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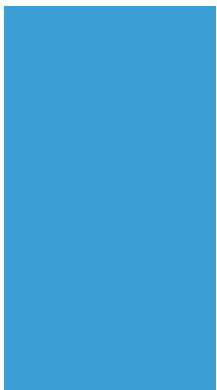
**Author**

Gallagher, Kevin P

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Center for Latin American Studies  
University of California, Berkeley



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Kevin P. Gallagher  
Assistant Professor of International Relations  
Boston University  
**Global Development and Environment Institute**  
Tufts University

June 2005  
Paper No. 14

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## CONTENTS

I. INTRODUCTION .....	1
II. ENDOGENOUS PRODUCTIVE CAPACITY .....	3
1. INVESTMENT: CROWDING IN—OR OUT? .....	3
2. LOCAL INPUTS INTO EXPORT-ORIENTED MANUFACTURING .....	7
3. KNOWLEDGE AND THE CAPACITY FOR INNOVATION .....	9
II. ENVIRONMENTAL PERFORMANCE .....	11
1. ENVIRONMENTAL IMPACTS OF THE MANUFACTURING SECTOR .....	12
2. STANDARDS AND COMPLIANCE—THE ROLE OF THE MEXICAN GOVERNMENT .....	15
3. VOLUNTARY INITIATIVES—CORPORATE SOCIAL RESPONSIBILITY? .....	17
III. RISING STANDARDS OF LIVING? .....	19
1. WAGES AND EMPLOYMENT .....	20
2. INEQUALITY AND POVERTY .....	22
3. INTERNAL AND EXTERNAL MIGRATION .....	23
IV. CONCLUSION: TOWARDS SUSTAINABLE INDUSTRIAL DEVELOPMENT .....	24
VI. REFERENCES .....	27
ENDNOTES .....	30



## I. INTRODUCTION

Mexico's liberalization strategy in the 1990s aimed to stimulate domestic economic growth by increasing the productivity and competitiveness of export-oriented manufacturing. Eschewing past industry and macroeconomic policies which promoted domestic firms, liberalization policies favored foreign firms. While industry policies were mostly "neutral," macroeconomic policies, especially high interest rates and an overvalued exchange rate, created a climate conducive to foreign, rather than domestic, investment. The hope was that the benefits of foreign investment would "spill over" to local firms and boost domestic investment and economic growth.

There were also hopes that FDI-led growth would bring environmental and social benefits. The growth of manufacturing jobs would absorb the urban poor and farmers displaced by NAFTA, closing the income inequality which plagues Mexico and stemming rural-urban and cross-border migration. The more efficient, globally integrated foreign firms would transfer "clean technology" and systems for better environmental management, reducing the pollution and health risks associated with industrial development.

By one set of standards, the strategy was somewhat successful. During the 1990s, foreign direct investment (FDI) inflows increased by a factor of five over the 1980s, and about half of it flowed into the manufacturing sector. Exports increased by more than a factor of three and manufactures accounted for nearly 90 percent of the total. The Achilles Heel, however, was a persistent current account deficit. Moreover, FDI inflows fell sharply after 2001, due largely to the downturn in the U.S. economy and China's accession to the WTO.

A simple perception of success, however, obscures a confusion of means and ends. The central goal of a development strategy is—or should—not be to increase FDI and exports but to improve the lives of people, including by promoting sustained and sustainable industrial growth.

This paper examines the performance of the FDI-led development strategy between 1994 and 2002 against the goals of sustainable industrial development. We focus on the manufacturing



sector and define sustainable industrial development in terms of three parameters:

- Economic: Increasing the endogenous productive capacity of Mexican firms and workers;
- Environmental: Raising the environmental performance of foreign and domestic firms;
- Social: Creating employment, thus contributing to greater income equality and reducing cross-border migration.

The central argument of the paper is that the FDI-dependent, export-oriented manufacturing model has not stimulated sustainable industrial development in Mexico, largely because growth in the export sector is cut off from the domestic economy. Indeed, rather than increasing endogenous capacity, there is evidence that FDI-led growth has undermined existing productive capacity. We also found that the environmental performance of the manufacturing sector worsened in the period under study, largely due to the inadequacy of government regulation, and that the model performed very poorly in terms of job growth and seems to have exacerbated, rather than reduced, external migration.

Part II considers the impacts of FDI on endogenous productive capacity by examining three broad indicators: 1) the rate of investment, both foreign and domestic; 2) local inputs into export-oriented manufacturing; and 3) capacities for technological innovation. Part III focuses on the environmental performance of the export-oriented manufacturing sector and examines in turn, environmental trends, government regulation, and voluntary corporate initiatives. Part IV examines job-creation in the manufacturing sector and considers its impacts on inequality and migration.

Part VI concludes with reflections on what kinds of policies would promote sustainable industrial development, including a greater focus on the domestic market, an improvement in the domestic climate for investment, a stronger government commitment to environmental protection, and investment in creating local capacities for innovation, including education and research and development.

## II. ENDOGENOUS PRODUCTIVE CAPACITY

The growth of endogenous productive capacity is the fundamental economic indicator to determine if a process of sustainable industrial development is underway. Endogenous productive capacity is the ensemble of knowledge, skills, and technology by which domestic firms and workers are able to design, produce, and sell products and services in domestic and/or global markets. In addition to the acquisition of know-how, that is, the ability to do what others have done, endogenous productive capacity entails the capability to innovate.

While productive capacity rests ultimately with firms and workers, government interventions and institutions can contribute to its growth. Indeed, effective policies which nurture innovation, such as public support for research and development, can themselves be considered as part of productive capacity.

This section considers whether the FDI-led strategy contributed to growth in endogenous productive capacity by examining data on three indicators: 1) macroeconomic performance, especially growth and investment (gross fixed capital formation); 2) efficiency spillovers from foreign firms; and 3) growth in local capacities for innovation.

### 1. INVESTMENT: CROWDING IN—OR OUT?

Investment is the lifeblood of economic growth and sustainable industrial development.

Investment can work to expand existing production capabilities, as well as to create new ones.

One of the “promises” of FDI is that it will “crowd in” domestic investment by increasing local aggregate demand and/or firm productivity.

From a macroeconomic point of view, the rate of GDP growth is the single most telling—and troublesome—indicator of how the FDI-led integration strategy affected sustainable industrial development in Mexico. Between 1994 and 2002, GDP grew at an average rate of only 2.7 percent per year. Indeed, GDP growth in the 1990s was less than half the 6.7 percent average

growth rate under the ISI policies of the 1970s. Even in the tumultuous 1980s, GDP grew an average of 3.7 percent per year (Table 1).

