



THE BINATIONAL IMPORTANCE OF THE MAQUILADORA INDUSTRY



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MEXICO'S MAQUILADORA INDUSTRY is part of a worldwide phenomenon more commonly known as production sharing. Through the maquiladora framework, foreign manufacturers—predominantly U.S. companies—are able to locate labor-intensive operations in labor-abundant Mexico, thus achieving lower labor costs in the overall production process. Mexico, in turn, receives investment—factories, machinery and equipment, state-of-the-art production technology—from countries such as the United States that have a relative abundance of capital. Thus, Mexico is able to attract some of the foreign direct investment it needs to grow.

Maquiladoras have not only become an increasingly significant component of the Mexican economy, they are also an important part of U.S. corporate strategy in achieving competitively priced goods in the world marketplace. As a result, consumers worldwide reap the benefits of maquiladora production in the form of lower-priced goods. This article examines the importance of the maquiladora industry for both the U.S. and Mexican economies.

Table 1
Maquiladora Industry Key Indicators

	1998	Percent change year ago	January– June 1999	Percent change year ago
Plants	2,983	9.8	3,219	10.8
Employment	1,008,031	12.2	1,096,619	11.8
Total raw materials (billions of U.S. dollars)	39.1	8.8	21.3	16.1
Imported	38.1	8.4	20.7	15.8
Domestic	1.1	28.2	.6	26.9
Value added (billions of U.S. dollars)	10.6	19.4	6.2	22.6
Exports (billions of U.S. dollars)	52.9	17.0	29.2	16.4

SOURCES: Instituto Nacional de Estadística, Geografía e Informática. Export data, Banco de México.

Importance for Mexico

Jobs, Exports and Foreign Exchange. In 1998, the maquiladora industry stood at nearly 3,000 plants with over a million workers, and growth continues strong this year. During the first six months of 1999, plants and employment grew at 10.8 percent and 11.8 percent, respectively, relative to the year-earlier period. Table 1 summarizes the industry's key indicators for 1998 and the first six months of 1999. Chart 1 shows the industry's principal sectors: electronics, transportation equipment, and textiles and apparel. Together, these three

sectors represented over 74 percent of maquiladora employment and nearly 80 percent of maquiladora production during the first six months of 1999.

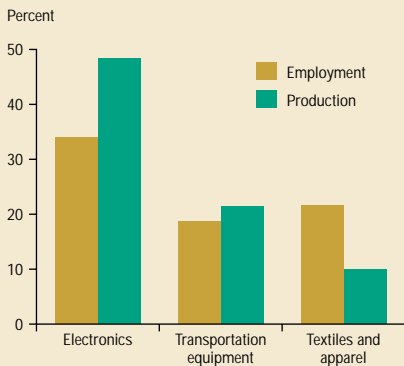
The maquiladora industry's importance for the Mexican economy has been increasing over time, especially in the areas of job creation, exports and foreign exchange. Chart 2 shows the industry's employment growth trend from 1983 through 1998. During this period, maquiladora employment grew at an average rate of 14.1 percent per year. Maquiladora employment growth has been so dynamic, especially vis-à-vis growth in the Mexican economy, that its share in formal and manufacturing

employment has risen considerably.¹ In 1998, maquiladoras provided almost 8 percent of Mexico's formal employment, up from just over 2 percent in 1983. They accounted for a greater share of the country's manufacturing employment—almost 28 percent—up from 7.2 percent in 1983. Undeniably, maquiladoras have been very important to Mexico in job creation.

As a key component of Mexico's export platform, the maquiladora industry also contributes to enhancing the country's place in the world economy. Chart 3 depicts the industry's export growth since 1983. On an average annual basis, maquiladora exports grew 20.4 percent during 1983–98 and totaled almost \$53 billion last year. During the first six months of this year, maquiladora exports grew 16.4 percent relative to the year-earlier period and represented almost 46 percent of the country's total exports and the majority—51.1 percent—of its manufacturing exports.

