trade. An interesting point that Merkel and Lovik make is that while Alabama lost about 12,500 jobs in apparel manufacturing between 1995 and 2000, "apparel exports to Canada and Mexico saw an eight-fold growth over the NAFTA decade from $37 million to about $285 million."[19] The authors speculate that the job losses in this industry were due to the "application and implementation of mechanical and technological advances in the U.S. economy."

[15] Merkel, E., & Lovik, L. (2006). The Economic Impact of NAFTA: A Case Study of Alabama. International Advances in Economic Research. 12(3), 422.

[16] *State and County QuickFacts.* U.S. Census Bureau. Retrieved from http://quickfacts.census.gov on December 12, 2007.

[17] *Profile of Selected Economic Characteristics: 2000.* U.S. Census Bureau, American FactFinder. Retrieved from http://factfinder.census.gov/ on December 12, 2007.

[18] See note 13.

[19] Merkel, E., & Lovik, L. (2006). The Impact of NAFTA on Production and Employment Opportunities Throughout Alabama: 1993-2004, page 7

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Profile of Selected Economic Characteristics: 2000. U.S. Census Bureau, American FactFinder. Retrieved from http://factfinder.census.gov/ on December 12, 2007.

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State and County QuickFacts. U.S. Census Bureau. Retrieved from http://quickfacts.census.gov on December 12, 2007.

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Thunderbird Business Research Center, Thunderbird Mexican Association (Phoenix, Ariz.), & Mexico. (2003). *Economic impact of the Mexico-Arizona relationship.* Phoenix, Ariz: Thunderbrid, The American Graduate School of International Management, Thunderbird Mexican Association.

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Part II
Total Value of NAFTA Trade by All Land Modes and Direct Effects

This section of the paper reviews the statistical data that describe NAFTA trade flows since its onset. The purpose of the review is twofold. First, because NAFTA removed and eliminated many trade barriers, the total volume and value of trade between NAFTA trading partners would be expected to increase. In order to determine the economic impact of NAFTA, the extent of new trade between Canada and Mexico needs to be identified. Secondly, states within this study would be expected to gain both in terms of exports and imports but not equally. Exports contribute to the economic activity while imports, to the extent that they replace and reduce a state's production, lower the levels of economic activity. Analyzing the net trade flow between trading partners provides insight into whether NAFTA has contributed to economic activity or not.

Data

The Bureau of Transportation Statistics (BTS) has maintained a TransBorder Freight Database since 1997.[20] The purpose of this database is to provide transportation information about NAFTA trade flows. This database includes freight flow data by commodity type and by mode of transportation. Its geographical details include shipments between United States, Mexico, and Canada.

In the following section, this data are used to analyze the NAFTA trade flows in the Arkansas Region. Total value of trade and trade balances by land mode are reported for each state and the Region as well as the value of trade associated with different surface transportation modes (truck and rail).

Region

For the Region composed of the states in this study, the total value of NAFTA trade increased by $77 billion in real terms, achieving an annual compounded growth rate of 8% over the 1995 to 2006 period. The state's shares of the total value of NAFTA trade have remained relative constant over the period (See Charts 1 and 2). By far, Texas is the dominating NAFTA trading partner with 72% of the trade in 1995 and 70% in 2006. Tennessee, Missouri, and Texas made up over 90% of the NAFTA trade in 1995 and 2006, with the remaining states splitting the remaining trade share.

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[20] Bureau of Transportation Statistic, U.S. Department of Transportation.
http://www.bts.gov/programs/international/transborder/

Chart 1
State Shares of Region's Total Value of NAFTA Trade
By All Land Modes 1995

AR
2.5%

LA
2.0%

MO
6.9%

MS
1.9%

OK
1.5%

TN
12.9%

TX
72.3%

Sources: Bureau of
Transportaton Statistics,
TransBorder Freight Data.
Department of Labor,
Bureau of Labor Statistics
Data, Import/Export Price
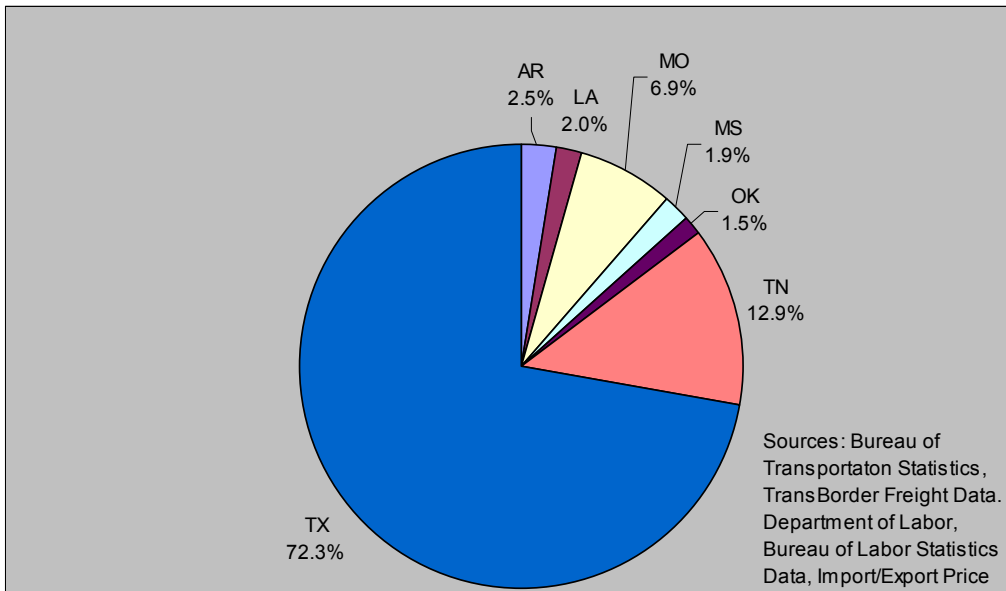
Chart 2
State Shares of Region's Total Value of NAFTA Trade
By All Land Modes 1995

AR
18%

LA
2.3%

MO
7.1%

MS
2.0%

OK
2.5%

TN
13.9%

TX
70.4%

Sources: Bureau of
Transportaton Statistics,
TransBorder Freight Data.
Department of Labor,
Bureau of Labor Statistics
Data, Import/Export Price
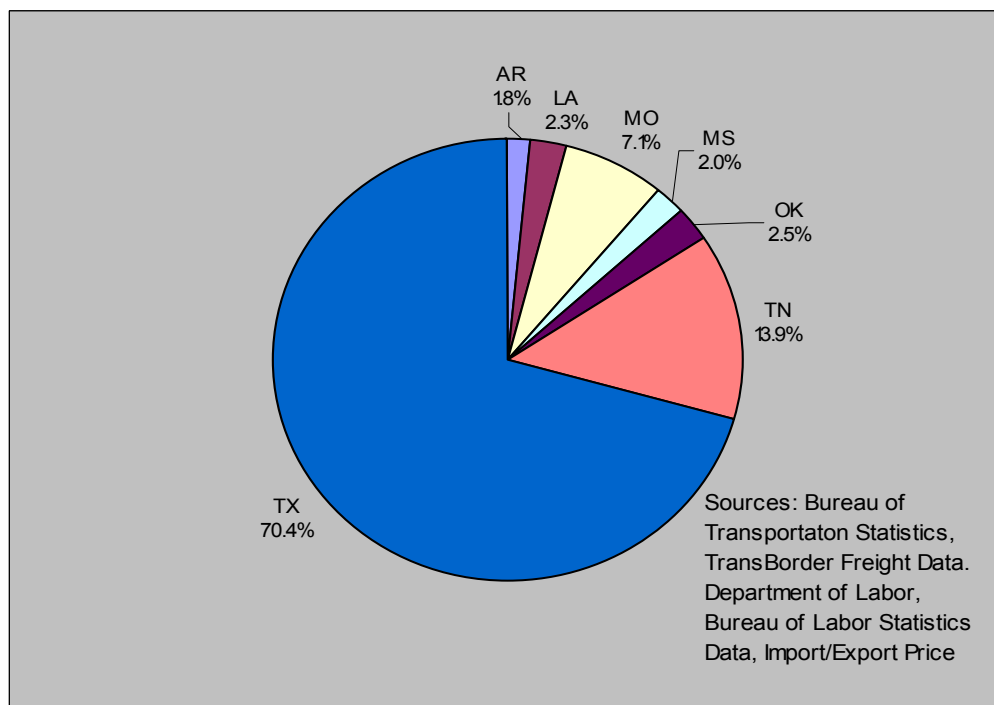
The Region has been a net exporter maintaining annual trade surpluses that have accumulated to a $137 billion over the 11 year period. As can be expected from its significant share of the NAFTA trade, Texas cumulative net NAFTA trade surplus ($148.9 billion) is larger than the cumulative net trade surplus of the Region (See Chart 3). Removing Texas trade balance from the Region causes the remaining cumulative balance to have a $11.5 billion deficit. This NAFTA trade deficit is chiefly due to Tennessee's $22.7 billion deficit.

Chart 3
Cumulative Net NAFTA Trade Balance.
By State 1995-2006

State	Value
TX	$148.96
TN	$(22.71)
OK	$1.09
MS	$1.14
MO	$(0.85)
LA	$7.72
AR	$2.04

(Billions of 2000 $)

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data. Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
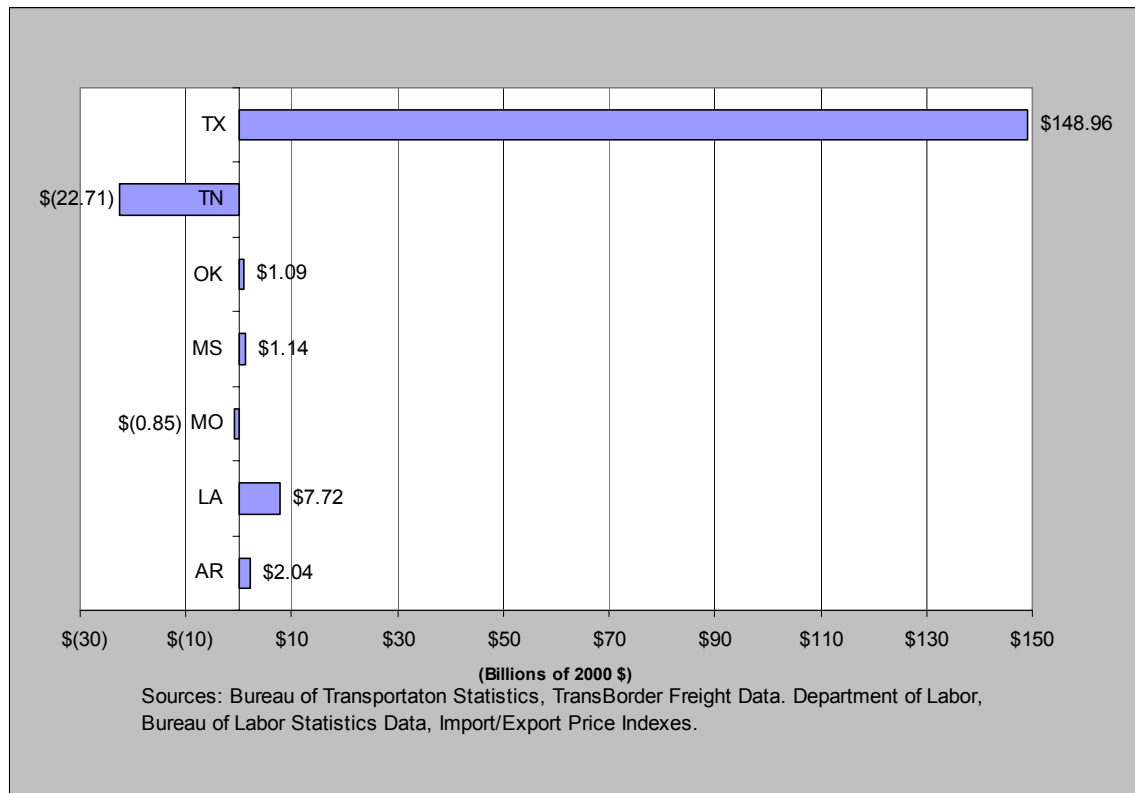
NAFTA Trade Flows

Charts 4-29 in this section of the report summarize TransBorder Freight data from 1995 through 2006 for the Region and the states of this study. Each chart shows the annual value of surface trade (right axis) for the all land transportation modes, the exports by land modes, and the imports by land modes. Mail which is another land transportation mode reported in the database is too minor to be included as a separate mode in this analysis. Dollar values have been converted to a 2000 dollar basis using import/export

price indexes.[21] Charts also show the annual export and import shares of the total value of trade (left axis). The gap between the export and import shares measures the net trade balance associated with NAFTA surface trade in commodities.

Region

The real value of NAFTA trade into the Region increased by $77 billion growing at an annual compounded rate of 8.04% over the 1995 to 2006 period (see Chart 4). Export values increased by $44 billion, achieving an annual growth rate of 8.4%, while import values increased by $33 billion or at an annual compounded growth of 7.6% during this period. Trucking was the major land mode used to transport both imports and exports. (see Charts 5 and 6). On average, trucks hauled annually 86% of the value of both exports and imports during this period.

Chart 4
Region's NAFTA Trade Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.

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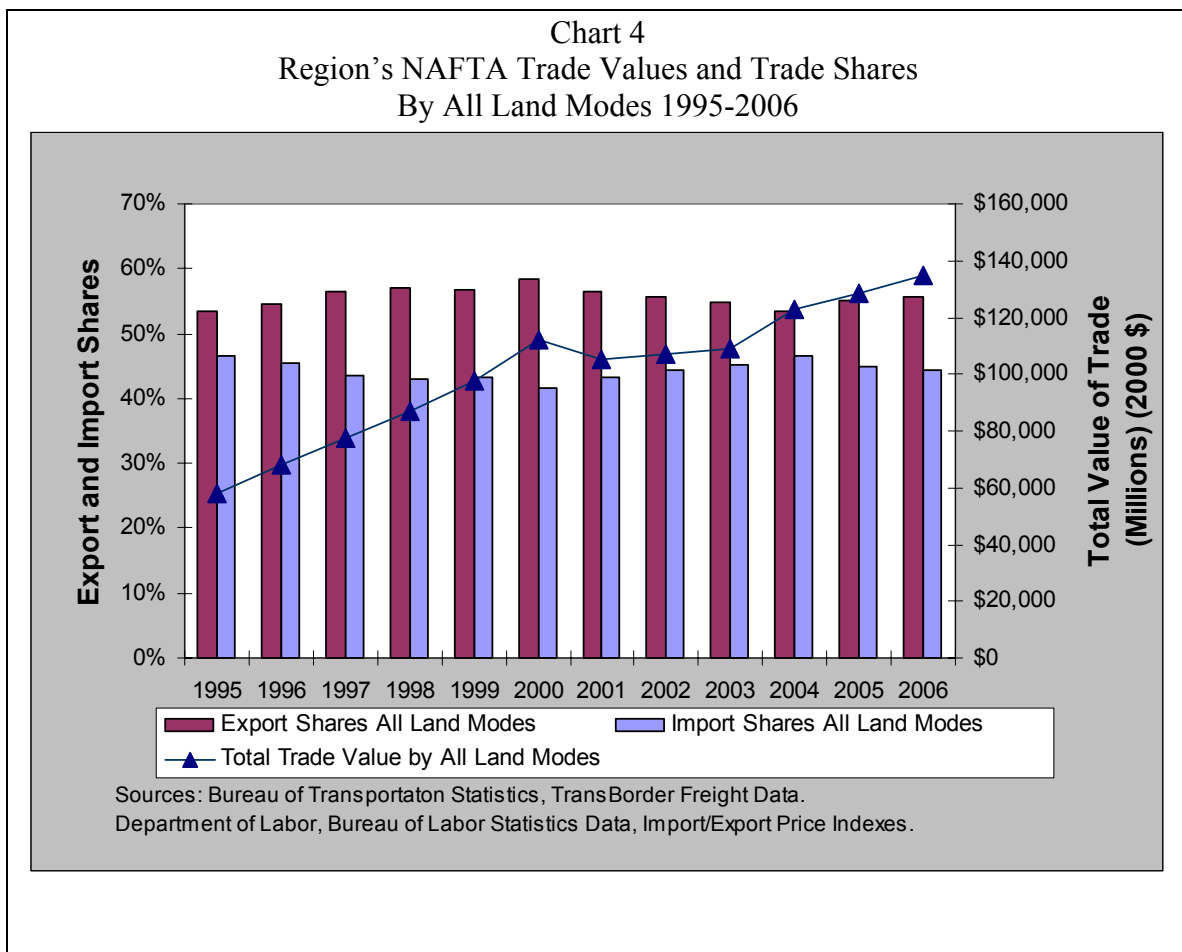
[21] Import/Export Price Indexes. U.S. Department of Labor, Bureau of Labor Statistics. http://www.bls.gov/data/.

Chart 5
Region's NAFTA Export Values and Shares
By Land Mode 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
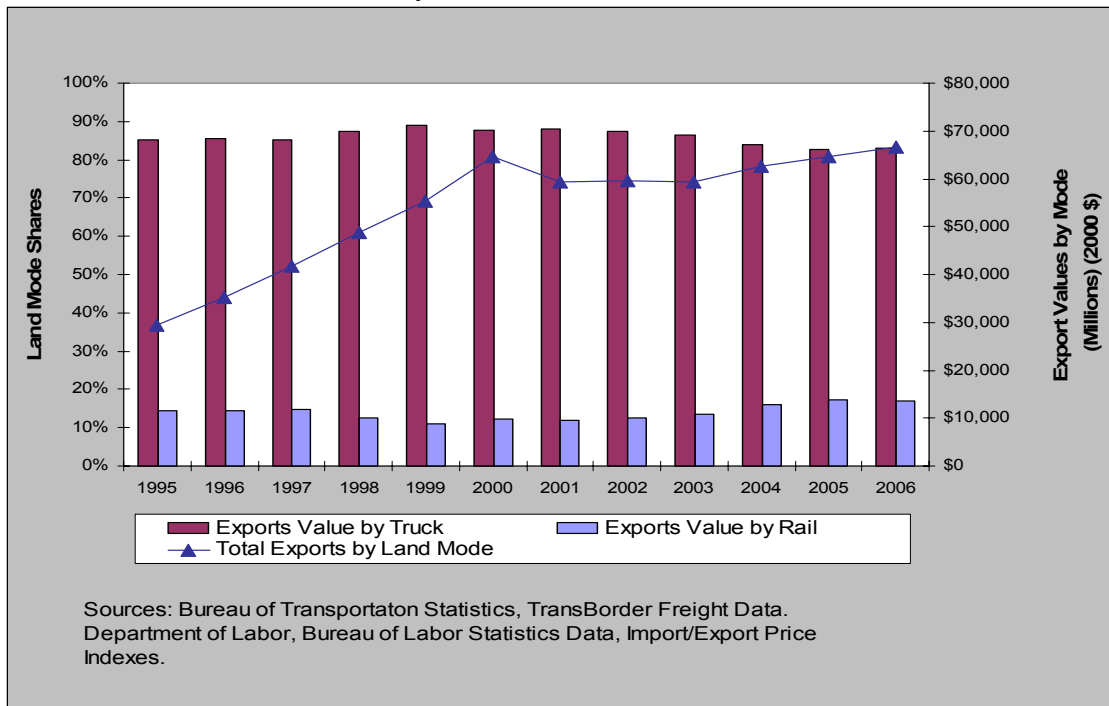
Chart 6
Region's NAFTA Import Values and Shares
By Land Mode 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.

Arkansas

The growth in the total value of Arkansas' NAFTA trade approached $1.3 billion in real terms over the 1995 to 2006 period. NAFTA trade grew at an annual compounded growth rate of 6% over this period. Arkansas became a net exporter of NAFTA commodities during this period (see Chart 7). Starting in 1995 with an $80.9 million NAFTA trade deficit, the net trade balance rapidly turned into a surplus of $401million by 1997, and reached its highest level of $531 million in 2006. Over the 1995-2006 the total of the NAFTA net trade balance added slightly more than $2 billion to the economy of Arkansas.

Chart 7
Arkansas' NAFTA Trade Values and Trade Shares
All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
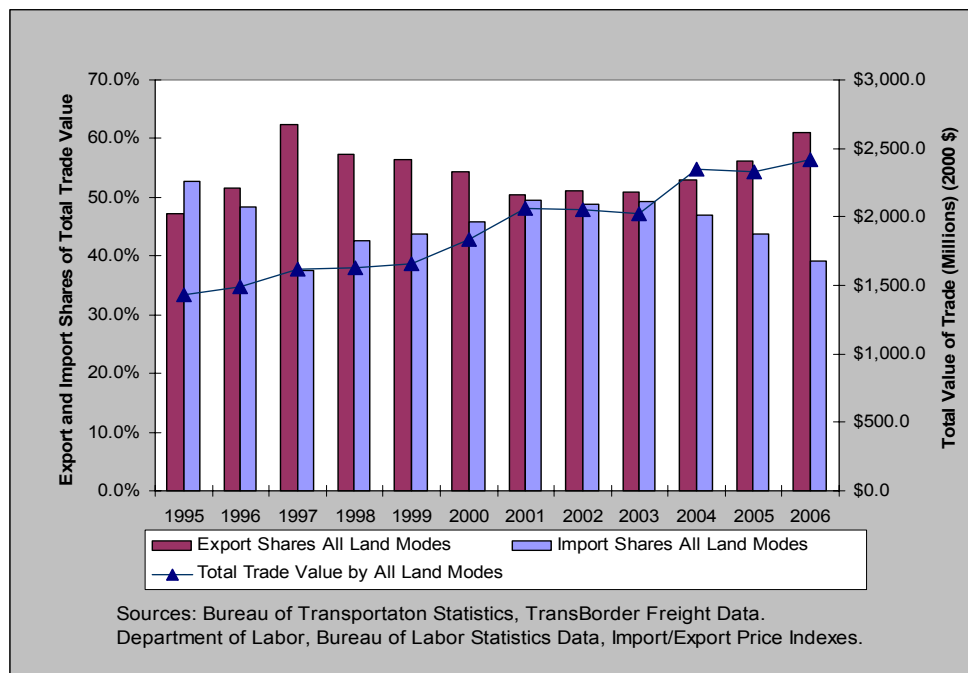
The value of Arkansas exports grew by approximately $657.9 million over the 1995 through 2006 period, and achieved an annual compounded growth rate of 6.7% (see Chart 8). The majority of the exports were moved by truck. However, starting in 2000 rail shipment grew continuously from 13.7% to 36% in 2006.

The real value of NAFTA imports by land mode to Arkansas has a mixed picture. NAFTA imports did not start to grow until 1998, they reached a maximum of $1,020 million in 2002, and then they began a moderate decline (see Chart 9). Trucking has been the major land mode for transporting NAFTA imports, averaging 78% annually.

Chart 8
Arkansas' NAFTA Export Values and Shares
By Land Mode 1995-2006

Land Mode Shares vs **Export Values by Mode (Millions) (2000 $)**, years 1995–2006.

Legend: Exports Value by Truck ▪ Exports Value by Rail ▪ Total Exports by Land Mode ▲

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
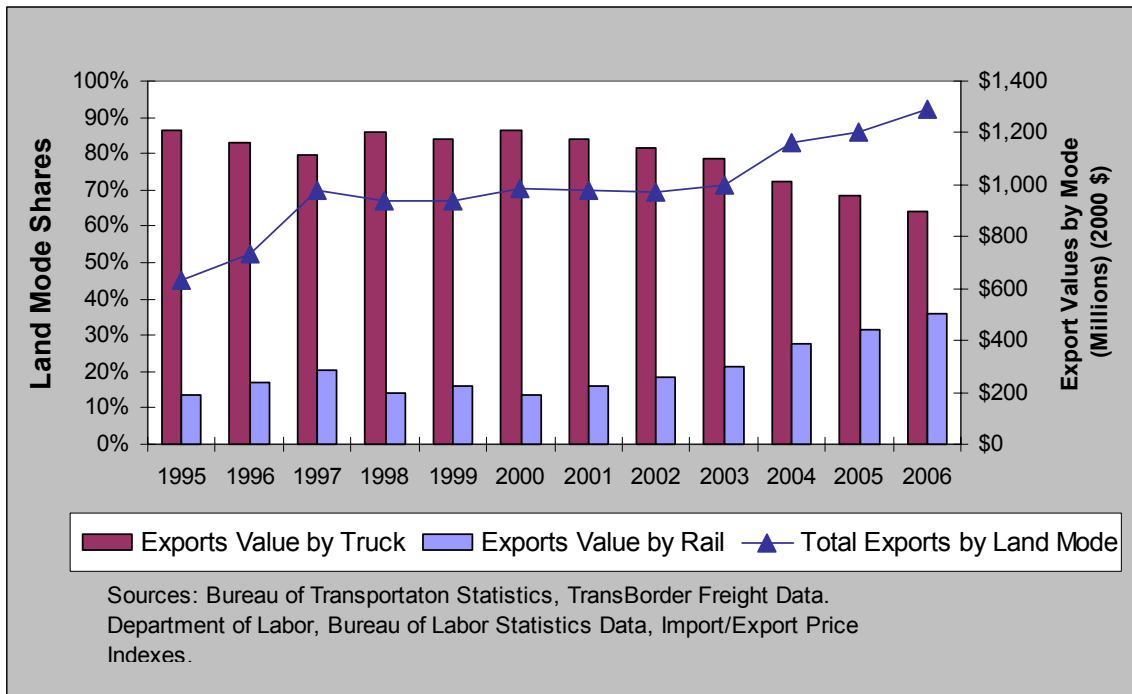
Chart 9
Arkansas' NAFTA Imports Values and Shares
By Land Mode 1995-2006

Land Mode Shares vs **Total Value of Imports (Millions) (2000 $)**, years 1995–2006.

