

MAQUILADORAS

Impact on Texas Border Cities

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Mexico's maquiladora industry has become an increasingly significant component of the Mexican economy as well as an important part of U.S. corporate strategy in achieving competitively priced goods in the world marketplace.¹ Maquiladoras are largely concentrated in Mexican cities that border the United States. Since Texas encompasses about half the U.S.–Mexico border, maquiladoras are especially relevant to the state's economy.

To assess the maquiladoras' importance to the border economy, we must first understand how maquiladoras affect Mexico. This article looks at the maquiladora industry's performance in Mexico and then the industry's significance for Texas border cities.

Mexico's Northern Border

The maquiladora industry has boosted job creation, exports and foreign exchange in Mexico. During 1983–2000, annual growth in maquiladora employment and exports averaged almost 14 percent and 21 percent, respectively. At about 1.3 million workers, maquiladora employment represented 29 percent of Mexico's manufacturing jobs in 2000, up from slightly more than 7

percent in 1983. Further, maquiladora exports, at \$79.4 billion in 2000, made up almost half Mexico's total exports (47.7 percent) and the majority of its manufacturing exports (54.7 percent). Maquiladoras are Mexico's top source of foreign exchange, netting almost \$18 billion last year. Table 1 summarizes the maquiladora industry's key indicators for 2000.

The maquiladora industry also has contributed significantly to Mexico's regional, technological, human capital and infrastructure development, as illustrated by what is happening at the border.

Regional Development

In 2000, Mexican border cities represented 62 percent of overall maquiladora employment (nearly 797,000 workers) and 70 percent of production (\$50 billion). The two locations with the highest concentration of maquiladora investment are Ciudad Juárez (across from El Paso) and Tijuana (across from San Diego). Together, these two cities in 2000 represented 34 percent of Mexico's total maquiladora employment, with more than 249,500 workers in Ciudad Juárez and over 187,300 workers in Tijuana.

Before the maquiladora program's implementation, cities along Mexico's northern border had among the highest unemployment rates in the country, typically in double digits. Because of the industry's settlement in these cities and its consistent record of employment growth, these locations now have among the nation's lowest unemployment rates. In fact, maquiladoras have become so important to the border that in Ciudad Juárez, for example, the majority of all jobs in 2000—60 percent—came from the maquiladora sector. Moreover, the overwhelming majority of the city's manufacturing jobs—87 percent—were attributable to maquiladora companies last year.

Technology and Human Capital

When Mexico's maquiladora program began in 1965, most companies were basically assembly operations requiring unskilled labor. The industry has evolved, and factories now use more sophisticated production techniques and require more skilled labor. For example, in 2000, technicians represented 12 percent of maquiladora employment, compared with 8.8 percent in 1975. In addition, the skill level of the maquiladoras' largest labor component—direct line workers—has been upgraded to suit newer technologies.²

Mexico's maquiladora companies today boast state-of-the-art production technology. Research and design centers are now part of the maquiladora landscape as well. A key example is the

Table 1
Maquiladora Industry Key Indicators, 2000

	2000	Change from 1999
Plants	3,590	8.9%
Employment	1,285,007	12.7%
Raw materials (billions)		
Imported	\$53.5	19.8%
Domestic	\$ 1.8	38.5%
Total	\$55.3	20.3%
Value added (billions)	\$17.8	32.4%
Exports (billions)	\$79.4	24.3%

SOURCES: Federal Reserve Bank of Dallas El Paso Branch, with data from Instituto Nacional de Estadística, Geografía e Informática; export data are from Banco de México.

Delphi Mexico Technical Center in Ciudad Juárez. This center, which until April 1999 was part of the General Motors Corp. maquiladora production infrastructure, is dedicated to the research and design of auto parts used by the world's top auto producers. Considered the most advanced of 31 such Delphi centers around the world, it employs almost 2,000 workers, most of whom are engineers. The center opened in April 1995 and within four years had doubled capacity.

