

Texas Border

Employment and Maquiladora Growth

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Courtesy of Mexico/Now magazine

In the 1990s, the Texas economy exceeded even the remarkable performance of its U.S. counterpart. State job growth averaged 2.9 percent per year from 1990 to 2000, well ahead of the 1.8 percent annual increases in the United States. Three engines drove the Texas economy forward in the 1990s: the oil sector, high tech (especially in Austin and Dallas) and a boom in border-city employment. Employment growth in the four largest Texas border cities topped that of the nation, and the three south Texas cities outperformed the state by a wide margin (Table 1).¹

The accelerated job growth along the Texas–Mexico border was the result of several factors: a quick Mexican recovery after the 1994–95 financial crisis; tight labor markets in the United States that attracted employers to the border in search of the region’s surplus labor; a strong peso for much of the period, which

increased retail sales in U.S. border cities; and rapid expansion of the maquiladora industry.

Maquiladora expansion came on the heels of NAFTA implementation and the 1994–95 peso devaluation. In recent years, however, this part of the border boom has turned to bust. After watching

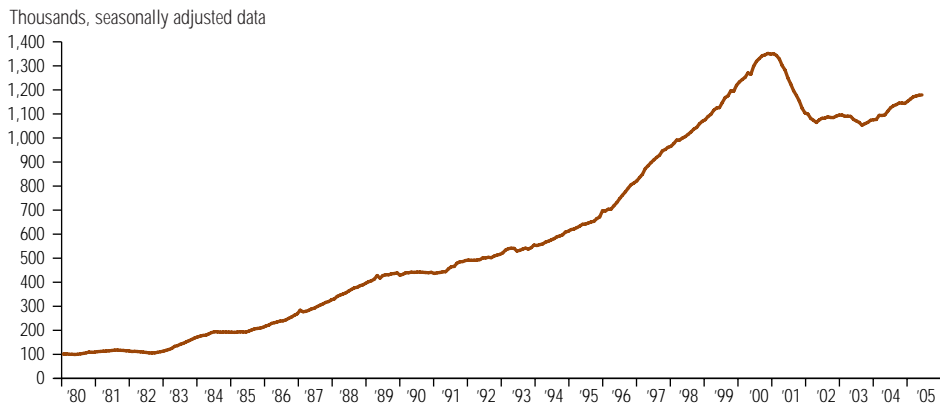
the industry lose 290,000 jobs between October 2000 and July 2003, many observers are questioning the industry’s future. Recession, rising wages in Mexico, low-wage competition from countries such as China and Mexico’s inability to deal with growing problems in its competitive environment have all contributed to

Table 1
Percent Job Growth Along the Texas–Mexico Border

	Texas	El Paso	Laredo	Brownsville	McAllen
1991	.7	2.3	4.3	2.0	1.5
1992	1.9	3.6	8.7	4.8	5.3
1993	3.3	2.2	3.6	4.4	4.5
1994	4.3	3.9	7.2	6.0	7.3
1995	2.9	0	–5.5	.4	2.7
1996	3.2	2.0	5.1	2.8	3.3
1997	4.4	2.7	7.6	3.0	3.8
1998	3.6	1.1	2.7	2.3	5.6
1999	2.2	2.0	5.3	5.8	6.5
2000	2.8	1.5	3.0	5.1	5.1
1990–2000	2.9	2.1	4.1	3.7	4.6

SOURCE: Federal Reserve Bank of Dallas, El Paso Branch, with data from the Texas Workforce Commission.

Chart 1
Maquiladora Employment Growth



SOURCES: Federal Reserve Bank of Dallas, El Paso Branch, with data from INEGI.

the recent downturn.

This article looks at the maquiladora's role in today's Texas economy, especially how it affects Texas border cities. We also assess the industry's future and the prospects for the maquiladora to again be a significant factor in job growth in Texas and Mexico.