Legend: Imports Value by Truck ▪ Imports Value by Rail ▪ Imports Value by All Land Modes ▲

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
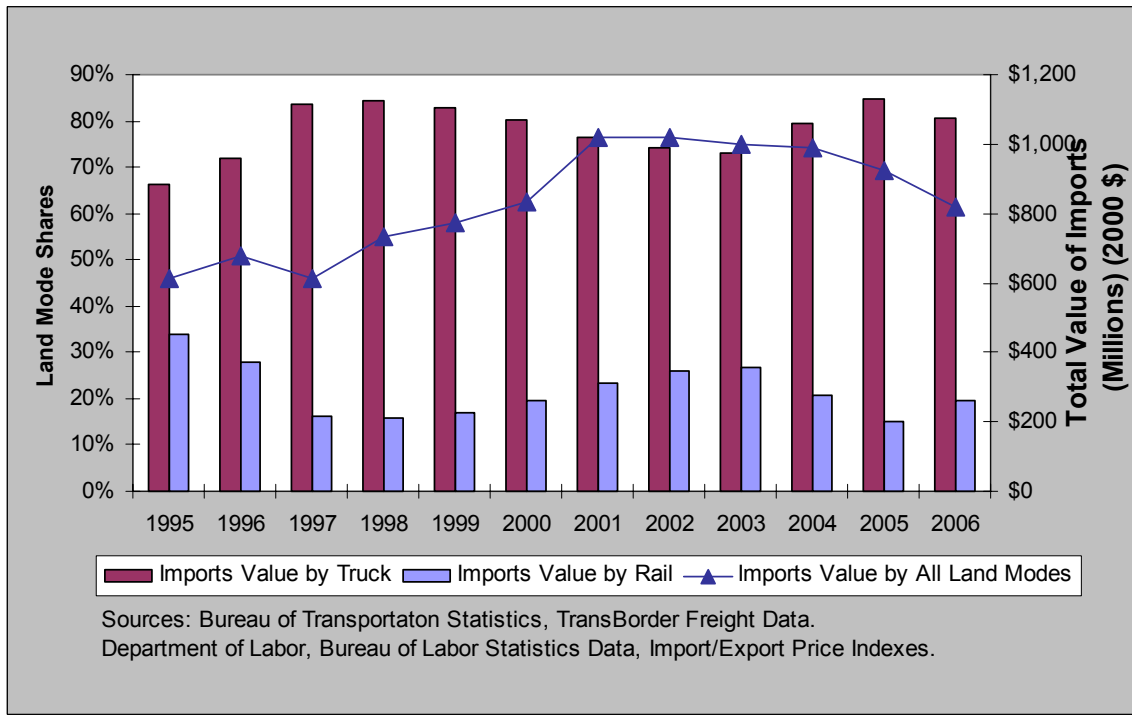
Louisiana

The total value of Louisiana's NAFTA trade grew in real terms by approximately $1.6 billion over the 1995-2006 period. This is equivalent to an annual compounded growth rate of 8%. Louisiana has been a net exporter of NAFTA commodities (see Chart 10). Starting in 1995 with an $330 millions NAFTA trade surplus, the surplus grew for 10 of the 11 years reaching a maximum of $1.1 billion in 2006. Over the 1995-2006 period the total of the NAFTA net trade balance added slightly more than $7.7 billions to the economy of Louisiana.

Chart 10
Louisiana's NAFTA Trade Values and Trade Shares
All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data. Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
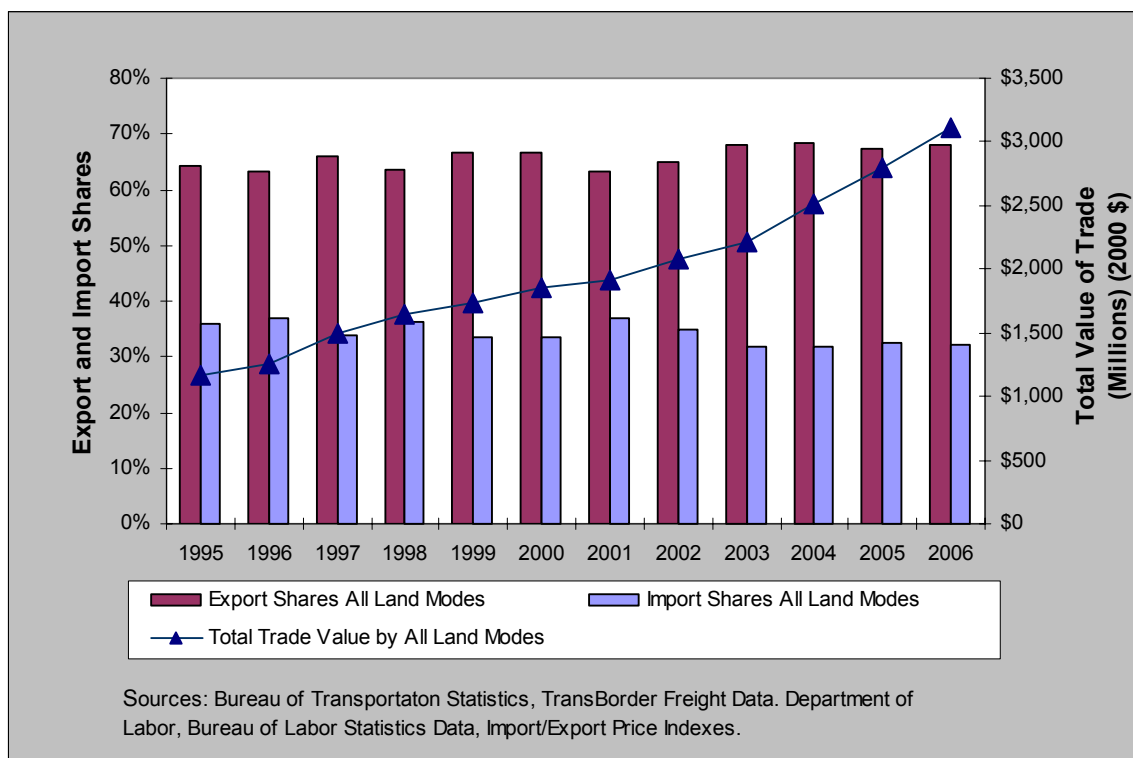
The value of Louisiana exports grew by approximately $1.4 billion between 1995 and 2006 achieving an annual compounded growth rate of 9.97% (see Chart 11). During this time period, preferred surface transportation mode changed from trucks to rail. In 2006, rail accounted for 64% of the total value of exports.

The real value of NAFTA imports by land mode in Louisiana increased by $580 millions from 1995 to 2006. Their annual compounded growth rate was 8.2% during this period (see Chart 12). Truck was the predominate mode of surface transportation for Louisiana's NAFTA imports. Trucking on average maintained a 78% annual share of the value of Louisiana's NAFTA imports.

Chart 11
Louisiana's NAFTA Export Values and Trade Shares
All Land Modes 1995-2006
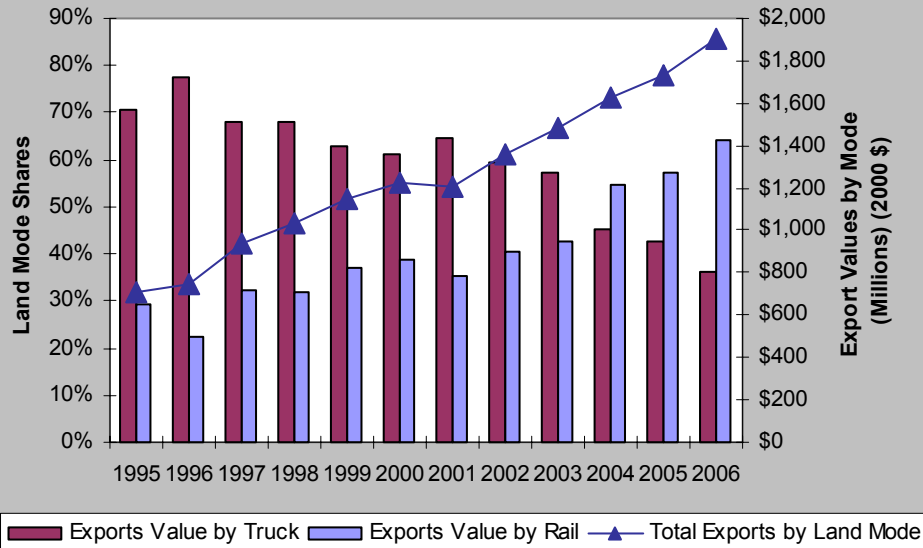
Sources: Bureau of Transportaton Statistics, TransBorder Freight
Data. Department of Labor, Bureau of Labor Statistics Data,
Import/Export Price Indexes.

Chart 12
Louisiana's NAFTA Import Values and Trade Shares
All Land Modes 1995-2006
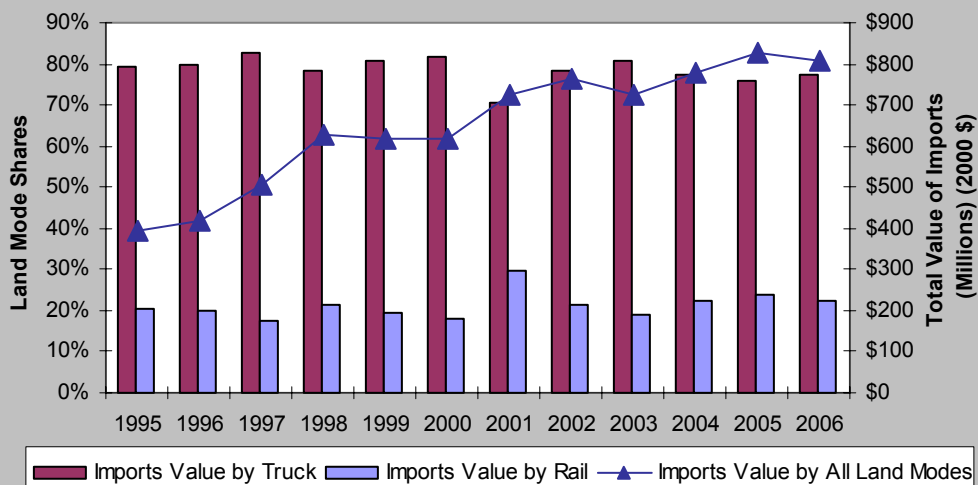
Sources: Bureau of Transportaton Statistics, TransBorder Freight Data. Department of
Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.

Missouri

The value NAFTA had on Missouri trade grew at an annual compounded growth rate of 8.4% increasing in real terms in excess of $5.6 billion over the 1995 to 2006 period (see Chart 13). Missouri's annual NAFTA trade balance swung back and forth between trade deficits and trade surpluses. Annual trade deficits were realized in 1995 and the 1998-2003 periods. In 1996-1997 and 2004-2006, Missouri had an annual trade surplus with its NAFTA trading partners. Over the 1995-2006 the total of the NAFTA net trade balance had a cumulative deficit of $851 million. For Missouri's economy, the cumulative impact of NAFTA trade reduced its size by $851 million.

Chart 13
Missouri's NAFTA Trade Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight
Data. Department of Labor, Bureau of Labor Statistics Data,
Import/Export Price Indexes.

The value of Missouri exports grew by approximately $3.2 billion between 1995 and 2006. This is equivalent to an annual compounded growth rate of 9.3% (see Chart 14). During this time period, trucking dominated surface transportation mode averaging an 80% annual share.

The real value of NAFTA imports by land mode to Missouri increased by $2.4 billion from 1995 to 2006. Their annual compounded growth rate was 7.4% (see Chart 15). Truck remained the predominate mode of surface transportation for Missouri NAFTA imports. On average during this period, trucks transported 77% of the total value of imports to Missouri.

Chart 14
Missouri's NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
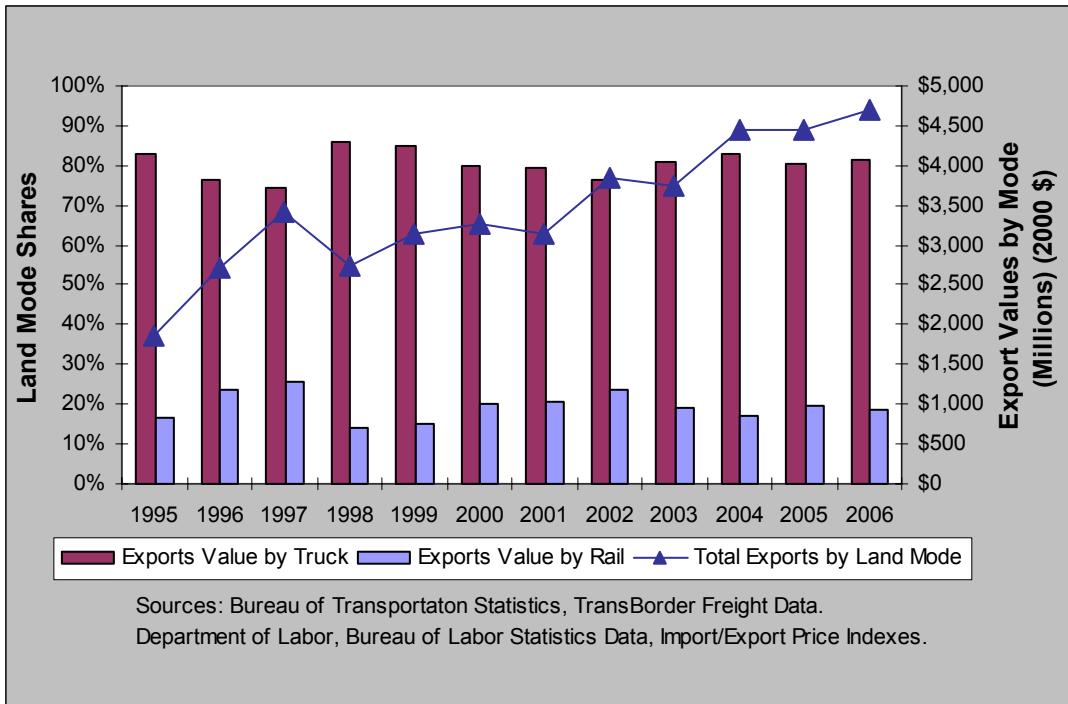
Chart 15
Missouri's NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
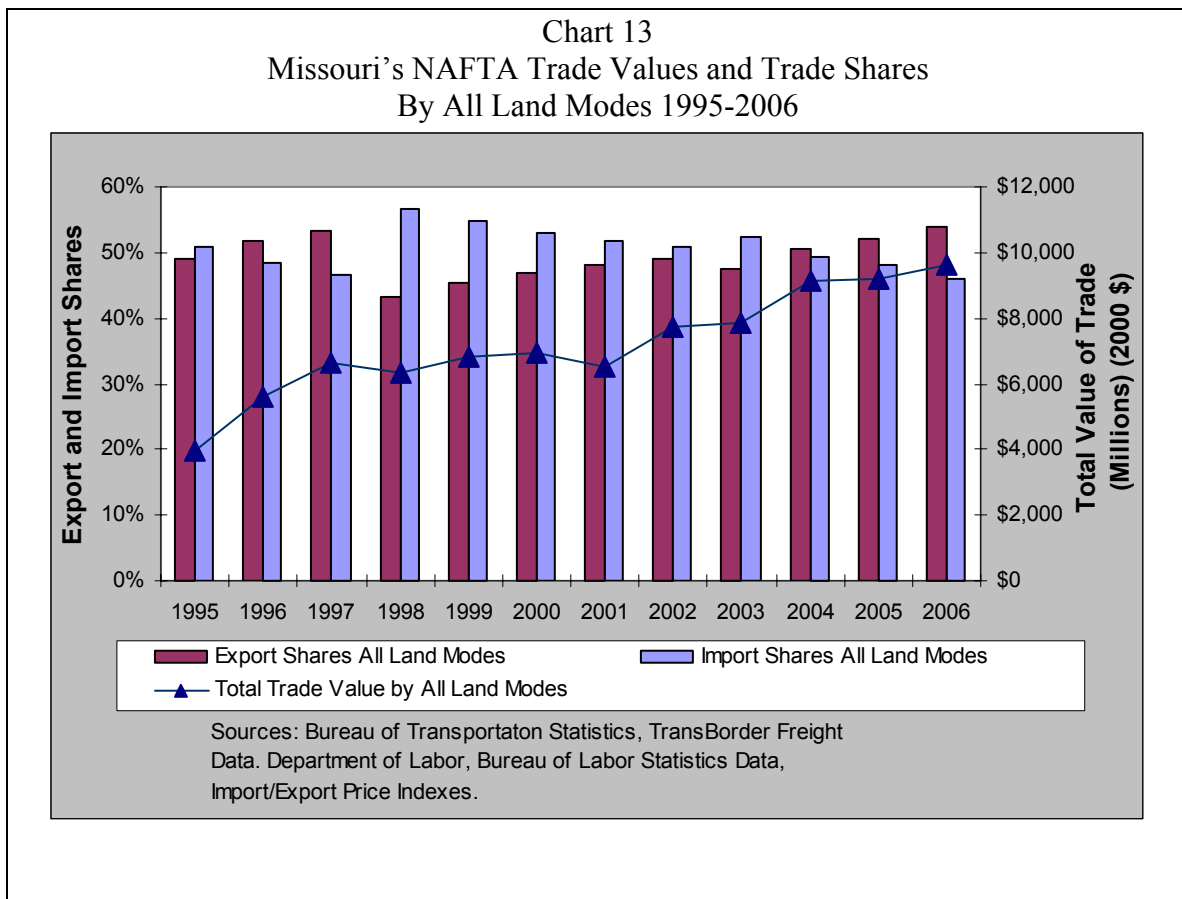Department of Labor, Bureau of Labor Statistics Data, Import/Export Price
Indexes.
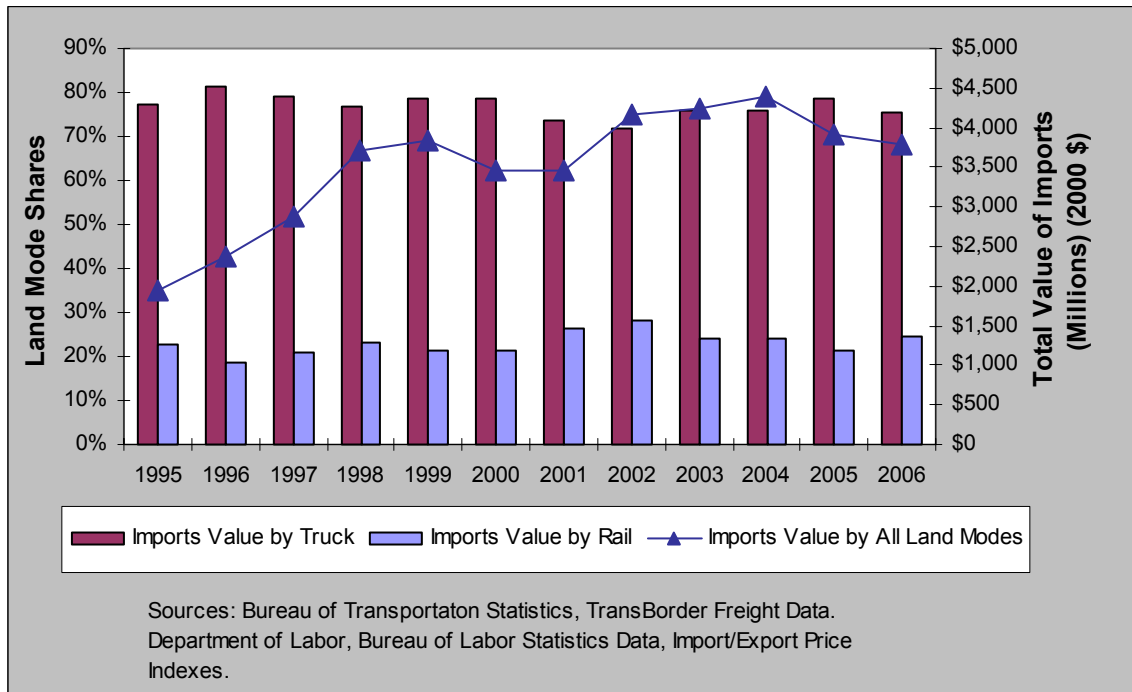
Mississippi

The total value of Mississippi NAFTA trade grew in real terms in excess of $1.6 billion over the 1995 to 2006 period achieving an annual compounded growth rate of 8.6% (see Chart 16). Mississippi's annual NAFTA trade balance made several major swings from trade deficits and trade surpluses. Annual trade deficits were realized in 1996-1997 and the 2002-2003 periods. While in the remaining years, Mississippi had an annual trade surplus with its NAFTA trading partners. Over the 1995-2006, the cumulative NAFTA net trade balance was a surplus indicating that overall NAFTA trade added slightly more than $1.1 billion to the economy of Mississippi.

Chart 16
Mississippi's NAFTA Trade Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
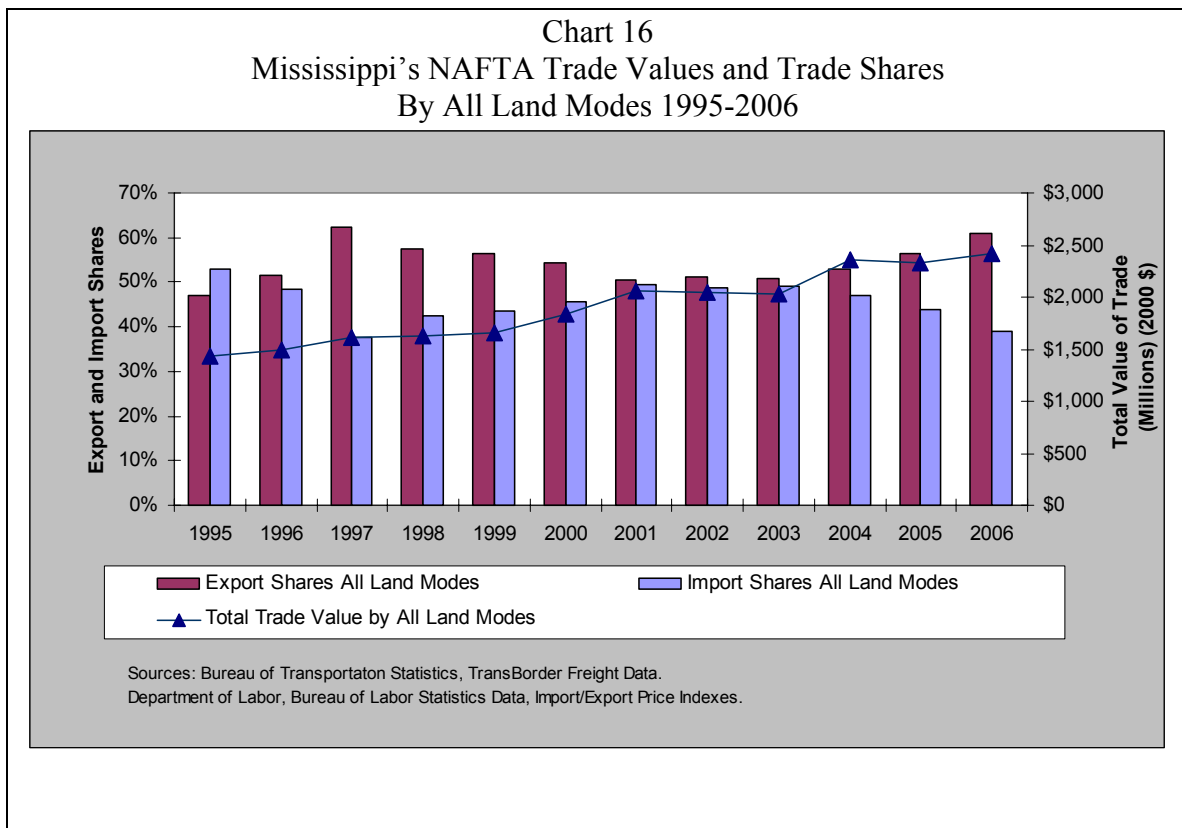
The value of Mississippi exports grew by approximately $800 million between 1995 and 2006 (see Chart 17). The annual compounded growth rate for the value of exports was 8.4%. During this time period, trucking dominated the surface transportation mode averaging an 80% annual share of the total value of exports. However, rail share of exports started to increase in 2000, and in 2006, it was 30% of the total value of exports.

The real value of NAFTA imports by land mode to Mississippi increased by $421 million from 1995 to 2006 (see Chart 18). These imports grew at an annual compounded growth rate of 5.3% during this period. Trucking has remained the predominate mode of surface transportation for moving Mississippi NAFTA imports. On average during this period, trucks transported 87% of the total value of NAFTA surface imports to Mississippi.

