

# **Integration, Productivity, and Inclusion in Mexico: A Macro Perspective\***

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## **1. Introduction**

Among the larger Latin American nations, Mexico stands out for attempting to escape the middle-income trap through a development strategy focused on economic integration. By joining the General Agreement on Tariffs and Trade (GATT, the predecessor to the World Trade Organization) in 1986, enacting the North American Free Trade Agreement (NAFTA) in 1994, and signing numerous other trade agreements since then, the Mexican government has transformed what was once a relatively closed economy into one of the world's most open and export-oriented ones. As a result of these trade policies and other, domestic reforms, Mexico has become one of the world's leading exporters of manufactured goods in general and of relatively advanced product categories in particular. Manufactures now account for about 80 percent of Mexican exports, and about three-quarters of these consist of machinery and equipment broadly defined—including large volumes of automotive and electronic products, and small but growing amounts of aerospace equipment, biotechnology products, and information technology. Mexican industries have become deeply integrated into global value (supply) chains, especially within North America and increasingly with East Asia and other world regions.

Yet, paradoxically, Mexico's stunning success in exports has been accompanied by a relatively low average growth rate of gross domestic product (GDP) over the past few decades, and the country has shown no signs of convergence with the United States and other industrialized countries in per capita income or labor productivity since it liberalized its international trade and foreign investment in the late 1980s. At the aggregate level, Mexico does not rank highly in international comparisons on a variety of key indicators of technological progress, such as patenting activity, research and development (R&D) expenditures, or

productivity growth. Moreover, the benefits of Mexico's export success do not appear to have been widely shared within the country, as the net employment gains in export industries have been disappointing and real wages in manufacturing have not increased significantly over the past two decades.

The incongruence between Mexico's export success and its lags in other indicators can be explained to some extent by the conceptual framework about technological innovation and economic catch-up proposed by Lee in his chapter in this book (see also Lee, 2013). As Lee observes, what ultimately drives increases in real wages and living standards is a sustained high rate of economic growth, which eventually exhausts the pool of surplus labor in a developing economy. Once real wages begin to rise, firms then have incentives to engage in innovative activities, aimed at raising the productivity of labor on the one hand and shifting industrial production toward goods that emphasize high quality over low cost on the other. In order to launch this process, a developing country should first emphasize growth by pushing exports of whatever products it has a comparative advantage in, usually unskilled labor-intensive manufactures. In these early stages of industrial development, inequality typically worsens as wage rates are initially low but productivity starts increasing. Over time, however, as increased industrial employment eventually pulls up wages and industries shift into more capital-intensive and technologically advanced directions, average living standards increase and the benefits of industrial development become more widely shared—but only if rapid growth is sustained over a long period of time instead of sporadic.

In the Mexican case, in spite of considerable success on the export front, the country has not had the kind of sustained rapid growth that is necessary to eliminate excess supplies of labor and raise real wages. Mexico's average GDP growth rate since it opened its economy in the late

1980s is less than 3 percent per year, compared with about 6 percent in the earlier epoch of import substitution industrialization policies, and notably less than what has been seen in the emerging market nations such as Korea and China in which real wages have increased dramatically. Mexico's slow average growth initially resulted from a series of boom-bust cycles and periodic crises in the 1980s and 1990s, but more recently has been the outcome of macroeconomic stabilization policies that have been designed to avoid crises but have done so by effectively restraining the accumulation of capital and growth of output in the domestic economy (Moreno-Brid and Ros, 2009; Ros, 2013). In addition, the growth stimulus that Mexico received from exports in the early post-liberalization and post-NAFTA years (1987-93 and 1994-2000, respectively) has been considerably dampened since 2001 (see Ibarra and Blecker, 2015). As a result of slow average growth, real wages have not increased, incentives for innovation have been blunted, and the gains from export success have not been widely shared.

Nevertheless, Mexico's openness to trade and its participation in global and regional value chains have led to significant industrial upgrading and the beginnings of local innovative efforts in certain segments of the economy. The days when labor-intensive apparel sweatshops were typical of Mexico's maquiladora export industries are gone; apparel factories and other low-skilled activities have largely moved on to lower-wage nations. As Mexico's exports have become concentrated in various types of machinery and equipment of increasing technological sophistication, its export industries have undergone a notable upgrading, resulting in rising skill levels and educational requirements for the labor force and—to a much more limited extent—nascent R&D activity within a subset of firms.<sup>1</sup>

Before proceeding further, it is important to acknowledge that Mexico's geographic proximity to the United States makes it a unique case among the major Latin American

countries. As a result of this proximity, Mexico's economic opening policies have resulted in a degree of economic integration with the United States that no other large Latin American nation would be likely to attain. Nevertheless, as shown by the comparative data presented in the chapters by Stallings and by Larrañaga and Rodríguez in this volume, Mexico is not so different from the major South American nations in terms of many indicators of social and economic development or educational attainment. Therefore, while taking Mexico's unique characteristics into account, an analysis of the Mexican case can help to reveal both the benefits and the costs of a strategy for breaking out of the middle income trap that is based heavily on trade liberalization and regional integration policies.

## **2. Trade and integration**

The growth of Mexico's manufactured exports since the country's economic opening in the late 1980s has been nothing short of stunning. Mexican manufactured exports grew (in real, inflation-adjusted terms) at an average annual rate of 14 percent in the first seven years of its trade liberalization policies (1987-93) and an even faster 16 percent annual clip during the first seven years of NAFTA (1994-2000).<sup>2</sup> Manufactures accounted for less than one-third of total Mexican exports in the 1960s and early 1970s (even including the nascent maquiladoras, which began to export in 1966), but averaged more than 80 percent of total exports during the entire post-NAFTA period (1994-2012) (Ibarra and Blecker, 2015).

As of 2012, the manufacturing share of Mexico's exports as reported by the World Bank was 74 percent, which placed Mexico in the first ranks of nations globally as a manufacturing exporter.<sup>3</sup> By this measure Mexico was very close to the European Union and Turkey, only

slightly behind Korea, and ahead of India and the United States—and far above the Latin American and Caribbean average or the larger South American countries. Indeed, Mexico's share of manufactures in total exports was higher than that of four out of the five BRICS countries (only China's share was higher, but China is a natural resource scarce country that exports relatively few primary commodities).

However, while Mexico has remained highly specialized in manufactured exports to date, the growth of these exports has slowed down notably since 2001: the average growth rate of manufactured exports in 2001-12 was only 3 percent in real terms, during a period of slower growth in Mexico's primary export market (the United States) and increased Chinese penetration of that market (Ibarra and Blecker, 2015). A similar pattern of dynamic export gains for Mexico in the early years of trade liberalization and NAFTA followed by a slowdown after 2001 is found in the data on bilateral U.S.-Mexican trade (see Table 1). U.S. nonpetroleum imports from Mexico grew at a remarkable 25.2 percent annual rate (in real terms) between 1993 and 2000.<sup>4</sup> At the same time, the share of Mexico in total U.S. nonpetroleum imports increased from 6.7 percent in 1993 to 11.4 percent in 2000.

The initial success and subsequent slowdown of the regional integration process are also visible in the post-NAFTA Mexican trade data.<sup>5</sup> The U.S. share of total Mexican exports rose from an already high 82.7 percent in 1993 to 88.7 percent in 2000, while the U.S. share of total Mexican imports increased from 69.3 to 73.1 percent between the same two years. Thus, the intensity of Mexico's intra-regional trade within North America increased significantly during the early years of NAFTA. During the 2000-7 period, however, the average annual growth rate of U.S. nonpetroleum imports from Mexico slowed to only 5.6 percent, while the growth rate of U.S. imports from China (all of which are nonpetroleum) was almost four times higher at 20.4

percent.