The technological evolution of the maquiladora industry would not have been possible without the required professional and skilled personnel. This increasingly skilled workforce comes, in large part, from the maquiladoras themselves through training and development at all levels. Typically, training includes in-house programs as well as visits to the company's manufacturing facilities outside Mexico. Maquiladoras also sponsor vocational programs at local technical centers and trade schools to ensure that workers' skills match those in demand by the industry.

A recent example of the maquiladora industry's efforts at educating its workforce is the Center for High Technology Training (Centro de Educación en Alta Tecnología, or CENALTEC), established in Ciudad Juárez in March 2000. This center, created through a collaborative effort between maquiladora companies

in the area and the state and federal governments, incorporates state-of-the-art infrastructure in training highly skilled technicians in manufacturing specialties. Companies award scholarships to the center's two-year training programs.

Infrastructure Development

Though the maquiladora industry is growing at more dynamic rates in the interior of Mexico, the border's appeal is still high among new investors, and, thus, growth at the border has been sustained. For example, border employment growth averaged 7.8 percent per year during the 1990s, while the corresponding figure for the interior was 17 percent. However, since the border's employment base (nearly 797,000 workers) is higher than the interior's (488,200 workers), job growth of almost 8 percent on the border is still impressive. Moreover, during the second half of the 1990s, when the entire maquiladora industry rebounded as a result of the peso devaluation, border employment averaged double-digit growth on a yearly basis (11.1 percent).³

One outcome of the border's dynamic maquiladora growth has been infrastructure bottlenecks in the region, which have been only partly alleviated by the industry's movement to the interior. The border's growth has led to such problems as insufficient or inadequate housing for maquiladora workers.

Maquiladora companies are teaming with the Mexican government to build adequate and affordable housing for workers and to assist them with financing. Delphi Automotive launched the first such program in 1997. Other large maquiladora companies have followed with similar programs.

Maquiladoras also have participated in improving the infrastructure of their border locations. For example, in Ciudad Juárez, maquiladoras make annual contributions to the city's budget that are targeted for different purposes, such as city road improvements.⁴ Also, maquiladoras have financially supported improvements to certain commercial bridges, which are critical to their daily production shipments across the border.⁵

Texas Border Cities

The Texas border is host to the majority of the maquiladoras along the U.S.–Mexico boundary. Table 2 lists the cities across from Texas with a maquiladora presence and outlines their individual participation in the industry. In 2000, these cities' combined share of total maquiladora employment and production equaled 35.4 percent and 40.4 percent, respectively. Within the border region, their combined share represented the majority—57.1 percent in employment and 57.5 percent in production. This is equivalent to a maquiladora industry employ-

Table 2
Maquiladora Industry Along the Texas–Mexico Border, 2000

	Ciudad Juárez (El Paso)	Ojinaga (Presidio)	Ciudad Acuña (Del Rio)	Piedras Negras (Eagle Pass)	Nuevo Laredo (Laredo)	Reynosa (McAllen)	Río Bravo (McAllen)	Matamoros (Brownsville)
Plants	308	8	56	38	54	117	13	119
Percent of total	8.6	.2	1.6	1.1	1.5	3.3	.4	3.3
Percent of border	14.3	.4	2.6	1.8	2.5	5.4	.6	5.5
Employment	249,509	967	32,130	14,546	22,603	66,091	3,287	66,023
Percent of total	19.4	.1	2.5	1.1	1.8	5.1	.3	5.1
Percent of border	31.3	.1	4.0	1.8	2.8	8.3	.4	8.3
Raw Material Imports (millions)	\$12,785	\$25	\$1,099	\$329	\$1,253	\$3,894	\$104	\$3,254
Percent of total	23.9	.0	2.1	.6	2.3	7.3	.2	6.1
Percent of border	32.6	.1	2.8	.8	3.2	9.9	.3	8.3
Gross Production (millions)	\$16,191	\$37	\$1,386	\$468	\$1,648	\$4,826	\$145	\$4,065
Percent of total	22.7	.1	1.9	.7	2.3	6.8	.2	5.7
Percent of border	32.4	.1	2.8	.9	3.3	9.7	.3	8.1

SOURCES: Federal Reserve Bank of Dallas El Paso Branch, with data from Instituto Nacional de Estadística, Geografía e Informática.