Chart 17
Mississippi's NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Legend: Exports Value by Truck — Exports Value by Rail — Total Exports by Land Mode

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
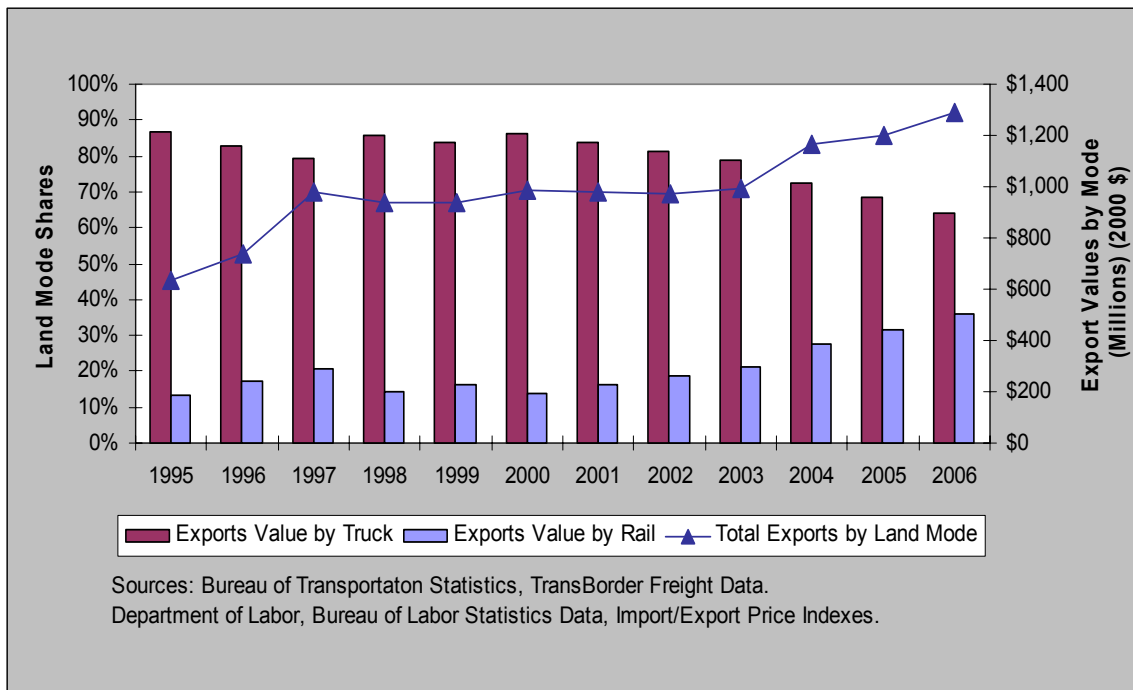
Chart 18
Mississippi's NAFTA Import Values and Trade Shares
By All Land Modes 1995-2006

Legend: Imports Value by Truck — Imports Value by Rail — Imports Value by All Land Modes

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
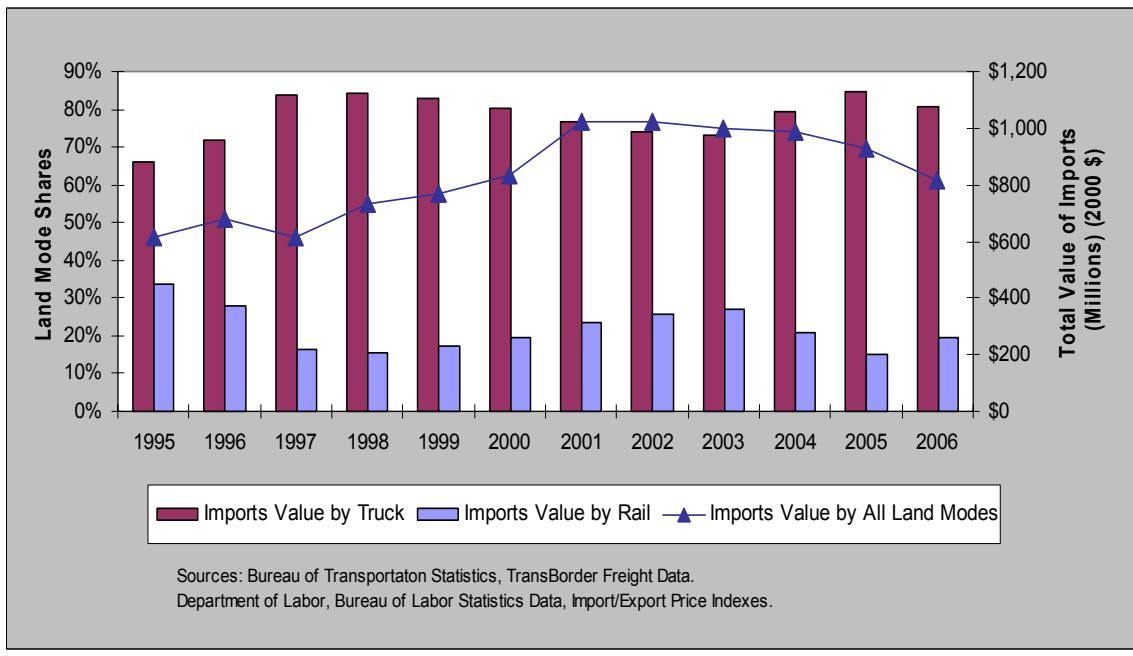
Oklahoma

Oklahoma's NAFTA trade grew in real terms in excess of $2.5 billion over the 1995 to 2006 period averaging an annual compounded growth rate of 13.1% (see Chart 19). Oklahoma's annual NAFTA trade balance made several sharp swings from trade deficits and trade surpluses. Oklahoma had an annual NAFTA trade deficit in 2001-2002 and in 2004. Over the 1995-2006 period, the cumulative NAFTA net trade balance had a surplus adding slightly more than $1.08 billion to the economy of Oklahoma.

Chart 19
Oklahoma's NAFTA Trade Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
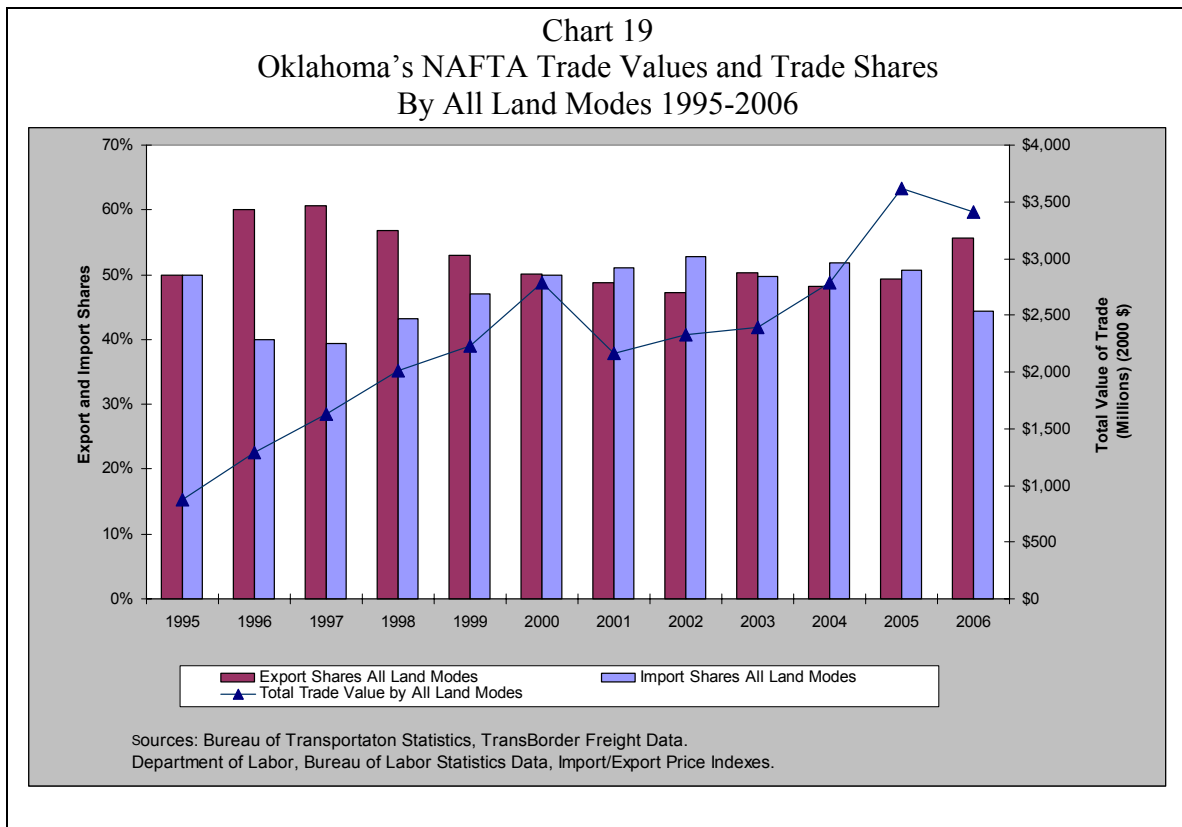
The value of Oklahoma exports grew at an annual compounded growth rate 14.2% increasing by approximately $1.4 billion between 1995 and 2006 (see Chart 20). Like the other states of this Region, trucking dominated surface transportation mode averaging an 80% annual share of the total value of exports.

The real value of Oklahoma's NAFTA imports by surface mode increased by $1 billion from 1995 to 2006. It grew at an annual compounded growth rate of 11.9% (see Chart 21). Trucking has been the dominate mode of surface transportation for moving Oklahoma's NAFTA imports. On average, trucks transported 82% of the total value of NAFTA surface imports to Oklahoma. Since 2003, rail has made an indent into trucking shares of imports, capturing almost 30% of the value of Oklahoma's imports.

Chart 20
Oklahoma's NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TranBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
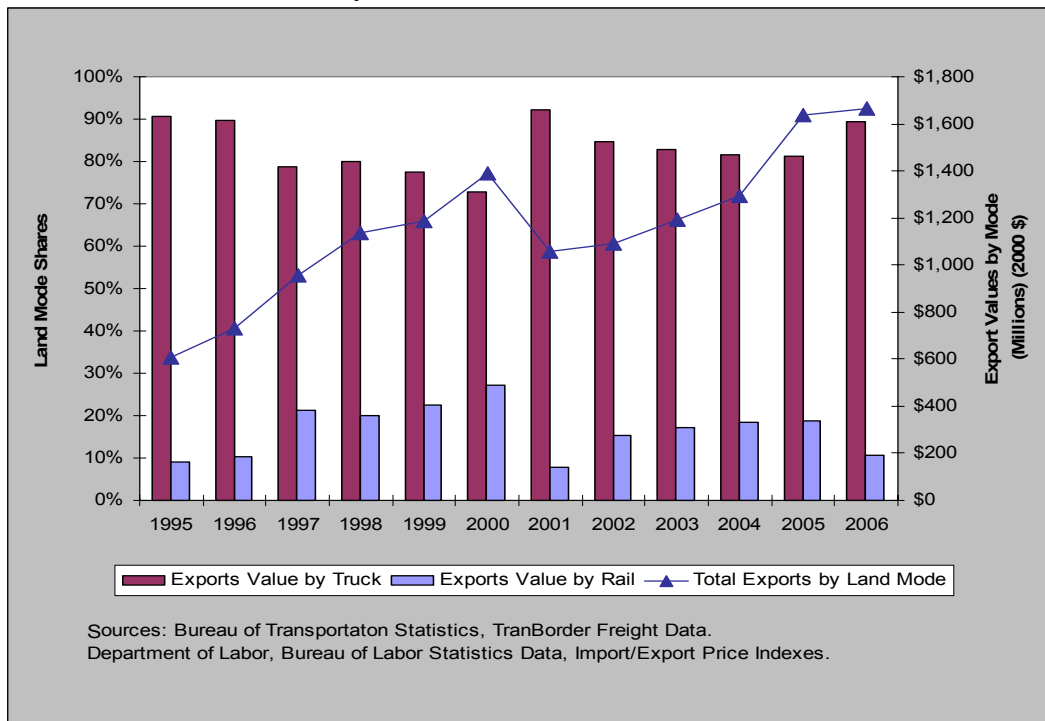
Chart 21
Oklahoma's NAFTA Import Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
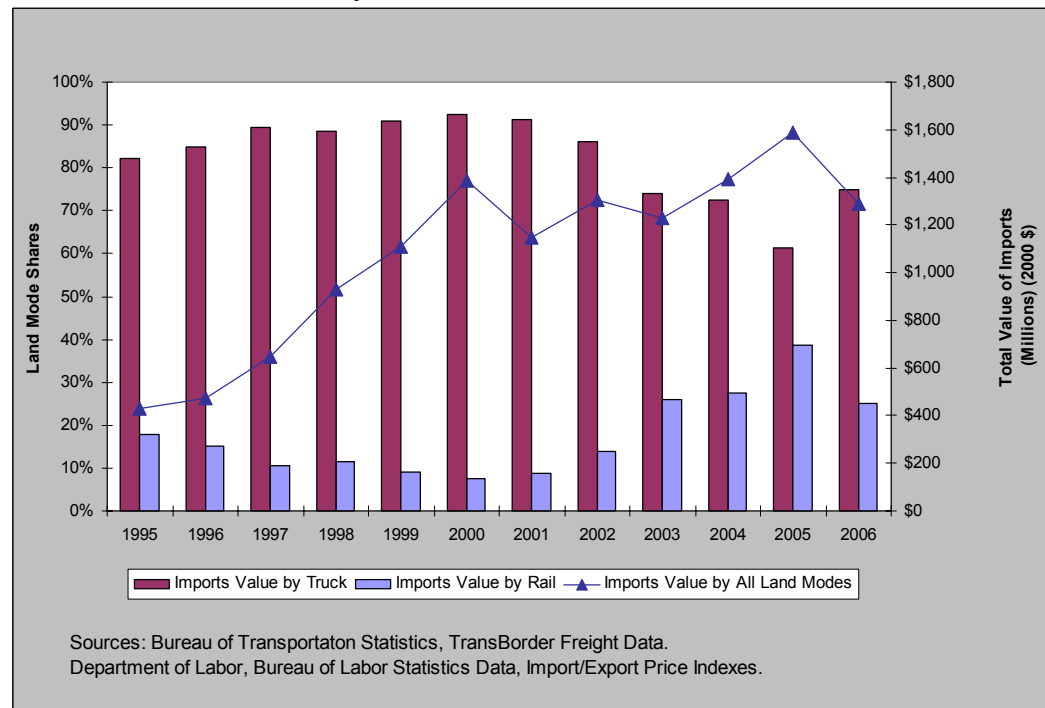
Tennessee

The total value of Tennessee NAFTA trade grew in real terms in excess of $11.3 billion over the 1995 to 2006 period achieving an annual compounded growth rate of 8.8%.(see Chart 22). Tennessee's annual NAFTA trade balance remained in a deficit during this period as the value of NAFTA imports continually exceeded the value of Tennessee NAFTA exports. Tennessee cumulative net trade balance deficit during this period was $22 billion.

Chart 22
Tennessee's NAFTA Trade Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
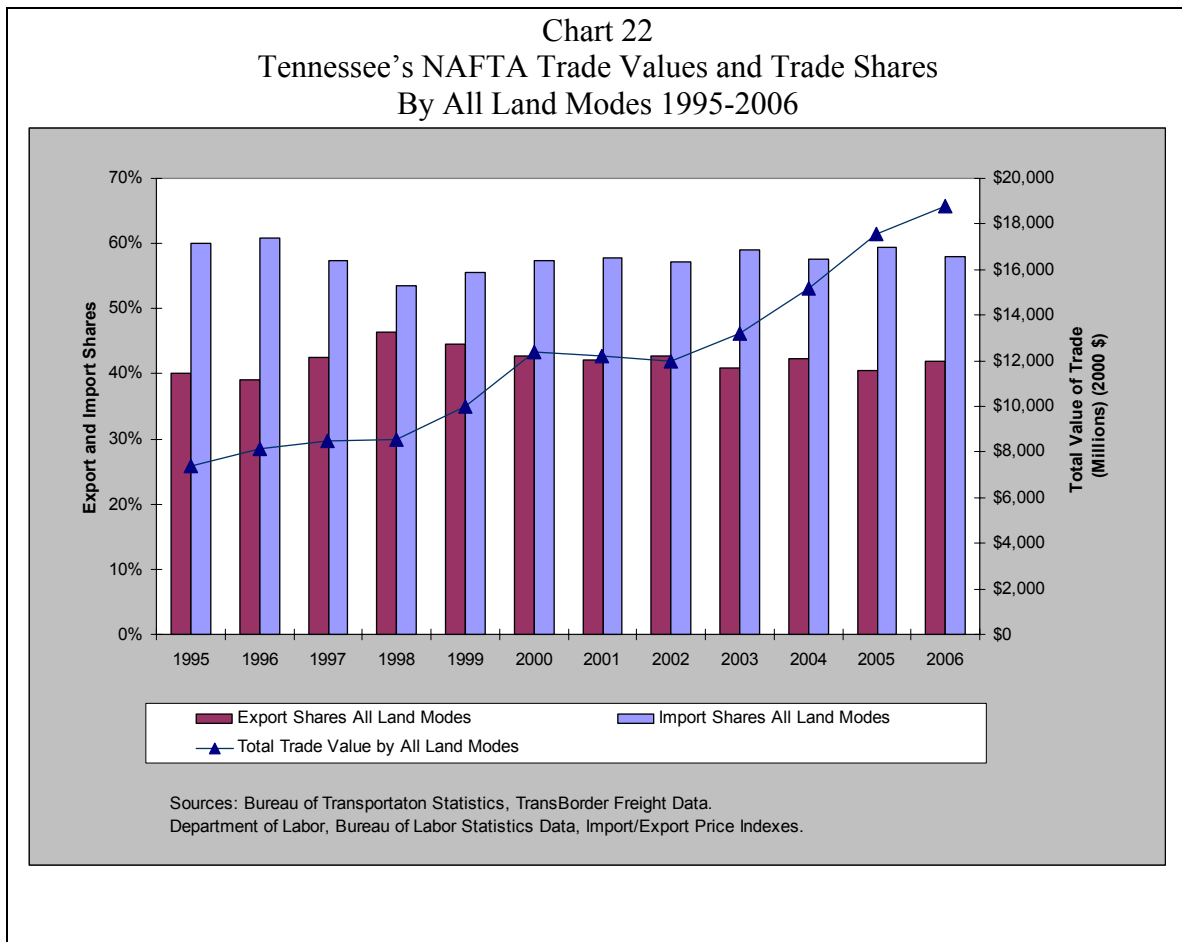
The value of Tennessee exports grew by nearly $4.9 billion between 1995 and 2006. The annual compounded growth rate for the value of exports was 9.3% (see Chart 23). Like the other states of this Region, trucking dominated surface transportation mode averaging an 83% annual share of the total value of exports.

The real value of Tennessee's NAFTA imports by surface mode increased by $6.4 billion from 1995 to 2006, and it grew at an annual compounded growth rate of 8.5% (see Chart 24). Trucking dominated surface transportation but it was not as significant as other states in the study area. On average, trucks transported 76% of the total value of NAFTA surface imports to Tennessee. Rail gained import share in recent years.

Chart 23
Tennessee's NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.

Chart 24
Tennessee's NAFTA Import Values and Trade Shares
By All Land Modes 1995-2006
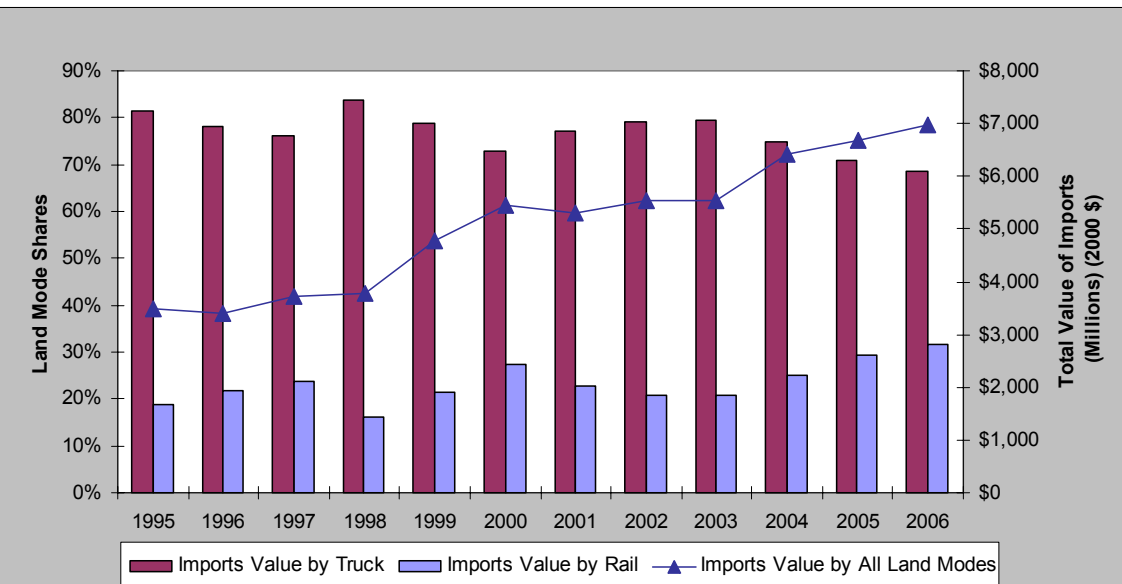
Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.

Texas

The total value of Texas NAFTA trade grew in real terms in excess of $53 billion over the 1995 to 2006 period (see Chart 25). The value of Texas NAFTA exports grew at an annual compounded growth rate of 7.8%. Texas annual NAFTA trade balance remained in a surplus position throughout this study's time period. Texas cumulative net trade balance surplus was $148 billion over the 1995-2006.

Chart 25
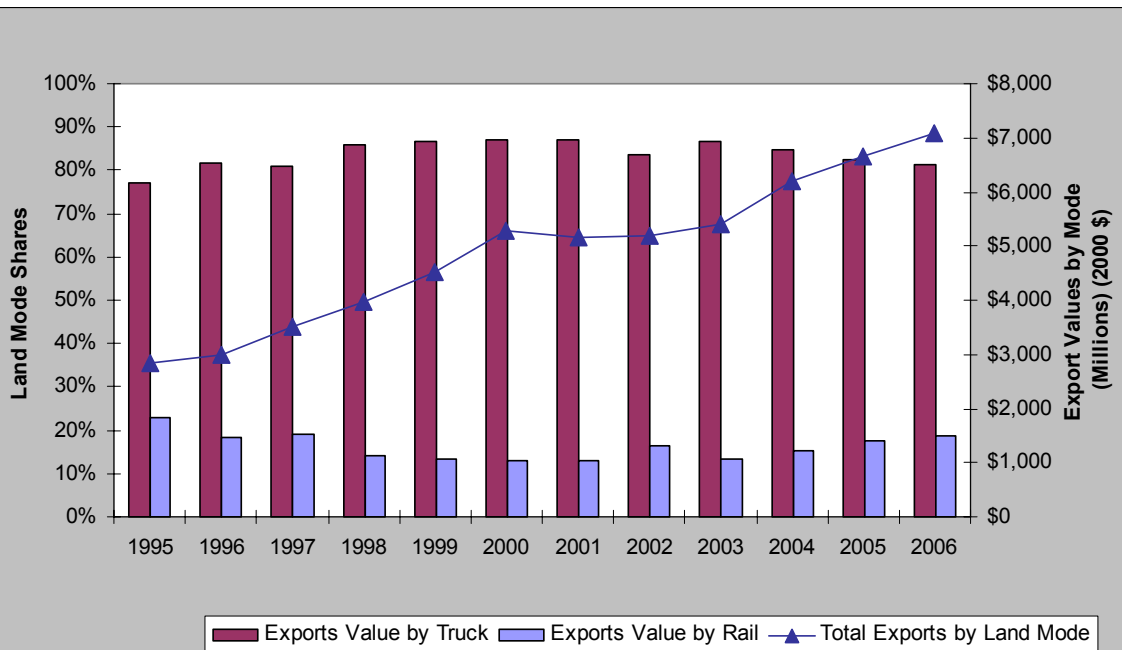Texas' NAFTA Import Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
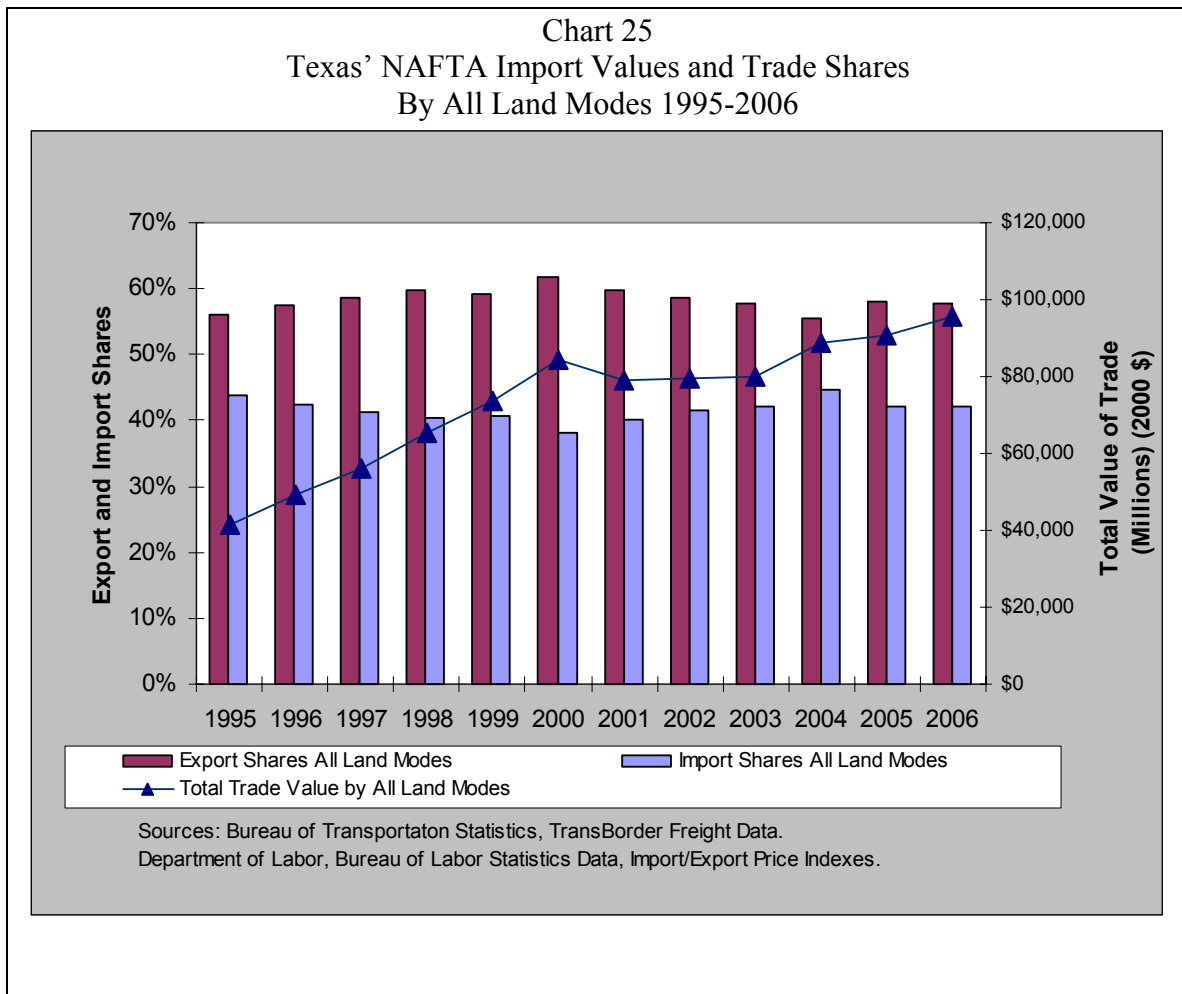
The value of Texas exports grew by approximately $31 billion between 1995 and 2006 (see Chart 26). The annual compounded growth rate for the value of exports was 8.1%. Trucking dominated the surface transportation modes averaging an 87% annual share of the total value of exports during this time period.

The real value of Texas NAFTA imports by land mode increased by $22 billion from 1995 to 2006, and it grew at an annual compounded growth rate of 7.4% (see Chart 27). Trucking also dominated surface transportation with an average share of 89%.