What accounts for this poor performance? While economists point to a variety of factors, the most important is the contraction of domestic investment. Between 1994-2002, total annual investment as a percent of GDP averaged 19.4 percent, the same as in the 1980s and down a bit from the 1970s (Table 1 and Figure 1). However, the share of FDI in total investment more than doubled, rising from 5.4 percent between 1981-93 to 12.6 percent between 1994-2002. The converse, of course, is that the share of domestic investment fell by a half.

The manufacturing sector has apparently been hard hit by the contraction in domestic investment. From 1970 to 1982, investment in manufacturing averaged about 10 percent of GDP and accounted for nearly half of investment overall. In the 1980s, investment in manufacturing dropped off to just over 5 percent of GDP, accounting for just over a quarter of total investment. While more recent data is not available, data from 1988 to 1994 show the persistence of a contractionary trend: investment in manufacturing remained under 6 percent of GDP and accounted for about a third of total investment (Moreno-Brid, 1999, Table 5).

Rather than stimulating new investment, FDI and the liberalization strategy overall, apparently “crowded out” domestic investment. Crowding out was not due to excessive borrowing by TNCs in domestic capital markets. Generally, TNC affiliates and domestic companies producing primarily for export have access to foreign sources of finance. According to many economists, the overarching cause was the anti-inflationary macroeconomic policy package, which generated high interest rates and an overvalued exchange rate (Nadal, 2003). A key element of the package, which aimed to suppress aggregate demand, was contractionary monetary policy. A high prime rate pushed up commercial bank interest rates, which averaged 22 percent between 1994-2002 (World Bank, 2002).

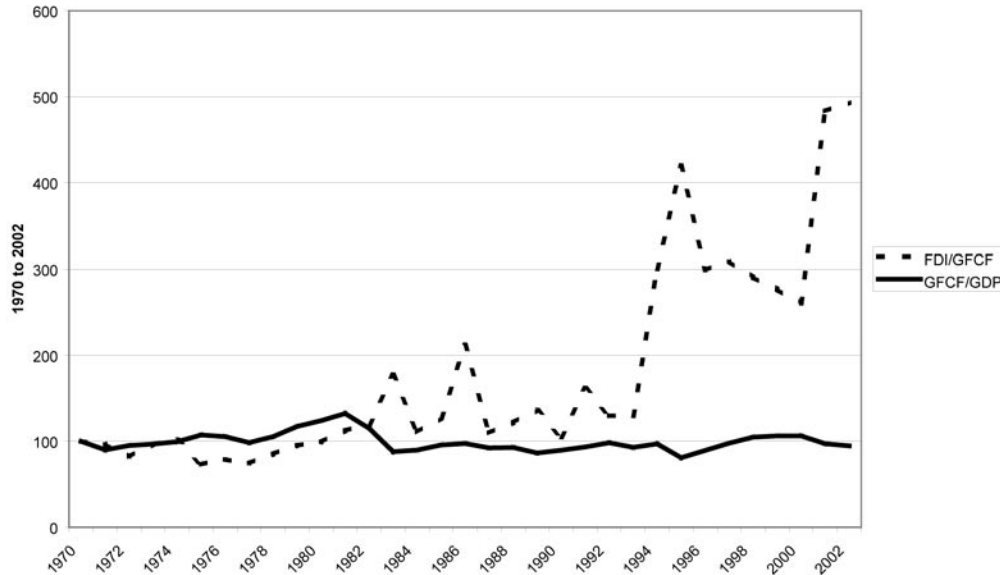
<b>Table 1</b>				
<b>Macro-Economic Variables: Investment and GDP</b>				
	<i>Investment (% of GDP)</i>	<i>FDI (% of total investment)</i>	<i>GDP Growth (%)</i>	<i>Growth in GDP per capita (%)</i>
1970-1980	20.7	3.6	6.7	3.6
1981-1993	19.4	5.4	3.3	-0.3*
1994	19.4	12.0	4.5	
1995	16.1	16.8	-6.2	-7.9
1996	17.9	12.0	5.1	3.5
1997	19.5	12.3	6.8	5.2
1998	20.9	11.6	4.9	3.5
1999	21.2	11.1	3.7	2.3
2000	21.2	10.4	6.7	5.2
2001	19.4	19.3	0.5	-1.0
2002	18.9	7.9	0.0	-1.4
1994-2002	19.4	12.6	2.7	1.4

\*1981-93

Source: World Bank, World Development Indicators, 2003; Urquidi (2003), Table 15.2.

High interest rates choke off domestic investment directly, by raising the cost of capital, and indirectly, by leading to an overvalued exchange rate, generated by inflows of foreign capital attracted by high interest rates. Indeed, a central objective of the liberalization strategy is the attraction of foreign portfolio capital inflows to finance balance of payments gaps. Moreover, the government has made the exchange rate the anchor of its domestic price system and undertakes interventions to raise the value of the peso, even though it is supposed to float (Nadal, 2003). An overvalued exchange rate makes imports, including of intermediate products, cheap relative to domestic production. Domestic producers get crowded out.

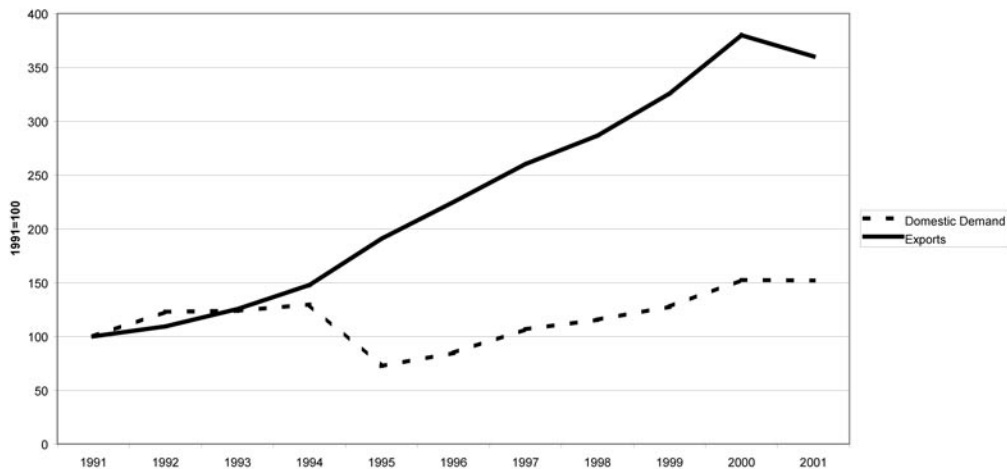
**Figure 1:**  
Total Investment in the Mexican Economy, 1970 to 2002