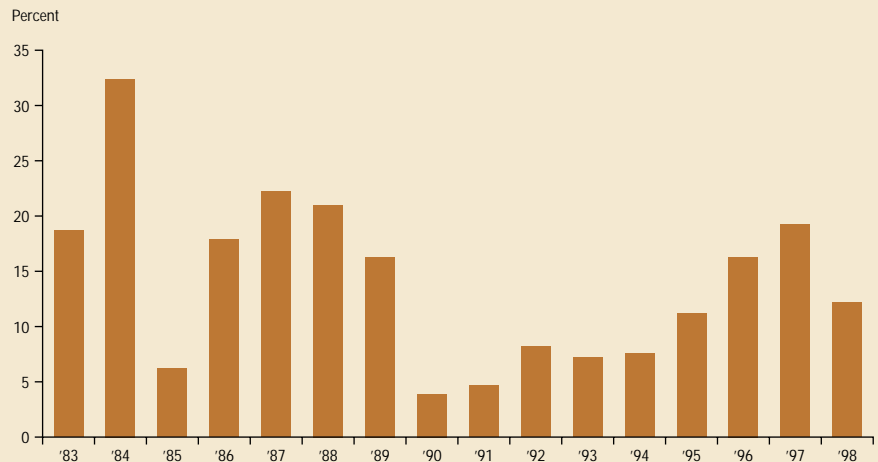
The maquiladora industry's solid export record has placed it among Mexico's top foreign exchange generators, affording the country a stronger position in its external-sector accounts. As Chart 4 shows, since the early 1980s maquiladoras have been Mexico's second-largest source of foreign exchange, after oil. However, in 1998, because of the precipitous drop in the oil price—and the maquiladora industry's continued

Chart 1
Maquiladora Employment and Production Shares in Principal Sectors, January–June 1999



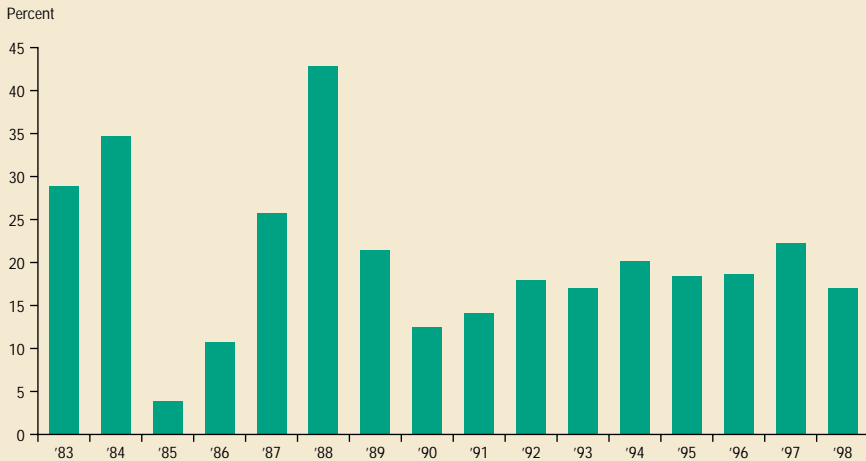
SOURCE: Instituto Nacional de Estadística, Geografía e Informática.

Chart 2
Maquiladora Employment
(Annual growth rates)



SOURCE: Instituto Nacional de Estadística, Geografía e Informática.

Chart 3
Maquiladora industry Exports
(Annual growth rates)



SOURCE: Banco de México.

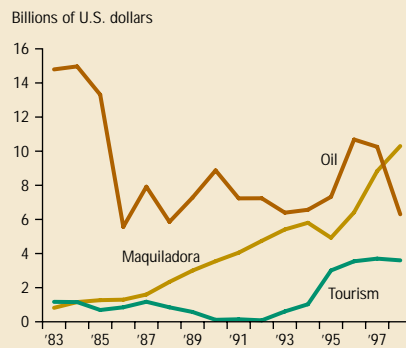
robustness last year—foreign exchange generated through oil fell behind that of maquiladoras for the first time, making maquiladoras the country's top foreign exchange source. Last year, maquiladoras contributed \$10.3 billion in foreign exchange for Mexico. The figure for the first six months of this year is \$6 billion, signaling that maquiladora value added at year-end will likely surpass the 1998 total.

Regional and Technological Development. The maquiladora industry has also contributed to Mexico's regional and technological development. Maquiladoras are concentrated in Mexico's northern border states, specifically in cities adjacent to the United States. The two most important locations are Ciudad Juárez, Chihuahua (across from El Paso, Texas), and Tijuana, Baja California (across from San Ysidro and San Diego, California). Together, these two cities represented 35 percent of Mexico's total maquiladora industry employment in 1998 and 39 percent of its maquiladora production. For all border cities combined, 1998 maquiladora employment and production shares were 65.5 percent and 73.4 percent, respectively.

