

# Mexico: Value added in exports of manufactures

*Gerardo Fujii G. and Rosario Cervantes M.*

## ABSTRACT

In the last few decades, Mexico's export sector has seen extraordinarily robust growth and has undergone sweeping changes, with exports of manufactures, especially intermediate- and high-technology products, leading the way. At the same time, however, the gap between exports and GDP has been widening, which indicates that the export sector is underperforming as a driver of economic growth. This study is based on the idea that the ability of exports to galvanize the economy will be heightened if export activity leads to an expansion of the domestic market. Whether or not it will do so depends on the amount of national income that is incorporated into exports. The authors estimate how much national value added is contained in exports of manufactures, by sector and by category (direct income, i.e., income generated directly by export activity, and indirect income, i.e., income incorporated into the inputs used to produce export goods). This information is provided for total exports of manufactures, exports of the maquila industry and non-maquila exports.

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## KEY WORDS

Manufacturers, exports, value, income, economic growth, statistics, Mexico

## JEL CLASSIFICATION

F14, F19, E01

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# I

## Introduction

A great deal of theoretical and empirical research has been conducted on the relationship between exports and economic growth. Four main vectors for the formation of that relationship have been identified. The first is competition in international markets, which creates an incentive for increasing the efficiency of the production system (Bhagwati and Srinivasan, 1979; Feder, 1983; Kohli and Singh, 1989; Krueger, 1980). The second is the effect that exports have in spurring specialization, which provides access to economies of scale (Helpman and Krugman, 1985). The third has to do with the fact that export firms tend to be more technologically advanced than others and that the technical progress they make diffuses into the rest of the economy (Grossman and Helpman, 1991). The fourth is that, by funnelling hard currency into the economy, exports help an economy to overcome external growth constraints (Thirlwall, 1979). This line of reasoning has underpinned the argument that countries with an export-led growth model will tend to grow faster than others. In addition, a number of research papers have posited that manufactured exports make the biggest contribution to growth because of the strength of global demand for those products, their price trends and the opportunities offered by a large manufacturing export sector for the incorporation of technical progress into its products.

These ideas were readily embraced in many countries in light of the strong growth of some Asian economies: growth which, according to proponents of this approach, was being driven primarily by exports of manufactures. This question has become even more relevant in recent times in view of the deep economic crisis that continues to trouble a large part of the world and that is prompting many countries to look to an increase in their exports as a means of pulling themselves out of that crisis.

These ideas took hold in Latin America in the 1980s and led the countries of the region to open up their economies and to give priority to their export sectors. Mexico has had one of the region's highest export growth rates in recent decades, and it has also witnessed a significant shift in the composition of its

exports towards manufactures, particularly intermediate- and high-technology products. Nonetheless, the Mexican economy's long-term growth trends fall far short of what is needed. The primary focus of this study is to help to explain why that is happening.

One of the reasons for this –which ties in with the focus of this study– is the fact that export growth has spurred imports of inputs. As a result, the multiplier effect of exports on economic growth has been weak (Ruiz Nápoles, 2004; Moreno-Brid, Rivas and Santamaría, 2005; Cervantes, 2008). The point of departure for this analysis is the idea that export growth can drive the expansion of the domestic market. Traditionally, export-led growth has been seen as the converse of growth driven by domestic demand (Eatwell, 1998, pp. 737-738), and this belief has been reflected in recent calls for East Asia and China to reorient their growth towards the domestic market. The starting point here is the idea that export-led growth is not necessarily at odds with growth that is driven by domestic demand and that the export sector can be configured in a way whereby its growth will galvanize the domestic market (Palley, 2002; Razmi and Blecker, 2008). What is more, even when authors such as Felipe (2003, p. vii), in referring to the countries of South-East Asia, conclude that “in the end, it is about achieving a golden combination between export-led growth and domestic demand-led growth”, or when they contend, as do Felipe and Lim (2005, p. 4), that: “...the best periods seem to be those when domestic demand and net exports exhibit significant and continuous growth or improvements...”, they are placing enough emphasis, in our opinion, on the complementarity that can exist between the expansion of exports and the invigoration of the domestic market. This is why it is important to calculate the direct and indirect value-added content of exports.