*World Bank, World Development Indicators, 2003.*

Besides high interest rates and overvalued exchange rates, Mexican policies have constricted aggregate demand by constraining wage growth through “economic solidarity pacts.” Real wages in manufacturing outside of the maquiladoras have decreased by 12 percent since 1994 (INEGI, 2003; Salas and Rendon, 2000; Arroyo, 2003). While the pacts helped to control inflation, they also drove incomes down. Domestic demand for manufactured goods plummeted

**Figure 2**  
Export and Domestic Sales of Mexican Manufactured Goods



*Source: Author's calculations based on INEGI, 2003.<sup>1</sup>*

after 1994 and growth remained sluggish throughout the decade. Between 1994 and 2001, domestic sales of manufactured goods rose by only 22 percent, while export sales rose by 212 percent (in 1995 dollars) (Figure 2).

## 2. LOCAL INPUTS INTO EXPORT-ORIENTED MANUFACTURING

A central “promise” of FDI is that it delivers “efficiency spillovers”—increases in technology, skills, and knowledge—to local firms and workers. Indeed, economists increasingly view improvements in technology, efficiency, and productivity, rather than capital accumulation, as the primary conduit by which FDI stimulates economic growth (Lim, 2001).

One of the most important ways that FDI generates efficiency spillovers is through “backward linkages,” that is, by expanding and deepening the skills of local suppliers, as well as by integrating them into global markets. Outsourcing by large multinational firms creates tiers of suppliers: local affiliates of the foreign firm; local direct suppliers to the foreign affiliates, often producing under long-term contract; and suppliers of local contractors. FDI, in other words, can stimulate complementary investments in firms that produce component parts and services.

In a case study of the automotive sector in Mexico, Moran (1998, pp. 53-56) found that the integration of Mexican producers into the global sourcing and marketing strategies of multinational car companies in the 1980s generated a host of spillovers to local firms and local communities. Spurred by the government’s export performance requirements, the big automakers—led by General Motors—invested heavily between 1979-81. Productive capacity grew rapidly—the production of engines alone grew to more than a million units per year. Employment in the auto industry swelled and wages and benefits were among the highest in the country.

The decision to produce for export rather than for the Mexican market, as they had done under domestic content requirements, led the automakers to transfer best production technology and to introduce industry best practices, such as zero-defects procedures and production audits. According to evidence cited by Moran, the backward linkages were extensive: within five years, there were 310 domestic producers of parts and accessories, of which nearly a third had annual

sales of more than \$1 million. There were also spillovers of export marketing skills: only four of the ten largest auto parts exporting firms in 1987 had foreign ownership.

Another study by Aitken, Hanson and Harrison (1997) found that, irrespective of geography or the export concentration in a sector, the presence of foreign manufacturing firms acts to increase the export capacity of domestic firms. The authors conclude that the “export spillovers” must stem from ways in which the foreign firm acts as a channel for technology, management, distribution services, and information about foreign markets.

Other studies, however, are less optimistic. In a large statistical study covering 52 Mexican industries, Romo Murillo (2003) examined four types of spillover mechanisms: backward linkages, collaboration effects (e.g. joint R and D); demonstration effects; and training effects. He found that foreign presence is positively related to demonstration and to training effects, but negatively correlated with demonstration effects. Most important, he found no evidence that foreign presence is linked to technology spillovers.

The reason for the failure of recent statistical studies to find technical spillovers from FDI stems in large part from the fact that, perhaps apart from the auto industry, Mexican suppliers remain largely out of the sub-contracting loop. In 2002, locally sourced inputs in Mexico’s export-oriented maquila manufacturing plants accounted for less than 4 percent of total value added—down from just under 5 percent in 1990 (Table 2).

In an examination of the sub-contracting process in the electronics industry in Jalisco, Dussel (1999) found a high degree of dependence on imported inputs: he estimates that the value added by Mexican firms to total production is only about 5 percent. The lack of backward linkages stems from many sources, included the limited access to financing by local firms and foreign firms’ concerns about political stability (Dussel 1999).

Besides squeezing out possibilities to gain efficiency spillovers, the lack of local sourcing means that the export-oriented strategy generates a persistent current account deficit. Between 1994 and 2002, the excess of imports over exports averaged \$13.5 billion per year (INEGI, 2003).

In contrast to export-oriented manufacturing, local linkages are strong in manufacturing for domestic markets. While annual data does not exist, a 1995 study suggested that local suppliers provided over 80 percent of inputs in non-maquila manufacturing. The figure is likely somewhat inflated by that year's peso crisis. Nonetheless, it is safe to conclude that local content is high in domestic manufacturing.

<b>Table 2</b>		
<b>Locally Sourced Inputs in Maquila Manufacturing Plants (Value added as % of total)</b>		
	<b><u>1990</u></b>	<b><u>2002</u></b>
Food and Beverage	38.6	42.9
Apparel	0.9	8.0
Footwear and Leather	6.9	2.7
Furniture and Wood Products	3.1	14.6
Chemical Products	10.2	5.5
Transportation Equipment	0.8	3.3
Machinery	4.6	2.6
Electronic Assembly	1.2	3.0
Materials and Electronic Accessories	0.01	2.2
Sporting Goods	1.1	2.2
Other	4.1	2.2
<b>Average</b>	<b>4.7</b>	<b>3.7</b>

*Source: INEGI, 2003.*

### 3. KNOWLEDGE AND THE CAPACITY FOR INNOVATION

The growth of endogenous productive capacities, especially the capacity for innovation, requires investment in expanding and utilizing knowledge. Knowledge is required to absorb new technologies, to compete globally in cutting edge industries, and to design and market new products and services, in domestic or global markets.

Especially for firms in “latecomer” countries like Mexico, investment in knowledge is the “make it or break it” variable which determines whether firms can compete in mature industries,



which earn thin and declining margins. “Even if a firm starts small,” conclude Amsden and Chu (2003) in a study of Taiwan’s successful high tech industry, “it must ramp up very quickly to achieve a high output level, a process that requires building assets related to project execution, production engineering, and a form of R&D that straddles or falls somewhere in between applied research and exploratory development” (p. 3).

