

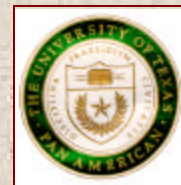
Boom or Bust: Is it the End of Mexico's Maquiladoras?



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**Working Paper #2002-6
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On a number of occasions, the President of the United States (US) George W. Bush has stated that “the US has no more important relationship in the world than the one we have with Mexico.” While some might disagree, the commercial relationship between the two countries has clearly become increasingly important. Facilitated by the implementation of the North American Free Trade Agreement (NAFTA), total two way trade between the US and Mexico went from a mere \$81 billion in 1993 to \$221 billion by 2001 (USITC, 2002). A good track record, however, is not always the best predictor of future success. In this paper we discuss a number of factors that threaten the vitality of the US - Mexican trade and investment relationship. The most visible sign that all is not well between these two NAFTA partners has been the recent performance of the maquiladora industry. A highly controversial form of foreign direct investment, maquiladoras (also referred to as maquilas) have traditionally been able to import raw and intermediate inputs from any part of the world, process those goods in Mexico, and then export the final product without having to pay Mexican duties. In October 2000 maquila employment reached an all time high of 1,338,970 (INEGI, 2002). From November 2000 until December 2001, however, maquila employment fell by 257,444 and during 2001 total maquila production contracted by 9.2 percent. This decline is especially startling when evaluated through a historical lens. From the beginning of the maquila program in 1965 through 2000, maquila employment suffered aggregate job losses in only two years (1975 and 1982) and those losses never surpassed 9,000 employees.

What has gone wrong with the maquilas? And perhaps more importantly, what are the strategic implications for companies attempting to profit from US - Mexican trade? While the events we describe in this paper are most applicable to maquilas, they

also have clear implications for all export oriented firms in Mexico that rely on a strategy of importing components, processing those items, and then exporting the final product. As shown in Table One, an examination of Mexican trade patterns demonstrates just how common this business model has become. For example, in 2001 maquiladoras imported \$57.6 billion dollars worth of inputs, which were then used to generate \$76.8 billion in exports. In addition, non-maquila firms that through various export promotion schemes can enjoy many of the same benefits as maquilas imported \$30.1 billion which were then used to generate \$54.6 billion in exports. Taken together, in 2001 82.9 percent of all Mexican exports were produced by firms following a maquila or maquila-like business model. Fully 98 percent of maquila exports and 89 percent of all Mexican exports were destined for the US. This paper continues as follows. In the next section, we briefly describe the development and current competitive profile of Mexico's maquiladoras. We then present evidence for and against the various explanations for maquiladora decline before concluding with the strategic implications that flow from our analysis. If President Bush is correct about the nature and importance of the US - Mexico relationship (especially as it involves trade), these events signal serious challenges ahead for companies and policy makers on both sides of the border.

Table One: *The Structure of Mexican Imports and Exports, 1998-2001 (in millions of US dollars)*

Imports	1998	1999	2000	2001
Definitive ¹	58,227	62,596	76,793	80,522
Maquila ²	42,557	50,409	61,709	57,599
Temporary ³	26,459	29,058	35,971	30,106
Total	125,242	142,064	174,473	168,276

Exports	1998	1999	2000	2001
Definitive ¹	19,924	21,889	29,173	27,118
Maquila ²	52,782	63,749	79,387	76,842
Temporary ³	44,737	51,065	57,864	54,587
Total	117,442	136,703	166,424	158,547

1. Definitive imports refers to goods brought into the country for consumption in the country. Definitive exports are those goods composed of national inputs that are then exported.

2. Maquila imports and exports are those items brought into the country and subsequently exported by firms registered as maquiladoras.

3. Temporary imports and exports refer to items that are brought into the country and subsequently exported by firms taking advantage of various export promotion programs such as the PITEX and the ALTEX programs.

Source: Banco Nacional de Comercio Exterior (www.bancomext.gob.mx)

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Originally designed as a program to provide jobs to Mexican workers that could no longer legally work in the US under the terms of the Bracero program, the maquilas have developed over the decades following a clearly recognizable pattern (cf. Carrillo, 1991; Wilson, 1992; Sklair, 1993; Brouthers, McCray, and Wilkinson, 1999). A common theme permeating the various stage models of maquiladora evolution developed by the above cited authors is that maquila line workers in the 60s, 70s, and early 80s typically performed very basic assembly operations that required few if any industrial skills. By the mid-1980s, however, researchers began documenting the presence of maquilas utilizing automated manufacturing systems, just-in-time (JIT) inventory practices, and

total quality management (TQM) techniques (Wilson, 1992). By all indications these types of production systems have become increasingly common over the last decade. By the start of 2000, a visitor touring maquila facilities in the major border industrial centers was likely to discover a mix of capital intensive manufacturing operations combined with low to medium skilled assembly, manufacturing, and product testing tasks.