[Table 1 about here]

As a result of this slowdown, the Mexican share of U.S. nonpetroleum imports remained roughly constant (11.3 percent in 2007 versus 11.4 percent in 2000), while the Chinese share more than doubled from 9.1 to 19.7 percent between 2000 and 2007 (see Table 1). Mexico held its position in the U.S. market better than most other nations at that time, because the jump in China's share during this period came more at the expense of other countries rather than Mexico. Nevertheless, numerous studies using a variety of methodologies have shown that significant amounts of potential Mexican exports were displaced by competing Chinese products in the U.S. market, implying that the Mexican share would likely have grown notably larger in the absence of the extraordinary growth of Chinese exports to the United States during that period.<sup>6</sup>

Perhaps the most dramatic sign of a post-2000 decline in North American regional integration was the drop in the U.S. share of Mexican imports from 73.1 percent in 2000 to 49.5 percent in 2007. During the same period, the Chinese share of Mexican imports jumped from 1.7 to 10.6 percent and the other Asian share increased from 10.0 to 17.6 percent. In contrast, the U.S. share of Mexican exports dipped more modestly from 88.7 to 82.1 percent between 2000 and 2007, so Mexico continued to be highly dependent on the U.S. market for its export sales. It should be noted that the reduced export dynamism and decreased regional (North American) integration in 2000-7 occurred—with suitable allowance for lagged effects—following a prolonged period of real appreciation of the peso in the late 1990s and early 2000s (see Figure 1).

[Figure 1 about here]

Mexican exports performed relatively better during the most recent phase (2007-13), largely because a depreciated peso (especially relative to the Chinese yuan) combined with rising

global fuel and transportation costs made Mexico once again a more competitive location for industrial production (so-called “reshoring”). As shown in Table 1, overall U.S. nonpetroleum imports grew very slowly (only 1.5 percent per year) in this period as a result of the Great Recession and the slow recovery thereafter, but imports of such goods from Mexico grew faster than this average rate and slightly faster than imports from China (4.4 percent for Mexico versus 4.3 percent for China). Also in this last phase, the U.S. share of total Mexican imports remained around 49 percent while the Chinese share rose further from 10.6 to 16.1 percent, and the U.S. share of Mexican exports continued to decline gradually (to 78.8 percent, the lowest level since the adoption of NAFTA). Thus, Mexico’s efforts to diversify its export markets via other trade agreements have begun to bear some modest fruit, but the reduction in the U.S. share of Mexican exports could also be partly a result of the slowdown in U.S. economic growth in this period.

Overall, the data reveal a striking shift in Mexico’s pattern of international integration since around 2000. When Mexico originally opened up its economy and joined NAFTA, it initially developed a heavily regional or bilateral pattern of trade within North America: Mexico imported mostly U.S.-produced capital and intermediate goods, and exported assembled products manufactured with these inputs back to the U.S. market. Since 2000, however, Mexico has exhibited more of a triangular pattern of trade, in which its imports come increasingly from East Asia while its exports are still sold mainly in the United States.

In spite of this geographic shift in Mexico’s trade pattern, NAFTA does appear to have resulted in a lasting increase in the integration of the country’s industrial production with that of the United States. The correlation coefficient for the growth rates of the two countries’ monthly indexes of industrial production (shown in Figure 2) was only 0.23 for the period 1981-93, prior to NAFTA, but rose to 0.59 percent in 1994-2013 after NAFTA went into effect, even including

the years of the peso crisis and recovery.<sup>7</sup> If we focus on the years after NAFTA *and* the recovery from the peso crisis, this correlation increased further to 0.83 in 1997-2013. Given the much larger size of the U.S. economy, we can infer that the Mexican industrial sector derives its dynamism mainly from the U.S. industrial sector and not vice-versa.

[Figure 2 about here]

The high correlation of Mexican and U.S. industrial production is consistent with the incorporation of Mexican industries into global and regional value chains targeted mainly at the U.S. consumer market. Further evidence of Mexico's incorporation into international value chains comes from its high degree of reliance on imported inputs (parts and components) for its export production. Ibarra and Blecker (2015) estimate that the elasticity of imports of intermediate goods with respect to manufactured exports is about 0.6 to 0.7, implying that for every 10 percent increase in Mexico's manufactured exports, imports of intermediate goods rise by about 6 to 7 percent. Furthermore, Mexico's exports are highly concentrated in industries in which global value chains are prevalent. As of 2012, about 76 percent of Mexico's manufactured exports consisted of transportation equipment (principally automobiles and auto parts), computers and electronic products, and other machinery and equipment. Most of the export growth in recent years has occurred in transportation equipment, which expanded by a remarkable 52 percent (in chained 2009 dollars) between 2007 and 2012.<sup>8</sup>

Deeper industrial integration with the United States turned out to be a boon for Mexico in the late 1990s. In the period 1997-2000, after the recovery from the peso crisis, the two countries' average annual growth rates of industrial production were almost identical, at 5.3 percent for the United States and 5.4 percent for Mexico. However, during the 2001-13 period, average annual industrial growth dropped to 0.7 percent per year in the United States and 1.2

percent in Mexico. Moreover, as Figure 2 shows, this slowdown in industrial growth began even before the Great Recession of 2008-9. Thus, the integration of Mexican industries into North American supply chains has continued to date, but has proved to be much less beneficial for Mexico since U.S. industrial growth slowed down in the early 21<sup>st</sup> century.

### **3. Productivity and innovation**

In spite of Mexico's relative success on the export side, its productivity growth has continued to lag behind many other major emerging market nations. Figure 3 compares the annual average growth rates of real GDP per employed person, in constant 1990 purchasing power parity (PPP) dollars, for a sample of emerging market nations from Asia and Latin America for the period 1990-2012. Mexico's productivity growth rate of only 0.8 percent per year ranks near the bottom among this group of comparator countries. However, Mexico's low average growth rate of productivity for total GDP is partly a reflection of the shift of labor into services, in which productivity grows more slowly (or has been falling, depending on the time period examined),<sup>9</sup> especially because a large portion of Mexican services production is in the informal sector in which productivity is low and slow-growing.

[Figure 3 about here]

In order to compare productivity growth rates for the trade-related parts of GDP, we also present data in Figure 3 for the manufacturing sector.<sup>10</sup> As expected, Mexico's growth rate of labor productivity (real value added in constant pesos per employed worker) in manufacturing is higher than for overall GDP (2.1 versus 0.8 percent per year). However, productivity growth is higher for manufacturing than for overall GDP in most of the countries shown, so Mexico

remains toward the lower end of the sample. Among the 16 countries included in this database (which includes Taiwan but excludes China), Mexico is ahead of only three countries (the Philippines, Brazil, and Colombia) in manufacturing productivity growth and behind the other 12 covered (the highest of which, Korea, registers 8.5 percent annually).