To nurture the capacity for innovation, investment is needed by both the public and private sectors in assets related to project execution, engineering and R&D. Indeed, Amsden and Chu (2003) argue that the most important factors in Taiwan’s success in the high tech industry were government subsidies for R&D channeled to nationally-owned firms. The government undertook R&D in its own laboratories, initiated joint research projects with the private sector, and subsidized private R&D (Amsden and Chu, 2003, p.12).

	<u>Mexico</u> <i>(average 1995 – 2000)</i>	<u>South Korea</u>
Patent applications—Resident share of total	4.91%	51.0 %
R&D expenditure as % of GDP	0.36%	2.60%
Scientists and engineers per million people	225	2152
Science and technology journal articles	2024	5219
R&D Technicians per million people	172	576

*Source: World Bank, World Development Indicators, 2003.*

How does Mexico perform against the yardstick of “capacity for innovation”? A thorough analysis of Mexico’s R&D policies or other indicators are beyond the scope of this paper. But a series of snapshots comparing Mexico and South Korea are telling. In 1981, 648 scientific journal articles were published in Mexico, compared to 168 in South Korea. Between 1995 and

2000, R&D as a percentage of GDP averaged 0.36 percent in Mexico. For manufacturing, R&D as a percentage of manufacturing GDP in Mexico is even lower, at 0.22 percent (Dussel Peters 2003). In South Korea, it was nearly 10 times greater, averaging 2.6 percent. In the same period, scientists and engineers per million people averaged 225, compared with 2152 in South Korea, and R&D technicians per million people averaged 172 in Mexico compared with 576 in South Korea (Table 3).

Another indicator of innovation capacity is the number of patent applications by residents. In 2000, Mexican residents applied for 451 patents, an increase of some 16 percent over 1996. Non-residents, on the other hand, applied for 66,465 patents in 2000, an increase of almost 120 percent over 1996. Indeed, the resident share of total patent applications fell by a half, dropping to only 0.67 percent in 2000 (Table 4). In South Korea, by contrast, the resident share of total applications averaged 51 percent between 1995-2000 (Table 12). In Taiwan, the resident share over the same period was 75 percent (Amsden and Chu, 2003).

**Table 4**  
**Patent Applications in Mexico**

	1996	1997	1998	1999	2000
Residents	389	429	472	468	451
Non-residents	30,305	35,503	44,249	49,532	66,465
Total	30,694	35,932	44,721	50,000	66,916
Resident share of total	1.27%	1.19%	1.08%	0.94%	0.67%

*Source: World Bank, World Development Indicators, 2003.*

## II. ENVIRONMENTAL PERFORMANCE

Many environmental trends are worsening in Mexico. Between 1985 and 1999, the economic costs of environmental degradation—including rural soil erosion, municipal solid waste, and urban air pollution—amounted to 10 percent of annual GDP, or \$36 billion per year (INEGI 2000; Gallagher 2003). These costs dwarf overall economic growth, which amounted to only 2.6

percent on an annual basis (INEGI, 2000). Indeed, these damage cost figures were cited by the World Bank as part of the rationale for a new environmental loan to Mexico in 2002.

In this section we examine the performance of the manufacturing sector. Although overall trends are worsening, there is some evidence of environmental improvement through compositional effects and through technology transfer from foreign firms. We also examine the role of the Mexican government in promoting better environmental performance through increased compliance with existing regulations. Finally, we consider the extent to which the largest U.S. TNCs in Mexico are embracing voluntary initiatives to improve their environmental performance under the mantle of corporate social responsibility.

#### 1. ENVIRONMENTAL IMPACTS OF THE MANUFACTURING SECTOR

Two recent in-depth studies evaluate the environmental impacts of export-led manufacturing growth in Mexico. Both come to similar conclusions: overall levels of industrial pollution, particularly criteria air pollution,<sup>2</sup> water pollution, and toxics, have increased faster than population growth and faster than the GDP of the economy as a whole in Mexico since the 1980s.

Both studies find that environmental degradation was fueled by large increases in manufacturing growth and exports. In other words, the overall “scale” of economic activity in the manufacturing sector corresponded with a growing amount of pollution. However, both studies found that overall levels of pollution occurred somewhat slower than overall growth in manufacturing output and overall growth of exports. The relative improvements were due to “composition effects,” small shifts away from pollution-intensive manufacturing (Gallagher 2002; Schatan 2002).

Under the integration strategy, Mexico consolidated its comparative advantage in labor-intensive assembly work and sold off state-patronized industries such as steel, cement, and pulp

and paper. On the whole, labor-intensive industries are less pollution-intensive than their heavily capital-intensive counterparts in the manufacturing sector. This explains why these studies have found compositional shifts away from pollution-intensive industry. However, both studies point out that such “compositional” changes toward relatively less pollution intensive industry have been far outweighed by overall scale effects of rapid industrial growth. One of the studies predicts that for every 1 percent increase in manufacturing output there was a corresponding 0.5 percent increase in pollution; the other study examines criteria air pollution only and predicts a corresponding pollution growth rate of 0.7 percent (Schatan, 2002; Gallagher 2003).

Two other studies, by the OECD and CEPAL, examined the foreign-dominated maquiladoras in particular. These studies note that although the “on-site” pollution of maquila assembly plants is relatively less pollution-intensive than their heavy industry counterparts, maquila growth attracts rapid migration. The influx far exceeds the infrastructure capacity of host communities and has led to inadequate management of sewage and waste, insufficient supplies of water, and negative consequences for air quality (OECD, 1995; Stromberg, 2002).

In addition, air pollution, once seen as a crisis in only Mexico City, is now becoming a problem in all major industrial cities. Guadalajara now exceeds air pollution norms for 40 percent of the year, Monterrey for 25 percent, Ciudad Juarez for 7 percent, Mexicali for 30 percent and Tijuana for 4 percent. With the exception of Guadalajara, these trends have all worsened since 1993 (Stromberg, 2002).

While environmental trends are worsening, there is little evidence that Mexico is a “pollution haven.” During the NAFTA debates, there was widespread concern that pollution-intensive U.S. firms would relocate to the border to evade tougher U.S. laws. One study found that California-based furniture makers moved to Mexico to avoid installing air pollution fixtures, and Mexico reportedly made statements attempting to lure U.S. firms by making low regulatory compliance costs part of their sales pitch. (Mayer 1998).