Growth and Decline

The maquiladora industry began in 1965 and experienced slow but steady growth under the Border Industrialization Program. The canceled Bracero Program had used Mexican labor in agriculture, and the replacement maquiladora was designed to relieve the resulting high unemployment rates in northern Mexico. The new program used low-wage Mexican labor as a lure to draw U.S. manufacturing to the region, allowing companies to move production machinery and unassembled parts into Mexico without tariff consequences, as long as the assembled product was returned to the United States for final sale.

Chart 1 shows the elevenfold increase in maquiladora employment between 1980 and its peak in 2000, from 120,000 workers to 1.3 million. In 1980, about 94 percent of maquiladora employment was in the border states of northern Mexico.² Today, the share has slipped to 76 percent, but the northern states still dominate. In 2004, 2,810 operating plants accounted for about 9 percent of formal employment in Mexico, or 3 percent of the total labor force. The companies operating under the maquiladora program are a who's who of U.S. industry, including Delphi, Mattel,

Tyco, General Electric and ITT.

The maquiladora industry has been highly cyclical since its inception, falling into its first recession in 1974 with an 11.5 percent decline in employment. Table 2 shows the uneven effects of the latest maquiladora downturn on Mexican border cities. Maquiladora employment in Ciudad Juárez was higher than in all the other cities combined when the recession began, and it has sustained the largest percentage losses from peak to trough (27.7 percent). Piedras Negras, Nuevo Laredo and Matamoros also suffered large percentage losses, all in excess of 24 percent. Ciudad Acuña and Reynosa were exceptions to the deep recession, with Ciudad Acuña declining only 10.6 percent and Reynosa continuing to grow throughout the downturn. Newer plants, a better industry mix and a business-friendly environment account for their better performance.

The cyclical nature of the maquiladora industry is not surprising, given its close ties to U.S. manufacturing (*Chart*

2). Throughout the latest recession and slow recovery, manufacturing was the hardest hit part of the U.S. economy, and maquiladora output and employment generally followed the lead of U.S. industrial production. In mid-2003, however, strong U.S. industrial growth finally returned, and as Table 2 shows, maquiladora employment has returned to recovery as well. Job growth remains uneven among the Mexican border cities, however, with Ciudad Acuña, Matamoros and Piedras Negras recovering more slowly.

How Do Maquiladoras Affect the Texas Border Economy?

The original vision for maquiladoras was the "twin plant," with capital-intensive operations located a few miles inside the U.S. border and low-wage, labor-intensive operations close by on the Mexican side. However, the bulk of U.S. manufacturing was already established in the Midwest, and trucking deregulation would make transportation links between the border and the Midwest both easier and cheaper in the 1970s and '80s. The twin-plant vision was never realized along the border. Instead, the maquiladora supply chain remained concentrated in states such as Illinois, Michigan and Ohio.

What economic impact would a new maquiladora in Mexico have on a neighboring U.S. city? The list might run as follows. To select and develop a site, U.S. legal, engineering and financial assistance would be used. Once established, the new plant would rely on U.S.-based businesses for customs, brokerage, warehousing and transportation services. The plant would also purchase a variety of office, packaging and industrial supplies. Corporate management, engineers and quality spe-

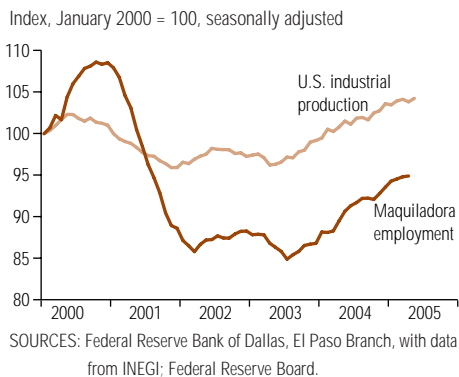
Table 2
Texas–Mexico Maquiladora Border Employment