Indicators of maquiladora upgrading are evident in a variety of economic and workforce data. From less than one billion dollars in 1980, by 2001 the value added by maquiladoras reached \$19.2 billion (Bancomext, 2002). In 1980, 85.3 percent of maquila employees were classified as direct labor, 9.1 percent as technicians, and 5.6 percent as administrative employees (INEGI, 2002). In 2001, the percentage of employees in direct labor positions had fallen to 79.3 percent and the percentage of technicians and administrative employees had increased to 12.8 and 7.9 percent respectively. In addition, women made up 77 percent of the direct labor maquila workforce in 1980 but by 2001 this percentage had dropped to 55 percent. Maquila compensation also appears to have improved over time (at least on some dimensions). MacLachlan and Aguilar (1998) found that maquila wages were roughly comparable or at times even higher than those paid in “equivalent domestic manufacturing industries.”

The evolution of production systems and workforce demographics are not the only factors altering the profile and competitiveness of Mexico’s maquiladoras. From the industry’s birth in 1965 to 1993, as long as maquilas exported 100 percent of their output they were allowed to import and export goods duty free. When sent to the US, if the products originally came from the US a duty was charged on only the value added in Mexico. Inputs from other countries were typically subjected to duties that ranged from

zero to five percent. Specific provisions of NAFTA have altered much of this regulatory structure (Sargent and Matthews, 2001). Organized into four categories, these changes include:

1. Mexican sales - Starting in 1994, maquilas have been able to sell an increasing percentage of their total production in Mexico. From 2001 onward, maquilas can sell 100 percent of their output in Mexico.

2. Regional Rules of Origin - Rather than having to pay duties on non-US content and Mexican value added, if maquiladora products contain sufficient inputs from one of the NAFTA countries those goods can enter the US duty free. Inputs from non-NAFTA countries, which are then processed in Mexico, can often qualify as a NAFTA originating product. From 1994 until the end of 2000, these so-called “tariff shifting” provisions enabled many maquilas to avoid both US and Mexican import duties on their non-NAFTA raw and intermediate materials.

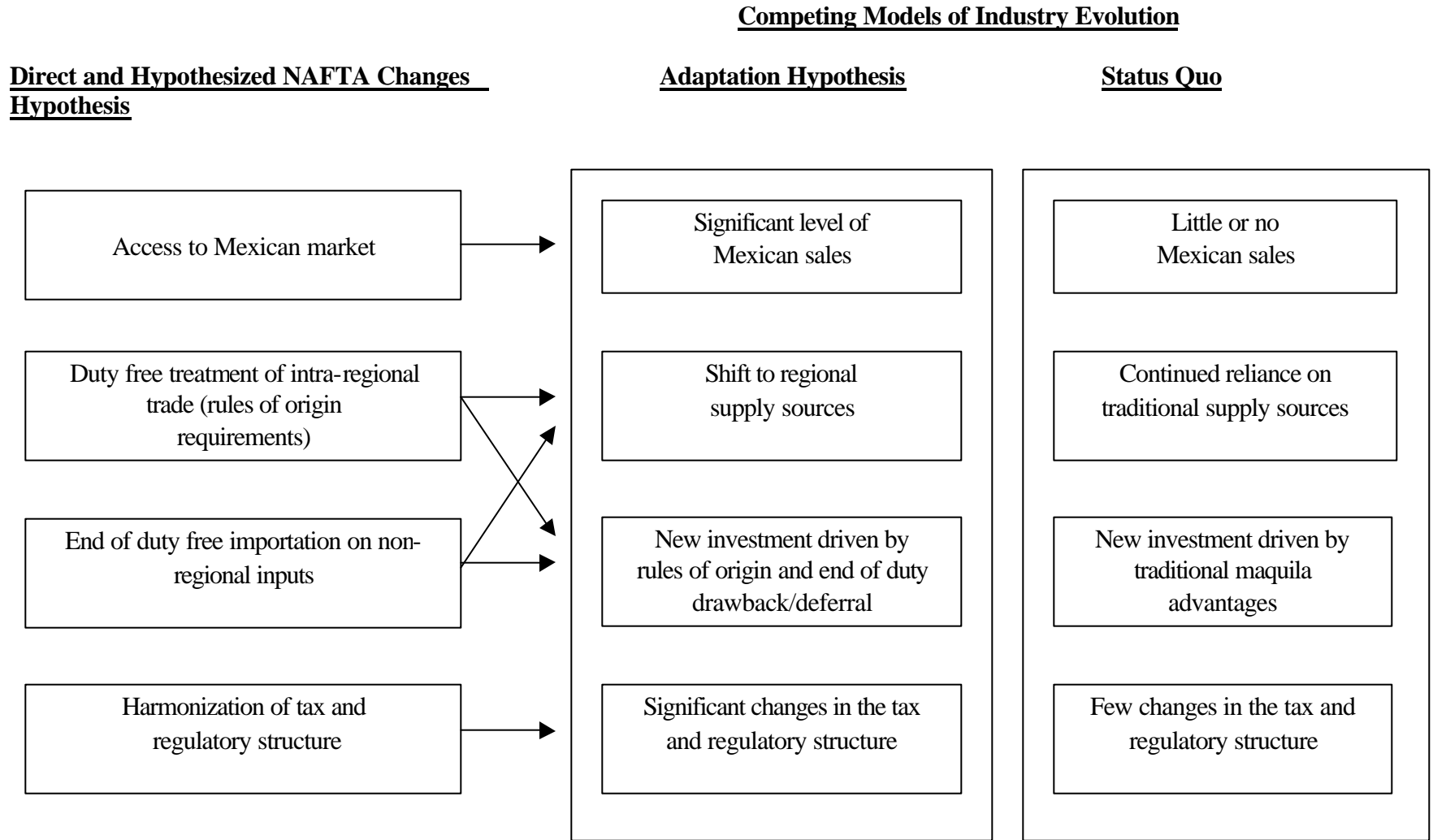
3. End of duty-deferral/drawback benefits (Article 303) - In order to close the loophole discussed in the prior paragraph, starting in 2001 NAFTA Article 303 prohibits Mexico from allowing non-regional imports into Mexico duty free. If the final product will be sold in one of the NAFTA countries, maquiladoras must now pay Mexican import duties on non-NAFTA inputs.