Although Mexico's average productivity growth is thus quite disappointing, the growth rate of productivity for the whole economy masks considerable unevenness between different segments of the country's highly dualistic economy. According to an analysis of Mexican economic census data for the period 1999-2009 by Bolio et al. (2014),<sup>11</sup> real value added per occupied person (in constant 2003 pesos) grew at a 5.8 percent annual rate in large firms (those with more than 500 employees), a 1.0 percent annual rate in medium-size firms (11-500 employees), and a -6.5 percent annual rate (i.e., there was falling productivity) in small firms (10 or less employees). The last group of firms, most of which can probably be considered informal enterprises, accounted for 42 percent of total employment in this sample in 2009 (up from 39 percent in 1999), while large firms accounted for only 20 percent (the same as in 1999). Thus, as of 2009 the vast majority (80 percent) of the nonagricultural private labor force was working in firms that had either mediocre or negative productivity growth during the preceding decade. This accounts for why the overall average growth rate of productivity (0.8 percent for all firms covered in these economic censuses) is so low, but it also shows that there is a modern segment of the Mexican economy in which productivity growth is quite rapid.

Whereas Bolio et al. (2014) analyze labor productivity in all nonagricultural firms (and hence include services and other industries, such as transportation, mining, and utilities, in addition to manufacturing), an earlier study by López-Córdova and Moreira (2004) focused on total factor productivity (TFP) in the manufacturing sectors of Mexico and Brazil. For Mexico,

this study found that “all firm-level gains [in TFP] occurred in traded industries, as productivity in firms in nontraded industries actually declined”, and that the reallocation of resources toward traded goods production contributed significantly to aggregate TFP gains in manufacturing (López-Córdova and Moreira, 2004, p. 589). The authors also found that “foreign firms were 13 percent more productive than their local counterparts in Mexico”, after controlling for other industry characteristics (p. 598). López-Córdova and Moreira did not find that exporting *per se* or the use of imported inputs contributed significantly to productivity growth (in fact the latter had a negative effect on TFP growth for foreign firms). However, they concluded that exporting selects for the more productive firms (i.e., the more productive firms are the most successful in exporting, and hence grow faster than other firms), and that the resulting reallocation of resources toward such firms increases average productivity and the average TFP growth rate in manufacturing.

Turning to innovation, at the aggregate level Mexico’s R&D expenditures are only about 0.5 percent of GDP, which puts the country well behind the leading emerging market nations such as Korea and China as well as the advanced industrialized countries, and Mexico also does not rank highly in patenting activity (see the chapter by Stallings in this volume). At the micro level, there is evidence of a small but increasing amount of technological innovation being conducted by firms inside Mexico (see Carrillo and Gomis, 2014), but thus far this activity has had little impact on the aggregate statistics for either innovative activity or productivity growth. One important reason for this lack of an aggregate impact is the dualism discussed above: the vast majority of the smaller, low-productivity firms are incapable of innovating; mostly the larger ones and perhaps a few of the smaller or medium-sized ones have the potential to be able to innovate. However, even among the larger firms and multinational corporations (MNCs), the

vast majority are not currently engaged in innovative activities. The survey of MNCs in Mexico discussed by Carillo and Gomis (2014), which includes both foreign and domestically owned firms, shows that only 28 percent are conducting innovation in Mexico while 72 percent are not.<sup>12</sup> Trade liberalization and economic integration have induced Mexican producers to focus on upgrading their production facilities and product quality, but this upgrading has been accomplished primarily through the adoption of foreign technology rather than through domestic innovative efforts (Carrillo et al., 2012).

Another important factor limiting domestic innovative activity is that government policies designed to promote R&D in Mexico are both recent in time and still limited in scope and budget. According to Villavicencio (2012, pp. 35, 43; author's translation), "Innovation policy as such in Mexico began only about a decade ago.... It is only in the new millennium that there appear policies to promote innovation in firms, as well as to stimulate private investment in R&D and the cooperation of firms with academic institutions and public centers of research". As an example, Villavicencio documents how one new institution, the federal Fondo Sectorial de Innovación (created in 2002), has funded R&D activity in various sectors, but has failed to increase its efforts significantly over time as a result of both budget constraints and a limited pool of eligible proposals. Because of the limited extent of the innovative efforts to date as well as the long lags involved in achieving measurable gains in productivity from innovative activities, it is too soon to judge what kind of aggregate impact these activities may have in the long run.

To conclude, there is a significant segment of the Mexican economy that is modern and dynamic, with high and rising productivity; this segment consists mainly of the larger firms and perhaps a small portion of the small- and medium-sized ones, and within manufacturing is

primarily oriented toward exports and dominated by foreign MNEs. In this sense, Mexico's economic opening strategy and its increasing integration into regional and global value chains have been successful in creating industries that are globally competitive and technologically progressive. However, this segment of the economy has not yet grown large enough to encompass more than one-fifth of the private, nonagricultural labor force, and only a subset of the modern segment of the economy is engaged in truly innovative activities. As a result, the average growth rates of productivity for the entire economy and for the manufacturing sector as a whole remain disappointingly low.

#### **4. Inclusion: employment, wages, and convergence**

One of the main objectives of Mexico's trade liberalization and economic integration strategy was to boost employment and wages in the country's industrial sector. This set of objectives was famously enshrined in President Carlos Salinas' twin promises that NAFTA would enable Mexico to "export goods not people" and transform the country into a first-world nation (which presumably would imply absolute, unconditional convergence in per capita income and real wages). Of course, the flow of migration to the United States did not diminish, and if anything probably accelerated in the first decade after NAFTA (Hanson, 2006); it has slowed since then mainly as a result of increased U.S. enforcement of immigration restrictions and slower growth in the U.S. economy. In this section, we focus on the domestic outcomes in the Mexican labor market and income distribution (see the chapter by Deyo for comparisons of Mexico with East Asian countries).

#### 4.1 Employment

Because manufactures account for the vast majority of Mexico's exports, we focus on manufacturing employment here. Figure 4 pieces together the best available data for employment in the manufacturing sector of Mexico between 1988 and 2013. Total employment in Mexican manufacturing grew by about 900,000 jobs in the first five years of NAFTA (comparing the economic census figures for 1993 and 1998), and probably about 1 million in the first seven years.<sup>13</sup> Although that was impressive growth in employment at the time, the number of manufacturing jobs in Mexico shrank by about 500,000 after 1998, leaving a net increase from 1993 to 2013 of only about 400,000. Given that the Mexican labor force has increased by about 950,000 per year throughout the past two decades,<sup>14</sup> we can see that the long-term net increase in manufacturing employment since NAFTA has amounted to less than half of one year's increase in the size of the Mexican labor force, and hence has made only a small dent in the country's long-term employment needs.

[Figure 4 about here]

In relation to the composition of manufacturing employment, it is important to note that the activities that account for the lion's share of Mexico's manufactured exports do not represent a majority of its manufacturing employment. As noted earlier, three sectors (transportation equipment, computers and electronic products, and other machinery and equipment) accounted for 76 percent of manufactured exports in 2012, but these same sectors accounted for only 40 percent of manufacturing employment as of 2013.<sup>15</sup> Paradoxically, and in spite of Mexico's reputation for specializing in labor-intensive exports, the most successful export industries are apparently *less* labor-intensive than the industries that produce mainly for the domestic market

(see also Ruiz Nápoles, 2004).

The disjuncture between exports and employment also reflects the industrial dualism discussed earlier. Bolio et al. (2014) identify the manufacturing sector with the largest amount of employment (food and beverages) as one characterized by a very large number of extremely small and low-productivity firms, most of which do not export. Indeed, the only manufacturing sector in which employment has increased since 2007 is transportation equipment; employment in all other sectors has either held steady or actually fallen, with the biggest decreases registered in textiles and apparel products and computers and electronic products—both of which are sectors subject to intense competitive pressures from lower-wage countries in Asia and Central America.