	Peak		Trough		April 2005
	Jobs	Date	Jobs	Date	
Ciudad Juárez	262,550	October 2000	189,930	June 2003	213,389
Ciudad Acuña	37,512	November 2002	33,541	February 2005	33,674
Piedras Negras	15,222	February 2000	10,939	December 2004	11,187
Nuevo Laredo	22,915	February 2000	17,171	April 2003	22,233
Reynosa	86,925	April 2005	N/A	N/A	N/A
Matamoros	68,413	October 2000	51,900	August 2003	53,002

NOTES: Seasonally adjusted data; border twin cities are as follows: Ciudad Juárez–El Paso, Ciudad Acuña–Del Rio, Piedras Negras–Eagle Pass, Nuevo Laredo–Laredo, Reynosa–McAllen and Matamoros–Brownsville.

SOURCE: Federal Reserve Bank of Dallas, El Paso Branch, with data from INEGI.

Chart 2
Maquiladora Ties to U.S. Industrial Sector



cialists would be drawn to the border to visit this plant, and they would spend money on food and lodging.³ Maquiladora employees draw their salary in Mexico but do a significant share of their shopping in the United States, stimulating employment in local retail and service sectors.

These impacts on the U.S. border have been recognized for some time, and a number of studies were conducted in the 1970s and '80s to quantify them. For instance, in 1972, Ladman and Poulsen found that Agua Prieta, Sonora, maquiladora workers spent 40 percent of their wages in Arizona.⁴ Ayer and Layton estimated the maquiladoras' impact on value added and population, using an input-output model for the Arizona-Mexico border economy. They concluded that Mexicans' expenditures due to the growing presence of twin plants increased value added by 14 percent and population by 11 percent on the U.S. side of the border.⁵

In a 1984 study of the Texas border, Holden estimated that maquiladora employment had a large impact on employment in the border communities of El Paso, Laredo, McAllen and Brownsville. For instance, a 10 percent increase in maquiladora payroll results in a 2 to 3 percent increase in employment in El Paso and McAllen as well as a 3 to 4 percent increase in Laredo and Brownsville.⁶

In another study, Sprinkle found that during the early 1980s Ciudad Juárez maquiladoras accounted for one of five jobs created in El Paso, and these new jobs were concentrated in the service sector.⁷ Silvers and Pavlakovich assessed the relative magnitude of employment gains and losses across U.S. border regions due to maquiladora industry activity. Their

research suggests that U.S. border states—with the exception of Arizona, where job losses ranged from negligible to small—gained jobs as a result of growth in the maquiladora industry.⁸

A more recent development has been the arrival of component parts and material suppliers in U.S. border cities. Specific examples can be found in El Paso, neighbor to Ciudad Juárez, which is home to the largest number of maquiladora employees along the U.S. border. Over the past decade, an increasing number of rubber and plastics, electronics and electrical equipment, and metal fabricating plants have begun to operate in El Paso to serve as suppliers to the maquiladora industry (Chart 3).

Components supplied include computer housings, electrical wiring harnesses, special dies and tools, and electrical switches. About 26 plastic-injection molding plants can be identified, 31 metal stamping companies, and 12 electric- and electronic-related companies. Together, these companies employed 4,000 workers in 2004. The manufacturing sectors that supply the maquiladoras paid about 40 percent more in hourly wages than the low-wage apparel, textile and leather industries that traditionally operated in El Paso.

Maquila manufacturing in Mexico also positively influences El Paso's employment in transportation, real estate, and legal and accounting services (Chart 4). Given the rapid increase in trade flows after 1993, transportation and