4. Harmonization of Regulatory Structures - Sargent and Matthews (2001) hypothesized that since NAFTA allows maquilas to have the same access to the Mexican market as non-maquila producers, there would be an effort on the part of the Mexican government to level the regulatory playing field between maquila and non-maquila sectors. For example, non-maquila firms (but not maquilas) in Mexico are subject to an

asset tax. Given equivalent market access, it seems logical that these regulatory differences would disappear over time.

Sargent and Matthews (2001) developed two alternative models of how the maquilas could respond to NAFTA (see Figure One). The adaptation model proposes that maquilas will respond to NAFTA incentives by selling more of their products in Mexico, by sourcing more of their raw and intermediate inputs from the NAFTA countries (to qualify under the regional rules of origin provisions and avoid Article 303 duty penalties), and by not actively resisting regulatory harmonization. The status quo model, in contrast, proposes that maquilas will prefer to retain their traditional business model. In other words, they will continue to export the great majority of their output, they will retain their traditional suppliers (often from non-NAFTA countries), and will actively resist regulatory harmonization. Based on interviews conducted in 1999 and 2000 with managers at 43 maquilas and with a variety of other industry insiders, with the exceptions of the television and apparel sectors strong support was found for the status quo model. A number of other researchers have conducted studies examining maquila dynamics in the 1990s. Noting that from 1988 to 1993 maquila employment increased by 78 percent but by 110 percent from 1994 to 1999, Gruben (2001) tested to determine if this acceleration was due to NAFTA. His results suggest that the increase in maquila activity during the mid and late 1990s was due to the rapidly expanding US economy (measured by the increase in US industrial production) and the increased competitiveness of dollar indexed maquila wages resulting from the 1994 peso devaluation.

Figure One : *Effects of NAFTA on Maquiladoras*



Source: Sargent and Matthews (2001)