On the whole, however, there has not been a “giant sucking sound” of dirty industry flocking to Mexico. Between 1988 and 1998, the share of “dirty industry” in total manufacturing production fell by 3.6 percent in Mexico and by 2.3 percent in the U.S. Employment in dirty industries in the U.S. remained about the same and declined by 2 percent in Mexico (Table 5).

**Table 5**

<b>Table 5: Share of Dirty Industry in National Manufacturing</b>			
	<b>1988</b>	<b>1994</b>	<b>1998</b>
<b>Mexico</b>			
<i>production</i>	30.1%	23.1%	26.5%
<i>employment</i>	7.9%	6.3%	5.9%
<b>US</b>			
<i>production</i>	17.0%	15.1%	14.7%
<i>employment</i>	11.3%	11.2%	11.2%

*Source: Gallagher (2003).*

A number of empirical studies have similarly concluded that Mexico is not a pollution haven. In a cross-industry comparison of data in one year, 1987, Grossman and Krueger (1993) tested whether pollution abatement costs in U.S. industries affected imports from Mexico, as one would expect if Mexico was a pollution haven relative to the U.S. They found the impact of cross-industry differences in pollution abatement costs on U.S. imports from Mexico to be positive, but small and statistically insignificant. Indeed, traditional economic determinants of trade and investment, such as factor prices and tariffs, were found to be far more significant.

A more recent study examined whether pollution abatement costs affected patterns of U.S. foreign investment into Mexico and three other countries (Eskeland and Harrison, 1997). The authors found a statistically insignificant, though positive, relationship between pollution abatement costs and levels of FDI. In a time-series study, Kahn (2001) examined the pollution intensity of U.S. trade with Mexico and other countries. Using U.S. Toxic Release Inventory data for 1972, 1982, and 1992, he found the pollution content of U.S. imports from Mexico slightly declined during the period.

A leading explanation for environmental improvements is the behavior of foreign firms. Three studies conclude that foreign presence in the Mexican steel industry led to better environmental performance. Gentry and Fernandez (1998) found that Dutch steel firms and the Mexican government brokered an agreement whereby the Mexican government agreed to share some of the environmental liabilities of the sector. Later, the foreign firms began investing in environmental improvements. A broader study of the Mexican steel sector found that foreign firms, or firms that serve foreign markets, were more apt to comply with environmental regulations in the steel sector (Mercado 2000).

A third study which examined criteria air pollution in Mexican steel, found that the Mexican sector is “cleaner” per unit of output than its U.S. counterpart. This is partly due to the fact the new investment (both foreign and domestic) came in the form of more environmentally benign mini-mill technology rather than more traditional and dirtier blast furnaces. Based on this analysis, the author hypothesized that when pollution is in large part a function of core technologies, new investment can bring overall reductions in pollution-intensity. However, when pollution is a function of end-of-pipe technologies, new investment will not necessarily correspond with reductions in pollution intensity unless such technology is required and enforced by government (Gallagher, 2002).

## 2. STANDARDS AND COMPLIANCE—THE ROLE OF THE MEXICAN GOVERNMENT

Dirty industries did not relocate to Mexico en masse following NAFTA. On the other hand, Mexico offered a generally laxer climate of environmental regulation for all industries than many U.S. states. In some cases, environmental standards were lower or non-existent.

In other cases, however, Mexican standards were—and are—relatively high, the result of significant evolution of environmental awareness during the 1990s. The problem is lack of enforcement, stemming in part from Mexico’s macroeconomic and fiscal crises. While they may not have been drawn to Mexico because of lower environmental standards, foreign firms would have had the opportunity to perform poorly once they got there. No doubt, many did.

To assess the environmental performance of the FDI-led integration strategy in general, the issue of compliance by firms—domestic and foreign—with environmental regulation is paramount. What are the determinants of regulatory compliance in Mexico?

Two World Bank studies concluded that the key determinants of compliance by domestic and foreign firms with environmental regulations in Mexico are: 1) government pressure, including inspections; 2) local community pressure; and 3) whether or not the firm has an environmental management system (EMS) (Dasgupta, Hettige et al. 1997). Interestingly, one of the studies found no correlation between compliance and foreign origin (Dasgupta et al, 1998). Foreign firms, in other words, were no more likely to comply with regulation than domestic firms.

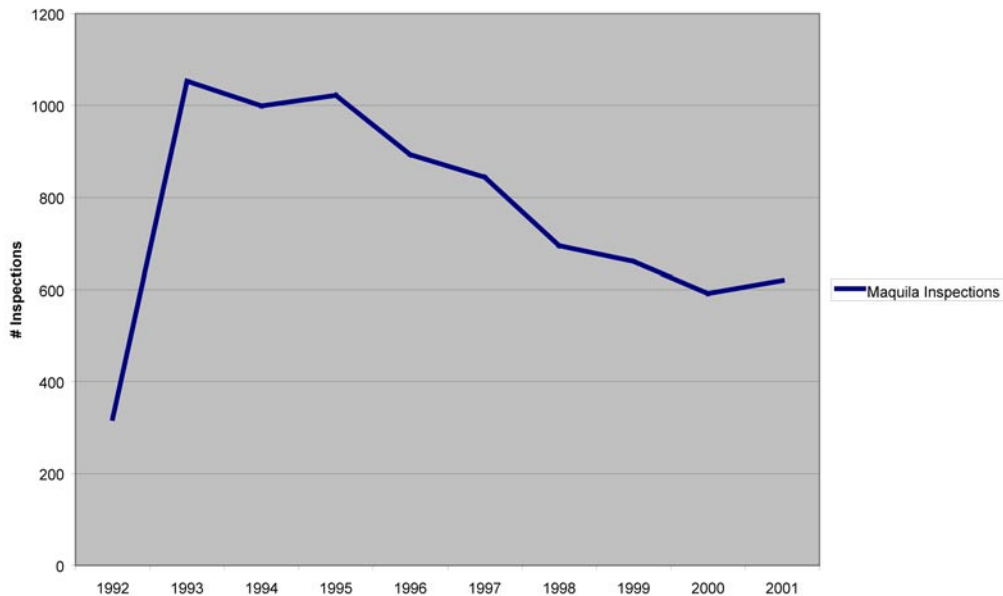
When foreign firms are in compliance, one study has shown that regulation and inspection are key drivers. A survey of 44 U.S. manufacturing firms in Mexico showed that environmental improvements such as investing in water treatment facilities were motivated by regulation and enforcement by the Mexican authorities (Gentry, 1998). A very recent study of 222 manufacturing firms in Mexico also found regulatory pressure to be the most significant driver of environmental performance. However, that same study also found firms exporting to the U.S. and Canada were more apt to be responsive to environmental concerns than non-exporting firms (Wisner and Epstein 2003).