Table 3

U.S.–Mexico Trade by Texas Border Port of Entry, 2000
(Millions of U.S. dollars)

	Exports to Mexico	Imports from Mexico	Total trade
Laredo	39,283.6	45,536.3	84,819.9
El Paso	17,520.4	22,810.6	40,331.0
Hidalgo	6,221.9	6,888.5	13,110.4
Brownsville—Cameron	6,374.1	6,049.5	12,423.6
Eagle Pass	4,283.5	3,041.1	7,324.6
Del Rio	1,156.1	1,282.6	2,438.7
Presidio	112.8	153.0	265.8
Rio Grande City	118.8	116.6	235.4
Progreso	129.0	15.6	144.6
Roma	92.4	16.1	108.5
Fabens	.9	.0	.9
Total Texas ports	75,293	85,910	161,203
Total all border ports	95,692	120,409	216,101
Texas share	78.7%	71.3%	74.6%

SOURCES: Texas Center for Border Economic and Enterprise Development, Texas A&M International University, with data from U.S. Department of Commerce.

ing more than 455,000 workers in 713 plants and with a total production value of nearly \$29 billion.

Texas border cities have reaped important benefits from their maquiladora neighbors. Transportation and customs services have flourished on the U.S. side of the border because of the maquiladora industry's large trade flows through border ports of entry (Table 3). These companies typically maintain distribution facilities and administrative offices on the U.S. side, stimulating the industrial real estate sector of Texas border cities. Maquiladoras also create jobs for the U.S. border in the legal, accounting and financial professions. Even the hotel, car rental and restaurant industries profit from maquiladoras because corporate personnel and other maquiladora visitors usually stay and eat on the U.S. side.⁶

Beyond the service industry, border manufacturing is increasingly benefiting from maquiladoras. Industry suppliers have been expanding or relocating their operations to cities such as El Paso to be close to their customer bases across the border. For instance, in 1999, there were 40 plastic injection molding companies in El Paso, employing more than 4,100 workers. These companies mostly serve the maquiladora industry in Ciudad Juárez in sectors that range from automotive and computers to

medical and consumer goods. Moreover, employment in plastics manufacturing in El Paso—up 101 percent since 1990—is highly skilled. From 1990 through 1999, for example, this sector's hourly compensation was, on average, nearly 21 percent higher than that of the apparel sector, El Paso's largest and most established manufacturing sector. The success of plastic injection molding in the area is also evidenced by the impressive growth of plastic product exports through El Paso, which equaled \$806 million in 1999, up more than 700 percent from the 1993 level.

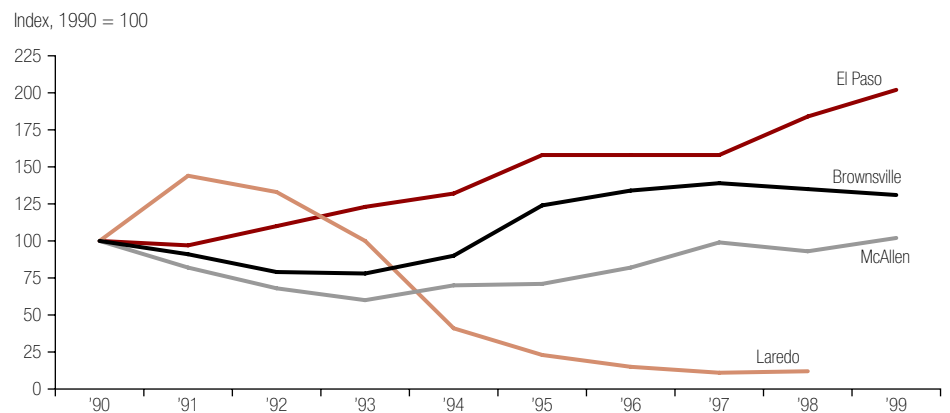
The employment link between maquiladoras and U.S. border cities is not exclusive to El Paso. Research has found a strong positive correlation between U.S. border city employment and export (maquiladora) production in the neighboring Mexican border city.⁷ Further, results show that for larger border cities, such as El Paso, the employment effect is strongest in manufacturing, while for smaller border cities, such as Laredo, the employment effects are strongest for the transportation and wholesale trade industries.