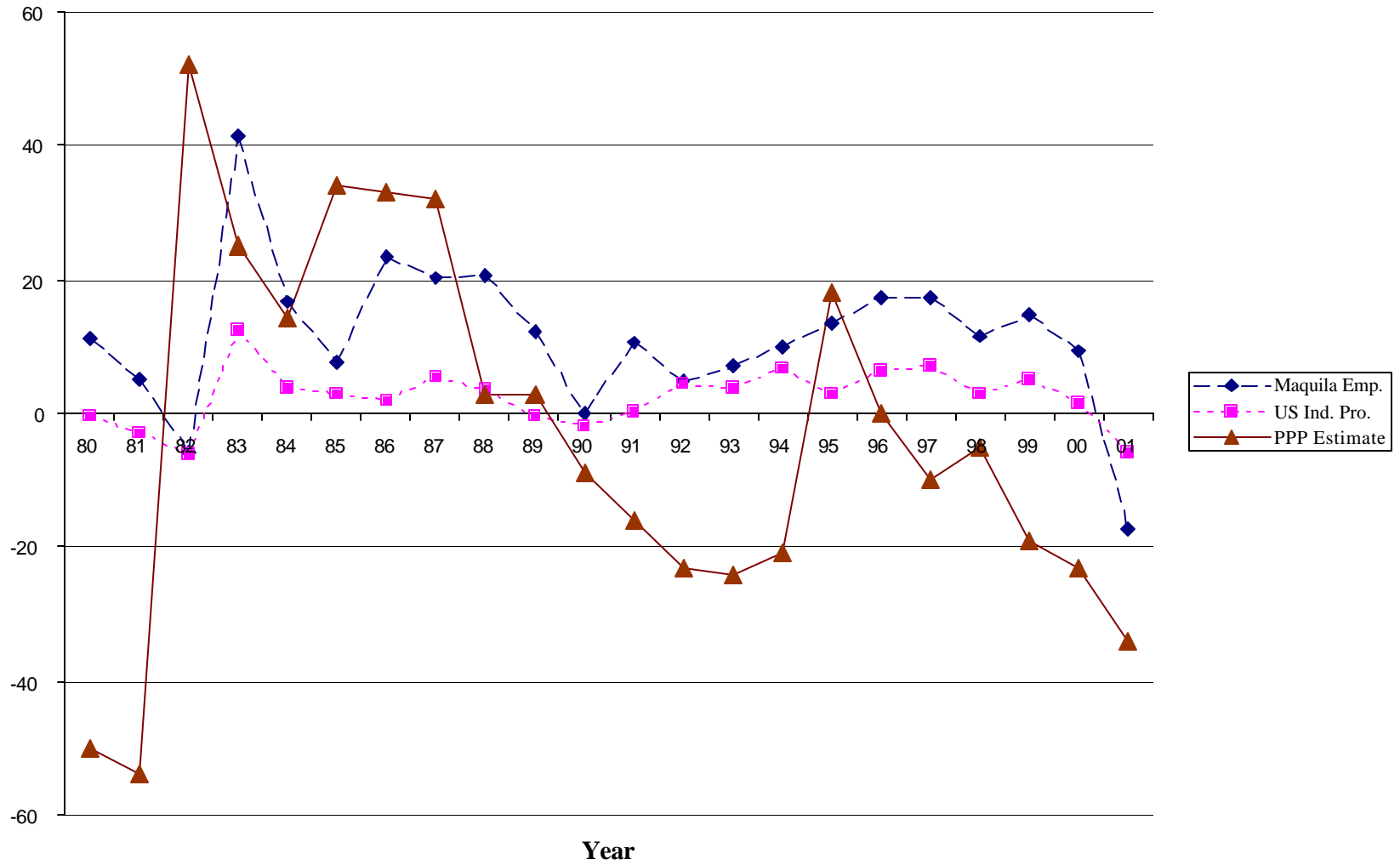
Based on these relationships, Gruben (2001, p. 19) concludes that “NAFTA did not make maquiladoras grow faster.”

In a similar study examining employment trends from January 1981 to December, 1998 in Cd. Juárez, Fullerton and Schauer (2001) found that inflation adjusted wage rates (measured in pesos), US industrial performance, and the dollar/peso exchange rate all played an important role in determining month-to-month fluctuations in employment in Cd. Juárez maquilas. In Figure Two, we provide a visual summary of a number of the relationships discussed by Gruben (2002) and Fullerton and Schauer (2002).

Specifically, we chart changes in maquila employment growth, changes in US industrial production, and purchasing power parity estimates of the over/undervaluation of the Mexican peso against the US dollar since 1980 (using 1996 as a base). Especially in the 1980s, there appears to be a strong relationship among these variables.

Taken as a whole, two dominant themes emerge from the recent maquila literature. First, in several industry segments maquiladoras now utilize relatively sophisticated production systems. Second, even with this upgrading and NAFTA modifications in the maquiladora regulatory structure employment growth is still strongly influenced by changes in industrial production in the US, to Mexican wage rates, and to the competitiveness of the dollar - peso exchange rate. As we will argue in the next section, it is just these factors (plus others) that help explain the collapse of maquila employment in 2001.

Figure Two: *Maquila Employment Growth, US Industrial Production, and PPP Estimate:*



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In Table Two, we present a summary of changes in maquila employment in major Mexican cities and industry segments beginning in 1994 and continuing to the end of 2001. Excluding Reynosa (where the changes have been less dramatic) as of October 2000 employment in the major maquila centers (Cd. Juárez, Tijuana, Matamoros, Mexicali, and Cd. Chihuahua) accounted for 48 percent of all maquila employment. Over the next 14 months, 56 percent of maquila job loss occurred in these five cities. The industrial sector data also reveal some important developments.

Table Two: *Changes in Maquila Employment by City and Sector*

	01/1994	01/2000	High	Date	Low	Date	Loss
City							
Cd. Juárez	129,991	229,478	262,805	Oct/00	207,087	Dec/01	55,718
Tijuana	80,506	174,277	198,776	Oct/00	150,443	Dec/01	48,333
Reynosa	34,874	63,531	68,545	May/00	64,866	Nov/00	3,679
Matamoros	39,126	61,273	69,989	Oct/00	54,336	Dec/01	15,653
Mexicali	19,495	55,857	64,932	Jan/01	51,231	Dec/01	13,701
Cd. Chihuahua	28,336	48,302	52,775	Sep/00	40,003	Dec/01	12,772
Sector							
Electronic	190,940	408,457	465,742	Oct/00	343,810	Dec/01	121,932
Auto Parts	126,061	219,300	248,912	Sep/00	218,289	Oct/01	30,623
Apparel	67,269	265,564	293,705	Jul/00	234,800	Dec/01	58,905
Total	546,433	1,214,541	1,338,970	Oct/00	1,081,526	Dec/01	257,444

Source: INEGI, Banco de Información Económico, Industria Maquiladora de Exportación (<http://www.inegi.gob.mx>)

Contraction in the three areas that represent the primary sources of maquila employment (electronics and electrical equipment, auto parts, and apparel) has been more severe than the industry average. Again using October 2000 as a base, these three sectors accounted for 75 percent of all maquila jobs. From October 2000 to December 2001, 80 percent of job losses occurred in these same sectors.