Chart 26
Texas' NAFTA Export Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
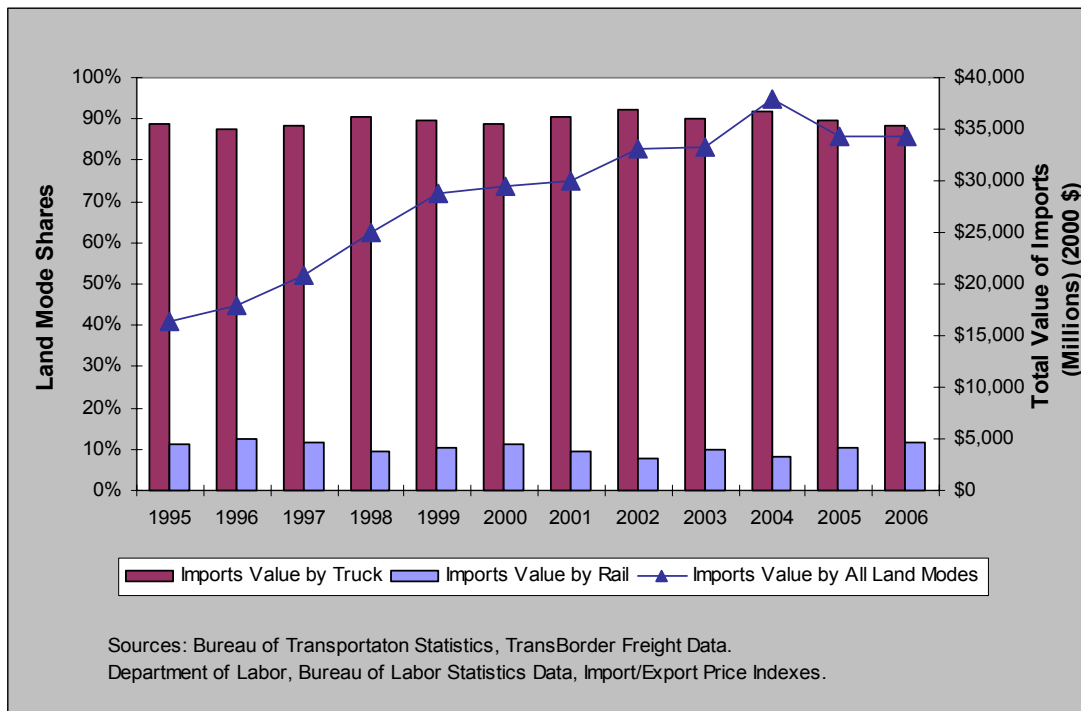
Chart 27
Texas' NAFTA Import Values and Trade Shares
By All Land Modes 1995-2006

Sources: Bureau of Transportaton Statistics, TransBorder Freight Data.
Department of Labor, Bureau of Labor Statistics Data, Import/Export Price Indexes.
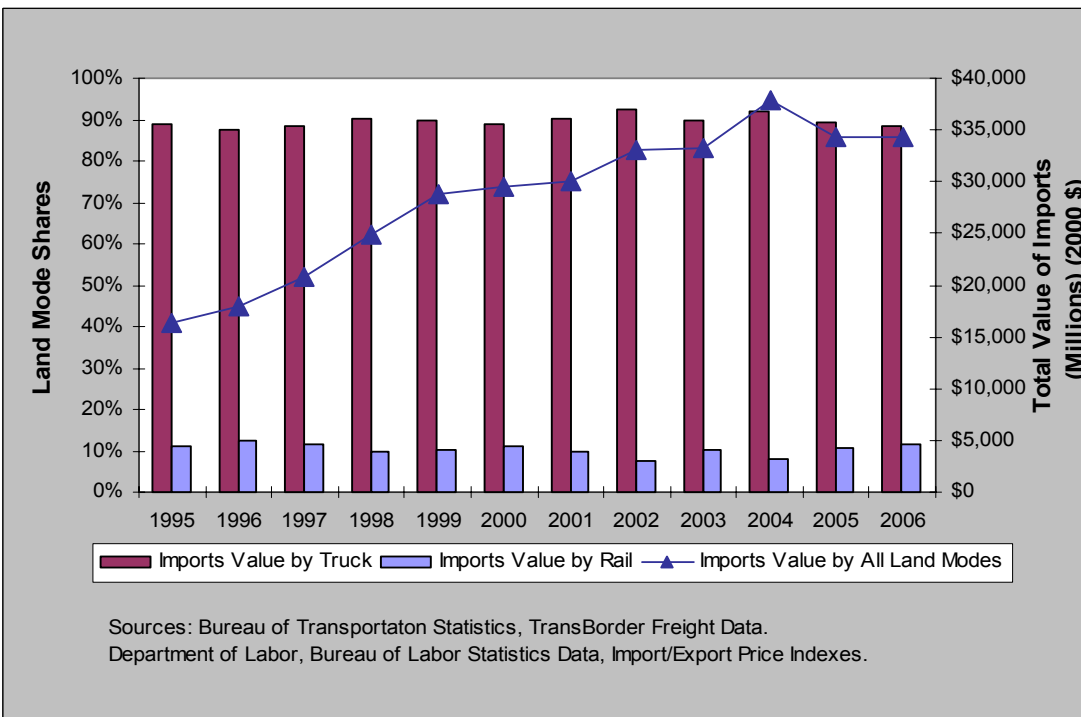
NAFTA Trade Flows Contribution to Gross Domestic Product by State

Gross Domestic Product (GDP) by state is the counterpart of the nations GDP and provides a comprehensive measure of a state's production. GDP by state is, "the sum of incomes earned by labor and capital and the costs incurred in the production of goods and services."[22] An industry contribution to GDP by state is its value added (the industries gross output minus its intermediate inputs including imports).

Exports add to GDP by state. Imports reduce GDP by state directly if they are consumed as intermediate inputs and indirectly if their consumption results in a reduction of domestic production. Hence, the net trade balance of a state measured as the differences between the value of state's exports and the value of state imports indicate the magnitude of trades contribution to the economy. Restricting the measure to NAFTA trade balances gives a way to access the overall NAFTA trade contribution to GDP by state.

Chart 28 shows NATFA exports and imports as a percentage of Gross Regional Product. The right axis of the chart is Gross Regional Product (the sum of the GSPs by state). The left axis shows the Rregion's export and import shares of GRP. As indicated in the chart, the value of NAFTA exports exceeded the value of NAFTA imports. The NAFTA export share of GRP and the NAFTA import share of GRP both grrew over the 1995-2006 period, increasing by 2%.

Chart 28
NAFTA Export and Import Shares of Gross Regional Product
1995-2006

Source: Bureau of Economic Analysis, U.S. Department of Commerce. Gross Regional Product is the sum of AR, LA, MO, MS, OK, TN, and TX GDP by state.

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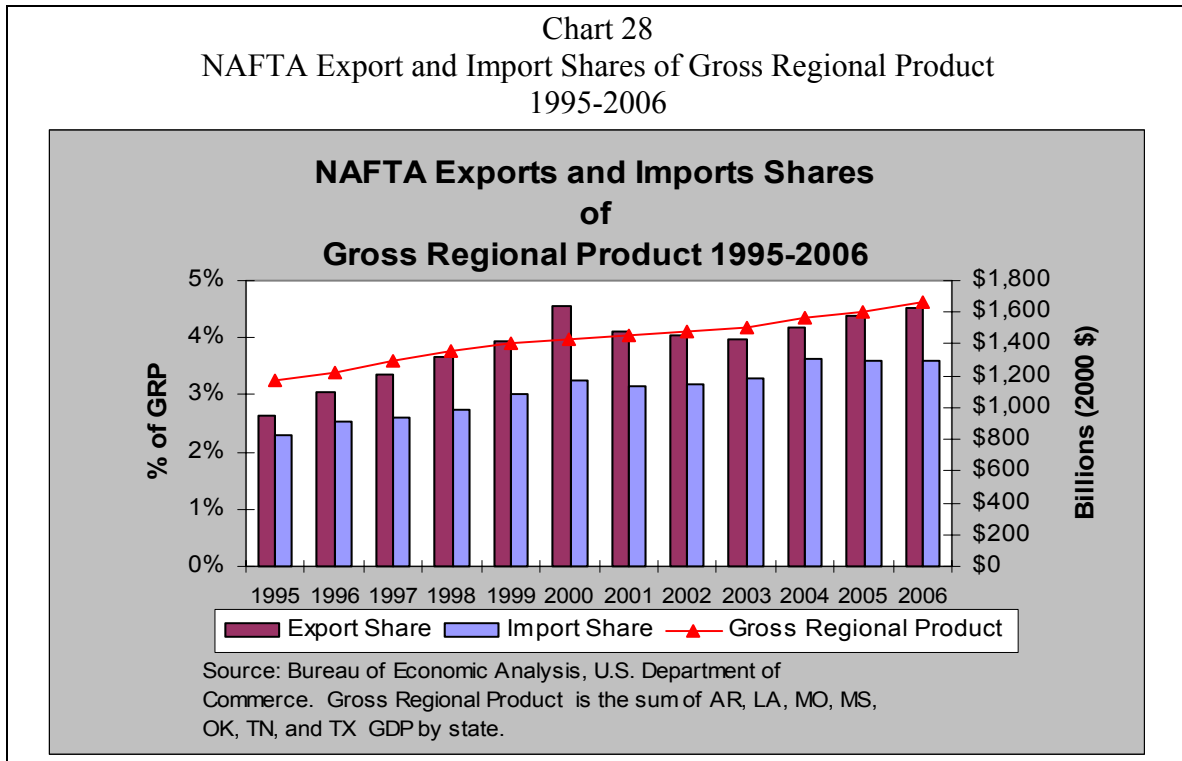
[22]Gross Domestic Product by State Estimation Methodology. Bureau of Economic Analysis, U.S. Department of Commerce, 2006.

Direct Impact Estimates of NAFTA Trade

The direct impact of NAFTA trade is the value of the changes in the final demands resulting from the trade liberalization. This corresponds to the value of NAFTA net trade balance since exports add to final demands while imports reduce final demands. In terms of the previous chart, the direct impact of NAFTA trade on the Region is the differences between the export and import shares of GRP multiplied by GRP. The estimates are shown in Chart 29.

Chart 29
NAFTA Trade Direct Impact on Gross Domestic Product
By State 1995-2006

Source: Bureau of Economic Analysis, U.S. Department of Commerce, GDP by State Data, and Bureau of Transportaton Statistics, TransBorder Freight Data.
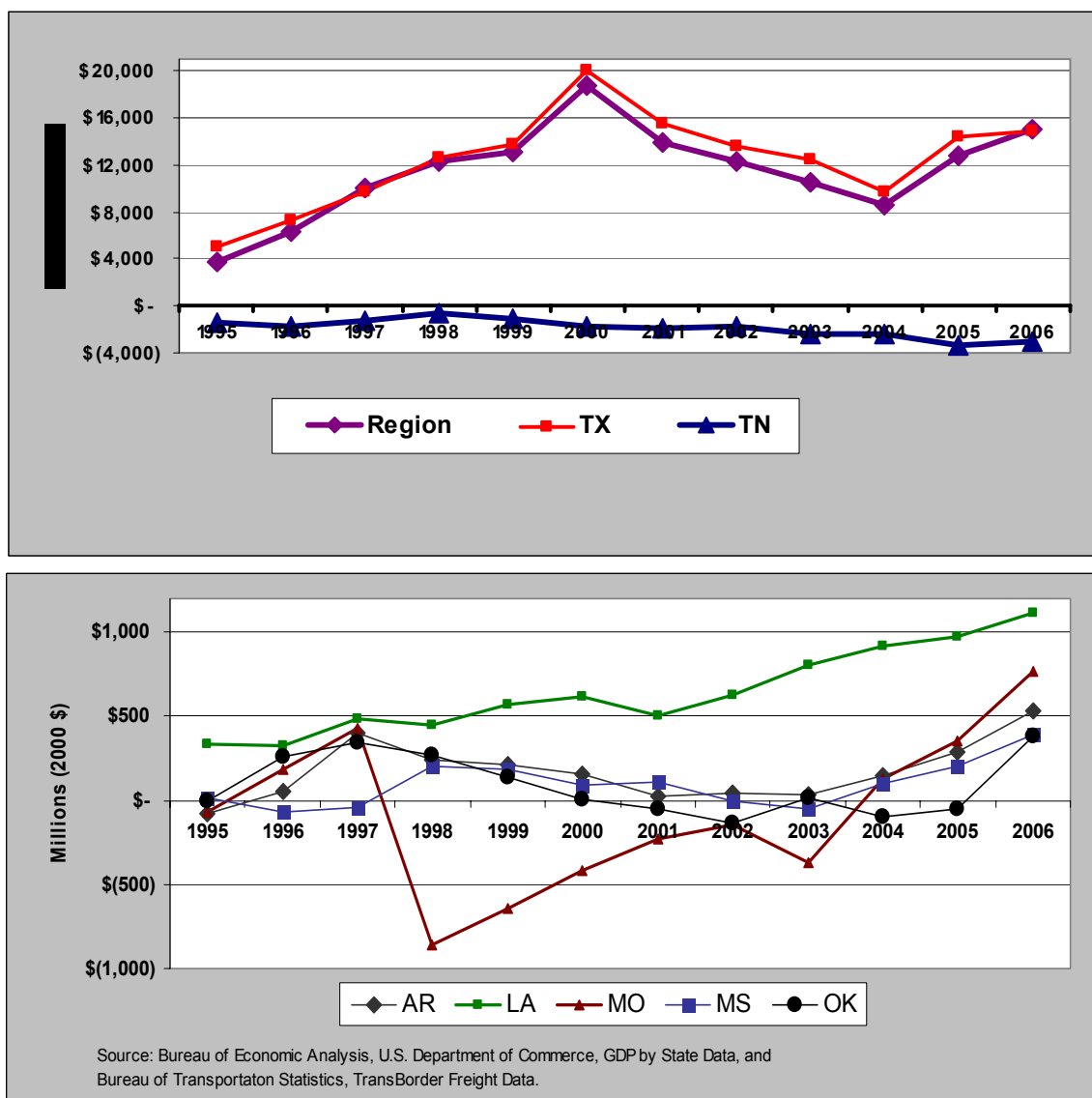
As shown in Chart 27, the NAFTA had a positive impact on the Region overall, but Tennessee lost on average 1% of its GDP per year and to a lesser extent, so did Missouri (-0.4%). Texas is the major winner in NAFTA trade. The direct impact of this trade on the Texas economy amounted to an additional 1.7% of GDP on average annually. This exceeded that total direct impact in the Region which was 0.7% additional GRP on average per year. Arkansas (0.24%), Louisiana (0.48%), Mississippi (0.14%), and Oklahoma (0.1%) direct impacts were all positive but small compared to the size of their state economies.

Part III
Estimates of the Economic Impact of NAFTA on the Region

In this section of the report the findings from an economic impact study of the trade flows are reported. Unfortunately, the complexities of the multitude of economic consequences of NAFTA preclude any accurate assessment and estimates of NAFTA's impact on our study Region. The data necessary to get a complete picture of NAFTA's economic impacts are not currently available in sufficient detail. In particular, NAFTA export data are origin of movement data which mean it is not a reliable indicator of place of production. NAFTA import data are not available to access the consequences of imports on domestic production and consumption. In order to use NAFTA trade flow data in the following impact analysis, several very significant data issues needed to be overlooked.

Methodology: Economic Impact Analysis and Input-Output Modeling

Using input-output analysis is a standard way to analyze economic impacts (Miernyk, 1965).[23] An input-output model (I-O model) has a detailed industry specification that has the capability to trace transactions between producers in response to changes in the demand for goods and services (final demand). An input-output analysis starts with a change in final demand that sets off a series of expenditures that filter through the whole model. The total change in all expenditures measures the total impact of the initial final demand change, and this is broken down into direct impacts, indirect impacts, and induced impacts.

For example, when NATFA trading partners purchase Arkansas goods, export demand which is an element of final demand is affected. As producers respond to the final demand change, a series of additional expenditures are made. A portion of the spending is for goods and services produced locally (within the study area) and a portion of the spending goes to goods and services purchased from outside the local area (outside the study area). The portion of spending that remains in the study area is called "direct expenditures" and is a measure of the direct effect or direct impact of the NAFTA trade. The rest of the spending is a leakage from the study area.

Direct expenditures give rise to interindustry purchases. That is, industries supplying the exporting industries make purchases from each other in order to fulfill the initial demand created by the direct expenditures. Interindustry purchases are called "indirect expenditures," and they are a measure of the value of the interindustry purchases caused by the direct expenditures.

Increases in the direct and interindustry expenditures result in additional earnings for workers. As workers spend these earnings, more goods and services are demanded, and therefore there are further increases in economic activity. These additional expenditures associated with this economic activity is called the induced expenditures. The sum of the direct, indirect, and induced effects is called the total effect or total impact.

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[23] Miernyk, William. The Elements of Input-Output Analysis, Random House, 1965.

In summary, direct expenditures set off rounds of indirect expenditures and induced expenditures that spread through the economy. To measure the total impact of these expenditures, expenditure multipliers are used. A regional expenditure multiplier that measures the impact on a per dollar basis of direct expenditures is defined as

Regional Expenditure Multiplier = (Direct Expenditures +Indirect Expenditures +Induced Expenditures)
(Direct Expenditures).

When direct expenditures are multiplied by an expenditure multiplier, the result is an estimate of the total impact of that expenditure or the change in the economy's output that is a consequence of the initial direct expenditure.

In regards to this study, exports are a direct expenditure adding to final demand and so are imports, but they reduce final demand. Exports are a direct expenditure and by multiplying them by an expenditure multiplier results in an estimate of the impact. Similarly, imports are a direct expenditure that reduce final demand and by multiplying them by an expenditure multiplier provides an estimate in their impact in the economy.

Economic impacts can be measured by various parameters. One measure is the value of the economic output created directly and indirectly by NAFTA trade. This is the broadest measure of economic impact. In principle, the net trade balance which is the difference between the values of exports and imports multiplied by the regional expenditure multiplier yields an estimate of the net economic impact on output of NAFTA trade. Another commonly presented measure of economic impact is the change in value added. Value added represents the payments to the factor of production (labor, capital, land, etc.). It is another broad measure but adjusts output for the cost of those things purchased in order to produce other goods and services. In other words, output as a measure of economic impact includes some "double counting" of the economic effects while value added makes an adjustment for this double counting. A third commonly provided economic impact measure is employee compensation—or the value of the added wages and salaries paid to workers. Finally, the gain in employment is a fourth commonly used measure of economic impact.

Data

Export values by state are available from the U.S. Department of Commerce at its TradeStats Express website.[24] The site provides statistics on the U.S. merchandise trade, but not trade in services. The state export data are based on the North American Industry Classification System (NACIS) 3-digit industrial categories. State export data are derived from the Origin of Movement series which measures the transportation origin of the exports. Unfortunately, the place where exports begin their journey to export is not necessarily the place that manufactured the export. Origin of Movement (OM) data do not provide reliable data on place of manufacturing, but it is the only data currently available on state export patterns and trends. To use this data to access the impact of

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[24] TradeStats[TM] Express, International Trade Administration, U.S. Department of Commerce. http://tse.export.gov/.

NAFTA merchandise trade by state, means the differences in origin of export and place of manufacturing is overlooked.

There is no NAFTA import database similar to OM series. Thus, there is no way to currently calculate the net trade balance of goods or services by state directly. Instead of giving up in the effort to access the impact of NAFTA trade by state, the study estimated state imports indirectly by using the value of the TransBorder Freight import data by all land modes. Several assumptions and qualifications needed to be made in order for this approximation to be justifiable. The total value of imports by all lands modes should approximate the value of all NAFTA imports. To the extent that imports arrive by air and water transportation modes make for a less reliable approximation. Likes need to be compared to likes too, and this appears to be true since the comparison is between the export of goods and import of freight. Finally, the destination state must be the state where the good are consumed and the state where a corresponding amount of domestic production is displaced. So that in the aggregate, when imports are consumed in a state, they have the same impact on the state as a reduction in exports. In effect, the regional expenditure multiplier is presumed to be the same for exports and imports in the aggregate and that the value of imports reduces domestic production dollar per dollar.

Economic Impact Analysis

The economic impact analysis used the Implan Impact Analysis Software.[25] For each state in the study the TradeStats Express export data were used to approximate the value of exports by NAICS 3-digit industry for each state. The TransBorder Freight import data for all land shipment was assumed to approximate the aggregate value of imports. Furthermore, the Implan's regional expenditure multipliers as well as its other impact multipliers where assumed to apply equally to both export and imports.

For each state, the economic impact of NAFTA exports and NAFTA imports were estimated and their net impact computed as their difference. NAFTA's impact on the combined Region was estimated by summing each individual state. This summation to accurately reflect the Region presumes that the states NAFTA trade flows and related activities where independent of each other. The economic impact results are reported in Tables 1- 3 for year 2005-2006.

Findings

In Table 1, the findings from the economic impacts associated with export activities in 2005 and 2006 and the change in these impacts are reported. In Table 2, the corresponding findings for NAFTA imports are reported. Finally, Tables 3 shows the net impacts of NAFTA calculated as the difference between the export and import activities.

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[25] Implan Professional Version 2. Minnesota Implan Group, Inc. Stillwater, Minnesota.

Impacts of NAFTA Exports

In all aspects, Texas dominated the combined NAFTA export impacts. Texas captured on average slightly more than 76% of the total output gain of the Region, and 65% of the output change over the 2005-2006 period. The regional output multipliers (the ratio for total to direct values) ranged from a low of 1.67 to a high of 1.95, and had an average value of 2.04 over the two- year period. Hence, for these states, a dollar of NAFTA exports contributed $2.04 to the output of the economy on average.

Value added measures the NAFTA impacts on the gross domestic product by state. On average for the two year period, combined NAFTA export activities added annually $23 billion directly to the Region. This had a potential to multiply annually to $70 billion on average (this is not realized because NAFTA imports reduce GDP by state). The value added multiplier (total value added per dollar of value added) averaged 2.29 across these states for this two-ear period. That is, on average every dollar of value added created by NAFTA exports could generate an additional 2.29 in value added.

Labor income is composed of employee compensation and proprietor's income. In terms of an impact analysis, labor income measures the additional income derived from the change in the total output. NAFTA export activities added directly on average $17.8 billion to income and $26 billion indirectly to the Region's income base over this two-year period. The labor income multiplier (total labor income added per dollar of labor income) averaged 2.29 across these states for this two year period. That is, on average every dollar of labor income added created by NAFTA exports generated an additional 2.26 in labor income.

As indicated earlier, employment estimates derived from this trade flow data are not reliable. However, the Implan employment estimates based on changes in final demand are estimated using national averages and from reliable sources. For this reliability to transfer NAFTA trade related employment depends on the validity of the assumption that the origin of export movement and place of manufacturing are in the same state. To the extent that this is true, the employment estimates become more reliable.

According to the Implan employment estimates, NAFTA export trade has generated on average 309 thousand direct jobs annually. Total direct, indirect, and induce jobs created by exports averaged 930 thousand jobs annually over this two-year period.