The point of departure for this analysis, then, is the idea that, while export performance may certainly influence the dynamics of an economy, it is not necessarily a question of having either export growth *or* growth driven by domestic demand. Instead, external demand can help to spur domestic demand, with both the external and internal markets driving the economy's growth. As we will see in section II, this issue has been approached in the literature on the basis of growth estimates calculated

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□ Funding for this study was provided by the National Council for Science and Technology of Mexico under Funding Category I0017 of Project 152740.

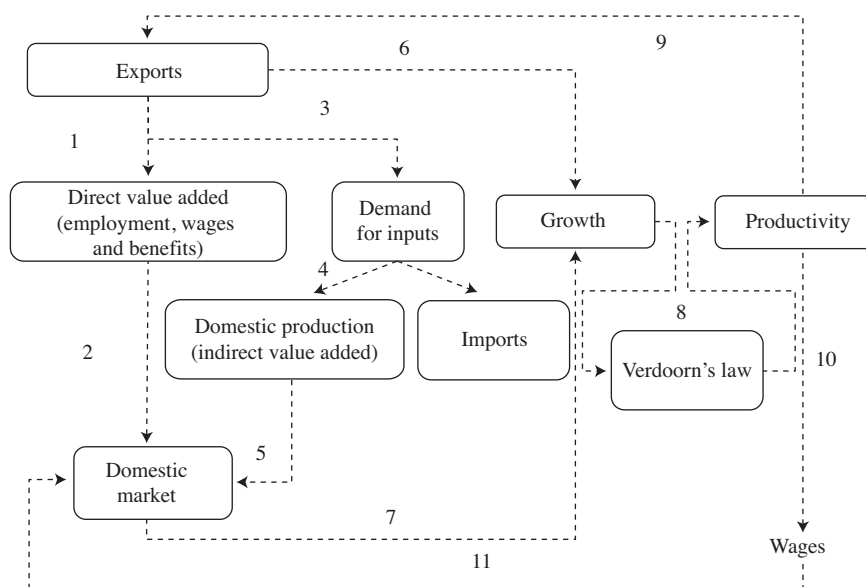
within a framework of external equilibrium. This study focuses on a different aspect of the question, which is explored by calculating the direct and indirect national value-added content of exports. The greater the amount of national income that is incorporated into exports, the stronger the effect that exports will have in terms of the growth of domestic demand. Since this will depend on the value-added profile of the export, this analysis will focus on Mexico's exports of manufactures as viewed from that vantage point. We believe that this approach can, on the one hand, help to explain why the Mexican economy has grown as slowly as it has during the last few decades and, on the other, help to pinpoint some of the traits of the export sector that can help to turn it into an engine of growth.

Figure 1 depicts the various paths by which exports can spur the domestic market and, hence, economic growth. On the one hand, exports translate directly into jobs, wages and benefits (1). The directly generated value added that is contained in exports fuels demand for consumer and capital goods, and the part of that demand that is met with domestically produced goods will help to expand the domestic market (2). On the other

hand, inputs are needed in order to produce exports (3). The more of those intermediate goods that are supplied by local firms (4), the more jobs, wages and benefits will be generated indirectly by the export sector (5). In other words, exports help to boost total demand and GDP in two ways: because they are a component of total demand and because of the multiplier effect that an upswing in exports has on the other components of aggregate demand. An increase in exports entails the use of more inputs, and—so long as they are produced in the country— this boosts production in the sectors that are making those inputs as well as having a multiplier effect. GDP growth is therefore generated as a direct result of the expansion of exports (6) and of the growth of the domestic market that is an indirect result of exports via the directly generated income that they contain and the demand for intermediate products incorporated into exports (7). If the requirements of Verdoorn's Law (8) are also satisfied, then the rise in productivity makes prices and exports more competitive (9) and boosts wages (10). This, in turn, spurs the domestic market (11). The economy then enters into a virtuous circle of demand-led growth.