Despite its efficacy, there are signs that Mexico's commitment to regulatory pressure may be falling by the wayside. Although spending on environmental protection grew impressively between 1988 and 1993, it tapered off by 45 percent between 1994 and 1999 (PROFEPA, 2000). Although such spending on the environment has grown considerably compared to earlier levels, it remains the lowest of all OECD countries. In relation to GDP, the average OECD country spends three times more than Mexico on the environment. In per capita terms, the average OECD country spends six times more than Mexico (OECD 1998).

Environmental inspection patterns mirror the trend in environmental spending. Although inspections got off to an impressive start in 1992, only 6 percent of establishments were inspected at the highest point. Total inspections decreased by 45 percent after 1993, and inspections in the maquila sector decreased by 37 percent (Figure 4).

The implementation of environmental management systems (EMS) has been found to correlate with firm-level environmental compliance. Although they are becoming more popular, the number of Mexican firms with EMS still remains very small. According to industry sources, 266 Mexican firms were certified to ISO 14,001, the international EMS standard, as of 2002—only one tenth of one percent of all firms. Countries such as Brazil, Korea, Taiwan, and China have between three and five times the number of ISO certifications as Mexico (ISOworld, 2003).

**Figure 4**  
**Maquila Inspections, 1992 to 2001**



*Source: Stromberg (2002).*

### 3. VOLUNTARY INITIATIVES—CORPORATE SOCIAL RESPONSIBILITY?

Prodded by pressures from environmental and community groups, as well as the threat of regulation, a number of companies, both foreign and Mexican, have taken voluntary initiatives



to improve their environmental and social performance. Under the mantle of “corporate social responsibility,” they have generated codes of conduct, implemented environmental management systems, consulted with advocacy groups, and/or produced “Sustainability Reports” disclosing information about company environmental performance

Voluntary initiatives have helped to improve company communication with the public. How effective they are generally in improving environmental and social performance remains a subject of study (Dahlstrom et al, 2003; Leighton et al, 2002). In Mexico, a handful of studies have shown that foreign firms have transferred environmentally friendly technology and management methods to Mexico.

One study described the way that affiliates of U.S. chemical firms teamed up with the Mexican chemical industry to incorporate U.S. “responsible care” environmental policies into operations of the Mexican chemical industry (Garcia-Johnson 2000). Another study on the chemical fibers industry found that although environmental regulations and inspections were the key driver for environmental compliance in that industry, foreign participation in the industry was correlated with environmental improvements as well (Dominquez-Villalabos 2000).

Another voluntary effort in 1997 and 1998 involved a number of U.S. firms, the World Bank, and Mexican SME (small and medium size enterprises) suppliers in the electronics and cement sectors. In an attempt to “green the supply chain,” foreign firms such as Lucent, SCI Systems, and IBM (in addition to a few large Mexican firms) contributed funds toward the training and certification of their SMEs in environmental management systems. The World Bank matched every dollar provided by the foreign “mentoring” firm with another dollar. Although laudable as a structure for collaboration, the project’s success was mixed. In some cases, the mentoring foreign firms themselves did not have an EMS, reducing their capacity to positively influence and work with their suppliers (World Bank, 1998).

There are signs that some portions of the Mexican business community are beginning

to take the environment more seriously. In 1992, Mexico's National Council of Ecological Industrialists (CONIECO) was created as an organization of manufacturers and resellers of products that can help clean the environment. The Latin American chapter of the World Business Council for Sustainable Development was established in Mexico City in 1993. In 1994, the Center for Private Sector Studies for Sustainable Development (CESPEDES) was formed (Barkin, 1999). And in 2002, the Mexican cement giant CEMEX received the 2002 World Environment Center's Gold Medal for International Corporate Environmental Achievement.

To what extent have foreign companies voluntarily adopted good environmental management as part of "standard operating procedure" in Mexico? In the absence of studies, we examined the "Broad Market Social Index" (BMSI) ratings of the largest publicly traded U.S. firms operating in Mexico.

Produced by KLD Research and Analytics Inc, a Boston-based firm, the BMSI—a proxy for "corporate social responsibility"—is created by screening companies according to four criteria.<sup>3</sup> Of the 26 largest (by total sales) U.S. firms operating in Mexico in 1999, 14 or 53 percent met the BMSI criteria, including IBM, PepsiCo, Motorola, Hewlett-Packard, and Proctor and Gamble. Among the 12 which did not meet the criteria were the three largest U.S. companies in Mexico—General Motors, Ford, and WalMart (Gallagher and Birch, 2004).

### III. RISING STANDARDS OF LIVING?

From the perspective of most Mexicans, the overarching goal of Mexico's FDI-led integration strategy was to "make life better," that is to raise the standard of living, especially for the poor and middle class. The hope was that a boom in better-paying manufacturing jobs would absorb migrants from the countryside, including those displaced by NAFTA, raising incomes, narrowing the gap between rich and poor, and reducing cross-border migration.

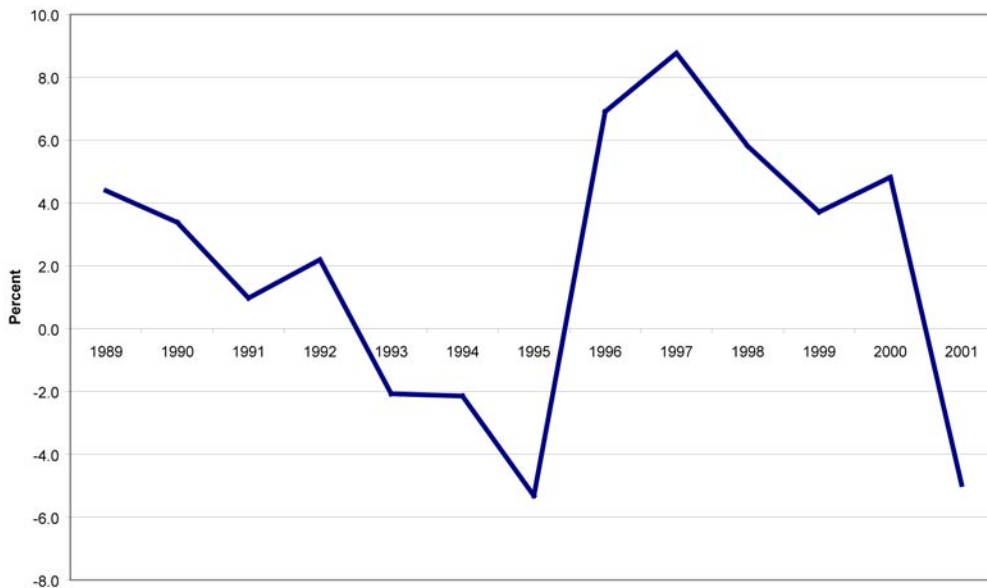
By the end of 2002, the promise remained to be fulfilled. The jobs directly created by the growth of the export-oriented manufacturing sector have been relatively few in number,

as well as low-paying and unstable. Moreover, the crowding out of domestic investment in manufacturing by FDI meant that the hoped-for boom in job growth did not materialize. In this section, we examine evidence about changes in wages and employment, income inequality, and internal and external migration patterns.