Table 1
Impacts of NAFTA Export Activities

Economic Impact of NAFTA Exports Activities In 2005							
2004 $				**Output**			
Exports		Direct		Indirect		Induced	Total
AR	$	1,373,099,184	$	573,776,166	$	354,194,232	$ 2,301,069,582
LA	$	3,718,846,332	$	1,375,759,805	$	1,273,596,434	$ 6,368,202,571
MO	$	5,275,468,104	$	2,756,087,498	$	1,925,360,078	$ 9,956,915,680
MS	$	1,394,799,674	$	592,253,263	$	332,373,610	$ 2,319,426,547
OK	$	2,140,506,126	$	825,489,907	$	648,270,210	$ 3,614,266,243
TN	$	7,894,539,343	$	3,299,370,429	$	2,256,614,601	$ 13,450,524,373
TX	$	66,589,445,641	$	40,024,631,681	$	23,655,094,205	$ 130,269,171,527
Region	$	88,386,704,404	$	49,447,368,749	$	30,445,503,370	$ 168,279,576,523

				Value Added			
Exports		Direct		Indirect		Induced	Total
AR	$	359,592,836	$	255,320,459	$	197,919,029	$ 812,832,324
LA	$	1,660,985,607	$	676,251,934	$	766,570,054	$ 3,103,807,595
MO	$	1,559,195,980	$	1,354,688,743	$	1,160,661	$ 2,915,045,384
MS	$	329,321,115	$	244,507,352	$	185,697,919	$ 759,526,386
OK	$	667,067,701	$	414,360,144	$	375,887,943	$ 1,457,315,788
TN	$	2,048,093,749	$	1,569,724,747	$	1,338,130,419	$ 4,955,948,915
TX	$	20,029,977,378	$	19,565,113,173	$	14,325,702,064	$ 53,920,792,614
Region	$	26,654,234,367	$	24,079,966,552	$	17,191,068,088	$ 67,925,269,007

				Labor Income			
Exports		Direct		Indirect		Induced	Total
AR	$	252,419,202	$	161,122,743	$	127,839,286	$ 541,381,231
LA	$	1,027,597,331	$	414,588,187	$	500,109,428	$ 1,942,294,946
MO	$	1,064,080,020	$	875,574,810	$	747,581,924	$ 2,687,236,754
MS	$	242,797,796	$	155,614,728	$	122,337,439	$ 520,749,963
OK	$	470,198,676	$	262,529,300	$	246,594,567	$ 979,322,543
TN	$	1,392,340,351	$	1,017,577,618	$	839,534,389	$ 3,249,452,358
TX	$	13,636,078,931	$	12,128,734,002	$	9,071,020,571	$ 34,835,833,505
Region	$	18,085,512,308	$	15,015,741,388	$	11,655,017,605	$ 44,756,271,300

				Employment			
Exports		Direct		Indirect		Induced	Total
AR		5,662		4,074		4,324	14,061
LA		36,537		10,258		15,830	62,625
MO		19,590		18,797		22,066	60,453
MS		5,686		4,100		4,112	13,898
OK		8,307		6,514		8,027	22,848
TN		26,688		21,544		23,702	71,934
TX		197,963		214,891		243,029	655,883
Region		300,433		280,178		321,090	901,701

Table 1							
Impacts of NAFTA Export Activities							
(Continued)							

Economic Impact of NAFTA Exports Activities In 2006							
2004 $			**Output**				
Exports	Direct		Indirect		Induced		Total
AR	$	1,576,545,170	$	650,094,680	$	407,923,431	$ 2,634,563,281
LA	$	3,998,509,224	$	1,456,823,464	$	1,372,748,239	$ 6,828,080,927
MO	$	5,753,211,614	$	2,999,997,370	$	2,100,774,338	$ 10,853,983,322
MS	$	1,638,371,430	$	716,325,433	$	382,337,448	$ 2,737,034,311
OK	$	2,117,795,757	$	809,349,535	$	644,531,117	$ 3,571,676,409
TN	$	8,786,798,030	$	3,716,340,760	$	2,517,780,506	$ 15,020,919,296
TX	$	69,696,993,980	$	42,320,233,620	$	24,965,826,120	$ 136,983,053,719
Region	$	93,568,225,205	$	52,669,164,860	$	32,391,921,199	$ 178,629,311,265
			Value Added				
Exports	Direct		Indirect		Induced		Total
AR	$	416,713,852	$	291,553,424	$	227,942,195	$ 936,209,471
LA	$	1,789,898,209	$	714,788,014	$	826,248,918	$ 3,330,935,141
MO	$	1,685,393,631	$	1,476,871,522	$	1,266,406,147	$ 4,428,671,300
MS	$	364,981,843	$	293,509,460	$	213,612,670	$ 872,103,973
OK	$	677,656,519	$	414,427,408	$	373,719,891	$ 1,465,803,818
TN	$	2,246,264,665	$	1,769,113,881	$	1,492,996,741	$ 5,508,375,287
TX	$	20,920,123,411	$	20,693,231,916	$	15,119,491,010	$ 56,732,846,337
Region	$	28,101,032,130	$	25,653,495,625	$	19,520,417,572	$ 73,274,945,327
			Labor Income				
Exports	Direct		Indirect		Induced		Total
AR	$	292,294,826	$	183,549,267	$	147,231,731	$ 623,075,824
LA	$	1,115,434,941	$	440,062,655	$	539,043,938	$ 2,094,541,533
MO	$	1,162,497,582	$	954,688,673	$	815,729,468	$ 2,932,915,723
MS	$	270,681,953	$	187,729,638	$	140,727,563	$ 599,139,154
OK	$	468,827,769	$	259,784,579	$	245,172,252	$ 973,784,601
TN	$	26,688	$	21,544	$	23,702	$ 71,934
TX	$	14,331,436,768	$	12,858,940,830	$	9,573,646,544	$ 36,764,024,141
Region	$	17,641,200,527	$	14,884,777,186	$	11,461,575,197	$ 43,987,552,911
			Employment				
Exports	Direct		Indirect		Induced		Total
AR		6,614		4,661		4,980	16,256
LA		38,873		10,873		17,062	66,808
MO		20,500		20,495		24,077	65,072
MS		6,224		4,924		4,730	15,878
OK		8,500		6,413		7,981	22,894
TN		29,200		24,261		26,446	79,907
TX		208,909		227,532		256,496	692,937
Region		318,820		299,159		341,772	959,752

Table 1
Impacts of NAFTA Export Activities
(Continued)

Change In the Economic Impact of NAFTA Exports Activities 2005-2006							
2004 $			**Output**				
Exports		Direct		Indirect		Induced	Total
AR	$	203,445,986	$	76,318,514	$	53,729,199	$ 333,493,699
LA	$	279,662,892	$	81,063,659	$	99,151,804	$ 459,878,356
MO	$	477,743,510	$	243,909,872	$	175,414,260	$ 897,067,642
MS	$	243,571,756	$	124,072,170	$	49,963,838	$ 417,607,764
OK	$	(22,710,369)	$	(16,140,372)	$	(3,739,092)	$ (42,589,834)
TN	$	892,258,687	$	416,970,331	$	261,165,905	$ 1,570,394,923
TX	$	3,107,548,339	$	2,295,601,939	$	1,310,731,914	$ 6,713,882,192
Region	$	5,181,520,801	$	3,221,796,112	$	1,946,417,829	$ 10,349,734,742
			Value Added				
Exports		Direct		Indirect		Induced	Total
AR	$	57,121,016	$	36,232,965	$	30,023,166	$ 123,377,147
LA	$	128,912,601	$	38,536,080	$	59,678,864	$ 227,127,546
MO	$	126,197,651	$	122,182,779	$	1,265,245,486	$ 1,513,625,916
MS	$	35,660,728	$	49,002,108	$	27,914,751	$ 112,577,587
OK	$	10,588,817	$	67,264	$	(2,168,051)	$ 8,488,030
TN	$	198,170,916	$	199,389,134	$	154,866,322	$ 552,426,372
TX	$	890,146,033	$	1,128,118,744	$	793,788,946	$ 2,812,053,723
Region	$	1,446,797,763	$	1,573,529,074	$	2,329,349,484	$ 5,349,676,321
			Labor Income				
Exports		Direct		Indirect		Induced	Total
AR	$	39,875,624	$	22,426,524	$	19,392,445	$ 81,694,593
LA	$	87,837,610	$	25,474,468	$	38,934,509	$ 152,246,588
MO	$	98,417,562	$	79,113,864	$	68,147,543	$ 245,678,969
MS	$	27,884,157	$	32,114,910	$	18,390,124	$ 78,389,191
OK	$	(1,370,907)	$	(2,744,721)	$	(1,422,315)	$ (5,537,942)
TN	$	(1,392,313,663)	$	(1,017,556,074)	$	(839,510,687)	$ (3,249,380,424)
TX	$	695,357,837	$	730,206,827	$	502,625,973	$ 1,928,190,636
Region	$	(444,311,780)	$	(130,964,202)	$	(193,442,407)	$ (768,718,389)
			Employment				
Exports		Direct		Indirect		Induced	Total
AR	$	952	$	587	$	656	2,195
LA	$	2,336	$	615	$	1,232	4,183
MO	$	910	$	1,698	$	2,011	4,619
MS	$	538	$	824	$	618	1,980
OK	$	193	$	(101)	$	(46)	46
TN	$	2,512	$	2,717	$	2,744	7,973
TX	$	10,946	$	12,641	$	13,467	37,054
Region		18,387		18,981		20,682	58,051

Source: U.S. Department of Commerce, Office of Trade and Industry Information, TradeStats Express and Bureau of Transportation Statistics, TransBorder Freight Data.

Impacts of NAFTA Import Activities

NAFTA Imports also had a substantial impact on the economies in this study as shown in Table 2. Although the estimated impacts are reported as positive values, it must be kept in mind that imports reduce final demand and the level of economic activity. By design, the regional and state economic impact multipliers are identical to their export counter-parts which have already been described in the previous section.

Overall, the Region imported annually $66 billion, which reduced total output by $122 billion on average over the two-year period. This reduction in total output removed $50 billion annually on average from the Region's GDP by state during the two years. Labor income was reduced by $23 billion annually on average. The imports reduced 455 thousand jobs annually on average over the two-year period. Texas received the largest share (69%) of imports on average over the 2005-2006 period.

Net Impact of NAFTA Trade

The differences between the export and import impacts provide an overall estimate of observable economic impact of NAFTA. Table 3 summarizes the net impacts of NAFTA trade flows.

Overall, NAFTA net trade contributed to the level of economic activities in the Region and most states in the Region. The net impact in the Region from direct NAFTA expenditures averaged $24 billion over the two-year period. Texas alone accounted for $23 billion (95%) of the net output impact. Tennessee is the only state in the Region that had negative net output impacts. In Tennessee, NAFTA's net trade flows reduced the level of economic activity by an annual average of $3 billion over the two-year period.

Direct net NAFTA trade created an additional $47 billion annually in additional regional output on average over the two years. For states realizing a net gain from NAFTA trade, average annual net output impact ranged from $686 million to $45 billion for the states range.

NAFTA trade added $20 billion to the Region's gross domestic products annually on average during 2005-2006. Tennessee lost $2 billion in its GDP annually during this period. For states realizing a net gain from NAFTA trade, average annual gross domestic product by state ranged from $243 million to $18 billion for Texas. Over this same period, labor income increased annually by $11 billion in the Region and ranged from -$31 million for Tennessee to $12 billion in Texas. Tennessee net employment impact of NAFTA trade was a loss of 31 thousand jobs annually. However, the Region gained 264 thousands jobs on average annually overall, with all the remaining states having a net annual job growth from 2.5 thousand to 229 thousands jobs per year on average.

Table 2
Impacts of NAFTA Import Activities

Economic Impact of NAFTA Imports Activities In 2005							
2004 $		Output					
Imports		Direct		Indirect		Induced		Total
AR	$	1,086,846,781	$	454,160,039	$	280,354,737	$	1,821,361,557
LA	$	987,384,997	$	365,275,806	$	338,150,571	$	1,690,811,375
MO	$	4,811,314,991	$	2,513,597,814	$	1,755,960,537	$	9,080,873,341
MS	$	1,052,100,268	$	446,737,856	$	250,710,099	$	1,749,548,223
OK	$	2,090,000,297	$	806,012,246	$	632,974,096	$	3,528,986,639
TN	$	11,460,026,817	$	4,789,497,139	$	3,275,791,369	$	19,525,315,325
TX	$	43,557,105,801	$	26,180,682,239	$	15,473,134,385	$	85,210,922,425
Region	$	65,044,779,951	$	35,555,963,139	$	22,007,075,795	$	122,607,818,884

Value Added							
Imports		Direct		Indirect		Induced		Total
AR	$	284,627,885	$	202,093,354	$	156,658,501	$	643,379,739
LA	$	441,005,657	$	179,550,579	$	203,530,800	$	824,087,037
MO	$	1,422,012,767	$	1,235,498,752	$	1,058,542	$	2,658,570,060
MS	$	248,407,596	$	184,432,399	$	140,072,323	$	572,912,318
OK	$	651,328,056	$	404,583,203	$	367,018,763	$	1,422,930,022
TN	$	2,973,094,220	$	2,278,674,779	$	1,942,483,256	$	7,194,252,255
TX	$	13,101,893,783	$	12,797,819,478	$	9,370,645,970	$	35,270,359,231
Region	$	19,122,369,962	$	17,282,652,545	$	12,181,468,156	$	48,586,490,662

Labor Income			
Imports	Direct	Indirect	Induced	Total
AR	199,796,927	127,533,201	101,188,405	428,518,533
LA	272,835,739	110,076,653	132,783,262	515,695,654
MO	970,458,744	798,538,845	681,807,197	2,450,804,786
MS	183,142,878	117,380,510	92,279,382	392,802,770
OK	459,104,210	256,334,849	240,776,100	956,215,159
TN	2,021,176,546	1,477,156,080	1,218,701,459	4,717,034,085
TX	8,919,553,647	7,933,577,838	5,933,483,887	22,786,615,372
Region	13,026,068,691	10,820,597,976	8,401,019,692	32,247,686,358

Employment			
Imports	Direct	Indirect	Induced	Total
AR	4481.870354	3224.68605	3422.805569	11129.36197
LA	9700.827879	2723.585327	4202.945117	16627.35832
MO	17866.40708	17143.17784	20124.56042	55134.14533
MS	4,289	3,093	3,102	10483.29003
OK	8,111	6,360	7,838	22308.89517
TN	38,741	31,274	34,407	104421.9607
TX	129,472	140,563	158,969	429004.1064
Region	212662.2368	204381.7809	232065.1003	649109.118

Table 2
Impacts of NAFTA Import Activities
(Continued)

Economic Impact of NAFTA Imports Activities In 2006							
2004$			**Output**				
Imports		Direct		Indirect		Induced	Total
AR	$	1,042,221,185	$	429,764,056	$	269,669,686	$ 1,741,654,927
LA	$	1,008,127,137	$	367,302,709	$	346,105,179	$ 1,721,535,025
MO	$	4,918,979,156	$	2,564,989,004	$	1,796,155,934	$ 9,280,124,094
MS	$	1,049,477,327	$	458,850,348	$	244,910,571	$ 1,753,238,247
OK	$	1,691,102,523	$	646,281,888	$	514,671,065	$ 2,852,055,477
TN	$	12,100,695,022	$	5,117,940,117	$	3,467,348,849	$ 20,685,983,987
TX	$	46,411,823,624	$	28,181,405,055	$	16,624,956,864	$ 91,218,185,544
Region	$	68,222,425,975	$	37,766,533,177	$	23,263,818,150	$ 129,252,777,302
			Value Added				
Imports		Direct		Indirect		Induced	Total
AR	$	275,480,851	$	192,739,898	$	150,687,839	$ 618,908,587
LA	$	451,279,429	$	180,216,464	$	208,318,628	$ 839,814,521
MO	$	1,441,006,641	$	1,262,720,845	$	1,082,773,563	$ 3,786,501,049
MS	$	233,793,243	$	188,010,800	$	136,832,009	$ 558,636,052
OK	$	541,122,365	$	330,928,624	$	298,422,852	$ 1,170,473,842
TN	$	3,093,432,165	$	2,436,326,345	$	2,056,073,005	$ 7,585,831,515
TX	$	13,930,888,874	$	13,779,799,889	$	10,068,198,210	$ 37,778,886,973
Region	$	19,967,003,566	$	18,370,742,866	$	14,001,306,107	$ 52,339,052,539
			Labor Income				
Imports		Direct		Indirect		Induced	Total
AR	$	193,230,023	$	121,340,598	$	97,331,832	$ 411,902,453
LA	$	281,229,871	$	110,951,127	$	135,906,857	$ 528,087,855
MO	$	993,932,043	$	816,256,032	$	697,446,316	$ 2,507,634,392
MS	$	173,388,383	$	120,252,340	$	90,144,630	$ 383,785,353
OK	$	374,368,407	$	207,443,214	$	195,774,977	$ 777,586,597
TN	$	2,122,644,576	$	1,577,909,435	$	1,289,966,627	$ 4,990,520,638
TX	$	9,543,426,159	$	8,562,878,536	$	6,375,173,009	$ 24,481,477,704
Region	$	13,682,219,463	$	11,517,031,283	$	8,881,744,248	$ 34,080,994,993
			Employment				
Imports		Direct		Indirect		Induced	Total
AR		4,372.51		3,081.42		3,292.37	10746.30479
LA		9,801		2,741		4,302	16844.01711
MO		17,527		17,523		20,586	55636.37027
MS		3,987		3,154		3,030	10170.83227
OK		6,787		5,121		6,373	18281.31964
TN		40,213		33,411		36,420	110043.526
TX		139,114		151,516		170,803	461432.6672
Region		221802.0307		216547.4014		244805.6051	683155.0372

Table 2
Impacts of NAFTA Import Activities
(Continued)

Change In the Economic Impact of NAFTA Exports Activities 2005-2006							
2004 $			**Output**				
Imports		Direct		Indirect		Induced	Total
AR	$	(44,625,596)	$	(24,395,982)	$	(10,685,051)	$ (79,706,629)
LA	$	20,742,140	$	2,026,903	$	7,954,608	$ 30,723,651
MO	$	107,664,166	$	51,391,190	$	40,195,397	$ 199,250,753
MS	$	(2,622,940)	$	12,112,492	$	(5,799,527)	$ 3,690,024
OK	$	(398,897,773)	$	(159,730,358)	$	(118,303,031)	$ (676,931,162)
TN	$	640,668,205	$	328,442,978	$	191,557,480	$ 1,160,668,662
TX	$	2,854,717,823	$	2,000,722,817	$	1,151,822,479	$ 6,007,263,119
Region	$	3,177,646,024	$	2,210,570,038	$	1,256,742,355	$ 6,644,958,418
Value Added							
Imports		Direct		Indirect		Induced	Total
AR	$	(9,147,034)	$	(9,353,456)	$	(5,970,662)	$ (24,471,152)
LA	$	10,273,772	$	665,885	$	4,787,828	$ 15,727,484
MO	$	18,993,874	$	27,222,093	$	1,081,715,021	$ 1,127,930,989
MS	$	(14,614,353)	$	3,578,401	$	(3,240,314)	$ (14,276,266)
OK	$	(110,205,691)	$	(73,654,579)	$	(68,595,911)	$ (252,456,181)
TN	$	120,337,945	$	157,651,566	$	113,589,749	$ 391,579,260
TX	$	828,995,091	$	981,980,411	$	697,552,240	$ 2,508,527,741
Region	$	844,633,604	$	1,088,090,321	$	1,819,837,951	$ 3,752,561,876
Labor Income							
Imports		Direct		Indirect		Induced	Total
AR	$	(6,566,904)	$	(6,192,603)	$	(3,856,573)	$ (16,616,080)
LA	$	8,394,132	$	874,474	$	3,123,595	$ 12,392,202
MO	$	23,473,299	$	17,717,187	$	15,639,120	$ 56,829,606
MS	$	(9,754,495)	$	2,871,830	$	(2,134,752)	$ (9,017,417)
OK	$	(84,735,803)	$	(48,891,635)	$	(45,001,124)	$ (178,628,562)
TN	$	101,468,030	$	100,753,355	$	71,265,169	$ 273,486,554
TX	$	623,872,512	$	629,300,698	$	441,689,122	$ 1,694,862,332
Region	$	656,150,772	$	696,433,307	$	480,724,556	$ 1,833,308,635
Employment							
Imports		Direct		Indirect		Induced	Total
AR	$	(109)	$	(143)	$	(130)	(383)
LA	$	100	$	18	$	99	217
MO	$	(339)	$	380	$	461	502
MS	$	(302)	$	61	$	(72)	(312)
OK	$	(1,324)	$	(1,239)	$	(1,465)	(4,028)
TN	$	1,472	$	2,137	$	2,013	5,622
TX	$	9,642	$	10,952	$	11,834	32,429
Region		9,140		12,166		12,741	34,046

Source: U.S. Department of Commerce, Office of Trade and Industry Information, TradeStats Express and Bureau of Transportation Statistics, TransBorder Freight Data.

Net Impact of NAFTA Trade

The differences between the export and import impacts provided an overall estimate of observable economic impact of NAFTA. Table 3 summarizes the net impacts of NAFTA trade flows.

Overall, NAFTA net trade contributed to the level of economic activities in the Region and most states in the Region. The net impact in the Region from direct NAFTA expenditures averaged $24 billion over the two-year period. Texas alone accounted for $23 billion (95%) of the net output impact. Tennessee is the only state in the Region that had negative net output impacts. In Tennessee, NAFTA's net trade flows reduced the level of economic activity by an annual average of $3 billion over the two-year period.

Direct net NAFTA trade created an additional $47 billion annually in additional regional output on average over the two years. For a state realizing a net gain from NAFTA trade, average annual net output impact ranged from $686 million to $45 billion for a state's range.

NAFTA trade added $20 billion to the Region's GDP annually on average during 2005-2006. Tennessee lost $2 billion in gross domestic product annually during this period. For a state realizing a net gain from NAFTA trade, average annual gross domestic product by state ranged from $243 million to $18 billion for Texas. Over this same period, labor income increased annually by $11 billion in the Region and ranged from -$31 million for Tennessee to $12 billion in Texas. Tennessee's net employment impact of NAFTA trade was a loss of 31 thousand jobs annually. However, the Region gained 264 thousands jobs on average annually overall with all the remaining states having a net annual job growth form 2.5 thousand to 229 thousands jobs per year on average.

Table 3
Net Economic Impact of NAFTA Export and Import Activities 2005-2006

Net Economic Impact of NAFTA Export and Import Impacts 2005							
2004 $			**Output**				
Net Impact	Direct		Indirect		Induced		Total
AR	$	286,252,403	$	119,616,127	$	73,839,495	$ 479,708,025
LA	$	2,731,461,334	$	1,010,483,999	$	935,445,863	$ 4,677,391,196
MO	$	464,153,114	$	242,489,684	$	169,399,541	$ 876,042,338
MS	$	342,699,406	$	145,515,407	$	81,663,511	$ 569,878,324
OK	$	50,505,829	$	19,477,661	$	15,296,113	$ 85,279,604
TN	$	(3,565,487,474)	$	(1,490,126,710)	$	(1,019,176,768)	$ (6,074,790,952)
TX	$	23,032,339,840	$	13,843,949,442	$	8,181,959,820	$ 45,058,249,103
Region	$	23,341,924,453	$	13,891,405,610	$	8,438,427,576	$ 45,671,757,638
			Value Added				
Net Impact	Direct		Indirect		Induced		Total
AR	$	74,964,951	$	53,227,105	$	41,260,528	$ 169,452,585
LA	$	1,219,979,950	$	496,701,354	$	563,039,253	$ 2,279,720,558
MO	$	137,183,214	$	119,189,991	$	102,119	$ 256,475,324
MS	$	80,913,519	$	60,074,953	$	45,625,596	$ 186,614,068
OK	$	15,739,645	$	9,776,941	$	8,869,179	$ 34,385,766
TN	$	(925,000,471)	$	(708,950,032)	$	(604,352,837)	$ (2,238,303,340)
TX	$	6,928,083,595	$	6,767,293,694	$	4,955,056,093	$ 18,650,433,383
Region	$	7,531,864,405	$	6,797,314,007	$	5,009,599,932	$ 19,338,778,344
			Labor Income				
Net Impact	Direct		Indirect		Induced		Total
AR	$	52,622,275	$	33,589,542	$	26,650,881	$ 112,862,698
LA	$	754,761,592	$	304,511,534	$	367,326,166	$ 1,426,599,292
MO	$	93,621,276	$	77,035,965	$	65,774,728	$ 236,431,968
MS	$	59,654,918	$	38,234,218	$	30,058,057	$ 127,947,193
OK	$	11,094,467	$	6,194,451	$	5,818,466	$ 23,107,384
TN	$	(628,836,195)	$	(459,578,462)	$	(379,167,070)	$ (1,467,581,727)
TX	$	4,716,525,284	$	4,195,156,165	$	3,137,536,684	$ 12,049,218,133
Region	$	5,059,443,617	$	4,195,143,412	$	3,253,997,913	$ 12,508,584,942
			Employment				
Net Impact	Direct		Indirect		Induced		Total
AR	$	1,180	$	849	$	901	$ 2,931
LA	$	26,836	$	7,534	$	11,627	$ 45,997
MO	$	1,724	$	1,654	$	1,941	$ 5,319
MS	$	1,397	$	1,007	$	1,010	$ 3,415
OK	$	196	$	154	$	189	$ 539
TN	$	(12,053)	$	(9,730)	$	(10,705)	$ (32,488)
TX	$	68,491	$	74,328	$	84,060	$ 226,879
Region	$	87,771	$	75,796	$	89,025	$ 252,592

Table 3
Net Economic Impact of NAFTA Export and Import Activities 2005-2006
(Continued)

Net Economic Impact of NAFTA Export and Import Impacts 2006				
2004 $		**Output**		
Net Impact	Direct	Indirect	Induced	Total
AR	$ 534,323,985	$ 220,330,624	$ 138,253,745	$ 892,908,354
LA	$ 2,990,382,087	$ 1,089,520,755	$ 1,026,643,059	$ 5,106,545,901
MO	$ 834,232,458	$ 435,008,365	$ 304,618,404	$ 1,573,859,228
MS	$ 588,894,103	$ 257,475,085	$ 137,426,877	$ 983,796,064
OK	$ 426,693,234	$ 163,067,647	$ 129,860,052	$ 719,620,932
TN	$ (3,313,896,992)	$ (1,401,599,357)	$ (949,568,343)	$ (5,665,064,691)
TX	$ 23,285,170,355	$ 14,138,828,564	$ 8,340,869,255	$ 45,764,868,175
Region	$ 25,345,799,231	$ 14,902,631,683	$ 9,128,103,049	$ 49,376,533,963
		Value Added		
Net Impact	Direct	Indirect	Induced	Total
AR	$ 141,233,001	$ 98,813,526	$ 77,254,356	$ 317,300,884
LA	$ 1,338,618,780	$ 534,571,550	$ 617,930,290	$ 2,491,120,620
MO	$ 244,386,991	$ 214,150,677	$ 183,632,584	$ 642,170,251
MS	$ 131,188,600	$ 105,498,660	$ 76,780,661	$ 313,467,921
OK	$ 136,534,154	$ 83,498,784	$ 75,297,039	$ 295,329,977
TN	$ (847,167,500)	$ (667,212,464)	$ (563,076,264)	$ (2,077,456,228)
TX	$ 6,989,234,538	$ 6,913,432,027	$ 5,051,292,800	$ 18,953,959,364
Region	$ 8,134,028,564	$ 7,282,752,759	$ 5,519,111,465	$ 20,935,892,789
		Labor Income		
Net Impact	Direct	Indirect	Induced	Total
AR	$ 99,064,803	$ 62,208,669	$ 49,899,899	$ 211,173,371
LA	$ 834,205,070	$ 329,111,528	$ 403,137,080	$ 1,566,453,678
MO	$ 168,565,539	$ 138,432,641	$ 118,283,151	$ 425,281,331
MS	$ 97,293,570	$ 67,477,298	$ 50,582,933	$ 215,353,801
OK	$ 94,459,362	$ 52,341,366	$ 49,397,276	$ 196,198,004
TN	$ (2,122,617,888)	$ (1,577,887,891)	$ (1,289,942,925)	$ (4,990,448,705)
TX	$ 4,788,010,609	$ 4,296,062,294	$ 3,198,473,535	$ 12,282,546,437
Region	$ 3,958,981,064	$ 3,367,745,904	$ 2,579,830,949	$ 9,906,557,917
		Employment		
Net Impact	Direct	Indirect	Induced	Total
AR	2,242	1,580	1,688	5,509
LA	29,072	8,132	12,760	49,964
MO	2,973	2,972	3,491	9,436
MS	2,237	1,770	1,700	5,707
OK	1,713	1,292	1,608	4,613
TN	(11,013)	(9,150)	(9,974)	(30,137)
TX	69,795	76,016	85,693	231,504
Region	97,018	82,612	96,967	276,597

Table 3
Net Economic Impact of NAFTA Export and Import Activities 2005-2006
(Continued)

Change In the Economic Impact of NAFTA Net Impact 2005-2006							
2004 $			**Output**				
Imports		Direct		Indirect		Induced		Total
AR	$	248,071,582	$	100,714,496	$	64,414,250	$	413,200,328
LA	$	258,920,752	$	79,036,756	$	91,197,196	$	429,154,705
MO	$	370,079,345	$	192,518,682	$	135,218,863	$	697,816,890
MS	$	246,194,696	$	111,959,678	$	55,763,365	$	413,917,740
OK	$	376,187,404	$	143,589,986	$	114,563,938	$	634,341,328
TN	$	251,590,482	$	88,527,353	$	69,608,425	$	409,726,261
TX	$	252,830,515	$	294,879,122	$	158,909,435	$	706,619,072
Region	$	2,003,874,778	$	1,011,226,073	$	689,675,473	$	3,704,776,324

Value Added							
Imports		Direct		Indirect		Induced		Total
AR	$	66,268,050	$	45,586,421	$	35,993,828	$	147,848,299
LA	$	(1,078,746,949)	$	(397,887,828)	$	(485,784,897)	$	(1,962,419,674)
MO	$	1,201,435,566	$	415,381,558	$	617,828,171	$	2,234,645,296
MS	$	163,473,471	$	154,075,724	$	138,006,988	$	455,556,183
OK	$	115,448,955	$	95,721,718	$	67,911,482	$	279,082,155
TN	$	1,061,534,624	$	792,448,817	$	679,649,875	$	2,533,633,316
TX	$	(7,775,251,095)	$	(7,434,506,159)	$	(5,518,132,358)	$	(20,727,889,611)
Region	$	(6,245,837,377)	$	(6,329,179,749)	$	(4,464,526,911)	$	(17,039,544,036)

Labor Income							
Imports		Direct		Indirect		Induced		Total
AR	$	46,442,528	$	28,619,127	$	23,249,018	$	98,310,673
LA	$	(655,696,789)	$	(242,302,866)	$	(317,426,267)	$	(1,215,425,921)
MO	$	740,583,794	$	252,075,563	$	337,362,353	$	1,330,021,710
MS	$	108,910,621	$	100,198,423	$	88,225,094	$	297,334,138
OK	$	86,199,103	$	61,282,847	$	44,764,466	$	192,246,417
TN	$	723,295,557	$	511,919,828	$	428,564,345	$	1,663,779,731
TX	$	(6,839,143,173)	$	(5,773,044,056)	$	(4,427,479,610)	$	(17,039,666,838)
Region	$	(5,789,408,359)	$	(5,061,251,133)	$	(3,822,740,599)	$	(14,673,400,091)

Employment							
Imports		Direct		Indirect		Induced		Total
AR	$	1,061	$	730	$	786	$	2,578
LA	$	(24,594)	$	(5,955)	$	(9,939)		(40,488)
MO	$	27,349	$	6,478	$	10,819		44,645
MS	$	1,576	$	1,964	$	2,481		6,021
OK	$	2,041	$	1,616	$	1,511		5,168
TN	$	13,766	$	11,022	$	12,313		37,101
TX	$	(79,504)	$	(83,478)	$	(94,034)		(257,015)
Region		(58,306)		(67,621)		(76,064)		(201,990)

Source: U.S. Department of Commerce, Office of Trade and Industry Information, TradeStats Express and Bureau of Transportation Statistics, TransBorder Freight Data.