There are several reasons why the employment gains from manufacturing exports have been disappointing. First, although the gross value of Mexico's exports has increased dramatically, a large portion of the increase consists of products assembled from imported intermediate goods (parts and components), leading to relatively little value added and few backward linkages to other domestic industries. The maquiladora plants are the most extreme case, as imported intermediate inputs on average accounted for more than three-quarters of the gross value of their exports (and hence value added was less than one-quarter) throughout most of the period from 1990 to 2006 (the last year for which separate data for the maquiladoras were reported). But the maquiladoras produced more than half of Mexico's manufactured exports during those years and accounted for most of the employment growth shown in Figure 4. As noted earlier, Ibarra and Blecker (2015) estimated that imports of intermediate goods have an elasticity of about 0.6 to 0.7 with respect to manufactured exports in Mexico. Since these estimates are for total manufactured exports and total intermediate imports (both maquiladora

and non-maquiladora), they suggest a very high dependency of all manufactured exports on imported intermediate inputs and a correspondingly low proportion of value added in those exports.<sup>16</sup>

Second, although Mexico has achieved large bilateral surpluses in goods trade with the United States, reaching \$112 billion in 2013, these bilateral surpluses are entirely offset by similarly large deficits with other countries (led by a \$101 billion deficit with Asia, of which \$55 billion was with China alone, plus a \$25 billion deficit with Europe),<sup>17</sup> so that Mexico gets no net stimulus to aggregate demand from its trade overall. Moreover, on a multilateral basis Mexico has a significant trade deficit in manufactures, offset mainly by a surplus in petroleum (Moreno-Brid, 2013). In 2013, Mexico had a deficit of -\$12.0 billion in manufactures, offset by surpluses of \$8.7 billion for petroleum products and \$2.3 billion for other primary commodities (agricultural and mineral, except petroleum).<sup>18</sup> Thus, contrary to the conventional view that Mexico is a natural resource scarce country, it is actually a net exporter of natural resources and a net importer of manufactures (thus more like the major South American nations than may otherwise be apparent). In any event, Mexico's trade deficit in manufactures signifies a net transfer of industrial employment to other countries, especially the Asian nations that supply Mexico with increasing proportions of its imports.

Third, contrary to the conventional view that Mexico's comparative advantage lies in less-skilled labor, the industries that have grown the most in the long term are ones that emphasize highly skilled rather than unskilled labor. Mexico's export industries have experienced a significant quality upgrading since trade liberalization, NAFTA, and the peso crisis, leading to rising demand for more educated workers (see, among others, Esquivel and Rodríguez-López, 2003; Verhoogen, 2008). Revenga and Montenegro (1998, p. 313) observed

that, “Since 1985, the largest increases in Mexico’s net exports have occurred in fairly capital-intensive industries such as transport equipment and nonelectrical machinery”, and this trend has continued to date. The export industries that are most intensive in less-skilled labor, such as apparel, have largely left Mexico for lower-wage locales in Asia or Central America, while the most successful export industries, such as electronics and transportation equipment, require more education and training for their workers. This industrial upgrading and the associated increases in skill requirements contribute positively to the long-term development of the Mexican economy, including its capacity for innovation, but have nevertheless meant that the net increases in manufacturing employment associated with exports have been much more limited than were expected as a result of trade liberalization and NAFTA (similar to what Deyo observes in the employment trends in Korean manufacturing in his chapter).

Finally, Mexico’s slower rate of industrial growth and its loss of U.S. market share to China since 2001, discussed earlier, have contributed to the absolute decline in manufacturing employment after that time. Even though Mexico’s labor productivity in manufacturing has grown more slowly than that of many other countries, it has still grown faster than industrial output since the early 2000s (roughly two percent versus one percent), resulting in a tendency for manufacturing employment to fall. Thus, it is no wonder that manufacturing employment in 2013 was still about a half million below its peak from around 2000.

#### *4.2 Wages and inequality*

One consequence of the upgrading of Mexico’s industrial structure was a significant increase in the wage premium for more skilled workers in the early years after trade

liberalization and NAFTA. The best measure of the skill premium that is available for the manufacturing sector (where the impact of trade is greatest) is the ratio of the salaries of nonproduction workers to wages of production workers (both measured on an hourly basis).<sup>19</sup> This ratio increased sharply from about 2:1 in 1987 (the year after Mexico joined GATT) to about 3:1 in 1996, and then diminished gradually to about 2.6:1 in 2013 (thus remaining substantially above its 1987 level). Similarly, Hanson (2004) found that wages increased relatively more for the more educated strata of the labor force in a comparison of broader population census data for 1990 and 2000.

The increase in wage inequality in the late 1980s and early 1990s was unexpected at the time, because most analysts expected *ex ante* that Mexico would specialize in industries that were intensive in less skilled labor. Since then, several explanations have been offered for the rising skill premium. Cragg and Epelbaum (1996) and Esquivel and Rodríguez-López (2003) argued that Mexico was experiencing skill-biased technological change that increased the relative demand for skilled labor. Revenga and Montenegro (1998) and Hanson and Harrison (1999) found that Mexico's tariff reductions after it joined GATT and NAFTA were greatest for products that were more intensive in less-skilled labor. Their findings suggested that trade liberalization reduced the rents that unskilled workers had been able to obtain previously in highly protected industries.

Feenstra and Hanson (1997) developed a model of U.S.-Mexican offshoring in which U.S. industries outsource the least skill-intensive operations in their supply chains to Mexico, but those operations are relatively high skill-intensive compared to the pre-existing industrial activities in Mexico. Such offshoring results in a rise in the average degree of skill intensity in both countries, leading to a rise in relative demand for more skilled labor and increasing wage

inequality in both. According to Verhoogen (2008), the peso depreciation of 1994-95 added an additional shock that induced further “quality upgrading” in Mexican industries. Essentially, the depreciation led to more rapid expansion of the more efficient and higher quality firms in export markets, which in turn led to greater wage increases within these firms compared to other firms and relatively greater wage increases for white collar workers compared to blue collar workers, and hence contributed to a rise in within-industry wage inequality.

In contrast, the more gradual decline in the skilled wage premium since 1997 appears to be largely unrelated to Mexico’s international trade. Esquivel et al. (2010) and Lustig et al. (2013) show that this decline can be attributed mainly to an increase in the relative supply of more educated workers, which more than offset the rising relative demand so that the rate of return to higher education diminished in the early 2000s. Nevertheless, wage inequality still increased in the long run, as the post-1997 decline in the skill premium was much less than the previous increase. This implies that the wage gains from trade liberalization and export growth have still been skewed toward the more highly educated and relatively better-off workers. For those workers who have the requisite education and training, the gains have helped to propel them into the rising Mexican middle class. But for the larger numbers of workers who lack the requisite skills, trade liberalization has failed to bring the promised benefits—and has left many of them to seek other solutions such as emigration or employment in low-productivity informal activities.

In addition to rising wage inequality between more and less skilled (or educated) workers, Mexico also experienced a widening of other social gaps in the years following its trade liberalization. Several studies have found that wage gaps between different regions of the country increased, with workers in the northern and border regions (where export industries and

foreign direct investment are concentrated) doing relatively better than those in the central and southern regions (Hanson, 2004; Borras and López-Córdova, 2007; Chiquiar, 2008). The latter two studies also provide an important qualification to the finding of increased wage inequality: they find that the increase in the skilled wage premium was relatively smaller in the northern and border states than in the rest of the country. This latter finding could be a result of low-skilled workers losing the most from globalization in the regions of the country that had less participation in exports and more exposure to the negative side of globalization (for example, cheap imports of basic foods and other consumer goods displacing local production). Also, Borras and López-Córdova (2007) found that less-skilled women workers did relatively better in the northern and border states than workers in the rest of the country as a result of globalization forces. Altogether, this evidence suggests that the benefits of export activity and globalization were very uneven and were concentrated in certain regions and groups, while other regions and groups either did not share in the gains or actually felt the brunt of the losses (for example, the losses to Mexican farmers caused by subsidized and dumped imports of U.S. corn, as analyzed by Wise, 2010).