A variety of explanations have been given in the business press for the loss of dynamism in the maquila industry. These include; 1) the 2001 US recession, 2) the appreciation of the Mexico peso against the US dollar and rising Mexican wage rates, 3) the NAFTA driven changes in the structure of the maquiladora program discussed in the prior section, 4) changes in the way maquiladoras are taxed, and finally 5) modifications in US trade policy. In the following paragraphs, we review the evidence for and against each of these explanations.

1. The US Recession - In 2001 US GDP growth reached a mere 1.2 percent and US industrial production fell 5.9 percent. Given this lackluster performance and the results of studies such as those by Gruben (2002) and Fullerton and Schauer (2002) that empirically demonstrate the close relationship between maquila growth and the health of the US economy, it comes as no surprise that 2001 was not a good year for maquilas. However, it is also clear US downturns rarely result in maquila employment and output falling. For example, in the 20-year period running from 1980 to 2000 US industrial production contracted in five years (1980, 1981, 1982, 1989, and 1990) by an average of 2.3 percent. During those same five years, maquila employment grew on average 4.5 percent (see Figure Two). In our view, the US slowdown provides an important but incomplete explanation for the collapse in maquila employment and output.

2. The Super Peso and Maquila Wages - Exchange rates directly affect the profitability of a country's exporters. Maquiladoras export most if not all of their production and tend to generate revenue in US dollars. However, they incur a number of costs in Mexico in the national currency (especially wages, taxes, and utility charges). When the Mexican peso appreciates against the US dollar, these costs go up proportionally. As of the end of December 2001, there was general agreement within Mexico that the so-called "super peso" was substantially overvalued. For example, comparing inflation and exchange rate changes in Mexico and the US since 1980 (according to purchasing power parity (PPP) theory differences in inflation are thought to be the primary determinate of exchange rate changes over time), the evidence suggests that the Mexican peso was more overvalued at the end of 2001 than it was before the last major Mexican devaluation in 1994 (see Figure Two). The dollar/peso exchange rate certainly has been of concern to those both inside and outside of Mexico. Economists such as the Noble Laureate Robert Mundell and Jeffrey Sachs have both publicly stated that Mexico needs to at the very least stop the appreciation of the Mexican peso against the dollar (Benavides, 2002; Zapata and Carrillo, 2002).

Measured in dollars, the super peso has significantly increased the cost of Mexican labor for maquiladora producers. At the same time, even in peso terms Mexican wage rates have been rising. The reasons for this increase are not totally understood. However, one contributing factor appears to be the increased aggressiveness of Mexican unions. For over seventy years, the *Partido Revolucionario Institucional* (PRI) was the dominant political force in Mexico. Rather than operate independently, labor unions were an integral part of PRI power structure. Arguing that it would increase inflation

and/or discourage foreign investment, Mexican presidents have often used their influence to moderate union demands. Former President Salinas de Gortari (1988-1994), for example, was famous for negotiating annual agreements with organized labor and industry representatives that typically resulted in both sides agreeing to moderate pay raises mirroring the annual rate of inflation. The victory of Vicente Fox from the opposition *Partido Accion Nacional* (PAN) party in the 2000 Mexican presidential election has freed Mexican unions from the limitations inherent in the former system. Less vulnerable to executive power, they appear to be utilizing their independence to negotiate for and obtain significant pay increases from a wide variety of employers. For example, while inflation in Mexico in 2002 is expected to be less than five percent, in the northern state of Nuevo Leon the local business chamber reported that the average labor contract signed in January, 2002 included a wage increase of nine percent (Dolores Ortega, 2002).

Whether it is due to the dollar/peso exchange rate, more aggressive unions, or other factors the wages paid by major maquiladoras at the start of 2002 is clearly not competitive with what is available in other developing countries. For example, in Nuevo Laredo in April 2002 the plant manager for a major electronics manufacturer stated that their fully loaded wage rate was averaging \$3.10 per hour. During the same month in Reynosa, the human resource manager for a large, multi-plant auto parts producer indicated that fully loaded wages at her plant were \$3.90 per hour. Wage rates in other developing countries with major maquila-type programs such as China and Honduras are a small fraction of what they are in Mexico. In addition, the drop in maquila employment certainly does not appear to be putting downward pressure on maquila wages. The

Mexican government reported that the average direct wage received by maquila operators in March, 2002 had increased by 10 percent in real terms when compared to a year earlier (INEGI, 2002).