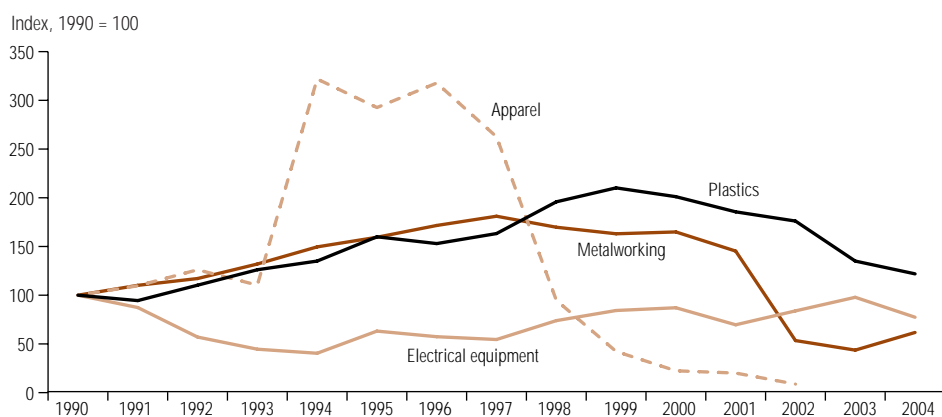
warehousing employment accelerated quickly. Business service employment, especially personnel supply services, computer programming and data processing, grew 45 percent from 1990 to 2004. El Paso's maquiladora-related businesses rely heavily on temporary staffing agencies to hire additional personnel to meet rising demand. Computer programming and data service workers help minimize the burden of paperwork required by customs agencies to export or import components. Legal employment grew 20 percent over the same period. Similar results can be found up and down the U.S. border.

The definitive study on the linkages between maquiladoras and the border economy, by Gordon Hanson, takes all these factors into account.⁹ Hanson estimates that a 10 percent increase in maquiladora output in a Mexican border city will increase employment in its U.S. city pair by 1.1 to 2 percent. He provides more specifics by estimating that this same 10 percent increase in output would increase wholesale trade employment in the U.S. city by 2.1 to 2.7 percent, transportation services by 1.7 to 2.7 percent, manufacturing by 1.2 to 2.1 percent and retail trade by 1 to 1.8 percent.

The Role of Recession

The recent recession has played an important role in the latest downturn of the highly cyclical maquiladora industry. At the same time, maquiladoras have long served as a low-wage platform for U.S.

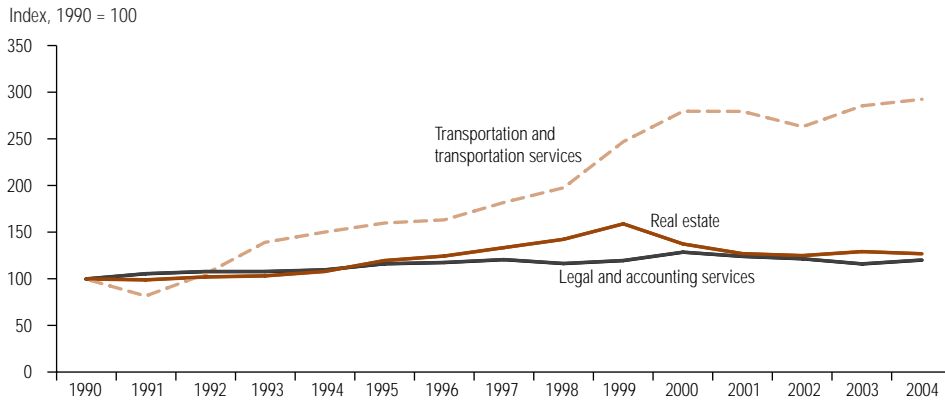
Chart 3
Maquiladora Suppliers in El Paso



NOTE: North American Industry Classification System (NAICS) codes used in the chart were 3327, 3329, 3328, 3332, 3335, 3159, 3261 and 3344.

SOURCE: Federal Reserve Bank of Dallas, El Paso Branch, with data from Bureau of Labor Statistics.

Chart 4
Service Employment in El Paso



NOTE: North American Industry Classification System (NAICS) codes used in the chart were 4889, 5311, 5312, 5313, 5411 and 5412.
 SOURCE: Federal Reserve Bank of Dallas, El Paso Branch, with data from Bureau of Labor Statistics.

manufacturing, and the rise of new low-wage alternatives such as China, India and Vietnam has broadened U.S. options for manufacturing. These very low-wage competitors, plus rising real Mexican wages, have become a factor in pushing some maquiladora activity abroad. Mexico generally has looked at the loss of the lowest wage jobs as an inevitable price of progress, because increasing domestic wage levels must be seen as a positive aspect of economic development. The government has expressed reluctance to enter into subsidy programs to retain or attract these industries, considering such action as poor fiscal policy and a violation of Organization for Economic Coopera-

tion and Development and World Trade Organization rules.