Regardless of the shifts in relative wages between different groups of workers since trade liberalization, overall average real wages in Mexican manufacturing have stagnated since those policies were adopted. As shown in Figure 5, real compensation per hour fluctuated cyclically in the aftermath of the debt crisis in the 1980s, then fell after the peso crisis of 1994-95, and eventually (by around 2003) recovered from the latter. However, as of 2013 real hourly compensation had barely recovered to its previous peak level of 1994, when NAFTA went into effect, and still remained below its historical peak level of 1981. Hanson (2004, p. 515) noted that the real wage fell for both genders in his comparison of data from the 1990 and 2000

population censuses: “When deflated by Mexico’s consumer price index (CPI), the average hourly wage in 1990 dollars declined for males from \$1.33 to \$1.11 and for females from \$1.24 to \$1.13”. Thus, *all of the changes in relative wages for different categories of workers discussed here have taken place around a long-run trend for average real wages that is at best flat, and at worse slowly declining*; on the whole, labor simply has not gained much either in real earnings or in employment from the tremendous expansion of exports of the past few decades.

[Figure 5 about here]

The overall distribution of income in Mexico is, of course, better measured by inequality at the household level rather than by wages for industrial workers alone. Gini coefficients and other standard indicators generally showed rising inequality from the 1980s through the mid-1990s (i.e., during the debt crisis and early years of trade liberalization), and then decreasing inequality in the late 1990s and early 2000s—with somewhat of a reversal after the recession of 2008-9. The period of rising inequality coincided with the country’s opening to trade and the increase in the skilled wage premium. The decrease in inequality in the late 1990s and early 2000s appears to have been caused mainly by domestic factors. Esquivel et al. (2010) and Lustig et al. (2013) attribute this decrease in inequality mainly to increased progressivity of fiscal policies (especially on the expenditure side, including new transfer programs) and the increase in the relative supply of skilled labor due to rising education levels (as discussed above).

The evidence of declining inequality in the late 1990s and early 2000s should be taken with caution, however, because the Gini coefficients are based on data sources that do not allow the separate computation of the income of the super-wealthy (top one percent or higher). Guerrero et al. (2009) show that Mexico has a relatively high ratio of billionaire’s net worth to GDP compared to other low and middle-income countries, and that this ratio was sometimes

increasing in periods (such as 2003-6) when conventionally measured Gini coefficients were falling. Guerrero et al. also show that billionaire-controlled companies have disproportionate political influence and are more able than other firms to win favorable rulings from the government agencies that are supposed to regulate them.

#### *4.3 Convergence*

Given the ambitious goals that Mexico set for its economic integration strategy, an important measure of inclusion (or the lack thereof) is the degree to which that strategy has enabled the country to achieve convergence in average living standards with its neighbor to the north. Unfortunately, however, there has been no convergence in either per capita income or labor productivity between Mexico and the United States since the former liberalized its trade and joined NAFTA. Figure 6 shows three measures of Mexico's labor productivity and per capita income, all taken from the most recent version (8.0) of the Penn World Tables (PWT) and measured as percentages of their respective U.S. levels at PPP.<sup>20</sup> All of these measures generally improved during the era of import substitution policies between the 1950s and the 1970s, indicating that Mexico was converging with the United States during those decades, although the relative productivity measures stagnated in the 1970s and the final increases in these measures (especially per capita income) around 1980 were associated with the unsustainable oil boom and debt build-up which occurred at that time. All three measures collapsed during the debt crisis of 1982-86, and fell again during the peso crisis of 1994-95.

[Figure 6 about here]

Of course, divergences that occurred as a result of macroeconomic crises cannot be

blamed on economic integration. Nevertheless, there is no evidence of a long-term increase in Mexico's relative productivity or per capita income compared to the United States since the country's initial trade liberalization (recall that Mexico joined GATT in 1986) or the formation of NAFTA (1994). On the contrary, as of the last year for which data are available (2011), Mexico's per capita income was no higher relative to the U.S. level than it was in the early 1990s prior to NAFTA, and its relative labor productivity was lower than in the pre-NAFTA years. Even more distressingly, by 2011 all the convergence that Mexico had achieved between 1950 and 1980 had been completely reversed; its labor productivity was a smaller percentage of the U.S. level than in 1950, and its per capita income was about the same percentage of the U.S. as in 1950 (around 30 percent). Similarly, there has been no convergence of Mexican wages toward U.S. levels in the past few decades. In 1993, the year before NAFTA went into effect, the average Mexican production worker in manufacturing earned 18 percent of the hourly compensation of a typical U.S. production worker; by 2012 (after various fluctuations in-between), this percentage had fallen to 16 percent.<sup>21</sup> Economic integration has thus not sufficed to revive the process of convergence since the reversals caused by the financial crises of the 1980s and 1990s.

## **5. Conclusions**

After a generation of focusing on trade liberalization policies, Mexico has established itself as a leading exporter of manufactured goods and a key link in global value chains, especially those targeted on ultimate sales to the U.S. market. However, the slow growth of the U.S. market and increasing Chinese penetration of that market have limited the expansion of

Mexican exports since 2001, in spite of some gains from a lower peso in the last few years. Furthermore, the broader benefits of this export success have been attenuated by various factors, including heavy reliance on imported inputs, exchange rate fluctuations, limited job creation, regional concentration of industries within Mexico, and a relatively low level of R&D activity at a national level. As a result of these limitations and other factors, median real wages in manufacturing have not increased significantly in the last two decades, while millions of Mexican workers have migrated to the United States in search of jobs at higher wages. Contrary to initial expectations, the greatest gains in employment and wages within the manufacturing sector have accrued mostly to the more highly educated workers, while total employment in that sector has decreased since it peaked around 2000.

The Mexican case thus suggests caution in relying upon trade liberalization and economic integration policies by themselves to foster more rapid economic growth and more inclusive development. Undoubtedly, such policies do boost trade, and they can also lead to upgrading of the industrial structure, increased productivity in the exporting firms, and eventually—with assistance from public policy—the birth of domestic innovative activities. Nevertheless, there are no automatic linkages from these sorts of gains to broader gains in aggregate growth and welfare, and the gains that are reaped (as well as any costs or losses) may be very unequally shared. This does not mean that countries like Mexico should not open their economies, promote exports, or seek to become a part of global value chains, but it does mean that the outcome of such efforts—especially the inclusivity of the gains—depends on the entire package of policies that accompanies the opening of trade at both the micro and macro levels.

A good example of the need for a more integrated and comprehensive policy approach is found in the frequently cited area of education. The overwhelming evidence of increased relative

demand for more skilled labor in the modern and successful firms makes it imperative for Mexico to focus on educational reforms that can improve the quality of basic (primary and secondary) education and enhance access to tertiary education, especially in the technical fields. Nevertheless, the fact that returns to higher education began to fall after the supply of more highly educated workers increased in the late 1990s and early 2000s suggests that merely expanding and improving education is not sufficient. Unless the demand for more educated labor keeps pace with the supply, the returns to higher education will diminish and the incentives to seek it will fall. Moreover, in the absence of adequate employment opportunities at rising wages domestically, some highly educated workers will seek to migrate abroad where they can earn higher incomes.<sup>22</sup> Therefore, policy makers need to be just as concerned about boosting the demand for skilled labor through measures that can attract and retain more high-technology production as they (rightly) are about boosting the supply of such labor through educational policies.