3. NAFTA - As mentioned, one of the primary challenges facing maquilas starting in 2001 was the implementation of NAFTA Article 303, which requires the Mexican government to charge import duties on non-NAFTA inputs when they first enter the country. Since Mexican duties commonly range from 0 to 35 percent, this represents a significant penalty for maquiladora producers. In an attempt to maintain its status as an attractive site for export oriented firms, the Mexican government developed a number of what are called sectoral programs (commonly shortened to PROSECs) that lower duties on many non-NAFTA inputs to the zero to five percent range. Unfortunately, the Mexican government did not release complete information on what products qualified under the PROSECs until late 2000 and not all the inputs that maquiladora operators requested qualified for these duty reductions. Responding to industry concerns, in 2001 the Mexican government first temporarily suspended the implementation of Article 303 and then developed something called *Regla Octava* (Rule Eight) to provide additional, but temporary duty relief for essential non-NAFTA inputs. Compared to the pre-2001 regime (duty free entry of goods from any part of the world), the current system of PROSECs, the *Regla Octava*, and the occasional threat from the Mexican government to use these instruments to force maquilas to buy more Mexican inputs represents a major, permanent structural weakness limiting the competitiveness of Mexican maquiladoras.

4. Mexican Taxes - Changes in the way maquilas are taxed represent another significant threat to maquiladora viability. Since their inception, maquiladoras have

always paid the standard Mexican payroll taxes but have not been subject to corporate income taxes. While attempting to simplify a very complex system, when a firm decides to establish a maquiladora they must form a Mexican corporation. Since maquiladoras typically sell all of their production back to the parent company, the amount of profit the Mexican corporation realizes is dependent on the transfer pricing policies agreed to by the multinational corporation (MNC) and the Mexican government. During the first three decades of the program, maquilas were more or less free to set their own transfer prices. Since Mexican corporate income taxes were generally higher than those in the US, maquiladora operators typically manipulated the price of inputs and outputs so they realized no profit or even a small loss in Mexico. In 1995, the Mexican government began requiring maquilas to add a substantial mark-up to the price of inputs thereby forcing maquilas to declare significant profits and pay income taxes in Mexico. To further increase tax revenues, the Mexican government again modified the transfer pricing rules in late 1999.

When evaluating the effects of these tax law changes, the fact that maquilas and their parent companies are paying more taxes in Mexico does not automatically mean that their total tax burden is increasing. In many cases, US MNCs can receive a foreign tax credit roughly equivalent to the amount paid in Mexican corporate income taxes and thereby reduce the amount they owe the US Treasury. However, the lack of consistency between the US and Mexican tax laws may result in the US Internal Revenue Service (IRS) disallowing some charges and thereby reducing the foreign tax credit available. If the MNC is actually losing money, however, there are major disadvantages to the current transfer price based tax scheme. In essence, by complying with these rules the MNC is

issuing a guarantee to the Mexican government that they will declare a substantial profit on their maquiladora operations and pay corporate income taxes regardless of the profitability of the parent company.

At least two additional modifications in the Mexican tax system are of concern. In late 2001, the Mexican Congress approved a number of unexpected tax law changes. Among other things, the new tax regime includes a three percent “substitute tax” that for many maquilas will significantly increase their total tax liability. In addition, in the past the Mexican government required businesses to pay payroll taxes on direct wages but did not tax indirect benefits. In a rather strange twist, the 2001 changes allow indirect benefits to be exempt from tax only if both direct and indirect employees receive the same benefits. While these new taxes are being challenged in the courts, at the start of 2002 one large maquiladora operator estimated that these changes will increase their costs by over a million dollars per year. To add to the industry’s concerns, the transfer pricing regulations now in place are set to expire at the end of 2003 and the Mexican government continues to threaten that they will impose a new tax concept being developed by the OECD called “permanent establishment.” If implemented, this could result in the Mexican government collecting taxes on profits made by US corporations selling products in the US but made in Mexico. The US IRS has stated that they will not issue a credit for taxes paid to the Mexican government under the permanent establishment rules thus creating the possibility that maquilas and their parent companies will be taxed on the same profits by both governments (resulting in an effective tax rate of around 70 percent).

5. US Trade Policy Modifications - In 2001, China officially joined the World Trade Organization (WTO). In 2000, the Caribbean Basin Trade Partnership Act, otherwise known as the Caribbean Basin Initiative or CBI, was approved by the US Congress. In the not too distant future, the rules that for decades have regulated the importation of apparel products into the US (referred to as the Multi-Fiber Agreement) will give way to an era of increased free trade as required by the Uruguay round of WTO trade negotiations. All of these changes directly impact the attractiveness of Mexico as a site for maquiladora activities. To understand why, one must go back to NAFTA and the performance of the three major industry segments since 1994.