To focus on the question of how maquiladoras will respond to economic recovery and which sectors would benefit, we developed some econometric estimates. As in other models, our methodology confirmed that past maquiladora employment has primarily been driven by the business cycle and relative real wages.¹⁰ Trends and dummy shift variables were included to account for structural change, particularly testing for breaks with the 1994 implementation of NAFTA and the 1994–95 financial crisis in Mexico. The general methodology follows several papers by Branson and Love, and

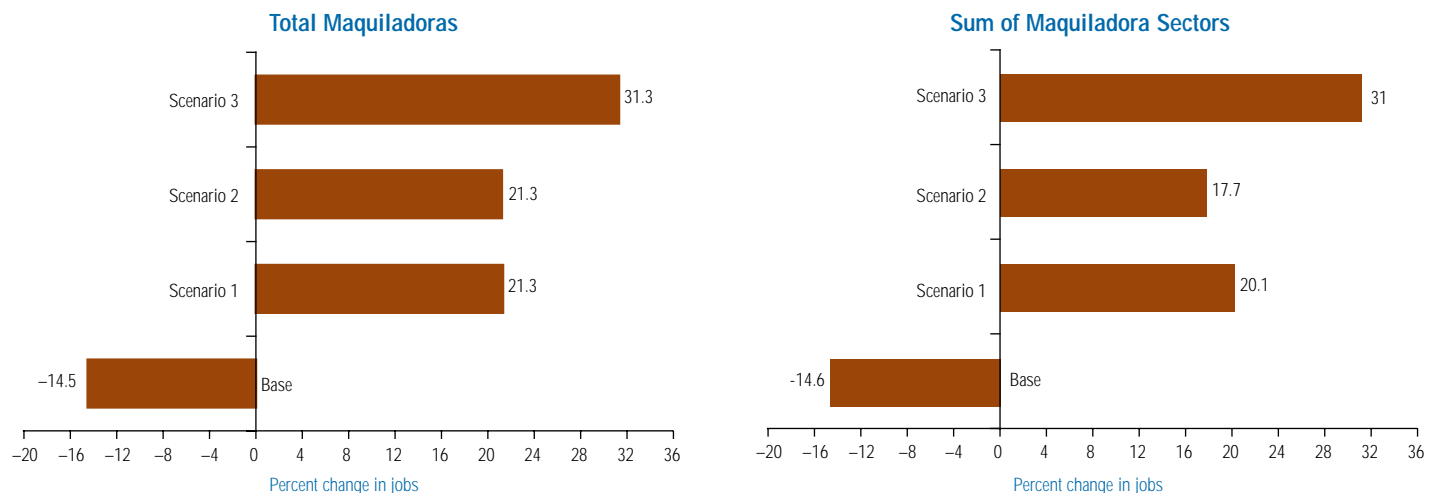
detailed results are reported elsewhere.¹¹

To examine the future of the industry under various assumptions, we simulated maquiladora employment following its second quarter 2000 peak. The base case was the actual outcome through 2002, a decline of 14.5 percent for the industry as a whole. Scenario 1 (S1) assumed no recession and that the U.S. unemployment rate held firm at a historically low 4 percent through the end of the period. Real relative wages rose in this scenario, just as in the base case. Scenario 2 (S2) assumed the recession occurred but that real relative maquiladora wages fell 6.1 percent after second quarter 2000 instead of rising 16.8 percent. And scenario 3 (S3) assumed the best of both worlds for maquiladora managers, falling real relative wages and no recession.