One key condition for attracting and keeping globally mobile industries is maintaining a competitive exchange rate, which Mexico has not done consistently throughout the period since it liberalized its trade. Much recent research has found that competitive exchange rates are a vital ingredient in achieving and sustaining rapid growth in emerging market nations (see, for example, Hausman et al., 2005; Rapetti et al., 2012). Berg et al. (2012) find that avoiding exchange rate overvaluation is especially important for maintaining a long duration of rapid growth. Blecker and Razmi (2008) stress the importance of exchange rates between a given emerging market nation like Mexico and other rival emerging market nations like China. This chapter has show that Mexico's exports have exhibited the best performance (controlling for other factors) when the peso was at a competitive level, while exports have grown more slowly

when the peso has been overvalued.

Recognizing the centrality of a competitive exchange rate also points to the need for more accommodative and pro-growth macroeconomic policies in general. Although a full discussion of macro policies would be beyond the scope of this chapter, it seems clear that unleashing Mexico's growth potential requires a renewed emphasis on the demand side as well as on the supply side.<sup>23</sup> Mexico needs a better balance of internal and external sources of demand than it has had in the past—either under the import substitution regime of the 1940s to the 1970s, when the economy was largely closed to trade and growth was mainly internally oriented, or under the trade liberalization regime since the late 1980s, in which the economy is wide open and growth is mainly dependent on the dynamism of exports and other external factors (Blecker, 2009). Redistributive policies that would further boost the incomes of the nascent middle class and social inclusion policies that would bring informal sector workers into the formal modern economy are essential for providing the domestic demand growth that Mexico needs to accompany its export promotion efforts.

Fortunately, rather than facing a conventional equity-efficiency trade-off, Mexico is in a position in which enhancing inclusion and promoting growth can potentially go hand in hand.<sup>24</sup> Higher wages and income levels, in addition to boosting domestic demand, would also foster incentives to innovate. In addition, the country needs increased investment in public infrastructure, improved provision of credit to the private sector (especially for small and medium-size firms), and expansion of the innovation policies that promote domestic R&D efforts. Ultimately, the goal should be to achieve a “virtuous circle” of rapid and balanced growth in which real wages rise in tandem with increasing productivity. Mexico needs to work on all these fronts to achieve its economic potential and foster the inclusive growth that past

reforms and integration efforts have promised but not delivered.

## Endnotes

<sup>1</sup> See Esquivel and Rodríguez-López (2003), Verhoogen (2008), Carillo et al. (2012), and Carillo and Gomis (2014), among many others.

<sup>2</sup> Data from Ibarra and Blecker (2015), who took the export data from the Mexican Instituto Nacional de Economía y Estadística (INEGI, [www.inegi.org.mx](http://www.inegi.org.mx)). Nominal exports in U.S. dollars were converted to real volumes of exports using the U.S. producer price index for industrial commodities from U.S. Bureau of Labor Statistics (BLS), [www.bls.gov](http://www.bls.gov).

<sup>3</sup> This figure for 2012 is taken from the World Bank's *World Development Indicators* (WDI) online database, and is used for international comparative purposes. According to the Mexican data source (INEGI) cited in the previous note, the figure was closer to 80 percent.

<sup>4</sup> We focus on nonpetroleum imports here to make the Mexican share more comparable to the Chinese share, because China does not export petroleum to the United States. Growth rates are computed using real nonpetroleum imports at chained 2009 prices.

<sup>5</sup> The Mexican trade data discussed here are drawn from Blecker (2014a, 2014b), who in turn obtained the data from INEGI.

<sup>6</sup> See, among others, Gallagher et al. (2008), Feenstra and Kee (2009), Hanson and Robertson (2009), and Dussel Peters and Gallagher (2013).

<sup>7</sup> Correlation coefficients and growth rates for industrial production are author's calculations from the same data sources given for Figure 2. I am indebted to Gerardo Esquivel for suggesting this way of analyzing Mexican-U.S. economic integration and for supplying historical data for Mexico.

<sup>8</sup> Author's calculations based on data from INEGI and the U.S. Bureau of Economic Analysis (BEA, [www.bea.gov](http://www.bea.gov)).

<sup>9</sup> Based on data from Timmer and de Vries (2007), labor productivity in Mexican services fell from 60 to 38 (in thousands of constant 1993 pesos per employee) between 1971 and 1995, and then increased but only to 43 (in the

same units) from 1995 to 2005.

<sup>10</sup> Data on productivity at the sectoral level for 16 Asian and Latin American nations were obtained from the Groningen Growth and Development Centre (GGDC) 10-Sector Database, which applies a common methodology to all countries—but, unfortunately, provides data only through 2005. The methodology is described in Timmer and de Vries (2007); the data are available at <http://www.rug.nl/research/ggdc/data/10-sector-database>.

<sup>11</sup> Bolio et al. (2014) use the Economic Censuses of 1999 and 2009 which, in reality, are based on data for 1998 and 2008. These censuses exclude the agricultural and government sectors.

<sup>12</sup> In this study, multinational enterprises are defined as conducting innovation in Mexico if they satisfy at least one of the following criteria in their Mexican affiliates or subsidiaries: “(a) they have an R&D department or unit, (b) they recognize that the R&D activity they realize [in Mexico] is used in other affiliates [in other countries], (c) they have linkages with educational centers for developing R&D in Mexico, and (d) they have sought government support for these same ends.” (Carrillo and Gomis, 2014, p. 398, author’s translation). The authors explain in a footnote that (b) refers to “reverse diffusion” of innovation from Mexico to other countries.

<sup>13</sup> Note that we attribute the Economic Census data here to the years in which the data were gathered, rather than the years in which the censuses were released as in Bolio et al. (2014) (see previous note). Complete data for 2000 are not available as only quinquennial Census data are available prior to 2007, but the data for the maquiladoras—where most of the job growth occurred—indicate that employment continued increasing until 2000.

<sup>14</sup> Author’s calculations based on data for 1993-2012 from World Bank, *World Development Indicators*, online database, <http://databank.worldbank.org/data/home.aspx>, downloaded April 6, 2014.

<sup>15</sup> Author’s calculations from INEGI’s Encuesta Mensual de la Industrial Manufacturera (EMIM), <http://www.inegi.org.mx/sistemas/bie/>.

<sup>16</sup> See also Moreno-Brid et al. (2005) and Fujii-Gambero and Cervantes-Martínez (2013).

<sup>17</sup> Data from INEGI. Due to small surpluses with other nations, mainly in Latin America, Mexico’s overall deficit in goods trade for 2013 was only \$1 billion.

<sup>18</sup> Based on author’s analysis of INEGI data.

<sup>19</sup> Although this is an admittedly imperfect measure, the distinction between nonproduction and production workers correlates well with the distinction between employees with higher and lower levels of educational

attainment, and data by educational level are not readily available for the manufacturing sector. The data given here are author's calculations based on various surveys of the manufacturing sector available from INEGI's Banco de Información Económica, <http://www.inegi.org.mx/sistemas/bie/>.