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 employment growth, these two locations now have among the nation's lowest unemployment rates. Last year, the open unemployment rate in Ciudad Juárez and Tijuana was more than 2 percentage points below the national average (*Chart 5*).² The maquiladora industry has become so important in border cities that in Ciudad Juárez, for example, more than 57 percent of all jobs came from maquiladora companies in 1998. Moreover, the overwhelming majority of the city's manufacturing

Chart 4
Top Foreign-Exchange Generators for Mexico



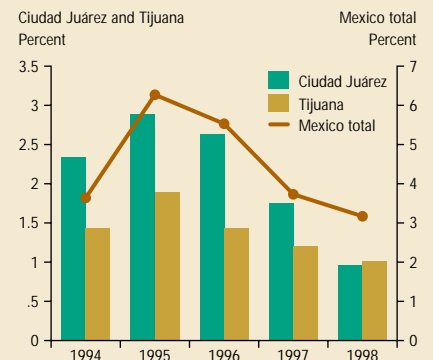
SOURCES: For the oil sector, data through 1987 are from PEMEX; remaining oil data are from Banco de México, Secretaría de Hacienda y Crédito Público and Instituto Nacional de Estadística, Geografía e Informática. Maquiladora and tourism data are from Banco de México.

jobs—85.4 percent—was attributable to these companies.

When Mexico's maquiladora program began in 1965, most maquiladora companies were basically assembly operations requiring unskilled labor. The industry has evolved significantly over the years to where the maquiladora factory floor now involves much more sophisticated production techniques. Concomitantly, maquiladora operations have increasingly required much more skilled labor. For example, during January–June 1999, technicians represented 12.1 percent of maquiladora employment, compared with 8.8 percent in 1975. Moreover, the skill level of the maquiladoras' largest labor component—direct line workers³—has been upgraded to suit newer technologies.

Some of the highest state-of-the-art production technology in Mexico today is found in maquiladora companies. Research and design centers are now part of the maquiladora landscape as well. A key example of this is the Delphi Mexico Technical Center in Ciudad Juárez. This center, which until recently was part of the General Motors maquiladora production infrastructure, is dedicated to the research and design of auto parts used by General Motors cars throughout the world. Considered the most advanced of 27 such centers around the world, it employs some 21,500 workers at 15 plants in Ciudad Juárez. Opened in April 1995, the center doubled capacity within four years. Mexico is thus proving to be a formidable production site at

Chart 5
Open Unemployment Rate



SOURCE: Instituto Nacional de Estadística, Geografía e Informática.

all levels of the manufacturing technology spectrum.

The regional and technological development that maquiladoras have brought to the border is spreading to Mexico's interior as more and more maquiladoras locate there.⁴ Maquiladora growth in the interior is helping alleviate some of the physical and social infrastructure pressures that dynamic growth has brought to the border cities. However, because border growth is still very strong, it continues to attract people from the interior. This has created problems for some border locations, such as insufficient or inadequate housing for maquiladora workers. Maquiladora companies are now working with the Mexican government to build adequate and affordable housing for workers and assist them with financing. The first such program was launched by Delphi Automotive in 1997. Since then, other large maquiladora companies have followed with similar programs.

Importance for the United States

International Competitiveness.

Maquiladoras have offered an important investment option for U.S. companies wanting to locate in Mexico. Since its inception, the maquiladora program has allowed for the duty-free importation of materials into Mexico⁵ and for 100 percent foreign ownership of operations. These features—which predated Mexico's current policy of freer foreign trade and investment by almost three decades—plus Mexico's availability of low-cost labor relative to the United States resulted in U.S. companies creating maquiladoras for their labor-intensive manufacturing processes. Examples of industries that have a labor-intensive work component are the top three maquiladora production sectors mentioned earlier: electronics, transportation equipment, and textiles and apparel. By generating important labor-cost reductions through their maquiladora operations, U.S. companies have been able to remain competitive in the world marketplace and thus have retained or even increased their world market share in the production of goods in these and other sectors.

A case in point is the U.S. auto industry. During the mid- to late 1970s, the U.S. auto industry faced intense competition from Japanese carmakers and, as a result, saw its world market share fall. In response to these developments, the U.S. auto industry restructured to become more competitive internationally, and part of its restructuring strategy involved more use of production-sharing operations. Thus, as their maquiladora operations grew from the early 1980s onward, U.S. automakers were able to regain some of the market share they had lost and maintain a stable share since—despite continued intense competition from Asian and other foreign carmakers.