Chart 5 shows the results for all maquiladoras combined. This can be computed two ways: as the result of a single estimate based on the sum of all maquiladora employment or as the sum of the simulation results for 10 maquiladora sectors. Fortunately, they agree quite closely. Eliminating the U.S. recession in S1 would provide an increase of approximately 20 percent in employment in the simulation period, replacing a decline of about 14.5 percent in the base case. The percentage turnaround for S2 is similar, and the combined effect in S3 is a 31 percent increase.

Four individual sectors do not

Chart 5
Simulation Results



NOTE: The base cases in the two calculations are slightly different because the chemicals sector was excluded from the sum of regression results. There was a break in the data for this sector.
 SOURCE: Authors' calculations.

Table 3
Maquiladora Sectors That Are Unresponsive to a U.S. Economic Rebound
(Percent change in jobs)

	Leather	Toys	Furniture	Not classified
Base	-25.6	-31.5	-8.7	-4.9
S1	-7.8	-21.0	-8.9	-2.1
S2	-6.8	-34.7	17.3	-22.1
S3	-7.4	-5.1	4.4	5.8

SOURCE: Authors' calculations.

respond to an upturn in the U.S. economy: leather, toys, furniture and a group of other, unclassified maquiladoras. Their simulation results are summarized in Table 3. Combined, these maquiladoras accounted for 226,782 jobs at the second quarter 2000 peak, or 18.1 percent of the total. These sectors are unlikely to return to growth with U.S. economic recovery.

The three largest maquiladora sectors, together accounting for 76.1 percent of the peak employment, all respond positively to economic recovery in the simulations. In S1, electrical machinery records an 18.2 percent increase, in place of a 26.1 percent decline. Textiles turn around to record a 63.2 percent gain in S1, and transportation equipment (which did not decline after second quarter 2000) grows by another 4.5 percent in this scenario.

In conclusion, less than 20 percent of maquiladora employment is in sectors that are unresponsive to economic recovery in the United States, and overall growth seems likely to continue. However, even those sectors that continue to grow in simulations are going to be influenced by foreign competition. The effect of foreign competition is often couched in terms of a product cycle, in which product development and testing occur in the United States, initial long production runs take place in Mexico and ultimately product commoditization happens in China or another low-wage competitor. The more quickly and easily a product is commoditized, the quicker it will move to China. Leather, toy and furniture sectors are often cited as no longer competitive in Mexico. But even within the most advanced sectors, we may find individual products susceptible to being lost to lower wage countries in exactly the same way—computers, cell phones, modems, printers and disk drives, for example. Hence,

the rise of foreign competition means even sectors returning to positive growth with economic recovery may experience slower job growth than in the recent past, as some products within the sector are commoditized.

In assessing Mexico's competitive prospects, the nation retains crucial advantages over the rest of the world, even as domestic wages rise. The most important factor is proximity to the U.S. market. For example, bulky items that have a high ratio of weight to value, such as large-screen televisions or major appliances, will remain competitive. Proximity also matters if the inventory cycle is short, if there are constant design changes or if there must be frequent retooling. Mexico will also be competitive when quality is more important than price, such as with medical equipment or when intellectual property rights are critical.¹²