FIGURE 1

**Exports and domestic demand**



Source: prepared by the authors.

In this article, reference will be made only to those relationships shown in figure 1 that pertain to the measurement of the value added contained in exports. This is because the objective is to provide estimates of the domestically generated value added that is contained in Mexico's exports of manufactures, since that is what determines the level of the export sector's capacity to directly and indirectly generate income and, thus, to expand the domestic market and ultimately help to create the kind of demand that will spur growth.

This question has become particularly important because of the way in which the international division of labour within the manufacturing sector has been changing in recent decades. In particular, the fragmentation of the production process into stages that are completed in different countries has given rise to a new area of research focusing on the quantification of the contribution made by exports to economic growth. Since the imported content of the goods exported by many economies has increased and since some imported goods may incorporate products that had previously been exported by the importing economy, attention is being centred on calculating the national value added in exports and imports, which clearly differs from the value of those flows per se (Loschky and Ritter, 2006; Breda, Cappariello and Zizza, 2007; Kranendonk and Verbruggen, 2008; Breda and Cappariello, 2008; Koopman, Wang and Wei, 2008; Chen and others, 2008; Akyüz, 2010). This is an especially important issue in countries whose exporters are actively involved in international production sharing, since this results in exports that have a very large component of imported inputs. One of these countries is

China, and this has recently prompted the development of methodological approaches to the estimation of the national value added in its exports, with the economy being broken down into those sectors that are actively engaged in international production sharing and those that are not (Chen and others, 2005; Koopman, Wang and Wei, 2008; Daudin, Riffart and Schweisguth, 2009; He and Zhang, 2010).

Since Mexico is actively engaged in international production sharing, the estimation of the national value added contained in its manufactured exports is of particular interest, as it can help us to gauge how much of a contribution exports are actually making to the country's economic growth via their effect in driving the expansion of domestic demand.

This article is structured as follows. The line of reasoning followed in the literature concerning the ways in which exports can contribute to the expansion of domestic demand and, hence, to economic growth is outlined in section II. The new approach being taken to the issue in the light of the intensification of international production sharing is also discussed. Section III describes the methods used to estimate the national value added contained in Mexico's exports of manufactures. In section IV, we summarize the changes that have occurred in Mexico's export sector and look at the sharp differences between the growth trends of exports and production in recent decades. Estimates of the national value-added content of the country's exports—which determine the extent to which exports will stimulate the domestic market and thus the economy as a whole—are presented in section V. Section VI concludes.

## II

### Exports, domestic demand and growth

Adam Smith spoke about the process by which foreign trade spurs the growth of the home market and about the fact that, as a result, exports help to increase production, thereby deepening the division of labour, which he saw as of being of key importance in augmenting the wealth of nations. According to Smith, for trading nations, foreign trade: "...carries out the surplus part of the produce of their land and labour for which there is no demand among them, and brings back in return for it something else for

which there is demand. By means of it, the narrowness of the home market does not hinder the division of labour in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labour may exceed the home consumption, it encourages them to improve its productive powers, and to augment its annual produce to the utmost, and thereby to increase the real revenue and wealth of the society" (Smith, 1958).

The traditional view of the demand-side relationship between exports and growth has focused on the effect that exports have on total demand, both directly (because they are a component of total demand) and indirectly (because of the multiplier effect that they have on other components of total demand). This view informs the concept of the foreign trade multiplier (Harrod, 1933), as well as the Hicks “super-multiplier” (Hicks, 1950), which adds in the fact that increased exports allow other demand components to expand to the point where the increase in imports balances out the initial rise in exports. The work of Thirlwall (1979) and Kaldor (1989) follows along the same lines when they estimate the increase in GDP generated by a given export growth rate, as measured by import growth. In Kaldor’s words: “from the point of view of any particular region, the ‘autonomous component of demand’ is the demand