Maquiladora production ultimately garners the largest benefits for the U.S. consumer—indeed, the world consumer—since this strategy results in lower-priced consumer goods than would be the case if the goods were produced entirely in the United States. The price of U.S.-brand-name cars today is lower because the U.S. automobile industry—like the auto industry in the rest of the world—has made extensive use of production-sharing operations. If U.S. automakers were forced to produce cars entirely in the United States, they would face wage rates that in 1998 were almost \$22 per hour. Under maquiladora production-sharing operations, they can achieve wage rates on their labor-intensive production operations of around \$5 per hour. Clearly, such cost benefits in a competitive environment have translated into lower-priced cars for the consumer.⁶

Production Sharing, U.S. Content and U.S. Jobs. Mexico's maquiladoras are just one example of the production sharing that takes place between U.S. companies and countries throughout the world. However, maquiladoras represent the preferred production-sharing strategy of U.S. producers. Moreover, given the proximity of maquiladoras to the United States, these operations have a high degree of U.S. content (raw materials and components originating in the United States).

In 1997, over 36 percent of total U.S. production-sharing imports came from Mexico. The next highest source was Japan, with 20 percent, followed by the

Dominican Republic, with 3.4 percent.⁷ For certain products, the maquiladora share of U.S. imports coming from Mexico is almost absolute. For example, 99.7 percent of total 1997 U.S. imports of motor vehicles from Mexico and 99.8 percent of television receivers came from maquiladoras. Indeed, through its maquiladora industry, Mexico is the leading exporter of television sets to the United States.⁸

Mexico's use of U.S. components relative to U.S. production-sharing operations in other parts of the world is substantial. In 1997, 58 percent of the value of U.S. components incorporated in worldwide production-sharing operations was derived in Mexico. In the case of motor vehicles, while U.S.-made parts represented 56 percent of the value of finished vehicles imported from Mexico under production sharing, they represented only 1 percent of the value of vehicles imported from Japan and Germany.

This high degree of U.S. content in Mexican maquiladoras highlights, in yet another way, the production sharing between maquiladoras and U.S. producers. According to the U.S. International Trade Commission, 82 percent of the materials imported by maquiladoras and similar operations are of U.S. origin.⁹ This translated into \$31 billion worth of U.S. components used by the industry in 1998. Moreover, these U.S. supplier industries are usually higher-tech manufacturers that employ thousands of high-skilled workers throughout the United States. In fact, a 1988 survey of maquiladora companies in Ciudad Juárez alone showed that maquiladoras in this city had suppliers in every U.S. state except Hawaii.¹⁰ Even though the nature and importance of suppliers varied across the different maquiladora companies surveyed, there were substantial linkages with the U.S. economy.

Thus, maquiladoras support U.S. jobs through their extensive use of U.S. suppliers. Because U.S. production-sharing operations in East Asia are not as reliant on U.S. suppliers as are maquiladoras, the positive impact on U.S. employment of these more distant operations is either absent or not as significant. Also, because some U.S. companies have been able to stay in business as a result of

their maquiladora production-sharing strategy, we can assume that without such a strategy and unable to cope with intense international competition, these companies would likely have closed and the direct U.S. jobs they now support would not exist. Hence, for all these reasons, maquiladoras help preserve U.S. jobs and generate new jobs in the long run.

Border Development. The maquiladora industry's large presence on Mexico's northern frontier has resulted in important benefits to U.S. border cities. Because of the maquiladora industry's large trade flows going through border ports of entry, transportation and customs services and the industrial real estate sectors have flourished on the U.S. side. Maquiladoras also create jobs in the legal, accounting and financial professions. Even the hotel, car rental and restaurant industries in border cities profit from maquiladoras since corporate personnel and other maquiladora visitors usually stay and eat on the U.S. side.¹¹

Beyond the service industry, however, the U.S. border is increasingly benefiting from maquiladoras in manufacturing. Because maquiladora companies use the just-in-time inventory system, they have been urging and even requiring their suppliers in the United States and elsewhere to locate closer to them. This has prompted maquiladora suppliers to expand or even relocate their operations to cities like El Paso. An example of a maquiladora supplier industry that has been attracted to El Paso is plastic-injection molding.

In 1998, there were over 50 plastic-injection molding companies in El Paso with some 3,700 employees. These companies mostly service the maquiladora industry across the border 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 85 percent since 1990—is highly skilled. From 1990 through 1998, for example, the hourly compensation rate paid by this sector was, on average, 21.5 percent higher than the apparel sector, El Paso's largest and most established manufacturing sector.¹²

For a city like El Paso, which, like

most U.S. border cities, has a high unemployment rate relative to the nation, its maquiladora linkages are important to the extent that they raise the city's overall employment level. Also, since the jobs that maquiladoras create in El Paso are in the white-collar professions or in higher-skilled manufacturing, maquiladoras also work to move the city up the economic ladder.