### 1. WAGES AND EMPLOYMENT

Between 1994 and 2002, a total of 637,000 new manufacturing jobs were created in the manufacturing sector, or about 82,500 each year. However, according to estimates provided in Mexico's national accounts, roughly 730,000 "new entrants" were added to the economically active workforce each year, for a total of 6.5 million new workers between 1994 and 2002. The manufacturing sector, in short, provided jobs for less than 12 percent of the people newly seeking employment each year. Moreover, job growth in the manufacturing sector has been on the decline since 1997 (Figure 5).

**Figure 5**  
Annual Change in Job Creation in Mexican Manufacturing



*Source: INEGI, 2003*

Not surprisingly, the overwhelming majority of new jobs—nearly 96 percent—were in the maquila sector. Seen from another angle, employment in the domestic economy is

drying up while the foreign sector putters on in small enclaves across Mexico. Moreover, jobs in the foreign sector are vulnerable to competition from Asia and to changes in global markets, especially a slowdown in the U.S. economy. By 2002, the major exporting firms and maquiladoras accounted for only 5.8 percent of total employment in Mexico (Dussel, 2003).

There is evidence that the jobs that have been created since 1994 are of poor quality. According to national employment surveys published by INEGI, 55.3 percent of new jobs do not provide benefits. Indeed, according to the same sources 49.5 percent of the employed Mexican workforce is without benefits (INEGI, 2003; referred to in Arroyo, 2003). The minimum wage in Mexico has declined by more than 70 percent since 1982 and 7 percent since 1994 (Figure 8).

Despite an 18 percent increase in productivity, wages in Mexican manufacturing overall have declined by 13 percent since 1994. Manufacturing wages gained ground between 1987 and 1994 but collapsed as a result of the 1995 peso crisis. In real terms, wages in were 24 percent lower than in 1982 (Salas and Zepeda, 2003).

In keeping with the thrust toward low-cost/low-wage manufacturing, wages in maquilas are lower than in the manufacturing sector as a whole. Real wages in maquiladoras averaged less than 80 percent of wages in non-maquiladora manufacturing between 1987 and 1994 (Alcalde, Bensusan et al. 2000). Maquila wages have increased relative to non-maquila wages since 1994 but were still 14 percent below the non-maquiladora manufacturing wage in 2002 (INEGI, 2003). One study found that wage gains in Mexico have been the largest in those firms most exposed to international trade and investment (Hanson 2003). In other words, the one area where wage increases occurred in the 1990s was in the foreign enclave.

Those Mexicans who cannot find jobs and end up staying in Mexico comprise the country's large and growing informal sector of the underemployed. Official estimates of the percentage of economically active Mexicans in the informal sector range from 30 to 62.7 percent (INEGI, 2003).

## 2. INEQUALITY AND POVERTY

The failure of the manufacturing sector to generate employment means that the FDI-led strategy did little to reduce the gap between rich and poor in incomes and assets. A 2002 study found Mexico's Gini coefficient to be .50 by most measures, making it one of the most unequal societies in the world (Corbacho, 2002).<sup>4</sup>

In 2002, the richest 20 percent of Mexicans continued to marshal more than 50 percent of total income—slightly more than in 1984—while the poorest 20 percent continued to receive less than 4 percent, much the same as in 1984. While overall income inequality declined somewhat between 2000 and 2002, the decline is due to a 3 percent loss by the richest 10 percent of the Mexican population, stemming from the stock market crash. The other 90 percent gained by a mere .33 percent (authors' calculations based on INEGI, 2003).

Poverty remains widespread in Mexico. The Mexican government defines extreme poverty as households (consisting of 4.6 persons) whose incomes are between zero and two “minimum wages” per day. At current exchange rates, two “minimum wages” is approximately \$7.50, or \$1.60 per person. In other words, households in extreme poverty in Mexico earn less than two dollars each day. Poverty, on the other hand, is defined as households that earn between two and five minimum wages per day—or \$1.60 to \$4 per day per person.

According to official estimates by the Mexican government, the number of households in extreme poverty declined between 1984 and 1996 (the last available year). Between 1984 and 1996, extreme poverty decreased from 59 to 31 percent of the population and total poverty from 91 to 73 percent (Dussel, 2000).<sup>5</sup> However, these studies do not take into account the decline in purchasing power that has occurred over this period (see Figure 8). Adjusting for the real value of the minimum wage, Laos (2000) calculated that extreme poverty increased between from 30 to 38 percent of the Mexican population between 1984 and 1996, and total population in poverty increased from 58.5 to 79.5 percent.

With poverty comes marginalization. Although there has been some improvement since 1995, the percentage of the population in 2000 without a complete primary education remained at 28 percent, and without running water or electricity 11 and 5 percent respectively (CONAPO, 2003). By OECD standards, these percentages are very high.

### 3. INTERNAL AND EXTERNAL MIGRATION

The economic forces described earlier in this report are both “push” and “pull” factors that contribute to migration in Mexico. Some 730,000 Mexicans entered the economically active workforce each year between 1994 and 2002, totaling 6.5 million new entrants. Only 552,000 new jobs were created in the entire economy each year on average, leaving some 2.5 million people without employment.

Poverty and marginalization have generated increases in both external and internal migration in Mexico. In the 1990s, approximately 300,000 Mexicans migrated to the U.S. each year—compared to less than 200,000 per year in the 1980s (INEGI, 2002). There is also a great deal of internal migration. For example, more people left than came to Mexico City during that period.