emanating from *outside* the region; and Hicks’ notion of ‘super-multiplier’ can be applied so as to express the doctrine of the foreign trade multiplier in a dynamic setting. So expressed, the doctrine asserts that the rate of economic development of a region is fundamentally governed by the rate of growth of its exports.” (Kaldor, 1989, p. 318) Kaldor also applies this principle to developing countries: “The spread of industrialisation in developing countries, if successful, involves following an ‘outward strategy’ which leads to the development of export potential and not just to import substitution...” (Kaldor, 1989, p. 341).

The estimates of the contribution of exports to growth that have been calculated on the above basis do not take the new stage-by-stage international division of labour into account. This is why it is so important to measure the national value-added content of trade flows.

### III

## A method for calculating the national value-added content of exports

An input-output analysis can be used to calculate how much national value added is contained in exports of manufactures, which can in turn be broken down into direct value added (the income generated during the process of transforming inputs into finished products for export) and indirect value added (income generated during the production of the domestically produced inputs incorporated into export products).

The input-output matrix for Mexico developed by the National Institute of Statistics and Geography (INEGI) on the basis of data for 2003 (INEGI, 2008) can be used to arrive at separate estimates for maquila plants and for the other export activities that INEGI classifies as being part of the Mexican economy.

To arrive at these estimates, we used the methodology employed by Koopman, Wang and Wei (2008) and He and Zhang (2010) to calculate the national value-added content of China’s exports of manufactures. They divided exports into regular exports and “processing exports”, which are basically differentiated from one another on the basis of the percentage of imported inputs used in their production. These terms are equivalent to the “domestic-economy exports” (DE) and “maquila exports” (ME) used in the matrix for Mexico.

This methodology is used to estimate how much of an effect the exports of any given sector have on the value added of other sectors via the demand for intermediate goods for use as inputs.

The national value added that is contained in exports can be broken down, then, into its two components: domestic-economy exports (DE) and maquila exports (ME).

The direct and indirect value added contained in DE is estimated on the basis of the value-added multipliers shown in equation (1), while the direct and indirect value added generated by ME is estimated on the basis of equation (2).

$$M^{EI} = A_V^{EI} (I - A^{EI})^{-1} \quad (1)$$

$$M^{IME} = \left[ A_V^{EI} (I - A^{EI})^{-1} A^{IME} + A_V^{IME} \right] \quad (2)$$

In (1),  $M^{EI}$  is the matrix for the coefficients of the value added contained in DE. In (2),  $M^{IME}$  is the matrix for the coefficients of the value added contained in ME. Both matrices are  $r \times r$ , where  $r$  represents all subsectors of the economy.

$A_V^{EI}$  is a diagonal matrix of coefficients of value added for DE, with the elements for the main diagonal being obtained by dividing the total value added by each subsector by the gross value of each subsector's output;  $(I - A_V^{EI})^{-1}$  is the Leontief inverse matrix, which, for the Mexican economy, is obtained from the DE input coefficients (i.e., by subtracting the ME intermediate consumption, since the firms in this sector use but do not produce intermediate inputs).

In equation (2),  $A_V^{IME}$  is a diagonal matrix for the coefficients of direct value added by ME activities and is

obtained by dividing total value added for each subsector by the gross value of output. For ME firms, this is equal to the volume of their exports.  $A_V^{IME}$  is a matrix for the coefficients of the domestically produced intermediate inputs for which there is ME demand.

When the columns of the values obtained in  $M^{EI}$  are added up, this yields the multipliers for the export value added of the DE firms in each subsector. The sums of the figures in the columns for the  $M^{IME}$  matrix represent the multipliers for the value added by ME plants.

## IV

### Mexico: dynamics and change in the composition of slow-growing exports

Since the late 1980s, Mexico has been trying to implement a strategy in which economic growth is to be led by exports of manufactures. The level of these exports has, in fact, soared, but they have not become a driver of economic growth for the country.