<sup>20</sup> A fourth measure, expenditure-side real GDP per person at chained PPPs, is almost identical to the similar measure at current PPPs, and hence is omitted to avoid cluttering the graph. For a similar analysis using earlier versions of the PWT and other data sources, see Blecker and Esquivel (2013).

<sup>21</sup> Source: BLS, "International Comparisons of Hourly Compensation Costs in Manufacturing, 2012", August 9, 2013, and author's calculations.

<sup>22</sup> Hanson (2006, pp. 898-99) notes that, contrary to popular perceptions, "individuals with moderate to high education levels have the highest likelihood of migrating abroad".

<sup>23</sup> For various perspectives on Mexico's macroeconomic policies and the causes of its slow growth in recent years see, among others, Levy and Walton (2009), Arias et al. (2010), Hanson (2010), Moreno-Brid and Ros (2009), and Ros (2013).

<sup>24</sup> Much recent research finds that, more generally, greater distributional equity and sustained rapid growth are compatible in the long run. See, for example, Berg et al. (2012) and Lee (2013).

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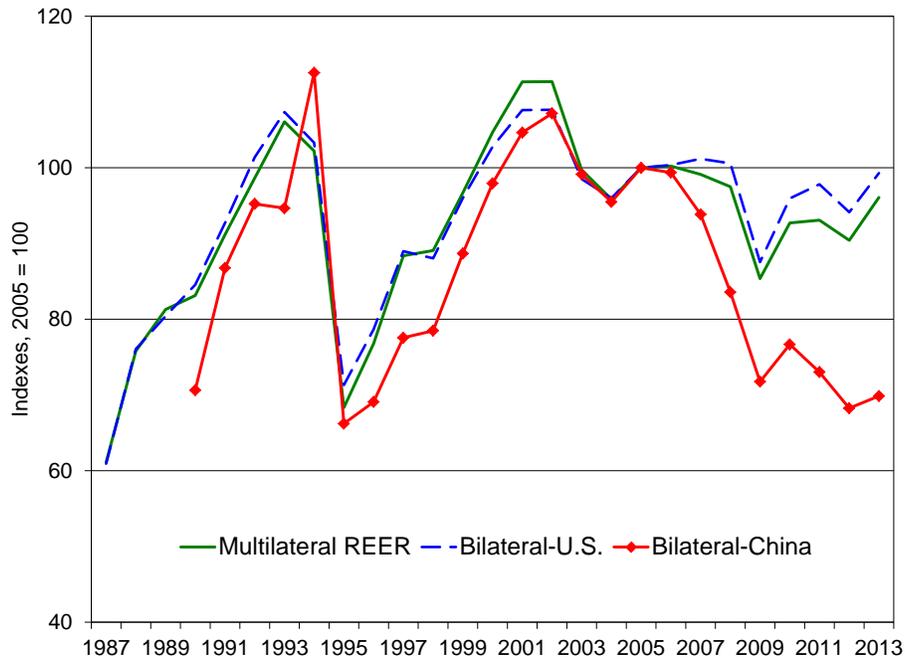
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**Table 1**  
**Growth Rates and Shares of U.S. Nonpetroleum Imports**  
**from Mexico, China, and Other Countries**

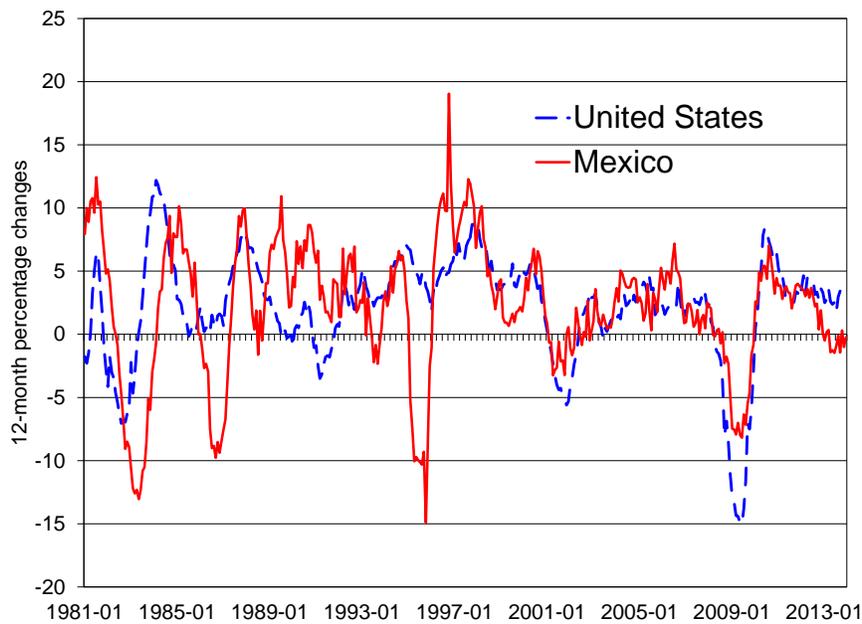
	Percentage share in total U.S. nonpetroleum imports				
	1987	1993	2000	2007	2013
Mexico	4.5	6.7	11.4	11.3	13.4
China	1.7	5.9	9.1	19.7	23.2
Other countries	93.8	87.4	79.5	69.0	63.5
	Average annual growth rate of real nonpetroleum imports (in percent per year)				
	1987-1993	1993-2000	2000-2007	2007-2013	
All countries		5.2	14.6	5.8	1.5
Mexico		12.4	25.2	5.6	4.4
China		29.1	23.2	20.4	4.3
Other countries		4.0	12.8	3.3	0.1

*Sources:* U.S. Bureau of Economic Analysis (BEA), International Transactions Accounts, Release of March 19, 2014 (Tables 2a and 2b), and National Income and Product Accounts, release of March 27, 2014 (Table 4.2.4), [www.bea.gov](http://www.bea.gov); Petróleos Mexicanos (Pemex), *Anuario Estadístico* (various years), [www.pemex.com](http://www.pemex.com); U.S. Census Bureau, FT900: U.S. International Trade in Goods and Services, December 2013, [www.census.gov](http://www.census.gov); and author's calculations.

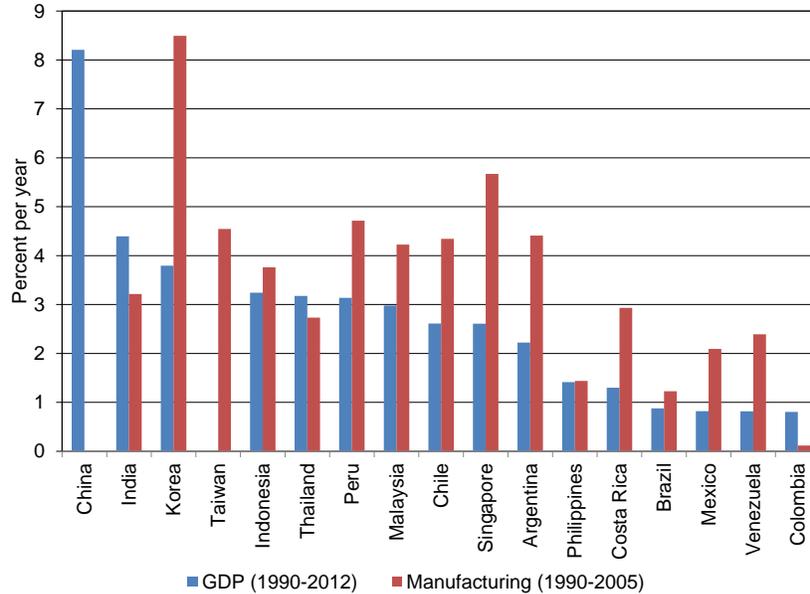
*Notes:* Percentages may not add to exactly 100.0 due to rounding. U.S. petroleum imports from Mexico were taken from Pemex up to 2007 and Census for 2013, and were subtracted from total imports from Mexico to get nonpetroleum imports from Mexico (all U.S. imports from China are nonpetroleum). Shares were calculated using nominal values; growth rates were calculated based on real imports where nominal imports in current dollars were deflated by the U.S. chain-type price index for nonpetroleum imports. Data for 2013 are preliminary.