Indeed, two of the three other major border cities in Texas—Brownsville and McAllen—are home to plastic injection molding suppliers that cater to the maquiladora industry. In addition to El Paso's 40 plastic injection molding companies, Brownsville has 11 and McAllen has 13.⁸ Laredo, which has a minimal manufacturing presence, is the exception, with no suppliers in this category.⁹ Chart 1 shows the growth trend of the rubber and miscellaneous plastics manufacturing subsector in all four cities for 1990–99. The only city that shows a decline is Laredo.

Skilled-Labor Bottlenecks

Keeping El Paso from taking full advantage of the maquiladora supplier market is an insufficient pool of skilled workers. Though plastics manufacturers in El Paso have used in-house train-

Chart 1
Rubber and Miscellaneous Plastics Employment for Major Border MSAs



NOTE: The rubber and miscellaneous plastics industry in Laredo reached such a small level in 1999 that data for that year were not made available.
SOURCE: Texas Workforce Commission.

El Paso, NAFTA and Worker Retraining

Between 1994 and 2000, a total of 330,107 U.S. workers were certified to receive benefits under the NAFTA Transitional Adjustment Assistance (TAA) program. This program was created in 1994 through NAFTA to help workers affected by increased imports from Mexico and Canada or by shifts in U.S. production to those countries as a result of the agreement. El Paso has the largest number of workers certified under this program—13,450 through 2000. Nearly 8,000 of these workers (more than 59 percent) were displaced from El Paso's apparel industry.

While many point to the TAA figures as evidence of NAFTA's negative impact on El Paso, NAFTA also has created jobs for the city. Unfortunately, because no accounting system equivalent to the TAA tracks the job-growth side of the equation, an assessment of NAFTA's net impact on El Paso's employment is not possible. Since NAFTA's passage, however, El Paso has registered a net gain in employment—30,733

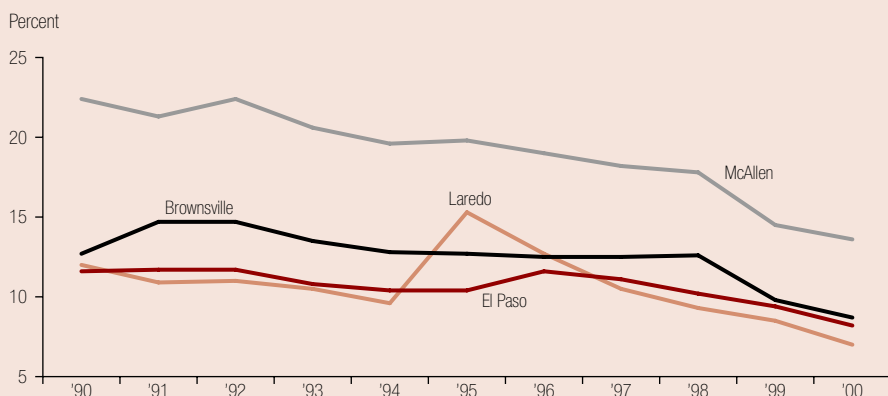
new jobs—or growth of almost 14 percent between 1993 and 2000.¹ NAFTA reasonably could be credited with some of this job growth in areas servicing the increased trade through the border resulting from NAFTA.² This implies new jobs in transportation and distribution services as well as in professional services such as legal, accounting, financial and customs brokerage. Finally, the unemployment rate has been on a downward trend in El Paso since NAFTA started, as it has for Texas' other major border cities (see chart).