#### 1. Total exports

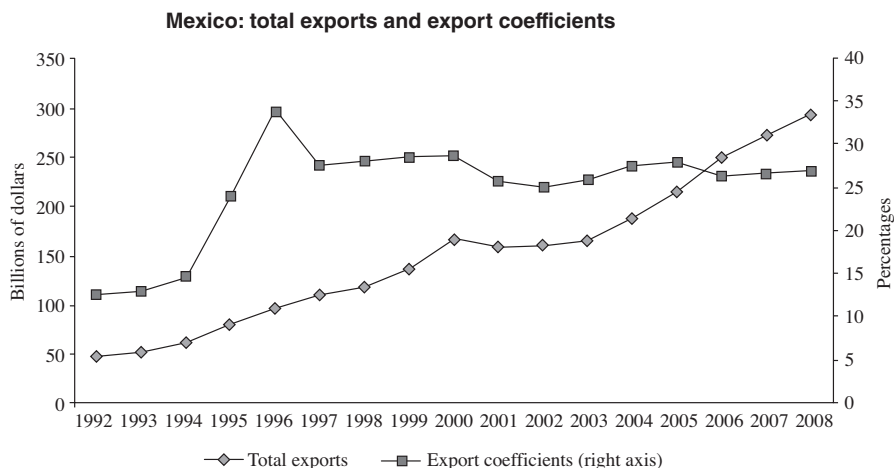
Mexico embarked on its trade liberalization process in 1987, when it became a party to the General Agreement on Tariffs and Trade (GATT). Between 1992 and 2008, in the space of just 16 years, the country's total exports jumped from US\$ 46.2 billion to US\$ 291 billion. The

mean annual growth rate for exports was 9.6% in 1989–2006, 5.8% between 1989 and 1993, and 14.1% for 1994–2008. As a result, the country's export coefficient climbed from 13% to around 27% between 1992 and 2008 (see figure 2).

#### 2. The changing composition of exports

The buoyancy of the country's exports was coupled with a shift in the composition of its goods exports: in 2008, the value of exports of manufactures came to US\$ 231 billion, which was equivalent to 79% of Mexico's total exports (see figure 3).

FIGURE 2

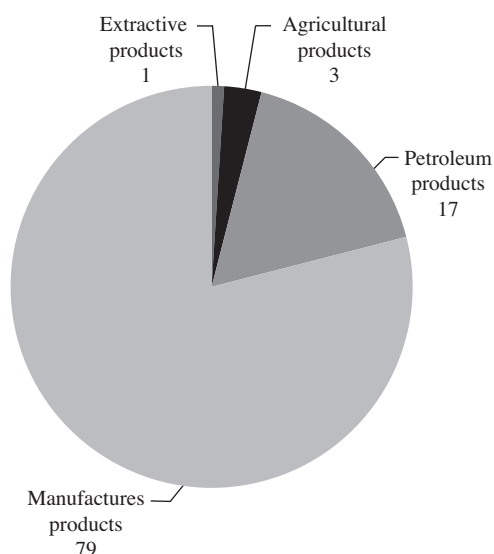


Source: Banco de México, *Informe anual*, 2008, Mexico City, 2009.



FIGURE 3

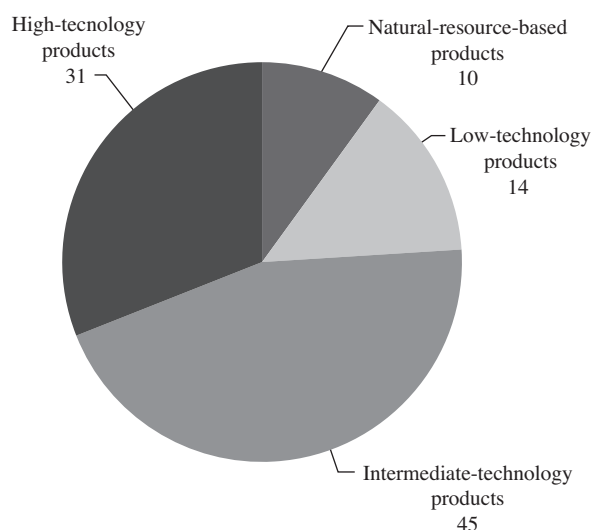
**Mexico: exports, by type of product, 2008**  
(Percentages)



Source: Banco de México, *Informe anual*, 2008, Mexico City, 2009.