Texas-Based Suppliers

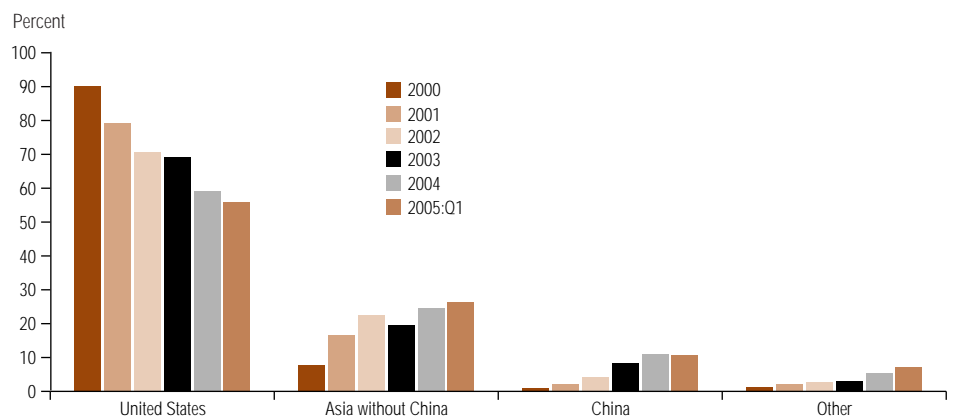
The maquiladoras' contribution to U.S. border city growth in the 1990s stemmed from (1) the spillovers from rapid maquiladora expansion in neighboring Mexican cities and (2) the shift of many maquiladora suppliers to border cities from their base in the Midwest. We have already shown how foreign competition and rising real wages in Mexico have reduced the prospects for maquiladora growth, but foreign competition is also making significant inroads into the maquiladora supply chain. This raises the possibility of slowing, or even reversing, the increase of U.S. border-city suppliers to the maquiladora industry.

Throughout the 1990s, the United States supplied the vast majority of maquiladora industry inputs. In 2000, 90 percent of maquiladora inputs were from the United States and 9 percent were from Asia, with China contributing only 1 percent (*Chart 6*). By 2004, 59 percent came from the United States and 35.7 percent from Asia, including 11.1 percent from China. The United States remains the majority supplier, but this rapidly moving trend continued to run in favor of Asia into 2005.

The vehicle for entry of foreign inputs to Mexico is 20 sectoral promotion programs, or PROSECs, created by the Mexican government in December 2000. They were created in response to implementation of NAFTA Article 303, which in January 2001 eliminated duty-free imports of maquiladora inputs from non-NAFTA countries. The PROSECs protect the entry to Mexico of non-NAFTA components that are not readily available in the domestic market, allowing them to enter under reduced tariffs of zero to 5 percent. Despite the paperwork and the need to track the origin of thousands of parts to comply with PROSECs, maquiladoras have apparently fully embraced the programs.

Data are not available on exactly which inputs are being displaced, making it difficult to assess the impact on Texas border communities. For example, if the 1990s shift of suppliers to the border from the Midwest was based on just-in-time inventory needs, it may be difficult for Asian suppliers to take their place. However, given the extent and pace at which

Chart 6
Mexican Maquiladora Imports by Country of Origin



SOURCE: Federal Reserve Bank of Dallas, El Paso Branch, with data from Banco de México.

Mexico retains important competitive advantages over many of its low-wage rivals, based on proximity to the United States, political and financial stability, and the rule of law.

Asian suppliers have taken market share, it would be hard to argue that the maquiladora market share of Texas-based suppliers has not been reduced. Future expansion of Texas-based suppliers is likely to slow as well.

Conclusion

Mexico's maquiladora jobs are growing once more, beginning with the resumption of U.S. industrial expansion in mid-2003. Mexico retains important competitive advantages over many of its low-wage rivals, based on proximity to the United States, political and financial stability, and the rule of law. The maquiladora industry is stable, competitive and growing again.

It is unlikely, however, to repeat the banner performance of the 1990s, at least not in the near future. There were elements of unique, one-time stimulus in the 1990s, with the collapse of the peso in 1994–95 and the implementation of NAFTA in 1994. Further, foreign competition appears to have taken away the potential for any growth in several low-wage sectors and probably has reduced the growth potential of a number of other sectors as well.

Rising real wages in Mexico have accelerated the transfer of low-wage jobs to other countries, and the Mexican gov-

ernment has argued that this must be seen as a highly desirable result of successful economic development and Mexico's move up the product cycle. The next generation of maquiladoras should not be judged by the ability to generate low-wage jobs, but by productivity, value added or rising wages. Critics, at the same time, claim Mexico simply has not done an adequate job of preparing the way for more sophisticated manufacturing. To illustrate this point, many observers cite the failure (so far) of proposed reforms in energy, labor law, taxes and telecommunications. These and other reforms are badly needed to prepare Mexico for a fine market economy.