Conclusion

NATFA trade data currently available from sources at U.S. Department of Commerce and the U.S. Department of Transportation are not yet reliable enough to make an accurate assessment of its economic impacts. TransBorder freight data are available at the state level but are limited to land shipment modes and the lack of industry details that are necessary to estimate or analyze industrial impacts. TradeStats provides export data by state at an industry level but its has origin of movement geographic reference not the place where the export was produced.

This study used TransBorder Surface Freight Data for all land modes to develop estimates of the direct impact of the NAFTA trade flow on gross domestic product by state for Arkansas and its surrounding states (Arkansas Region). Overall, Arkansas Region benefited directly from NAFTA trade in the sense that in the aggregate the value of NAFTA exports contribution to gross domestic product by state exceeded the estimated reduction in gross domestic product by state due to NAFTA imports. This finding was not true for every state in the Region. Tennessee and to a lesser extent Missouri suffered net losses to their gross domestic product by state because of NAFTA trade over the 1995-2006 periods. Occasionally other states in the region had years where NAFTA trade detracted from gross domestic product by state too, but overall the cumulative impact for AR, LA, MS, and TX on NAFTA trade was positive for shipments by land modes over the 1996-2006 periods.

NAFTA export data by industry were used to estimate its economic impact of data using the Implan model. Import estimates from the TransBorder Surface Freight Data were made for comparative purposes and to allow an estimate of the net impact of NAFTA trade. Due to the nature of this data and the many assumptions underlying the impact analysis, the net economic impact estimates are not reliable. At most, they provide a very broad assessment of NAFTA trade on the Arkansas Region. The analysis found that far and away Texas is the major NAFTA trading partner in the Arkansas Region over the 2005-20006 period. Except for Tennessee the other states in the region also had positive net economic impact because of NAFTA trade. Tennessee's NAFTA trade had a negative net economic impact on the state.

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APPENDIX 1
Intra-NAFTA Trade and Surface Traffic: A Very Disaggregated View

Intra-NAFTA Trade and Surface Traffic: A Very Disaggregated View

Mark Funk, Erick Elder, Vincent Yao, and Ashvin Vibhakar

This paper studies surface traffic from intra-North American Free Trade Agreement (NAFTA) trade in five Mid-South states using trade data disaggregated by state, industry, and transportation mode. The data reveal that intra-NAFTA trade traffic differs widely across states, industries, and transportation modes. Unfortunately, the aggregated data used in most previous studies of NAFTA sacrifice valuable information about these differences. Accounting for these variations is crucial if analysts seek accurate estimates of the economic relationships within the NAFTA region or seek reliable forecasts of transportation needs. The data demonstrate that, within the NAFTA region, (i) the pattern of surface-transported trade within each state differs across industries; (ii) the pattern of surface-transported trade within each industry differs across states; and (iii) the mode of transport for intra-NAFTA trade depends on the importer, the exporter, and the industry. (JEL F14, R40)

T he signing of the North American Free Trade Agreement (NAFTA) in December 1992 and its implementation starting in January 1994 sparked an enormous effort to measure NAFTA's effects on the NAFTA economies. Most such studies use aggregated data and thus sacrifice valuable information on the differences among states, regions, and industries (e.g., Gould, 1998, and Krueger, 1999). The aggregated approach also prevents economists from drawing clear policy conclusions on the impacts of NAFTA, especially because policymakers often focus narrowly on specific states or specific industries. For example, with the NAFTA-region surface-transported trade rising by 85 percent between 1995 and 2004, the Mid-South transportation infrastructure, public sector agencies, and transportation companies require detailed information on transportation infrastructure needs. While aggre-gated trade volumes may indicate total transportation needs, trade traffic disaggregated by state, industry, and transport mode could assist planners in determining the future road and rail needs in their specific region.

Using a rich dataset on post-NAFTA trade traffic from the Bureau of Transportation Statistics (BTS), we describe intra-NAFTA trade traffic by transportation mode (truck or rail) since NAFTA's implementation for each 2-digit standard industrial classification (SIC) industry in five Mid-South states (Arkansas, Louisiana, Mississippi, Tennessee, and Texas). Examining the data at this level of disaggregation yields insights into how NAFTA has affected trade and transportation patterns. We uncover many striking differences in the NAFTA-region trade traffic among states, industries, and transportation modes. Analysis at the detailed level can account for these differences and thus should

Table 1

SIC Industries

01-09 Agriculture

10-14 Mining

20 Food and Kindred Products

21 Tobacco Products

22 Textile Mill Products

23 Apparel and Other Textile Products

24 Lumber and Wood Products

25 Furniture and Fixtures

26 Paper and Allied Products

28 Chemicals and Allied Products

30 Rubber and Miscellaneous Plastics Products

31 Leather and Leather Products

32 Stone, Clay, Glass and Concrete

33 Primary Metal Industries

34 Fabricated Metal Products

35 Industrial Machinery and Equipment

36 Electrical and Electronic Equipment

37 Transportation Equipment

38 Instruments and Related Products

39 Miscellaneous Manufacturing

improve the accuracy of the estimates of the NAFTA-area economic relationships.

The sections of this article describe the following: the BTS data, the trade traffic by state and industry, the data disaggregated by transportation mode, and the completely disaggregated data. Throughout, we emphasize the disparities in growth since the implementation of NAFTA, details that are unavailable in the aggregated data. The disaggregated data demonstrate that the intra-NAFTA trade traffic differs across states, industries, and transportation modes.

NAFTA DATA

The BTS provides surface transportation data disaggregated to the mode of transport (truck, rail, mail, and pipe) for U.S. imports and exports to Canada and Mexico in the Transborder Freight Database. The BTS reports monthly data at the

industry level using the 2-digit schedule B industry definition for exports and the 2-digit TSUSA industry definition for imports, covering 100 industries. The BTS data are a subset of the U.S. Census trade data and are the best publicly available data on transborder transportation flows. However, the data have some limitations. For example, the recorded mode of transport is the mode in use when the shipment crossed the border. We aggregated foreign destination to national levels from the BTS-provided Canadian province and Mexican state levels, thus reducing concerns over the accuracy of the foreign origin and destination. The trade shipped by mail and pipe were dropped because of the low volume and low frequency of observed trade; water and air shipments are not provided. Thus, the data should not be seen as measuring trade relationships, but rather as measuring the surface traffic from intra-NAFTA trade. We aggregated the data to annual frequency and into 20 SIC 2-digit agricultural, mining, and manufacturing industries (see Table 1 for a list of industries). The data begin in April 1994, thus limiting our sample of full-year observations to 1995-2004. The BTS data did not account for trans-shipments until 1997. Using the BTS statistics on trans-shipments, we adjust the data for the period 1997-2004 to account for trans-shipments. We deflate the data using the CPI (2002 base year).

A few previous studies used regional-level trade data (e.g., Wall, 2003) or state-level trade data (e.g., Coughlin and Wall, 2003) aggregated over industries and mode. Wall (2003) found that the South Central United States enjoyed some of the fastest growth in NAFTA trade, whereas Coughlin and Wall (2003) found that three of the states sampled in this article enjoyed export growth above the national average (Arkansas, Tennessee, and Texas). We aggregate our traffic data to the state level and show cumulative export and import growth of truck- and rail-transported trade during the post-NAFTA period in Figure 1. Of the five Mid-South states, Louisiana experienced the largest growth in surface-transported exports to both Canada and Mexico (96 percent and 198 percent, respectively). Texas experienced the slowest surface-transported export growth to Mexico (77 percent), while Arkansas's surface-transported exports to Canada

Figure 1

Surface-Transported Export and Import Growth, 1995-2004

A. Export Growth

Percent

B. Import Growth
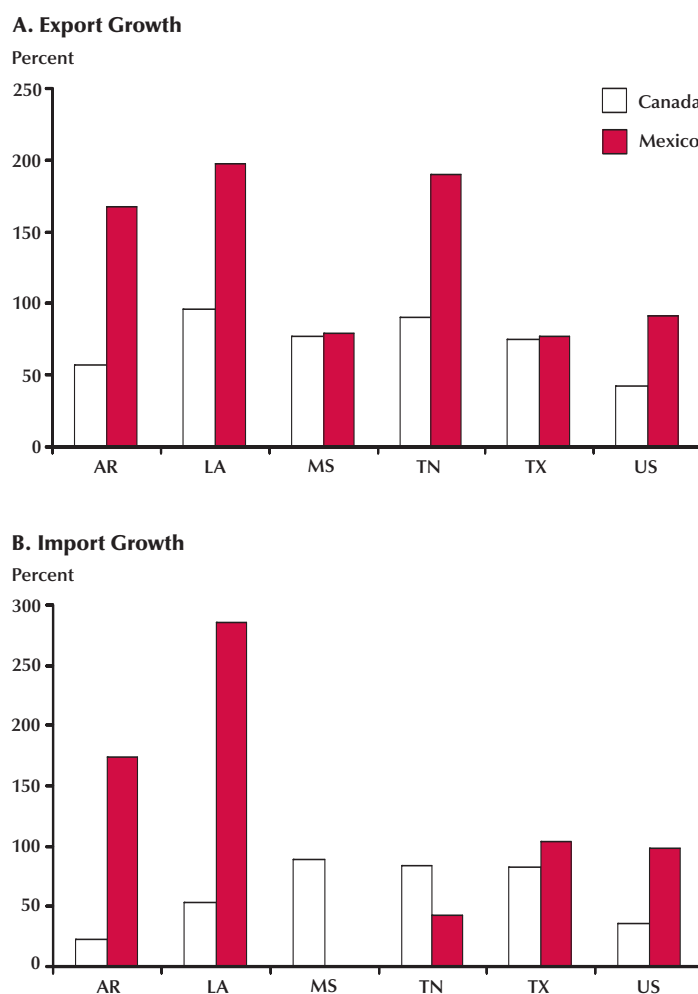
Percent

grew by only 57 percent. On the import side, Louisiana and Arkansas experienced strong growth in surface-transported imports from Mexico (285 percent and 173 percent, respectively), while Mississippi's surface-transported imports from Mexico showed no growth.

NAFTA TRADE DATA DISAGGREGATED BY INDUSTRY

Aggregating the trade traffic (see Figure 1) across all industries for each U.S. state–foreign country combination conceals the substantial variation that exists at the industry level. Romalis (2005) finds that the impact of NAFTA varied substantially at the commodity level, particularly in highly protected sectors. We explore this variation at the industry level in a couple of different ways. First, for each U.S. state in our sample, we aggregate the truck and rail exports and imports to and from Mexico and Canada for each industry and calculate the average growth rate for each industry using the geometric mean. Using Arkansas as an example, this aggregation involves adding the Arkansas truck

Table 2

Surface-Transported Export and Import Growth by State, 1995-2004

State	Median	Standard deviation	Min SIC	Min	Max SIC	Max
A. Export growth						
AR	4.0	8.9	39	–17.8	22	14.2
LA	3.7	10.2	24	–8.8	37	29.6
MS	5.3	9.9	39	–4.6	10-14	33.6
TN	6.4	6.3	24	–4.5	38	23.8
TX	4.2	7.0	21	–17.5	35	11.7
Maximum	**6.4**					**33.6**
Minimum	**3.7**			**–17.8**		
B. Import growth						
AR	5.9	5.9	33	–1.1	01-09	21.1
LA	7.2	8.6	31	–3.5	34	34.8
MS	7.5	9.1	38	–13.4	34	22.0
TN	9.2	24.8	36	–4.9	21	115.7
TX	7.0	5.3	01-09	–2.5	25	19.2
Maximum	**9.2**					**115.7**
Minimum	**5.9**			**–13.4**		

NOTE: The fourth column of Table 2A (Table 2B) reports the SIC code of the industry with the lowest average surface-transported export (import) growth rate for a particular state, and the fifth column reports that industry's average growth rate. The sixth column reports the SIC code of the industry with the highest average surface-transported export (import) growth rate for a particular state, and the last column reports that industry's average growth rate.

exports of industry 1 to Mexico, Arkansas rail exports for industry 1 to Mexico, Arkansas truck exports of industry 1 to Canada, and Arkansas rail exports for industry 1 to Canada. The aggregated series is Arkansas surface-transported exports of industry 1, and the average growth rate of this series is calculated. The median export (import) growth rate across a state's 20 SIC industries is reported in the second column of Table 2A (Table 2B). The state with the highest median surface-transported export growth rate was Tennessee, at 6.4 percent; and the state with the lowest median growth rate for surface-transported exports was Louisiana, at 3.7 percent. For the five Mid-South states we examine, Coughlin and Wall (2003) also found that NAFTA's impact on state exports was largest for Tennessee and smallest for Louisiana. For imports transported by surface modes, Tennessee had the highest median growth rate, at 9.2 percent; Arkansas had the lowest median growth rate, at only 5.9 percent.

Reporting only the median average growth rates masks a substantial amount of variation across states and across industries. The fourth column of Table 2A (Table 2B) reports the SIC code of the industry with the lowest average surface-transported export (import) growth rate for a particular state, and the fifth column reports that industry's average growth rate. The sixth column reports the SIC code of the industry with the highest average surface-transported export (import) growth rate for a particular state, and the last column reports that industry's average growth rate. Finally, the third column reports the standard deviation of the average growth rates across a particular state's 20 industries. For all five states, the difference between the minimum and the maximum growth rates was 28 percent or more. For example, for Arkansas exports,

Table 3

Surface-Transported Export and Import Growth by U.S. State–Foreign Country Combination, 1995-2004

State	Country	Median	Standard deviation	Min SIC	Min	Max SIC	Max
A. Export growth							
AR	Mexico	9.3	15.5	39	–23.9	30	35.4
AR	Canada	4.9	7.1	39	–13.5	22	14.6
LA	Mexico	13.3	12.5	24	–21.0	10-14	31.9
LA	Canada	2.9	10.8	39	–7.4	37	30.9
MS	Mexico	14.7	25.2	36	–22.1	20	77.0
MS	Canada	6.7	9.0	39	–4.6	10-14	33.8
TN	Mexico	13.3	12.3	24	–19.1	34	34.1
TN	Canada	5.6	6.8	01-09	–5.2	38	23.2
TX	Mexico	4.2	7.6	21	–17.5	35	14.2
TX	Canada	5.7	4.0	39	–7.2	25	14.1
Maximum		**14.7**					**77.0**
Minimum		**2.9**			**–23.9**		
B. Import growth							
AR	Mexico	8.5	14.9	01-09	–6.8	37	42.2
AR	Canada	4.1	8.5	22	–5.2	01-09	29.2
LA	Mexico	17.8	43.0	24	–18.2	37	175.9
LA	Canada	5.5	9.4	32	–4.2	34	33.1
MS	Mexico	–0.1	23.8	38	–47.5	24	63.8
MS	Canada	8.1	7.7	32	–4.8	34	22.3
TN	Mexico	10.9	19.9	24	–12.1	20	64.1
TN	Canada	6.8	25.3	32	–5.3	21	115.7
TX	Mexico	5.5	6.6	24	–4.0	25	22.3
TX	Canada	7.9	5.6	26	1.9	22	20.4
Maximum		**17.8**					**175.9**
Minimum		**–0.1**			**–47.5**		

NOTE: The fourth column of Table 3A (Table 3B) reports the SIC code of the industry with the lowest average surface-transported export (import) growth rate for a particular U.S. state–foreign country combination, and the fifth column reports that industry's average growth rate. The sixth column reports the SIC code of the industry with the highest average surface-transported export (import) growth rate for a particular U.S. state–foreign country combination, and the last column reports that industry's average growth rate.

SIC 39 (Miscellaneous Manufacturing) had the lowest average growth rate, at –17.8 percent; SIC 22 (Textile Mill Products) had the highest average growth rate, at 14.2 percent.

The results from a lesser degree of aggregation are reported in Table 3. In that table, unlike Table 2, the Mexico and Canada trade traffic are not aggre-gated together. Not surprisingly, the greater disag-gregation leads to greater variation. The highest median industry growth rate for any state's surface-transported exports was for Mississippi exports to Mexico, at 14.7 percent—followed by Tennessee exports to Mexico and Louisiana exports to Mexico, both at 13.3 percent. The lowest median industry
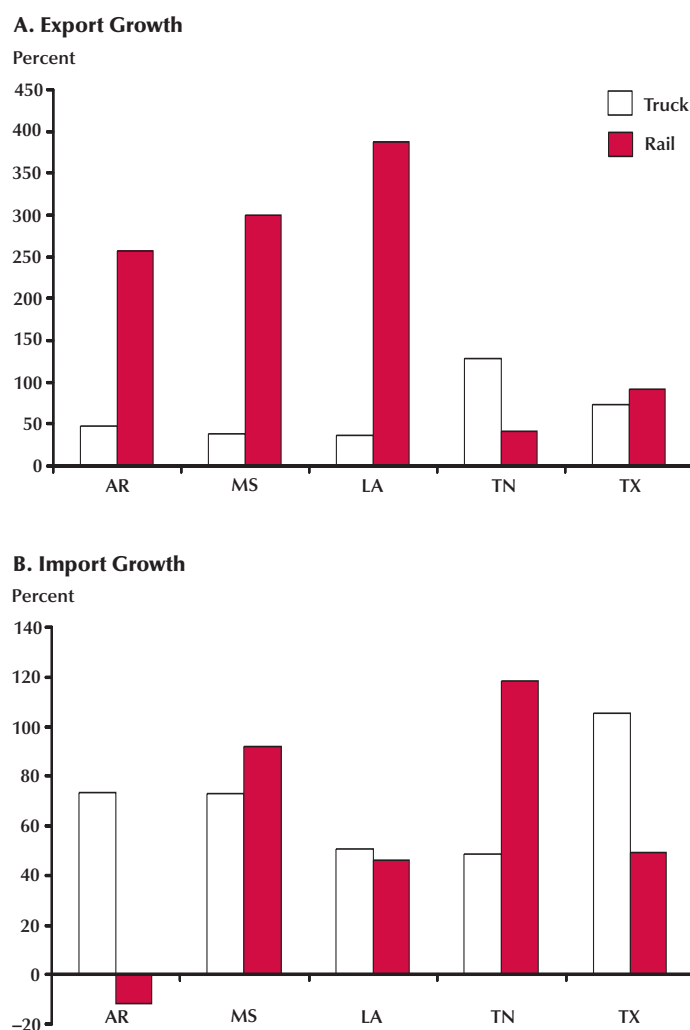
Table 4

Surface-Transported Trade in 2004 by Mode and U.S. State (2002$)

State	Truck exports ($)	Truck imports ($)	Rail exports ($)	Rail imports ($)
A. Canada trade				
AR	684,267,201	535,451,400	202,652,108	180,653,725
LA	540,396,139	442,323,001	665,276,768	160,882,116
MS	490,497,001	532,416,001	173,136,084	117,522,505
TN	4,083,726,001	2,264,711,000	664,154,653	1,118,257,593
TX	7,490,419,001	4,455,484,900	1,665,231,032	1,638,128,908
B. Mexico trade				
AR	178,779,101	246,335,002	123,725,697	22,910,516
LA	211,021,110	157,577,302	243,201,610	14,016,310
MS	208,129,871	265,056,032	152,102,929	1,971,084
TN	1,276,195,001	2,526,309,361	314,716,088	493,519,204
TX	33,660,047,000	30,234,739,420	5,090,747,901	1,424,301,861

growth rate was for Louisiana exports to Canada, at 2.9 percent. The highest industry average growth rate was for Mississippi exports of SIC 20 (Food and Kindred Products) to Mexico, at 77.0 percent; the lowest industry average growth rate was for Arkansas exports of SIC 39 (Miscellaneous Manufacturing) to Mexico, at –23.9 percent. Texas surface-transported exports to Canada showed the least variation across industries, with a standard deviation of average growth rates of only 4.0 percent; but, even so, there was still a relatively sizeable difference, with an average growth rate of –7.2 percent for SIC 39 (Miscellaneous Manufacturing) and an average growth rate of 14.1 percent for SIC 25 (Furniture and Fixtures). The U.S. state–foreign country combination with the greatest amount of variation across industries (as measured by the standard deviation of the average growth rates) was Mississippi surface-transported exports to Mexico, with a standard deviation of 25.2 percent.

Surface-transported imports exhibit similar variation. The U.S. state–foreign country combination with the highest median industry growth rate was Louisiana imports from Mexico, at 17.8 percent; the U.S. state–foreign country combination with the lowest median industry growth rate was Mississippi imports from Mexico, at –0.1 percent.

The industry with the highest growth rate was Louisiana imports of SIC 37 (Transportation Equipment) from Mexico, at 175.9 percent; the industry with the lowest average growth rate was Mississippi imports of SIC 38 (Instruments and Related Products) from Mexico, at –47.5 percent. The U.S. state–foreign country combination with the greatest variation across industries was Louisiana imports from Mexico, with a standard deviation of 43 percent; Texas imports from Canada exhibited the least amount of volatility, with a standard deviation of average growth rates across industries of only 5.6 percent. Finally, notice that the fastest-growing and slowest-growing industries varied from state to state and by NAFTA partner. For example, Arkansas surface-transported agricultural imports from Canada grew by 29.2 percent, while Arkansas surface-transported agricultural imports from Mexico grew by –6.8 percent. Aggregation over industries or over states masks these details, which are central for state and regional policymakers. Disaggregated data allow state policymakers to assess each industry's trade traffic and its impact on state employment, wages, and taxation—and hence assists policymakers in transportation planning.

Figure 2

Surface-Transported Export and Import Growth by Mode, 1995-2004

A. Export Growth

B. Import Growth

NAFTA TRADE DATA DISAGGREGATED BY TRANSPORTATION MODE

Table 4 shows the truck- and rail-transported trade between the Mid-South states and the NAFTA partners.

Texas surface-transported trade was (unsurprisingly) dominated by Mexico. The other Mid-South states had more trade traffic with Canada. The Texas trade traffic dwarfed those of other states, which

suggests that analysis using data aggregated over states may miss vital details for smaller states. Trade by truck was substantially larger than trade by rail for all states except Louisiana; for the other four states, truck exports were at least twice as large as rail exports. However, the real value of trade shipped by rail grew much faster than the trade shipped by truck, especially for Louisiana and Mississippi. Figure 2 shows the cumulative export and import growth by mode for each state during the post-NAFTA period. Table 5 shows the changing

Table 5

Truck Share of Surface-Transported Exports and Imports by U.S. State

State	Truck share of exports, 1995 (percent)	Truck share of exports, 2004 (percent)	Truck share of imports, 1995 (percent)	Truck share of imports, 2004 (percent)
A. To Canada				
AR	90.0	77.2	61.0	74.8
LA	71.0	44.8	77.1	73.3
MS	92.9	73.9	80.7	81.9
TN	77.1	86.0	77.9	66.9
TX	83.8	81.8	68.1	73.1
B. To Mexico				
AR	69.4	59.1	96.8	91.5
LA	68.4	46.5	97.8	91.8
MS	80.1	57.8	94.3	99.3
TN	78.5	80.2	84.3	83.7
TX	87.8	86.9	93.7	95.5

share of trade with Canada and Mexico transported by truck during the post-NAFTA period. For most states, the share of exports by truck declined during the post-NAFTA period. The pattern is not as clear with surface-transported imports. The data also show that a larger share of Mexican traded goods was transported by truck, especially for imports from Mexico.

However, this level of aggregation obscures substantial industry-level variation. Table 6 shows the export and import growth by U.S. state–mode combination (compared with export and import growth by U.S. state–foreign country combination, which is shown in Table 3). As in Table 3, there is substantial variation across states and industries. The U.S. state–mode combination with the highest median industry growth rate for exports was Mississippi rail exports, at 21.7 percent; the lowest was for Tennessee rail exports, at –1.3 percent. There is also a substantial amount of variation within a given state. While Mississippi rail exports clearly has the widest variation in industry growth rates (using the range or the standard deviation of the estimated industry growth rates as a measure of dispersion), eight of the ten U.S. state–mode export combinations have a range in excess of 27

percent or more *per year* between the fastest-growing industries and the slowest-growing industries.