FIGURE 4

**Mexico: industrial exports, by technological content, 2006**  
(Percentages of total industrial exports)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), *Latin America and the Caribbean in the World Economy 2007. Trends 2008* (LC7G.2383-P), Santiago, Chile, 2008. United Nations publication, Sales No. E.08.II.G.36.

### 3. Exports of manufactures, by factor-use intensity

Figure 4 depicts the composition of industrial exports by factor-use intensity. Exports are also divided into natural-resource-intensive and (low, intermediate or high) technology-intensive goods. As the figure shows, manufactures that are intensive in intermediate and high technologies account for the lion's share of the export market (around 60% of the country's manufactured exports since the early 1990s). These figures should be viewed with caution, however, since they are derived from a technology-based classification of export products, and it is quite possible that a country may have specialized in technologically rudimentary stages in the production of a high-technology good. This is especially the case in countries where a large percentage of manufactured exports are produced as part of the system of international production sharing. And, as we will see now, Mexico has been an active participant in this system.

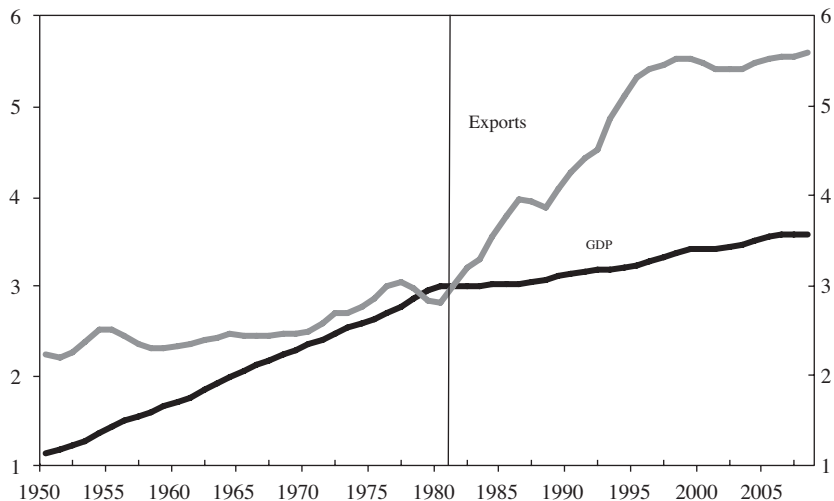
Failing to take into account the particular manufacturing-export profiles of countries actively engaged in international production sharing can yield misleading findings. For example, Myro and others (2008, pp. 38 and 40) divide the manufactured exports

of member countries of the Organisation for Economic Cooperation and Development (OECD) into three categories (advanced, intermediate and traditional) and classify them on the basis of the growth of demand and technological intensity. They report that, as of 2005, 41% of Mexico's exports of manufactures were in the first category, 39% in the intermediate category and 25% in the category of traditional exports. The corresponding figures for Germany are 21%, 55% and 23%, while Japan's are 2%, 55% and 13%. In other words, these data are indicating that Mexico is more strongly positioned to meet the growing demand on the international market for high-technology manufactures than these two developed export powerhouses are. What is more, in terms of the sophistication of its exports (Hausmann, Hwang and Rodrik, 2007) and its adaptability index, the country's international position is expected to become even stronger because of the structure of its production specialization profile. These statements do not, however, appear to take into consideration the phase of the production process of high-technology goods in which Mexico has specialized.