**Figure 1. Real value of the Mexican peso, bilateral and multilateral indexes, 1987-2013**  
 Source: International Monetary Fund, *International Financial Statistics*, online database, and author's calculations.



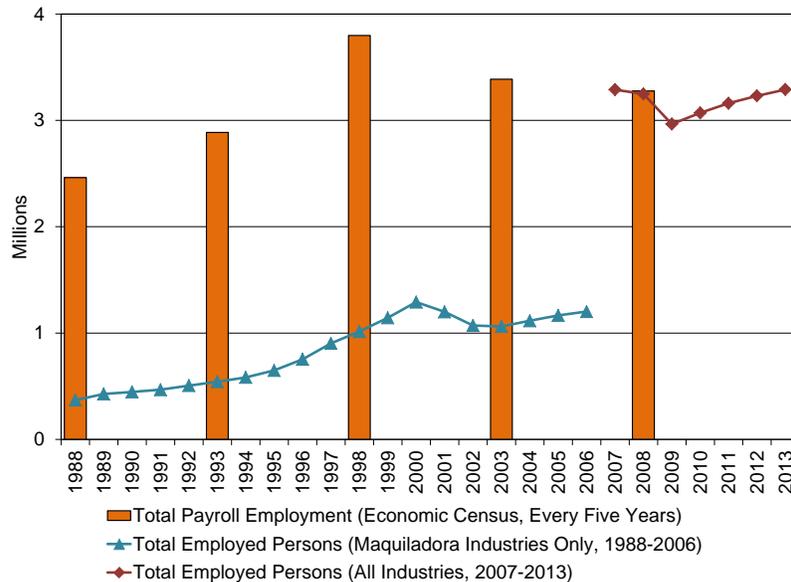
**Figure 2. Mexican and U.S. indexes of industrial production, 12-month growth rates, monthly, January 1981 to December 2013**  
 Sources: Federal Reserve Board of Governors, INEGI, and author's calculations.



**Figure 3. Average annual growth rates of labor productivity: GDP and manufacturing value added per employed person in constant 1990 PPP dollars.**

Sources: GDP data from World Bank, World Development Indicators (WDI) online database; manufacturing data from Groningen Growth and Development Centre 10-Sector Database, Timmer and de Vries (2007); and author's calculations.

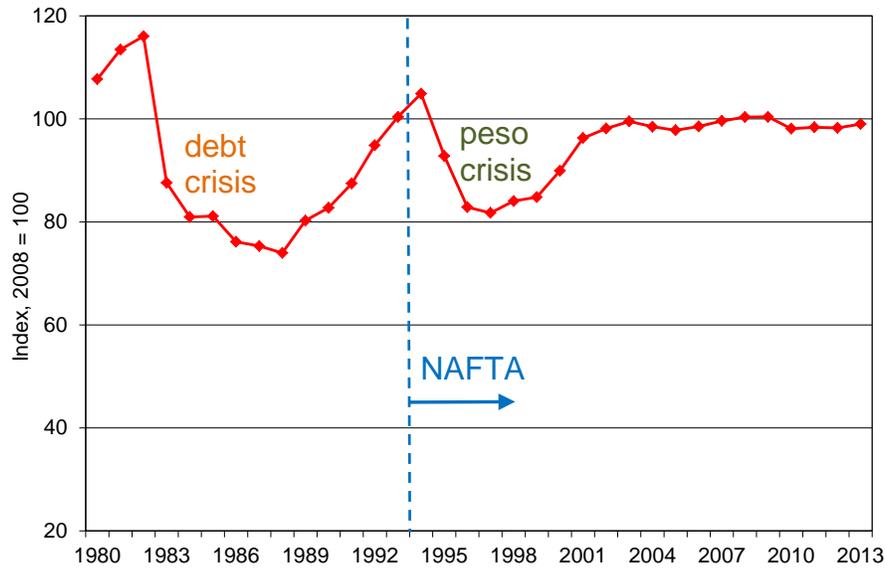
Notes: GDP per employed person is not available for Taiwan; manufacturing value added per employed person is not available for China. Manufacturing data for India are for 1990-2004 only.



**Figure 4. Total employment in Mexican manufacturing, alternative measures, 1988-2013**

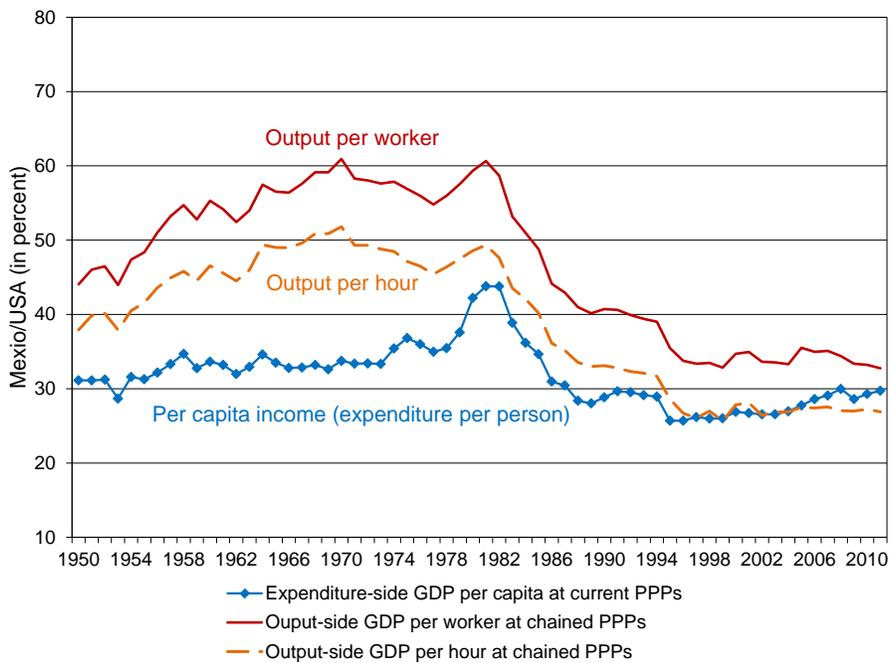
Sources: INEGI, Encuesta Nacional de la Industrial Manufacturera (EMIM), Censos Económicos, and author's calculations.

Notes: Data are shown for all periods for which each series is available: maquiladora data ended in 2006; the new, complete survey of all industries began in 2007; and the Economic Census is quinquennial (Census data for 2013 were not available at the time of this writing). Data for the maquiladoras (1988-2006) and for all industries (2007-13) are annual averages of monthly data.



**Figure 5. Real hourly compensation in Mexican manufacturing industries, annually 1980-2013**

Sources: INEGI, Banco de México, and author's calculations.



**Figure 6. Per capita income and labor productivity, at purchasing power parity (PPP), Mexico as a percentage of the United States, 1950-2011**

Sources: Penn World Tables 8.0 (Feenstra et al., 2013) and author's calculations.