Conclusion

Overall, the maquiladora industry is an important positive force behind the growth and development of both the Mexican and U.S. economies. It has proved to be a consistent engine of job, export and foreign exchange growth in Mexico. Maquiladoras have also contributed to Mexico's regional and technological development. For the United States, the maquiladora industry has proved to be a vehicle by which U.S. industry has retained or even enhanced its international competitiveness and has resulted in lower-priced goods for consumers. Moreover, the high degree of U.S.-generated content in maquiladora operations reflects important production and employment linkages between maquiladoras and producers throughout the United States. For U.S. border cities—traditionally high-unemployment locations—the presence of maquiladoras across the border has translated into more abundant and better-paying jobs. Although under NAFTA the maquiladora industry faces new North American rules of origin for their imported inputs in 2001, these changes are not expected to derail the industry's pattern of solid growth into the next century.

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Notes

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- ¹ Formal employment refers to employment registered with Instituto Mexicano del Seguro Social (IMSS), the Mexican social security system.
- ² The definition of open unemployment in Mexico is narrow; it is derived from considering as employed anybody who may have worked at least one hour during the unemployment survey week. However, even when considering broader definitions of unemployment, border cities have lower rates than the rest of the nation. For a complete list of definitions of all the unemployment indicators used in Mexico, see *Business Frontier*, Federal Reserve Bank of Dallas, El Paso Branch, Issue 1, 1999, p. 5.
- ³ Direct labor represented 80.8 percent of total maquiladora employment during the first six months of this year. Although the majority of these workers—56 percent—was female, this share is down considerably from 78.3 percent in 1975. In fact, when looking at specific locations, the female share has dropped even lower. For example, during January–June 1999, Ciudad Juárez showed an almost even split between female (50.4 percent) and male (49.6 percent) workers, while Tijuana showed males holding a slight majority (50.7 percent) over female workers.
- ⁴ Examples of specific cities in the interior that have witnessed important maquiladora industry growth are Hermosillo, Sonora and Torreón, Coahuila. In the last five years, the number of maquiladora plants in Hermosillo grew over 126 percent, and employment grew nearly 246 percent. The corresponding figures for Torreón are 84 percent and 198 percent, respectively. Also, the state of Jalisco has been so successful in attracting higher-tech maquiladoras, especially in the electronics industry, that the area is now being dubbed the Silicon Valley of Mexico.
- ⁵ As of 2001, the North American Free Trade Agreement will impose North American rules of origin to determine duty-free status on inputs imported by maquiladoras into Mexico. This action will replace the maquiladora program's current rule of allowing duty-free importation of inputs regardless of country of origin.
- ⁶ For a comprehensive look at the current state of the U.S. auto industry, see Randall Miller, *The Road Ahead for the U.S. Auto Industry*, U.S. Department of Commerce, Office of Automotive Affairs, March 1999. Also, for information on wages in the Mexican auto industry, see *Fifth Annual Report to Congress Regarding the Impact of the North American Free Trade Agreement upon U.S. Automotive Trade with Mexico*, U.S. Department of Commerce, Office of Automotive Affairs, July 1999.
- ⁷ U.S. International Trade Commission, *Production Sharing: Use of U.S. Components and Materials in Foreign Assembly Operations, 1994–97*, December 1998, p. 1-8.
- ⁸ *Ibid.*, p. 1-6.
- ⁹ *Ibid.*, p. 2-2.
- ¹⁰ 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).
- ¹¹ Delphi Automotive, until last year a part of General Motors, has conducted annual studies since 1996 on the total estimated economic impact on El Paso of Delphi's operations in Ciudad Juárez. In June 1998 this figure was close to \$278 million. Also, the El Paso Foreign Trade Association recently conducted a study on the economic impact of Juárez's overall maquiladora industry on El Paso. The results will be available soon.
- ¹² In 1990, hourly compensation rates were estimated at \$6 for apparel and \$7.50 for rubber and miscellaneous plastics. In 1997, the estimates were \$8.60 for apparel and \$11.10 for plastics. The compensation differential between the two subsectors was smaller in 1998, with apparel's compensation rate at \$10.90 and plastics at \$11.40. Affecting apparel's much higher compensation performance in 1998 was the sector's smaller employment base, which apparently generated higher overtime payments.