Yet despite the fact that Mexican exporters of manufactures have performed so brilliantly since the 1980s, the gap between exports and GDP has continued to widen (see figure 5). This phenomenon, which has

been highlighted by Palma (2005), was particularly marked in the 1990s, when exports jumped by an average annual rate of 12.5%, while GDP grew by a rate of 3.4% (World Bank, 2011).

FIGURE 5

**Mexico: gross domestic product (GDP) and exports, 1950-2005<sup>a</sup>**

Source: National Institute of Statistics and Geography (INEGI), “Banco de Información Económica” for the 1980-2010 series; “Estadísticas históricas de México” for the 1950-1979 GDP series; and Petróleos Mexicanos (PEMEX), *Anuario estadístico*, 1988, for the 1950-1979 oil exports series.

<sup>a</sup> The figures shown above were calculated as moving three-year averages and then converted into log-based index numbers. The base year 1981 = 20.1 was used both for the observed value of GDP and for the observed value of non-petroleum exports.

## V

### Estimation of the national value added contained in Mexico’s exports of manufactures

Since the exports manufactured by the domestic economy and the maquila export economy differ greatly in terms of the value added that they contain (both in relation to the level of value added as such and the percentages of that value added that are generated directly and indirectly), we will start out by gauging the relative proportions of the country’s manufactures supplied by each of these sectors, both at an overall level and in the different branches of the manufacturing sector.

#### 1. Exports of manufactures generated by the domestic economy and by the maquila industry

Table 1 gives a breakdown of the country’s exports of manufactures by subsector of economic activity. It also disaggregates the figures for the three sectors that account for two thirds of Mexico’s exports (computers and electronics, transport equipment, and the electrical power industry) and for the maquila industry and domestic



economy. (See table A1 of the statistical appendix for a breakdown of these data into 21 different sectors; tables 1 and 2 give the same information for the three major export sectors. More detailed information for all manufacturing sectors is given in the statistical appendix.)

The results show that:

- The maquila industry accounts for the lion's share of manufactured exports (62% of the total).
- When the country's export sectors are divided up into three categories according to the extent of their integration with the Mexican economy as a whole, as measured by the contribution made by those exports to the domestic economy –high (over 70% of exports come from the domestic economy), intermediate (between 30% and 70% come from the domestic economy) and low (less than 30% do so)– it becomes clear that 52% of the country's exports of manufactures are produced by sectors that are not well integrated with the domestic economy. At the other extreme, just 10% of those exports come from sectors that are highly integrated with the domestic economy.
- The three sectors that account for the largest shares of exports of manufactures are the electronics industry (29% of the total), the transport equipment industry (28%) and the electrical equipment industry (9% of the total). Taken together, they account for 66% of the value of the country's exports of manufactures.
- These sectors differ a great deal from one another, however, in terms of the extent of their integration with the rest of the Mexican economy: whereas

88% of the exports of the electronics industry and 81% of those of the electrical equipment industry are produced by maquilas, 58% of the transport equipment that is exported is produced by the domestic economy.

## 2. National value added in exports of manufactures

Tables 2 and A2 show how much national value added is contained in the country's exports of manufactured goods. This information is given for the whole of the economy and for the two main categories within it (the domestic economy and the maquila industry) and is then broken down into the various branches of the manufacturing sector. The figures for national value added are also divided into the portions of that value that are generated directly and indirectly. Finally, the coefficients for the national value-added content of the country's exports are given. In order to provide a frame of reference, the corresponding figures for the Chinese economy are given where comparable statistics are available.

The most informative conclusions to be drawn from these tables are as follows:

- (i) The domestic economy's exports (38% of total exports of manufactures) account for 67% of the domestic value-added content of the country's exports of manufactured goods. Maquila exporters (62% of total exports of manufactures) account for 33%. In other words, the bulk of the country's manufactured exports comes from the sector that makes less of a contribution to national income.