Interestingly, El Paso's No. 1 position in NAFTA TAA certifications in the United States has placed the city in the national spotlight, attracting funding toward retraining programs for trade-displaced workers. For example, the U.S. Department of Labor awarded El Paso, through the city's Proactive Reemployment Project or PREP, a \$45 million grant to retrain some 4,000 workers, most of them former garment industry employees. This grant is

the largest of its kind ever awarded to a city by the Labor Department. In 1998, project ARRIBA (Advanced Retraining and Redevelopment Initiative in Border Areas) was launched in El Paso with a state grant of \$1 million. ARRIBA secured additional funding totaling more than \$1.5 million from the governor's Discretionary Fund (\$600,000), the North American Development Bank (\$450,000), El Paso County (\$250,000) and El Paso Empowerment Zone Corp. (\$211,297).

Last year the El Paso Chamber of Commerce opened the Center for Worker Preparedness with a \$1.4 million grant from the U.S. Department of Commerce and a \$1 million interest-free loan from the North American Development Bank. In addition, local educational and training institutions have received funding for programs such as the El Paso Manufacturing Training Consortium at El Paso Community College. Thus, if NAFTA is to be cited as the cause of much worker displacement in El Paso, it also has contributed toward an improved worker-training infrastructure.

Unemployment at the Texas Border (Major MSAs)



SOURCE: Texas Workforce Commission.

Notes

¹ If a broader definition of employment is used, including jobs outside the Social Security system, El Paso's employment gain between 1993 and 2000 was larger, at 40,635 new jobs. See *Borderplex Economic Outlook: 2000–2002*, Border Region Modeling Project, The University of Texas at El Paso, November 2000, Business Report SR00-1.

² El Paso is the second-largest land port at the border for U.S.–Mexico trade, after Laredo. During 1994–2000, total U.S.–Mexico trade through El Paso grew 122 percent to \$40.3 billion. The trade increase was due to both maquiladora-specific and NAFTA-specific activity.

ing to develop their workers into skilled technicians, a broader effort is required to generate a continuous supply of skilled labor. Recognizing this need, the city has implemented various programs to train workers not only in plastic-

injection-molding techniques but also in metal stamping, tool and die, and other areas that complement the manufacturing processes of maquiladora suppliers. El Paso also has received multiple worker retraining grants as a

result of worker displacements in the city's apparel industry (see box titled "El Paso, NAFTA and Worker Retraining"). The goal is to transform an unskilled labor pool into the skilled workers sought by the industries coming to

town in pursuit of the maquiladora market across the border.

The state's other border cities face similar situations. Research on maquiladora market opportunities for border cities in South Texas shows that maquiladoras are willing to enhance their base of local suppliers. The companies' savings in inventory and transportation costs are obvious. However, one bottleneck is a workforce with inadequate skills.¹⁰

Lucrative Market

El Paso has carved an important niche in serving the maquiladora industry, especially in plastic injection molding. This demonstrates that border cities such as El Paso—which have traditionally lacked a sophisticated industrial base—can nonetheless attract investments using their formidable advantage with the lucrative maquiladora market. The total maquiladora inputs or components market in Ciudad Juárez alone was worth nearly \$13 billion in 2000. The industry's components market along the Texas border—from Juárez to Matamoros—was a massive \$23 billion in 2000, roughly 42 percent of the maquiladora industry's total components market (\$55.3 billion).

Maquiladoras import 97 percent of the components they use. And 80 to 85 percent of these come from the United States, mostly from states not bordering Mexico.¹¹ As more suppliers seek to move closer to their maquiladora customer base, the border stands to benefit. The border's traditionally high unemployment rate translates into an available labor pool in the region.¹² However, this workforce has to be transformed into the skilled labor that high-tech maquiladora suppliers need. Should this happen, we could see industrialization of the border at a time when the rest of the country is de-industrializing, precisely because of the lack of available workers.¹³

For Texas border cities, the presence of maquiladoras across the border translates into more and better-paying jobs. In short, maquiladoras help the Texas border region move up the economic ladder.