Finally, it is not just the maquiladora industry that is affected by foreign competition, but the U.S.-based supply chain as well. In 2000, 90 percent of inputs to the maquiladoras came from the United States, and four years later that number was only 59 percent. Texas border cities in the 1990s developed rapidly as a critical, new part of this supply chain, with suppliers shifting from the Midwest to the U.S.–Mexico border. We lack industry detail to know exactly how the recent success of foreign suppliers is affecting Texas border cities, but again, declining economic stimulus from maquiladora expansion would seem to be the rule.

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Notes

¹ The four border cities contributed 6.8 percent of the 2.3 million jobs generated in Texas from 1990 to 2000, while making up 6.1 percent of Texas employment in 1990.

² Mexican border states include Baja California, Sonora, Chihuahua, Coahuila and Tamaulipas, excluding Nuevo León.

³ "The Employment Impact of Maquiladoras Along the U.S. Border," by J. Michael Patrick, in *The Maquiladora Industry: Economic Solution or Problem?*, ed. Khosrow Fatemi, New York: Praeger Publishers, 1990, pp. 31–35.

⁴ "Economic Impact of the Mexican Border Industrialization Program: Agua Prieta, Sonora," by Jerry R. Ladman and Mark O. Poulsen, Arizona State University, Center for Latin American Studies, May 1972.

⁵ "The Border Industry Program and the Impact of Expenditures on a U.S. Border Community," by Harry Ayer and Ross Layton, *Annals of Regional Science*, vol. 8, 1974, pp. 105–17.

⁶ "Maquiladoras Along the Texas–Mexico Border: An Econometric Evaluation of Employment and Retail Sales Effect on Four Texas Border SMSAs," by Richard J. Holden, Texas Department of Community Affairs, Regional Economic Development Division, February 1984.

⁷ "Project Link: An Investigation of Employment Linkages Between Cd. Juárez and El Paso," by Richard Sprinkle, University of Texas at El Paso, December 1986.

⁸ "Maquila Industry Impacts on the Spatial Redistribution of Employment," by Arthur L. Silvers and Vera K. Pavlakovich, *Journal of Borderlands Studies*, vol. 9, December 1994, pp. 47–64.

⁹ "U.S.–Mexico Integration and Regional Economies: Evidence from Border-City Pairs," by Gordon Hanson, *Journal of Urban Economics*, vol. 50, September 2001, pp. 259–87.

¹⁰ For more information, see the papers from the Dallas Fed conference "Maquiladora Downturn: Structural Change or Cyclical Factors?" available at www.dallasfed.org/news/research/2003/03maquiladora.html. In particular, see the presentations by Everardo Elizondo Almaguer, Banco de México; William C. Gruben, Federal Reserve Bank of Dallas; James Gerber, San Diego State University; and Ernesto Acevedo Fernández, Ministry of Finance and Public Credit.

¹¹ "Maquiladora Downturn: Structural Change or Cyclical Factors?" by Jesus Cañas, Roberto Coronado and Robert W. Gilmer, *International Business and Economics Research Journal*, vol. 3, August 2004; "Dollar Appreciation and Manufacturing Employment and Output," by William H. Branson and James P. Love, National Bureau of Economic Research, Working Paper No. 1972, July 1986; "The Real Exchange Rate and Employment in U.S. Manufacturing: State and Regional Results," by William H. Branson and James P. Love, National Bureau of Economic Research, Working Paper No. 2435, November 1987; "The Real Exchange Rate, Employment and Output in Manufacturing in the U.S. and Japan," by William H. Branson and James P. Love, National Bureau of Economic Research, Working Paper No. 2491, February 1988.

¹² See "Maquiladora Downturn: Structural Change or Cyclical Factors?" by Jesus Cañas, Roberto Coronado and Robert W. Gilmer, Federal Reserve Bank of Dallas *Business Frontier*, Issue 2, 2004.