Areas that attracted the most people are the industrial centers where FDI tends to agglomerate. Stimulating flows of migrants away from less productive rural areas toward urban areas with manufacturing was a stated goal of the Mexican government. People are leaving the poorest regions such as Oaxaca, Chiapas, and Guerrero and going to states such as Baja California, Chihuahua, and Tamaulipas. We confirmed this trend by conducting simple bi-variate regressions on the relationship between FDI and migration in Mexican states. For our regressions we asked the question: to what extent do increases in manufacturing growth or FDI correlate with net internal migration by state in Mexico?

For manufacturing, we found a very strong correlation between statewide manufacturing growth and net internal migration. For every 1 percent increase in manufacturing growth by

state, we found a corresponding increase in internal migration of 4 percent. In separate bi-variate regressions we found that FDI has a significant but fairly small positive relationship with net migration. We found that for every one dollar per capita increase in FDI in Mexican states there is a .35 percent (one-third of 1 percent) increase in migration to those states. In other words, FDI independently accounts for one-third of 1 percent of internal migration patterns in Mexico.

#### IV. CONCLUSION: TOWARDS SUSTAINABLE INDUSTRIAL DEVELOPMENT

In this paper, we examined the performance of Mexico's FDI-led integration strategy in the 1990s according to the objectives of nurturing "sustainable industrial development," which we defined in terms of growth of endogenous productive capacity, improved environmental performance of industry, and reduced inequality through growth in employment.

We found that, although FDI inflows and exports increased in the manufacturing sector, the strategy has apparently contributed little towards promoting endogenous productive capacity in Mexico. The reason is that it has generated a form of development in which the domestic economy is largely cut off from growth in the export sector. We also found that environmental performance has worsened because of scale effects and the inadequacy of the Mexican government's commitment to environmental regulation and that the strategy performed very poorly in terms of job growth. As a result, it did little to reduce inequality and seems to have exacerbated, rather than reduced, external migration.

What might be an alternative path? Given market tendencies toward economic globalization, as well as neo-liberal regional and global trade and investment rules and the proximity of the colossus to the north, what "room to move" does Mexico have in terms of charting a path towards sustainable industrial development?

A starting point would be to embrace sustainable industrial development as the centerpiece of a development strategy. This would mean, first of all, that the fundamental goal would be not to increase FDI per se but to improve the overall climate for domestic production and investment,

most importantly by domestic investors in domestic firms. To do so, the high domestic cost of capital must be reduced in a way that does not re-trigger inflation. Credit instruments designed specifically for micro, small, and medium sized firms could generate both employment and investment, through their linkages to locally-sourced inputs.

Second, a sustainable industrial development strategy would require a substantial increase in public and private investment in deepening and broadening Mexican capacities for innovation. Investment is needed in general education (primary through university), technical, engineering, scientific and business education, and industry-relevant research and development.

Third, the embrace of a sustainable industrial development strategy would mean looking to the domestic market as a basis for the growth of innovative and efficient firms and new products and services. For example, R&D should be directed not only towards generating globally competitive products and industries but also those designed for domestic markets.

Fourth, appropriate policies would need to maximize the potential for efficiency spillovers from FDI, especially via the development of local supply capacities. In the past, Mexico obtained FDI spillovers largely via export performance and domestic content requirements. These policies are now ruled out by the WTO and NAFTA. Tools consistent with current trade and investment rules include tax incentives for local investment of profits and/or job training, as well as direct government support for job training and skill acquisition programs (see OECD, 2003).

Fifth, a strategy aimed at sustainable industrial development would require a vigorous commitment to minimizing the environmental damage generated by industrial growth. This would entail investing financial resources in strengthening and enforcing environmental regulations, as well as working with firms to develop performance-based environmental management systems. Environmental objectives also need to be integrated into R&D strategies to promote the design of more eco-efficient processes, products, and services.

Sixth, a sustainable industrial development strategy would require reflection and debate on Mexico's overall industry strategy. What industries should Mexico nurture? Should it focus



primarily on labor-intensive sectors rich in local content? Does Mexico need to have global “cutting edge” capabilities in industries such as high tech or bio-tech, in order to gain a basic knowledge and technical base for the industries of the future—or should it focus on agro-industrial industries which build on its core agricultural strengths? And what kinds of industry development tools might be effective?

A debate about industry policy and indeed, development strategy, is already underway in Mexico. It is taking place against the backdrop not only of North American but larger hemispheric economic integration via the still-to-be-concluded Free Trade of the Americas Agreement (FTAA). Through a ban on performance requirements and domestic content laws, the FTAA would proscribe for all Latin American countries the use of tools which, in an earlier era, helped Mexico develop a manufacturing base. Yet, it is clear that the neo-liberal strategy followed in the 1990s has worked more to de-industrialize than to develop manufacturing capacity in Mexico. A fulsome alternative would require a restructuring of regional trade and investment rules to promote national capacities for development.

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## ENDNOTES

<sup>1</sup> Domestic demand is calculated as apparent consumption (value added plus imports minus exports).

<sup>2</sup> Criteria air pollutants are non-toxic air pollutants such as NO<sub>x</sub>, SO<sub>x</sub>, SO<sub>2</sub>, NO<sub>2</sub>, VOC, HC, all particulates, and carbon monoxide.

<sup>3</sup> The four criteria, which only cover company performance in the U.S., are: 1) whether the firm is engaged in gambling or the production of alcohol, tobacco, or nuclear power; 2) whether the firm derives more than 2 percent of its gross revenues from the sales of military weapons; 3) strengths and weaknesses in community relations, employee relations, workforce diversity, environment and human rights; and 4) product quality and safety.

<sup>4</sup> The Gini coefficient ranges from a value of 0 if a nation has perfect equality, to 1 if a nation is very unequal. European countries, among the most equal societies, have Gini coefficients in the .23 range, while Brazil, the world's most unequal society, has a Gini coefficient close to .60.

<sup>5</sup> These figures are sometimes interpreted as being at odds with World Bank figures on poverty in Mexico. In fact, the World Bank is working with the same data (official Mexican data) but deriving different measures from it. For international comparison, the World Bank determines the number of people that live on less than one dollar per day, and the number of people who live on two dollars per day. For 1998, the World Bank reports that 15.9 percent of the Mexican population lived on less than one dollar per day, and 37.7 percent lived on less than two dollars per day. Remember that the range for extreme poverty in Mexico is between zero and 1.6 dollars per day. Thus, the World Bank figures for two dollars per day should be slightly higher than Mexico's extreme poverty figures, which they are (37.7 percent for World Bank, 31 percent for Dussel).

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