On the import side, the U.S. state–mode combination with the highest median industry growth rate was Tennessee truck imports, at 11.9 percent; the lowest was Arkansas rail imports, at only 0.1 percent. The U.S. state–mode combination with the least variation was Arkansas truck imports, with a standard deviation of average growth rates of 6.5 percent; the greatest variation was Tennessee truck imports, at 24.9 percent. Texas rail imports of SIC 34 (Fabricated Metal Products) had the lowest average growth rate, at –39.1 percent; Tennessee truck imports of SIC 21 (Tobacco) had the highest average growth rate at 115.7 percent. In general, exports and imports were much more volatile for rail shipments than for truck shipments. Again, notice that the fastest- and the slowest-growing industries varied from state to state and by NAFTA partner. Aggregation over industries or over states complicates transport planning by masking the volatility of the trade traffic.

Disaggregating to the industry level provides insight into these growth patterns as shown in Figure 3, panels A and B. SIC 10-14, SIC 28, and SIC 30 (Food, Chemicals, and Rubber, respec-

Table 6

Surface-Transported Export and Import Growth by U.S. State–Mode Combination, 1995-2004

Mode	State	Median	Standard deviation	Min SIC	Min	Max SIC	Max
A. Export growth							
Truck	AR	4.9	8.6	39	–17.8	22	14.7
Truck	LA	3.7	7.7	37	–7.3	34	20.5
Truck	MS	1.9	8.3	37	–9.2	10-14	24.2
Truck	TN	7.9	6.5	24	–3.8	38	23.8
Truck	TX	4.2	7.3	21	–17.5	35	12.2
Rail	AR	11.2	10.9	10-14	–4.8	36	34.3
Rail	LA	4.7	31.4	36	–27.5	37	103.5
Rail	MS	21.7	43.7	26	–13.0	37	164.4
Rail	TN	–1.3	8.5	39	–26.4	37	9.3
Rail	TX	5.5	12.0	23	–25.2	26	18.8
Maximum		**21.7**					**164.4**
Minimum		**–1.3**			**–27.5**		
B. Import growth							
Truck	AR	5.7	6.5	10-14	–0.7	01-09	24.2
Truck	LA	4.2	9.3	31	–4.8	34	34.8
Truck	MS	7.7	8.8	38	–13.4	34	21.9
Truck	TN	11.9	24.9	36	–5.0	21	115.7
Truck	TX	7.5	7.4	01-09	–2.2	21	27.2
Rail	AR	0.1	13.0	37	–17.7	10-14	30.6
Rail	LA	6.6	20.8	37	–34.0	32	49.1
Rail	MS	5.7	18.1	35	–28.6	28	31.5
Rail	TN	9.7	20.3	32	–24.0	25	49.2
Rail	TX	1.8	15.1	34	–39.1	32	24.8
Maximum		**11.9**					**115.7**
Minimum		**0.1**			**–39.1**		

NOTE: The fourth column of Table 3A (Table 3B) reports the SIC code of the industry with the lowest average surface-transported export (import) growth rate for a particular U.S. state–mode combination, and the fifth column reports that industry's average growth rate. The sixth column reports the SIC code of the industry with the highest average surface-transported export (import) growth rate for a particular U.S. state–mode combination, and the last column reports that industry's average growth rate.

tively) were much more likely to be exported by rail if the destination was Canada than if the destination was Mexico. SIC 28 and SIC 30 (Chemicals and Rubber, respectively) have a larger share of surface-transported Canadian trade than of surface-transported Mexican trade. Note that while Mexico dominated the Mid-South surface-transported trade for most industries, Texas was the only Mid-

South state to trade by truck and rail more with Mexico than with Canada.

Similarly, the disaggregated data shown in Figure 4, panels A and B, provide insight into why Mid-South imports from Mexico were more likely to be shipped by truck than were imports from Canada. Just over 50 percent of all Mid-South imports from Mexico—but less than 20 percent of

Figure 3

Mid-South Surface-Transported Exports, 2004

A. Mid-South Exports to Canada

Millions $

B. Mid-South Exports to Mexico

Millions $
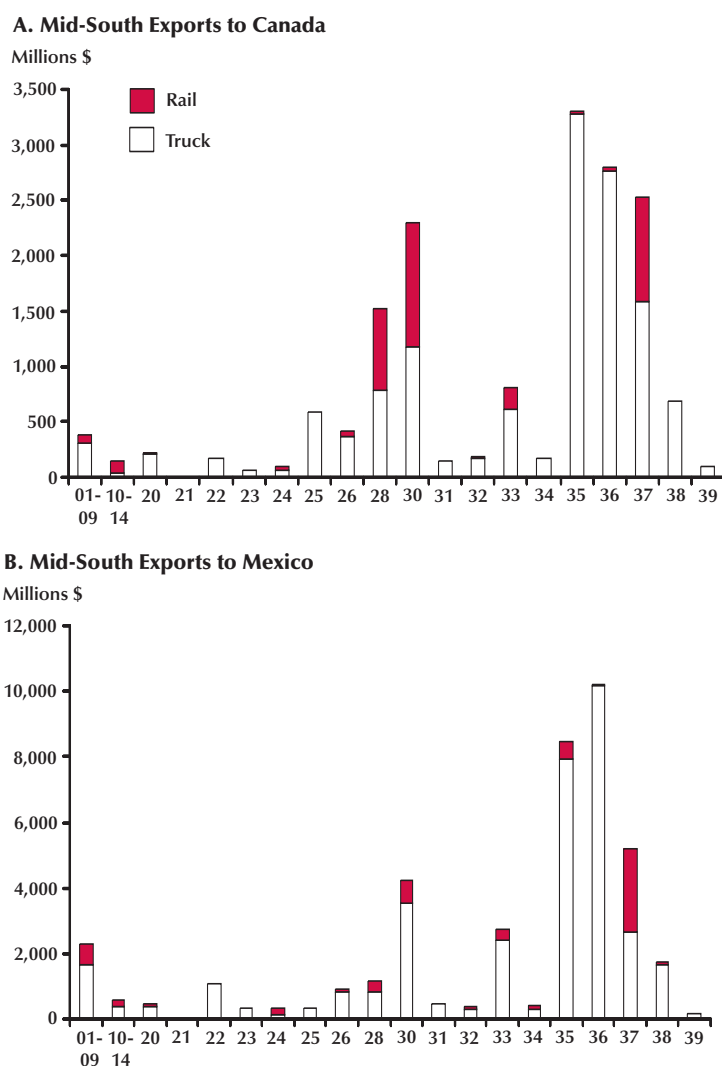
all Mid-South imports from Canada—were from industries SIC 35 and SIC 36 (Industrial Machinery and Electrical Equipment, respectively). These two industries tended to ship by truck, for both Canada and Mexico, whether a Mid-South export or import. Similarly, a relatively large proportion of Mid-South imports from Canada come from industries SIC 28, SIC 30, and SIC 33 (Chemicals, Rubber, and Primary Metals, respectively); a relatively large proportion these industries' shipments travel by rail, regardless of the NAFTA source and destination.

NAFTA TRADE DATA COMPLETELY DISAGGREGATED

Table 7, panels A and B, report data disaggregated by state, country, and mode of transportation. The U.S. state–mode–foreign country combination with the highest median growth rate for truck exports was Tennessee exports to Mexico (16.0 percent), while the combination with the highest median growth rate for rail exports was Mississippi rail exports to Canada (17.7 percent). The combina-

Figure 4

Mid-South Surface-Transported Imports, 2004

A. Mid-South Imports from Canada

Millions $

B. Mid-South Imports from Mexico

Millions $
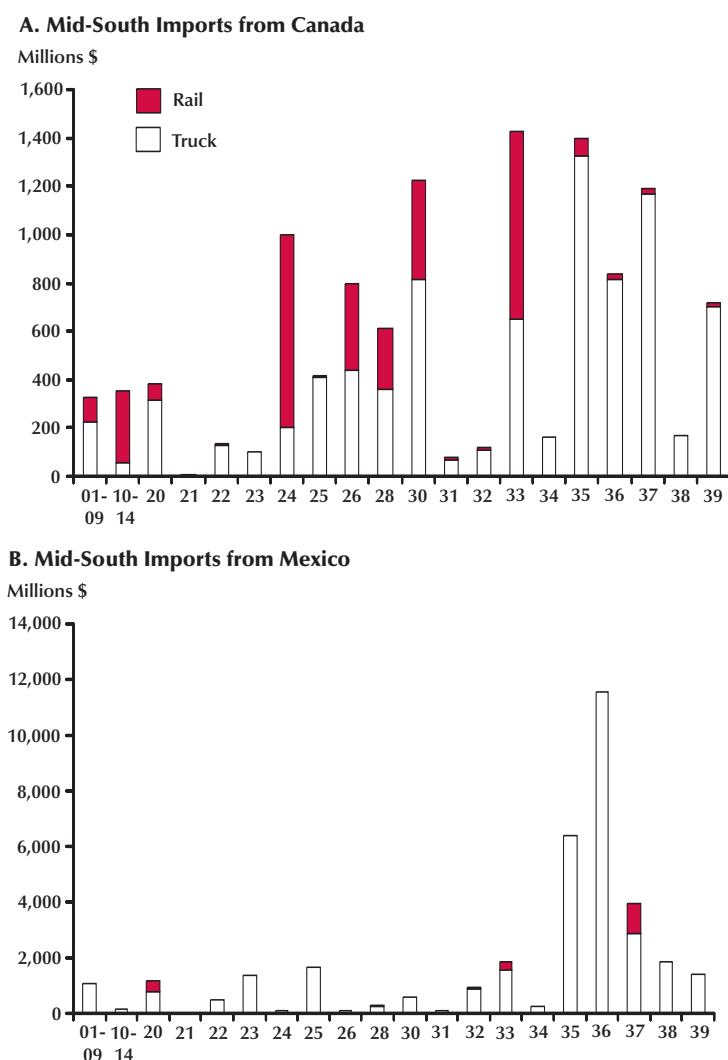
tion with the lowest median growth rate for truck exports was Mississippi exports to Mexico (0.8 percent), and the lowest median growth rate for rail exports was for Tennessee exports to Mexico (–3.0 percent). Once again, the difference, for a given U.S. state–mode–foreign country combination, between the fastest- and slowest-growing industries is striking. For exports, 16 of the 20 U.S. state–mode–foreign country combinations had a 30 percent per year difference between the minimum and the maximum industry-level growth rates.

This enormous difference shows the importance of using disaggregated trade data. Table 7, panel B, contains similar results using import data.

CONCLUSION

Most studies of NAFTA use aggregated data and thus sacrifice valuable information on crucial differences among states, regions, and industries. The aggregated approach prevents economists from

Table 7

Surface-Transported Exports and Imports Growth by U.S. State–Mode–Foreign Country Combination, 1995-2004

Mode	State	Country	Median	STD	Min SIC	Min	Max SIC	Max
A. Exports growth								
Truck	AR	Mexico	8.1	14.7	39	–23.9	30	35.3
Truck	AR	Canada	3.0	6.9	39	–13.5	22	15.1
Truck	LA	Mexico	8.7	11.0	36	–17.6	20	26.4
Truck	LA	Canada	1.9	8.8	37	–8.8	23	22.5
Truck	MS	Mexico	0.8	17.7	36	–22.1	31	35.3
Truck	MS	Canada	6.5	8.0	37	–9.6	10-14	24.6
Truck	TN	Mexico	16.0	13.2	24	–19.7	34	34.2
Truck	TN	Canada	6.4	6.5	39	–2.4	38	23.2
Truck	TX	Mexico	4.0	8.0	21	–17.5	35	15.1
Truck	TX	Canada	5.5	4.2	39	–7.1	25	14.1
Rail	AR	Mexico	14.2	31.3	28	–5.1	33	70.4
Rail	AR	Canada	11.1	9.5	10-14	–4.8	28	27.6
Rail	LA	Mexico	20.0	23.6	24	–27.0	10-14	52.5
Rail	LA	Canada	2.3	15.9	39	–23.0	10-14	32.5
Rail	MS	Mexico	3.0	2.9	01-09	–2.2	28	4.3
Rail	MS	Canada	17.7	23.3	26	–13.7	36	64.2
Rail	TN	Mexico	–3.0	30.1	24	–18.3	37	87.1
Rail	TN	Canada	–1.7	10.2	32	–26.3	24	5.7
Rail	TX	Mexico	6.3	13.1	23	–25.2	30	23.6
Rail	TX	Canada	3.8	11.4	31	–17.6	36	22.7
Maximum			**20.0**					**87.1**
Minimum			**–3.0**			**–27.0**		
B. Imports growth								
Truck	AR	Mexico	10.0	13.6	31	–5.6	37	42.1
Truck	AR	Canada	3.9	9.2	22	–5.4	01-09	32.5
Truck	LA	Mexico	13.0	44.0	24	–19.2	37	175.9
Truck	LA	Canada	5.7	9.6	31	–4.9	34	33.1
Truck	MS	Mexico	2.1	26.1	38	–47.5	24	79.2
Truck	MS	Canada	7.9	7.3	32	–4.8	34	22.3
Truck	TN	Mexico	13.0	19.6	24	–11.8	20	64.1
Truck	TN	Canada	5.9	25.3	10-14	–2.3	21	115.7
Truck	TX	Mexico	7.5	7.6	24	–3.7	10-14	24.2
Truck	TX	Canada	7.9	5.6	26	2.0	22	20.4
Rail	AR	Mexico	–13.1	0.0	28	–13.1	28	–13.1
Rail	AR	Canada	0.1	14.8	37	–24.7	10-14	30.6
Rail	LA	Mexico	0.0	0.0	0	0.0	0	0.0
Rail	LA	Canada	6.6	18.7	37	–35.6	01-09	17.7
Rail	MS	Mexico	0.0	0.0	0	0.0	0	0.0
Rail	MS	Canada	3.7	18.3	35	–28.8	28	32.7
Rail	TN	Mexico	16.0	8.6	37	9.9	33	22.1
Rail	TN	Canada	9.7	21.9	32	–24.1	25	49.2
Rail	TX	Mexico	–5.6	20.9	25	–34.1	32	28.9
Rail	TX	Canada	2.8	11.7	34	–34.2	22	19.0
Maximum			**16.0**					**175.9**
Minimum			**–13.0**			**–47.5**		

NOTE: The fourth column of Table 3A (Table 3B) reports the SIC code of the industry with the lowest average surface-transported export (import) growth rate for a particular U.S. state–mode–foreign country combination, and the fifth column reports that industry's average growth rate. The sixth column reports the SIC code of the industry with the highest average surface-transported export (import) growth rate for a particular U.S. state–mode–foreign country combination, and the last column reports that industry's average growth rate. The "minimum" median is reported as –2.6 in the table even though there is a –24.1 for Arkansas rail imports from Mexico; but there is only one industry for that category.

drawing clear conclusions on the narrow policy issues, such as transportation planning, of most interest to state and regional policymakers. Using a rich dataset on post-NAFTA trade traffic from the BTS, we uncover many striking differences in intra-NAFTA trade traffic between states and industries and by transportation mode.

Within each state, the pattern of surface-transported intra-NAFTA trade differed substantially across industries. For example, Mississippi exports to Mexico showed industry-level growth rates ranging from –22.1 percent to 77.0 percent, with a standard deviation of 25.2 percent. Within each industry, the trade traffic varied across states. As shown in Table 7B, for SIC 24 (Lumber and Wood Products) Louisiana truck imports from Mexico fell by –19.2 percent annually, while Mississippi truck imports from Mexico rose 79.2 percent annually. Results like these support Coughlin and Wall's (2003) conclusions on the importance of firm mobility in determining the effects of NAFTA on state-level trade. Further, the transportation mode of intra-NAFTA trade depended on the state and the industry. Of the 20 possible U.S. state–mode–foreign country combinations we examined for the Mid-South, 16 showed export growth rates differing at the industry level by 30 percent or more per year. In general, exports and imports were much more volatile for rail shipments than for truck shipments. All of these differences highlight the need to disaggregate the data to draw policy-relevant conclusions.

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APPENDIX 2
Intra-NAFTA Trade in MidSouth Industries: A Gravity Model

Intra-NAFTA Trade in MidSouth Industries: A Gravity Model

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Abstract
This paper examines industry-level growth since the implementation of NAFTA. Using a rich dataset on traffic between NAFTA members, we estimate several gravity models to assess trade between NAFTA members at the industry level. The results show significant disparities across states and industries. For exports within the NAFTA region, the results show large differences in growth rates both between states and between industries. For imports within the NAFTA region, the growth rates vary more between industries than between states.

Among the five MidSouth states, we examine, the data reveals substantial variation both within states at the industry level, and within industries across states. Once the fundamental determinants of trade are considered, the growth of industry-level trade between Texas and the NAFTA partners has been weaker than in other states. Given Texas' dominant position in the NAFTA region, this finding may partially explain the weak aggregate effects of NAFTA found in the existing literature. Our results also confirm the importance of vertical intra-industry trade in the U.S.-Mexico trade relationship and suggest a considerable relocation of production linked to trade between the NAFTA members.

JEL classification: R23, R11

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1. Introduction

The implementation of NAFTA in January 1994 inspired a large research effort among economists with the aim of measuring the treaty's effects on the three NAFTA economies. Most of the studies use a gravity model approach (Gould, 1998; Krueger, 1999). Gravity models explain trade flows as a function of the exporter and importer market size and distance from each other. Once these fundamental determinants of trade flows are accounted for, any extraordinary flows can be attributed to free trade agreements or other non-natural features such as borders. For example, both Gould (1998) and Krueger (1999) find that NAFTA does not, in general, have a significant impact on bilateral trade flows, although the increase in trade was net trade creating. Gould comes to his conclusion using quarterly data from the three NAFTA countries from 1980 through 1996. Although he concludes that U.S. export growth to Mexico was 16.3% higher in the first three years due to the NAFTA treaty, the effects on U.S. imports from Mexico and U.S.-Canada trade were not statistically significant. Krueger uses a panel dataset for 61 countries every other year from 1987 to 1997, which enables her to comment on a broader picture of trade creation and trade diversion effects of NAFTA. Like Gould, she does not find significant trade creation between the NAFTA partners. However, she does find that NAFTA countries import less than predicted from non-NAFTA trading partners.

Like the Gould and Krueger studies, most of the existing literature uses aggregate data and thus overlooks the differences between states, regions, and industries. Not only does this sacrifice valuable information, the aggregated approach prevents economists from drawing clear conclusions for policymakers on the importance of trade within the NAFTA region, especially since policymakers often focus narrowly on specific states or specific industries. For example, the NAFTA-region surface-transported trade grew by 85% between 1995 and 2004, but the extra strain on transportation infrastructure is not shared equally across the 50 U.S. states. Moreover, trade in the NAFTA region may have inspired the relocation of production between states. An aggregate analysis would miss the localized effects of the production relocation.

Only a few studies have taken a more narrow focus. Wall (2003) breaks the U.S. into nine BEA economic regions and Canada into three regions and finds that the impact

of NAFTA differs for different regions. While all U.S. regions except the Rocky Mountains experienced rapid trade growth with Central Canada, most regions experienced declining trade with Eastern and Western Canada. While NAFTA did not affect total trade between the U.S. and Canada, the regional differences were key.

In Wall's study, the South Central U.S. enjoyed some of the fastest growth in NAFTA trade. This paper examines the growth of trade within the NAFTA region since the implementation of the NAFTA treaty. We narrow the geographic focus to five MidSouth states along one of the NAFTA region's major surface-transported trade routes: Arkansas, Louisiana, Mississippi, Tennessee and Texas. Note that the states vary substantially by economic size, industrial composition and trade volumes. Table 1 shows the dollar value and the share of total state exports going to Canada and Mexico from our sample states. The NAFTA partners are the top two export markets for all states except Louisiana, for whom Canada is the fourth largest market. The share of exports going to Canada and Mexico is 35% or greater for four of the states, Louisiana being the exception.

Coughlin and Wall (2000) examine the effects of NAFTA on individual U.S. states. Unlike them, we use data disaggregated to the industry-level (2-digit SIC) and by transportation mode (truck or rail) from the Bureau of Transportation Statistics (BTS). Most industry-level studies focus on describing the data and do not control for other factors as we do with the gravity model (e.g., Klein, Schuh, and Triest, 2002; Burfisher, 2001). The few that employ a gravity model focus on only a handful of select industries (e.g., Grant and Lambert, 2003). Our previous study (Funk et al., 2006) finds striking differences in trade flows across industries and by state. While many industries experienced stable growth of trade within the NAFTA region, other industries saw more dramatic change. Indeed, the considerable differences in the volatility of industry-level trade may dominate the data at the aggregate level. Analysis at the detailed level can account for these industry and state differences and thus should improve the accuracy of the estimates of the NAFTA-area economic relationships.

We find significant disparities across states and industries in the trade flows between the NAFTA members. For U.S. state exports to NAFTA partners, the results show large differences in growth rates both between industries and between states. Many

industries experienced NAFTA-region export growth in some states while simultaneously shrinking in other states. Variations in imports growth within states or within industries are less substantial than the variations in export growth. Once the fundamental determinants of trade are considered the growth of industry-level NAFTA-region trade in Texas has been weaker than in the other sampled states. Given Texas' central economic position in the NAFTA region, this finding may partially explain the weak aggregate effects of the NAFTA treaty found in the existing literature. Our results also highlight the importance of intra-industry trade. Every state enjoyed increased imports and exports in at least one industry, and two industries showed increased imports and increased exports in at least four states.

The paper proceeds as follows. Section 2 describes the NAFTA-region industry-level trade patterns using the disaggregated data. We emphasize the inter-industry and inter-state disparities in growth and volatility, details that are unavailable in the aggregated data. Section 3 explains the gravity model we use to uncover the NAFTA region relationships at the disaggregate level. Section 4 reports the estimated gravity models. The results demonstrate that NAFTA-region trade has different growth patterns for different states, industries, and transportation modes. The last section concludes.

2. NAFTA Data: A Very Disaggregated View

The Bureau of Transportation Statistics (BTS) provides trade data by destination and source in the Transborder Freight Database. The BTS reports the monthly value of NAFTA region trade by transportation mode (truck, rail, mail, and pipe) at the industry level using the 2-digit Schedule B industry definition for exports and the 2-digit Harmonized Tariff Schedule of the United States Annotated (TSUSA) industry definition for imports, covering 100 industries. We aggregated the data to annual frequency and into 20 2-digit SIC agricultural, mining, and manufacturing industries (see Table 2 for list of industries). The trade shipped by mail and pipe were dropped from estimation due to the low volume and low frequency of observed trade. The data begin in April 1994, thus limiting our sample of full-year observations to 1995-2004. The BTS data did not account for trans-shipments until 1997. Using the BTS statistics on trans-shipments, we adjust the data for years 1995-1997 to account from trans-shipments. We deflate the

trade data using the CPI (2002 base year). A detailed analysis of the data at the various disaggregated levels is provided in Funk et al. (2006).

Aggregating trade across all industries for each state-foreign country combination conceals the substantial variation that exists at the industry level. To illustrate this variation, the third column in Tables 3a and 3b reports the median growth rate across each state's 20 SIC industries for exports and imports respectively.[1] The state-foreign country combination with the highest median industry growth rate is Tennessee exports to Mexico at 10.7%, while the state-foreign country combination with the lowest median industry growth rate is Arkansas exports to Canada (3.2%). Even for Arkansas exports to Canada, there is a great deal of variation across industries. The minimum annualized growth rate was -13.6% (in SIC 39 Miscellaneous Manufacturing) and the maximum growth rate was 18.1% (in SIC 22 Textile Mill Products), with a standard deviation across industries of 7.7% -- and Arkansas's exports to Canada show relatively little cross-industry variation compared to other states. Mississippi exports to Mexico show *annual* industry-level growth rates ranging from -19.5% to 68.2% with a standard deviation of 21.6%.

Imports exhibit similar variation. The median industry growth rate of Mississippi imports from Mexico is -1.3%, but with wide variation across industries: SIC 38 Instruments and Related Products shrank an average -39% per year while SIC 24 Lumber and Wood Products grew an average 48.2% per year. The state-foreign country combination with the highest median industry growth rate is Louisiana imports from Mexico (13.0% overall), with industry growth rates ranging from -14.7% (SIC 20 Food and Kindred Products) to 60.6% (SIC 37 Transportation Equipment). Finally, notice the fastest growing and the slowest growing industries varied from state-to-state and by NAFTA partner. Aggregation over industries or over states masks these details that are central to state and regional policymakers.

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[1] To estimate the growth and volatility of the disaggregated data series, a log-linear trend was fit through each individual US state-foreign country-mode-industry series.

$$y_t = \alpha + \beta * time + \varepsilon_t$$

where y_t is the log of the particular trade flow. The estimated average annual growth rate of the actual trade flow is then given by $100*(e^{\beta}-1)$. For each industry within a given combination the above regression is estimated, the estimated trend growth rate is determined for each industry, and the residuals are obtained.

The volatility of industry-level trade also varied state-by-state and by NAFTA partner. Table 3c and 3d shows the volatility of exports and imports for each state-foreign country combination. The volatility of a particular series is measured as the average absolute percentage deviation from a log-linear trend. Note that our measure of volatility is the variation around the trend, so trade growing at a high but constant rate would have volatility of zero. The volatility measures how consistent (and thus predictable) the trade flows are over time. We find that there is a considerable amount of volatility over time for many of the industries. The least volatile export series is for SIC 28 Chemicals and Allied Products from Tennessee to Canada where the average absolute percentage deviation is only 3.9%. The column labeled "Median" reports the median volatility measure over all of the industries for a particular state-country combination. The median export (and import) volatility is generally less than 20% for all states' trade with Canada, but is over 30% for all states' (except Texas) trade with Mexico suggesting that for many industries trade with Mexico has been much more volatile than the trade with Canada since the implementation of the NAFTA treaty.