1. Electronic and electrical equipment - As shown in Table One, this is the largest segment in the maquiladora program. While there are few formal studies on the topic, scattered evidence suggests that electronic/electrical equipment maquilas commonly import from Asia 60 to 95 percent of their raw and intermediate components (Berlanga-Albrecht, 1999; Sargent and Matthews, 2001). Given their reliance on non-NAFTA inputs, this industrial sector appears to be particularly vulnerable to Mexico's awkward attempts to reduce or eliminate duty penalties on non-regional goods. In addition, Mexico has traditionally placed significant anti-dumping duties on Chinese products. Since China is a substantial and growing power in global electronics, this tactic creates additional uncertainty for maquila operators that often view sourcing components from China as critical to their long run viability. China joining the WTO also means that the US duty rates for many Chinese imports will be reduced. These developments are clearly causing major Japanese and Korean maquiladora operators to rethink their strategy of producing electronic components in Asia, assembling those inputs in Mexico,

and selling the final product in the US to one of both producing and assembling in Asia to serve the US market. According to popular press reports, Matsushita has already laid off 500 of its 1,800 employees in Tijuana and is looking at other countries where it makes sense to relocate their remaining operations. A number of other blue chip electronics firms such as Sony, Kyocera, Sanyo, Kenwood, and Solectron have all significantly reduced their Mexican workforce and/or closed Mexican plants (Lindquist, 2001; López, 2002).

2. Apparel - After more than a decade of stagnation, maquila employment in this sector exploded from 67,269 at the start of 1994 to a high of 293,705 in July 2000. The reason for this increase is clear. Before NAFTA, to qualify for special trade incentives apparel firms often had little choice but to produce and cut fabric in the US, export that fabric to Mexico or other low wage countries to be sewn, and then re-import the finished garment for sale in the US. Depending on the product, these imports were often subjected to strict quotas. NAFTA significantly altered this production model. Since 1994, many firms continue to produce fabric in the US, but both cutting and sewing can be done in Mexico. More importantly, import quotas have been relaxed or eliminated entirely within the NAFTA block (Adkisson, 2002). As a direct result of these NAFTA incentives, there was a migration of apparel firms from Asia, the Caribbean, and Central America to Mexico (cf. Bair and Geriffi, 2001). While slow to correct this distortion, the US Congress recently passed the Caribbean Trade Partnership Act of 2000 which is designed to grant “NAFTA parity” to apparel producers in 24 Central American and Caribbean countries. While these changes reduce Mexico’s unique advantages, the real threat is more likely to be the phase out of the Multi-Fiber Agreement in 2005. As

mentioned, one of the outcomes of the last round of WTO trade negotiations was the elimination in 2005 of quotas on many apparel exports. Many industry watchers take for granted that these changes will result in significant reshuffling in global production chains. Furthermore, with full WTO membership Chinese manufacturers will be able to export to the US quota free. In a 1999 report, the U.S. International Trade Commission estimated that with the end of the quota system China's share of US apparel imports would go from 12 to 30 percent. Furthermore, this increase will occur as Chinese products (USITC, 1999: pp. 19): "displace exports from other suppliers, particularly suppliers whose exports currently are not restricted by quotas." With their very existence a direct result of "exports not restricted by quotas," maquila apparel producers could conceivably shrink back to their pre-1994 levels by the end the decade.

3. Auto Parts - Of the three major maquila segment, the production of auto parts appears to have the strongest competitive position. While many products that qualify in this category have something to do with electronics (and hence may be dependent on raw and intermediate materials from Asia and somewhat vulnerable to Article 303 changes), final assemblers in North America typically employ JIT inventory systems. Given this production model and the fact that the great majority of maquila output is shipped by truck, it is hard to see General Motors or other major regional producers deciding that it makes better sense to assemble a product such as an auto harness in a plant in Asia or Central America, load that harness on a truck, put that trailer on a freighter, transport it across the ocean, unload at a US port, and then transport the harness to the final assembler. Given the imperatives of the JIT system, the competitiveness of maquila auto part producers does not appear to be as threatened as the other major segments.

Table Three: *US Imports 2000 - 2001: Selected Countries and Sectors (in millions of US dollars)*

Total US Imports from Mexico and China

	2000	2001	Gain/Loss
Mexico	134,734.4	130,508.9	- 4,225.5
China	99,580.5	102,069.3	2,488.8

Electrical machinery and equipment (Tariff Heading 85)

	2000	2001	Gain/Loss
Mexico	35,639.4	33,347.8	- 2,291.6
China	19,359.7	19,610.8	251.1

Apparel (Tariff Headings 61 and 62)

	2000	2001	Gain/Loss
Mexico	8,617.0	8,027.0	- 590.0
China	6,192.9	6,416.0	223.1
Honduras	2,415.0	2,437.0	22.0
El Salvador	1,600.2	1,633.8	33.6
Guatemala	1,484.5	1,615.1	130.6
Nicaragua	337.3	380.2	42.9
Dominican Republic	2,383.4	2,225.0	- 158.4
Jamaica	267.2	187.4	- 79.8