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Notes

¹ For an overview of the maquiladora industry and its importance for the U.S. and Mexican economies, see "The Binational Importance of the Maquiladora Industry," *Southwest Economy*, Federal Reserve Bank of Dallas, Issue 6, November/December 1999, pp. 1–5.

² Direct labor represented 80.9 percent of total maquiladora employment in 2000. Although the majority of these workers (55.2 percent) were female, this share is down considerably from 78.3 percent in 1975. In fact, in the industry's top two locations—Ciudad Juárez and Tijuana—females make up just under half (49.7 percent) of the direct-labor workforce, putting them in the minority.

³ Because maquiladora companies have dollar-denominated budgets but their costs are in pesos, the overnight impact of any peso devaluation is essentially a reduction in their peso-based costs. Maquiladoras have therefore responded to devaluations in Mexico by substantially expanding their operations.

⁴ According to the Treasury Department of the city of Juárez, the voluntary contribution that each maquiladora in Juárez gives to the city each year, on a voluntary basis, is \$15 per employee and is based on each company's employment base at year-end. Not all maquiladoras contribute, but a majority (54 percent based on employment) do. Last year, maquiladora contributions to the city of Juárez equaled \$1.6 million.

⁵ For the improvements to the Bridge of the Americas between El Paso and Juárez in 1996–98, for example, various private-sector entities in Juárez—including the maquiladora association—contributed some \$7 million.

⁶ Delphi Automotive, until April 1999 a part of General Motors Corp., has conducted annual studies since 1996 on the total estimated economic impact on El Paso of Delphi's operations in Ciudad Juárez. Beyond including elements such as what the company pays the city in property taxes for distribution and warehousing facilities, the study also includes expenditures in El Paso on hotels, restaurants and rental cars by corporate visitors to Delphi plants. In June 1999, Delphi's total (direct and indirect) economic impact on El Paso was estimated at above \$285 million.

⁷ The overall elasticity—or responsiveness—of U.S. border-city employment with respect to Mexican export production is between 0.11 and 0.2. In other words, a 10 percent rise in export manufacturing in a Mexican border city leads to a 1.1 to 2 percent rise in employment in the neighboring U.S. border city. See Gordon H. Hanson, "U.S.–Mexico Integration and Regional Economies: Evidence of Border-City Pairs," forthcoming in *Journal of Urban Economics*.

⁸ Brownsville Economic Development Council and McAllen Economic Development Corp.

⁹ In 2000, for example, only 2.6 percent of Laredo's nonfarm employment—some 1,800 workers—was working in manufacturing, compared with 15 percent in El Paso, 12 percent in Brownsville and 8 percent in McAllen.

¹⁰ See J. Michael Patrick, "Maquiladoras and South Texas Border Economic Development," *Journal of Borderlands Studies*, Spring 1989, pp. 89–98. The author suggests that the situation has not changed much in the ensuing 12 years.

¹¹ A 1988 survey of maquiladora companies in Ciudad Juárez alone showed suppliers in every U.S. state except Hawaii, with a large portion in Midwestern and Northeastern states. See William L. Mitchell and Lucinda Vargas, "The Economic Impact of the Maquiladora Industry in Juárez on El Paso, Texas, and Other Sections of the United States," Grupo Bermúdez Industrial Developers, Ciudad Juárez, Chihuahua, 1989, photocopy. Current anecdotal evidence shows that maquiladoras continue to have close links with suppliers throughout the United States.

¹² In 2000, the weighted average unemployment rate of Texas' four major border cities was more than double the national and state unemployment averages.

¹³ ADC Telecommunications offers an example of how cities like El Paso are developing industrially in response to the presence of maquiladoras across the border. The company manufactures telecommunications equipment at two plants in Juárez and one in Delicias, Chihuahua. Late last year, ADC opened a metal fabrication plant in El Paso to feed components to its Mexican facilities. ADC also has a distribution center in Santa Teresa, N.M., just west of El Paso.