3. METHODOLOGY

While economic theory explains trade flows as arising from comparative advantage or economies of scale, empirical researchers have found that a simple gravity model outperforms traditional theory-based empirical specifications. Anderson and Wincoop (2003) provide a good overview of the motivation and empirical use of the gravity model. The basic gravity model explains (natural) trade patterns as resulting from economic size (income and population) and distance. The impact of unnatural factors such as trade or security policy can be tested by adding proxies to the model. In a panel setting, the time-invariant distance effect cannot be distinguished from the time-invariant fixed effect or other time-invariant factors such as border effects or language. Several solutions have been proposed that allow the disentangling of the effects of time-invariant factors. Anderson and Wincoop (2003) suggest using a multilateral resistance term. Chang and Wall (2004) suggest a two-stage estimation process: estimate an importer-exporter fixed effect in the first stage, then regress the fixed effect on distance and other time-invariant factors in the second stage. The Chang and Wall method has the advantages of being estimable via ordinary least squares and of not requiring the

assumptions about distance internal to states and countries. We adopt the Chang and Wall fixed-effects gravity model method. In the simplest specification, the gravity model explains bilateral trade flows as a function of the exporter and importer per capita GDP, a time effect, and a fixed effect for each exporter-importer pair. The time-invariant fixed effect captures all time-invariant effects such as distance, borders effects, and language. Since we are not directly interested in these effects, we do not estimate the second stage.

Previous gravity models of NAFTA aggregated trade flows over industries or states. We disaggregate data into 20 2-digit SIC industries. Further, this paper evaluates trade flows disaggregated by the mode of transportation. Extending the Cheng and Wall (2004) specification to our context, we model the trade flow of industry k from US state i to the NAFTA trade partner j as:

(1) $\qquad X_{ijk} = \alpha_{ij} + \beta_1 GSPC_i + \beta_2 GDPC_j + \delta_1 Trend + \varepsilon_{ij}$

with X_{ijk} is the log of exports, $GSPC_{it}$ is the log per capita gross state product of state i, $GDPC_{jt}$ is the log of per capita foreign gross domestic for foreign country j, and $Trend$ denotes the time trend (excluding a time subscript for notational convenience). The above specification of the gravity model assumes that each exporter-importer pair has a unique intercept (α_{ij}), but that all industries within a given exporter-importer pair share the same intercept. This implies that, for a given exporter-importer pair such as Arkansas and Mexico, the predicted trade volumes would be identical for all industries. To allow industries to have different intercepts and thus differing trade volumes, we also incorporate an industry-specific intercept. Equation (1) also assumes a common time trend for all industries for any exporter-importer pair. This implies that, for a given exporter-importer pair such as Arkansas and Mexico, the growth rate of trade would be identical across all industries. In the estimation, we can also allow for unique trends for each industry. Our gravity model specification thus becomes:

(2) $\qquad \ln X_{ijk} = \alpha_{ij} + \alpha_k + \beta_1 GSPC_i + \beta_2 GDPC_j + \delta_1 Trend * SIC + \varepsilon_{ij}$

where α_k is the industry specific intercept, and SIC is a vector of industry dummies allowing the estimation of industry specific trends. Note that the industry-specific intercept α_k is constant across NAFTA trade partners. We estimate Equation (2) separately for each state. In the estimation, the α_{ij} term reduces to a dummy with a value of 1 if the NAFTA partner is Canada and 0 if the partner is Mexico. The estimated

industry-level trend shows the industry-level growth of NAFTA region trade not captured by the fundamental determinants of trade such as the growth in domestic and foreign per capita GDP and the country dummy.

The size of each state's economy comes from the Bureau of Economic Analysis' (BEA) Gross State Product (GSP). Canadian GDP and population data come from *Statistics Canada*. Mexican GDP and population data come from the IMF's *World Economic Outlook*. The GDP data is converted to PPP US$ (2002 $) using the IMF's PPP exchange rates from the IMF's *World Economic Outlook*.

4. GRAVITY MODEL

Using the BTS data, we estimate the gravity model specified in Equation (2) by Feasible Generalized Least Square (FGLS). The error term in Equation (2), ε_{ij}, is assumed to include two error components: one fixed effects and the other white noise. Therefore, FGLS estimates a fixed-effects panel data model (Baltagi, 2001). Coefficients on industry-specific trends are the most interesting to us. Previous studies, such as Gould (1998) and Krueger (1999), usually test the significance of a NAFTA dummy (before and after 1994) impacting gross output. But as Burfisher et al. (2001) point out, both the static and dynamic benefits of free trade are realized through economic adjustment, as trading partners reallocate resources to their industries of comparative advantages. With the disaggregated data, we are able to describe the evolving lifecycle of different industries for each state as the adjustment to the NAFTA treaty progresses. With income and other trade determinants accounted for by the gravity model, the industry-specific trend coefficients capture each industry's growth rate of NAFTA region trade. Rather than measuring the impact of the NAFTA treaty on trade as in previous studies, our focus is on understanding industry-level trade growth since the implementation of the NAFTA treaty.

4.1 Exports

We estimate the gravity model for each state and for imports and exports separately to obtain a clearer picture of the underlying dynamics of trade with NAFTA partners in the MidSouth states. The estimation includes a constant, state GSP, foreign GDP, a country dummy, industry fixed-effects (base industry is SIC 39 Miscellaneous

Products), and industry-specific trends.[2] Table 4a reports results from the gravity model when exports is the dependent variable.

The effect of state-level GSP and foreign country GDP on state exports differs across states. All states show a statistically significant positive relationship between foreign per capita GDP and state exports. The relationship varies from a low of 1.17 for Texas to 4.32 in Mississippi. The results for per capita state GSP show even more disparity of state's responses. The estimated elasticity for exports to GSP is the highest at 4.43 for Arkansas and the lowest at -2.10 for Louisiana (both statistically significant at 5% level). The divergent responses may reflect different business cycles at the state level, as analyzed in Owyang et al. (2005). For example, the five states experienced different duration and depth of contractions during the most recent recession. Holding all else constant, all five states would export more to Mexico than to Canada.

Our data and specification allow us to estimate unique growth trends for each industry in each state since the implementation of NAFTA, with the fundamental trade determinants captured by the gravity model. Examining the data within states, the industry-level trends show striking variance. Tennessee had more industries (13 of Tennessee's 20 industries) exhibiting statistically significant trend growth than the other four states. Tennessee's fastest growing industry, once the fundamental trade determinants are captured by the gravity model, is SIC 38 (Instruments and Related Products), with an annual growth rate of 0.22. Aside from SIC 21 (Tobacco), the slowest statistically significant growth among Tennessee's industries occurred in SIC 28 (Chemicals and Allied Products) and SIC 32 (Stone, Clay, Glass and Concrete), with annual growth of 0.04. Only seven Mississippi industries show statistically significantly growth trends. Mississippi's SIC 10-14 (Mining) industry grew at an annual rate of 0.34, which is the fastest growth of any industry in any of the five states, but SIC 39 (Miscellaneous Products) grew at -0.08. Eight Arkansas industries showed statistically significant trends, with five of the industries showing positive growth and three industries shrinking. Nine Louisiana industries showed statistically significant growth in exports to

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[2] Tennessee reported exports in all 20 industries, while the other four states reported exports in only 19 industries (SIC 21 Tobacco Products being the difference). For Tennessee, the regressions include 19 fixed effects and 20 industry trends. For the other states, the regressions include 18 fixed effects and 19 industry trends. Note that the results are identical if, for Tennessee, we had estimated 19 industry trends plus a trend for the model. The trends in the state and foreign country GDP were removed prior to estimation.

NAFTA partners, from SIC 34 (Fabricated Metal Products) growing at a 0.24 annual rate to SIC 36 (Electrical and Electronic Equipment) growing at a -0.10 annual rate. The widely divergent export growth rates since the implementation of the NAFTA treaty on industries within individual states suggest future researchers should carefully consider the variations between industries. Only Texas breaks the mold: statistically significant industry growth trends in Texas range from 0.03 (SIC 26, Paper and Allied Products) to 0.08 (SIC 30 Rubber Products and SIC 35 Industrial Machinery). By absolute dollar terms, Texas has more trade volume and gained more trade volume with NAFTA partners than any other state in the nation. Since Texas would dominate any aggregation over states, aggregate analysis may not reveal the substantial variation between industries within states that is shown by our disaggregated analysis.

The disaggregated analysis within industries is also revealing. Some industries showed commonalities across states. Of the 20 industries, 11 industries showed positive growth rates in all five states. Only SIC 30 (Rubber and Miscellaneous) showed positive, statistically significant trend growth in all five states, with growth ranging from 0.06 in Tennessee to 0.16 in Arkansas and Mississippi. Only SIC 33 (Primary Metal Industries) showed positive, statistically significant growth in four states.

More interestingly, for many industries exports to NAFTA partners grew in some states while simultaneously shrinking in other states. For example, SIC 36 (Electrical and Electronic Equipment) exports grew in Tennessee and Texas (statistically significant estimated trends of 0.10 and 0.05 respectively), but shrank in the other three states with a statistically significant estimated trend of -0.10 in Louisiana. SIC 10-14 (Mining) had statistically significant positive export growth in Louisiana and Mississippi (0.20 and 0.34, respectively), but statistically significant falling exports from Arkansas (-0.13). SIC 34 (Fabricated Metal Products) exports to NAFTA partners grew in Tennessee and Louisiana, but shrank in Arkansas. These results imply that the variations between industries may be less significant than variations between states within industries, which suggest that researchers should pay more attention to state differences than industry differences. The results may indicate the relocation of production as the international trade forces a reallocation of resources. Note that aggregating across states would yield results similar to Texas's results, given Texas's dominant share of the trade in the

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NAFTA region. Since the industry-level trends in Texas are weak compared to the other states, analysts may not find the industry-level effects unless the data is disaggregated to the state level.

4.2 Imports

Table 4b provides the gravity model results for imports. The effects on imports of foreign per capita GDP, per capita GSP and Canadian dummy are quite different from those on exports. Most of the gravity model coefficients are positive, but only Tennessee's results are statistically significant. This suggests that per capita output is not a primary driver of state imports from NAFTA partners. Texas and Tennessee are significantly more likely to import from Mexico than Canada. The other states are more likely to import from Canada than Mexico, but the effect is statistically significant only for Louisiana.

The industry-specific import trends vary within each state, but less so than with exports. More Tennessee industries (11) showed statistically significant growth in imports to NAFTA partners than in any other state, while only 5 Mississippi industries showed statistically significant growth. The trends in Tennessee industries range from .05 in SIC 39 (Miscellaneous Products) to 0.28 in SIC 20 (Food and Kindred Products). The statistically significant trends in Mississippi range from 0.11 in SIC 22 (Textile Mill Products) to 0.20 in SIC 24 (Lumber and Wood Products). In Arkansas, the statistically significant trends range from 0.06 in SIC 24 (Lumber and Wood Products) to 0.18 in SIC 10-14 (Mining). The range of estimated trend growth rates in Louisiana started at 0.05 in SIC 10-14 (Mining) to 0.27 in SIC 34 (Fabricated Metal Products). In Texas, the statistically significant trends ranged from 0.03 in SIC 33 (Primary Metal Industries) to 0.13 in SIC 22 (Textile Mill Products). No industry in any state exhibited statistically significantly negative growth in imports to NAFTA partners, once the gravity model accounts for the fundamental determinants of growth.

Most industries also show less import-growth variation across states than export-growth variation. For example, the growth of SIC 34 (Fabricated Metal Products) exports to NAFTA partners ranged from -0.07 to 0.24 but growth of import from NAFTA partners ranged from 0.11 to 0.27. Only two industries saw statistically significant positive export growth in at least four states; four industries saw statistically significant

positive import growth in at least four states. Three industries saw exports shrink in some states while increasing in others; no industry saw statistically significant decrease in imports in any state.

Texas' growth of trade with NAFTA partners has been much smaller than in the other states, possibly because Mexico-Texas trade reached maturity in anticipation of the NAFTA treaty. Again, given the dominant trade volume in Texas, aggregating across states would yield results similar to Texas. Since the industry level trends in Texas are much weaker, economically and statistically, than in the other states, the industry-level effects may not be visible unless the data is disaggregated to the state level.

Comparison between Table 4a and Table 4b allows us to evaluate the importance of vertical intra-industry trade (IIT) in the U.S.-Mexico trade relationship. The U.S. International Trade Commission (1997), Gonzalez and Velez (1995) and others find that trade between Mexico and US features significant levels of assembly and other value-added activities of US components in Mexico for re-export to U.S.. Every state enjoyed increased imports and exports in at least one industry, with 5 Louisiana industries and 8 Tennessee industries showing growth in both imports and exports. SIC 30 (Rubber and Miscellaneous) and SIC 33 (Primary Products) showed both import and export growth in four of the five states.

We also estimated the gravity model for each state by each mode (truck and rail), for exports and imports separately (results available from the authors). The results were qualitatively similar to the gravity model aggregated over modes, with one additional insight: exports transported by rail have markedly different reactions to per capita GDP when the compared to truck-transported exports. For truck exports, all states had positive estimated reactions to foreign GDP, with three of the five states having statistically significant responses greater than 1.0; for rail exports, the estimated reaction is negative for three of five states, and is statistically significant (at the 10% level) and positive for only one state (Mississippi). Similarly, the reaction to state GSP is negative for four of five states when the exports are by rail; the reaction to state GSP is positive and statistically significant (at 5% level) for four of the five states for truck exports. These results strongly suggest that rising per capita income in U.S. states and foreign countries leads to a larger share of exports transported by truck.

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4.3 Effect of Accounting for Fundamental Trade Determinants

Comparison between trends in the raw data and the trends estimated in the gravity models provides further insight into trade within the NAFTA region. The difference between the raw growth rates and the gravity model growth rates indicate the effect of fundamental factors such as per capita GDP. For example, Mississippi imports of SIC 34 (Fabricated Metal Products) show a raw annual growth rate of 0.14, but once the fundamental trade factors are removed, the gravity model annual growth rate falls 0.02. Mississippi imports of SIC 35 (Industrial Machinery) show a raw annual growth rate of 0.05, but once the fundamental trade factors are removed the gravity model annual growth rate increases to 0.12. In general, the gravity model boosts the estimated import growth in SIC 35 (Industrial Machinery) and SIC 23 (Apparel), but decreases import growth in SIC 01-09 (Agriculture). The gravity model boosts the estimated export growth in SIC 25 (Furniture), SIC 23 (Apparel), and SIC 34 (Fabricated Metal Products), but decreases export growth in SIC 10 (Mining), SIC 24 (Lumber), SIC 20 (Food), and SIC 22 (Textile Mill Products).

The results also point to two industries that had extensive domestic distortions in addition to trade barriers and were often put at the top of the "endangered jobs" list in the pre-NAFTA debate, for instance, by Perot et al. (1993) and Shaiken (1993). One is Agriculture (SIC 01), which accounts for 24% of Mexican employment. In general, the raw data show strong positive trends in import growth in agricultural goods. However, fears of too many displaced farm workers and possible migration to Mexican cities and the United States led to the final NAFTA agreement allowing a 15-year transition period for sensitive crops. The transition includes a two-tiered tariff structure for imports from NAFTA partners. Therefore, the full effects of the NAFTA agreement have not yet been felt in this industry; the gravity models find limited negative effects of the NAFTA agreement on the overall agricultural sector to date. Interestingly, Grant and Lambert (2005) find substantial levels of trade creation when they further disaggregate the agricultural sector into nine sectors. The second industry is autos and parts (SIC 37). Many economists (for instance, Womack, 1991) argued that Mexico had extensive distortions in the auto industry through its "auto decrees" which included requirements for domestic content and the trade balance, and therefore the NAFTA treaty would

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benefit both exports and imports of U.S. auto industry. Burfisher et al. (2001) find a dramatic increase of intra-industry trade in auto and parts since 1994, and the raw data shows positive trends in imports and exports for Louisiana, Mississippi, Tennessee, and Texas. Once the fundamental trade factors are controlled for in the gravity model, the data show increasing growth of trade with NAFTA partners for Texas, Tennessee and Mississippi exports, and increasing growth of imports for Texas.

5. Conclusion

Most NAFTA studies use aggregate data and thus sacrifice valuable information on crucial differences between states, regions, and industries. The benefits of free trade, however, are realized through economic adjustment, as trading partners reallocate resources to their industries of comparative advantages. The aggregated approach prevents economists from drawing clear conclusions on the narrow policy issues of most interest to state and regional policymakers. This paper examines industry-level growth since the implementation of NAFTA. With the data disaggregated to the industry and state level, we are able to describe the evolving life cycles of different industries for each state as the NAFTA adjustment progresses.

Gravity model results show significant disparity of trade between NAFTA members at the state and industry level. The results show both substantial variation in export growth across states for many industries, and substantial variation in export growth within states across industries. This suggests that the inter-industry variations are at least as important as the interstate variations. Variations in imports growth within states or within industries are less substantial than the variations in export growth. These differences would not be visible at aggregated levels.

The data also indicates significant relocation of production within the five sample states. Many industries experienced growth in the exports to NAFTA partners in some states while simultaneously shrinking in other states. For example, SIC 36 (Electrical and Electronic Equipment) exports grew in Tennessee and Texas, but shrank in the other three states; SIC 10-14 (Mining) grew in Louisiana and Mississippi (0.20 and 0.34, respectively), but declined in Arkansas (-0.13). SIC 34 (Fabricated Metal Products) exports grew in Tennessee and Louisiana, but shrank in Arkansas.

Our specification of the gravity model allows an evaluation of the importance of intra-industry trade in the U.S.-Mexico trade relationship. Every state enjoyed increased imports and exports in at least one industry, with five Louisiana industries and eight Tennessee industries showing growth in both imports and exports. SIC 30 (Rubber and Miscellaneous) and SIC 33 (Primary Products) showed both import and export growth in four of the five states. Analysis at the aggregate level would not detect these intra-industry trade patterns or the apparent relocation of production within the five state region.

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Table 1: Exports within NAFTA, by State (2005)

	Total Exports		Share of State Exports	
	Canada	Mexico	Canada	Mexico
Arkansas	$1 billion	$0.416 billion	26%	11%
Louisiana	$1.6 billion	$2.2 billion	8%	11%
Mississippi	$0.896 billion	$0.535 billion	22%	13%
Tennessee	$6.1 billion	$1.9 billion	32%	10%
Texas	$14.7 billion	$50.1 billion	11%	39%

Source: Origin of Movement State Export Series, Census Bureau

TABLE 2 SIC Industries

SIC Industry
01-09 Agriculture
10-14 Mining
20 Food and Kindred Products
21 Tobacco and Manufactured
22 Textile Mill Products
23 Apparel and other Textile Products
24 Lumber and Wood Products
25 Furniture and Fixtures
26 Paper and Allied Products
28 Chemicals and Allied Products
30 Rubber and Miscellaneous
31 Leather and Leather Products
32 Stone, Clay, Glass and Concrete
33 Primary Metal Industries
34 Fabricated Metal Products
35 Industrial Machinery and
36 Electrical and Electronic Equipment
37 Transportation Equipment
38 Instruments and Related Products
39 Miscellaneous Manufacturing

TABLE 3a Export Growth – By Country

State	Country	Median	STD	Min	Max	Min SIC	Max SIC
AR	Mexico	4.0	16.7	-28.6	31.4	31	30
AR	Canada	3.2	7.7	-13.6	18.1	39	22
LA	Mexico	10.3	12.9	-19.2	37.0	36	10
LA	Canada	3.4	14.2	-8.8	44.0	39	23
MS	Mexico	8.7	21.6	-19.5	68.2	36	20
MS	Canada	4.2	11.3	-9.3	43.1	39	10
TN	Mexico	10.7	12.4	-15.4	36.0	24	25
TN	Canada	4.5	6.9	-7.3	18.8	1	38
TX	Mexico	4.6	7.2	-13.1	12.4	21	35
TX	Canada	3.6	5.7	-9.6	19.8	39	25
Maximum		**10.7**			**68.2**		
Minimum		**3.2**		**-28.6**			

TABLE 3b Import Growth – By Country

State	Country	Median	STD	Min	Max	Min SIC	Max SIC
AR	Mexico	5.4	12.8	-16.7	36.7	1	30
AR	Canada	5.2	8.9	-6.8	26.1	37	1
LA	Mexico	13.0	20.1	-14.7	60.6	20	37
LA	Canada	4.4	8.0	-3.4	22.6	32	23
MS	Mexico	-1.3	22.0	-39.0	48.2	38	24
MS	Canada	6.0	8.8	-4.4	23.0	32	23
TN	Mexico	11.3	20.1	-13.1	65.7	24	22
TN	Canada	6.3	15.3	-4.4	68.9	22	21
TX	Mexico	4.5	6.6	-7.7	17.4	24	35
TX	Canada	7.5	6.4	0.6	24.3	36	22
Maximum		**13.0**			**68.9**		
Minimum		**-1.3**		**-39.0**			

TABLE 3c Export Volatility – By Country

State	Country	Median	STD	Min	Max	Min SIC	Max SIC
AR	Mexico	45.7	49.3	17.1	212.1	33	10
AR	Canada	16.6	7.4	10.1	37.8	30	10
LA	Mexico	40.4	22.2	11.4	98.5	30	34
LA	Canada	15.1	19.7	5.5	88.1	31	23
MS	Mexico	58.0	45.9	15.3	201.2	28	36
MS	Canada	16.9	16.6	8.5	84.7	34	37
TN	Mexico	33.2	20.3	9.4	81.6	28	10
TN	Canada	15.4	12.5	3.9	54.8	28	39
TX	Mexico	14.7	10.4	6.2	50.8	1	21
TX	Canada	12.2	5.2	7.2	26.5	1	37
Maximum		**58.0**			**212.1**		
Minimum		**12.2**		**3.9**			

TABLE 3d Import Volatility – By Country

State	Country	Median	STD	Min	Max	Min SIC	Max SIC
AR	Mexico	46.7	55.4	10.2	248.9	20	37
AR	Canada	16.7	11.7	8.6	42.2	35	38
LA	Mexico	56.4	132.	12.4	578.3	35	37
LA	Canada	18.3	11.5	8.7	56.3	33	34
MS	Mexico	63.0	42.6	21.8	205.3	32	37
MS	Canada	19.0	14.5	4.3	58.5	24	23
TN	Mexico	31.6	12.9	18.1	69.8	33	24
TN	Canada	15.9	22.3	5.9	108.3	35	21
TX	Mexico	10.6	12.6	4.4	58.5	39	10
TX	Canada	12.6	5.7	3.9	29.1	20	36
Maximum		**63.0**			**578.3**		
Minimum		**10.6**		**3.9**			

TABLE 4a Exports

	Arkansas	Louisiana	Mississippi	Tennessee	Texas
FGDPC	3.02**	2.66**	4.32**	3.39**	1.17**
GSPC	4.43**	-2.10**	0.47**	2.97**	3.96**
CanDummy	-2.01*	-2.10*	-3.98**	-2.69**	-3.17**
SIC 01-09	0.04	0.02	0.10**	0.03	0.04*
SIC 10-14	-0.13**	0.20**	0.34**	-0.02	0.02
SIC 20	0.07**	0.12**	0.03	0.02	0.06**
SIC 21	--	--	--	-2.00**	--
SIC 22	0.10*	0.06**	0.06	0.08**	0.07
SIC 23	-0.10	0.10	-0.00	-0.03	-0.00
SIC 24	-0.02	-0.05	0.02	-0.03	0.02
SIC 25	0.01	0.07*	0.11	0.14*	0.04
SIC 26	0.12**	0.05	-0.03	0.04	0.03*
SIC 28	0.00	0.04*	0.01	0.04**	0.04
SIC 30	0.16**	0.12**	0.16**	0.06**	0.08**
SIC 31	-0.09	0.09	0.18**	0.14**	0.02
SIC 32	0.04	0.01	0.06	0.04*	0.04**
SIC 33	0.06**	0.01	0.04*	0.10*	0.04**
SIC 34	-0.07**	0.24**	0.01	0.14*	0.01
SIC 35	0.04	0.06**	0.02	0.10**	0.08*
SIC 36	-0.02	-0.10**	-0.05	0.10**	0.05**
SIC 37	0.02	0.09	0.17**	0.07**	0.06**
SIC 38	0.03	0.01	0.04	0.22**	0.07**
SIC 39	-0.21**	-0.13	-0.08*	0.08	-0.04
F-test on industries	33.14	38.58	17.89	87.49	52.88
R^2_{adj}	0.60	0.66	0.48	0.81	0.57

** = significant at 5% level; * = significant at 10% level. F-stat is the test statistic where the null hypothesis is a common trend and intercept across industries versus the alternative of industry specific intercepts and trends.
FGDPC = per capita country GDP; GSPC = per capita state GSP; CanDummy = 0 if Mexico, 1 if Canada.

TABLE 4b Imports

	Arkansas	Louisiana	Mississippi	Tennessee	Texas
FGDPC	0.95	-1.18	0.68	2.86**	0.91
GSPC	1.09	1.11	2.69	3.14**	1.24
CanDummy	0.34	4.06**	0.99	-2.37*	-2.31**
SIC 01-09	0.08	0.07	0.07	0.04	0.04
SIC 10-14	0.18**	0.05**	0.04	0.04	0.06
SIC 20	0.09	-0.01	0.01	0.28**	0.12**
SIC 21	--	--	--	0.51**	--
SIC 22	0.01	0.08	0.11*	0.23**	0.13**
SIC 23	0.06	0.12	0.06	0.12	0.02
SIC 24	0.06**	0.00	0.20**	-0.05	-0.01
SIC 25	0.08**	0.10**	0.05	0.13**	0.11**
SIC 26	0.06	-0.06	0.06	0.03	0.03
SIC 28	0.16**	0.15**	0.19**	0.15**	0.06
SIC 30	0.14**	0.11**	0.12**	0.06**	0.03
SIC 31	-0.05	0.05	-0.09	0.07**	-0.02
SIC 32	0.12**	0.04	0.05	0.03	0.07
SIC 33	0.13*	0.01	-0.07	0.12**	0.03**
SIC 34	0.15**	0.27**	0.02	0.14*	0.11**
SIC 35	0.01	0.09**	0.12**	0.10	0.12**
SIC 36	0.03	0.01	0.02	-0.01	0.04
SIC 37	-0.04	0.12	0.05	0.05	0.09**
SIC 38	0.03	0.23*	-0.13	0.21**	0.03
SIC 39	0.01	0.05*	0.04	0.05**	0.09**
F test on industries	10.76	8.00	9.92	12.89	14.96
R^2_{adj}	0.58	0.78	0.72	0.70	0.37

** = significant at 5% level; * = significant at 10% level.
FGDPC = per capita country GDP; GSPC = per capita state GSP; CanDummy = 0 if Mexico, 1 if Canada.