Vehicles (Tariff Heading 87)

	2000	2001	Gain/Loss
Mexico	26,010.6	26,262.3	251.7

Source: United States International Trade Commission (<http://dataweb.usitc.gov>)

In Table Three, we present trade data comparing the performance of exporters to the US from various countries and industry segments. The numbers clearly show the growing threat from China and other low wage countries in the major maquiladora sectors. For example, in a year where US imports from Mexico dropped over \$4.2 billion dollars, imports from China increased by \$2.5 billion. Mexican electronic exports to the US in 2001 dropped substantially while those from China increased slightly. In apparel, Mexican exports to the US again dropped while exports from China and several countries in Central America increased. Surprisingly, Caribbean countries had a very poor year with their apparel exports to the US even with the signing of the Trade Partnership Act. Mexican exports of vehicles included under tariff heading 87 experienced a slight increase, which suggests that final assemblers (and their suppliers) continue to rely on Mexico as a major production location for the US market.

THE END OF AN ERA?

In this paper, our goal has been to explore the strategic implications of the unprecedented contraction in maquiladora activity during the latter half of 2000 and continuing throughout 2001. We argue that the downturn in the US economy is only one of the many factors contributing to the loss of over a quarter million maquiladora jobs. We want to emphasize that much of our analysis is speculative and that the full impact of the changes we have presented will not be known for several years if not decades. However, given the multiple forces at work one begins to wonder about the mid and long term potential of Mexico to continue playing its historical role as the primary assembly and manufacturing site for firms exporting to the US that require a low wage labor force.

The possibility that Mexico could retain this role would certainly be greater if the Mexican government expressed a serious interest in continuing to make this type of contribution. Instead, President Fox and other top officials have publicly stated that the export-oriented model based on labor-intensive maquiladoras has reached “a certain degree of exhaustion” (Diaz Mendez, 2002). In addition, top Mexican policy makers primarily attribute the maquila contraction to the slowdown in the US economy rather than the other explanations provided in this paper. Furthermore, they continue to state that Mexico is not receiving a fair share of the taxes generated by maquilas and they will continue to their efforts to increase the revenue stream coming to them from the industry.

The Mexican government does have a vision for what they would like the industry to become. They do not want, or feel that they cannot, successfully compete against China and other low wage countries for the less attractive maquila segments. Therefore, they are encouraging export oriented firms to move into higher valued added, technology intensive industries and allow those dependent on large numbers of low wage, low skilled workers to die out. Mexico is certainly not the first country to embrace this strategy. Hong Kong, Singapore, Taiwan and others have all proven that maquila type industries should be considered as only the first step up the ladder eventually leading to advanced industrialization. However, there is relatively little hard evidence to suggest that Mexico has created the conditions necessary to move *en masse* into a more complex, technology dependent manufacturing paradigm.

Experts generally agree that to successfully attract, retain, and grow knowledge intensive firms countries need to provide an abundant supply of highly educated workers, excellent scientific infrastructure, and efficient government institutions (Cimoli, 2000).

Based on world comparisons, Mexico is not especially competitive on any of these dimensions. In an assessment of the reading, mathematics, and science abilities of 15 year old students in 28 OECD countries plus Brazil, Latvia, Liechtenstein, and the Russian Federation, Mexican student scores ranked second to last along all three dimensions (ahead of only Brazil) (PISA, 2000). In an extensive study of its national innovation system, Cimoli (2000, p. 280) concluded that Mexico's "participation in the globalization of scientific and technological activities is very poor." The 2000 Global Competitiveness Report prepared by Harvard University and the World Economic Forum ranked Mexico 42 of 58 countries (down from 34th in 1999). This decline was due to factors such as widespread corruption, poor police protection, and chronic deficiencies in research and development spending and the quality of math and science education. Mexico is running the risk of pricing itself out of low-tech, low wage industries without having the capability of adequately supporting more advanced sectors.

Even with the competitiveness challenges currently facing the maquilas, we are not arguing that the industry will disappear entirely. As discussed, many maquilas, especially those in the auto parts sector, have already transitioned into a higher valued added model. Our best guess is that many of these firms will continue to find Mexico an attractive production location even with a higher cost structure. If nothing else, the advantages of being located next to the largest consumer market in the world is a tremendous benefit for maquila suppliers fully integrated into a coherent JIT, quick response production model. At the same time, the momentum that pushed Mexico close to the top of the list of US trading partners has dissipated and the evidence supporting President Bush's statement about the importance of the US-Mexican relationship is

becoming less and less convincing. Unless there is a substantial peso devaluation (resulting in a lowering of costs for export oriented firms that generate revenues in dollars), just as the terrorist attacks on New York and Washington have pushed Mexico to the backburner of the US's political agenda, the accession of China to full WTO status and a series of misguided policies may result in a similar fall from grace for Mexico in the corporate boardrooms of US MNCs.

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