TABLE 1

**Mexico: composition of manufacturing-sector exports, 2003**  
(Millions of pesos)

Subsector	Total		Domestic-economy exports (DE)		Maquila exports (ME)		Percentages	
	Exports	Percentages	Exports	Percentages	Exports	Percentages	Domestic economy	Maquila exports
Electronics	385 317	28.9	47 741	9.4	337 576	40.8	12.4	87.6
Transport equipment	366 969	27.5	211 203	41.6	155 766	18.8	57.6	42.4
Electrical equipment	122 366	9.2	23 135	4.6	99 231	12	18.9	81.1
Three-sector subtotal	874 651	65.5	282 078	55.6	592 573	71.6	32.3	67.7
Other manufactures	460 514	34.5	225 015	44.4	235 499	28.4	48.9	51.1
<i>Total exports</i>	<i>1 335 165</i>	<i>100</i>	<i>507 093</i>	<i>100</i>	<i>828 072</i>	<i>100</i>	<i>38</i>	<i>62</i>

Source: estimates calculated by the authors on the basis of Institute of Statistics and Geography (INEGI), "Matriz de insumo-producto 2003", Mexico City, 2008.

TABLE 2

**Mexico: total national value-added content in exports of manufactures, 2003**  
(Millions of pesos)

	Manufacturing sector - total										
	Total value added		Direct value added		Indirect value added		Percentages of national value added over value of exports				
	Pesos	Percentages	Pesos	Percentages	Pesos	Percentages	Total	Direct	Indirect	Indirect - manufacturing	Indirect - intra-industry
Transport equipment	182 741	32.4	100 446	33.4	82 294	31.1	49.8	27.4	22.4	5.7	2.7
Electronics	81 024	14.3	48 505	16.1	32 520	12.3	21	12.6	8.4	1.8	0.5
Electrical equipment	41 578	7.4	23 002	7.7	18 576	7	34	18.8	15.2	3.8	0.2
Three-sector total	305 343	54.1	171 953	57.2	133 390	50.5	34.9	19.7	15.3	3.7	1.5
Other manufactures	259 416	45.9	128 596	42.8	130 820	49.5	56.3	27.9	28.4	5.5	5.3
<i>Total value added</i>	<i>564 759</i>	<i>100</i>	<i>300 549</i>	<i>100</i>	<i>264 210</i>	<i>100</i>	<i>42.3</i>	<i>22.5</i>	<i>19.8</i>	<i>4.3</i>	
Domestic-economy exports (DE)											
Transport equipment	144 396	38.1	74 718	39.4	69 678	36.8	68.4	35.4	33	8.9	4.6
Electronics	33 812	8.9	20 878	11	12 934	6.8	70.8	43.7	27.1	7	2.8
Electrical equipment	17 551	4.6	9 398	5	8 153	4.3	75.9	40.6	35.2	10.4	0.5
Three-sector total	195 759	51.7	104 993	55.4	90 766	47.9	69.4	37.2	32.2	8.7	4.2
Other manufactures	183 185	48.3	84 452	44.6	98 734	52.1	81.4	37.5	43.9	8.5	8.2
<i>Total value added</i>	<i>378 945</i>	<i>100</i>	<i>189 445</i>	<i>100</i>	<i>189 499</i>	<i>100</i>	<i>74.7</i>	<i>37.4</i>	<i>37.4</i>	<i>8.6</i>	
Maquila exports (MEI)											
Transport equipment	38 344	20.6	25 728	23.2	12 616	16.9	24.6	16.5	8.1	1.2	0.1
Electronics	47 212	25.4	27 627	24.9	19 585	26.2	14	8.2	5.8	1.1	0.2
Electrical equipment	24 027	12.9	13 604	12.2	10 423	14	24.2	13.7	10.5	2.2	0.1
Three-sector total	109 584	59	66 960	60.3	42 624	57.1	18.5	11.3	7.2	1.3	0.2
Other manufactures	76 231	41	44 144	39.7	32 087	42.9	32.4	18.7	13.6	2.6	2.4
<i>Total value added</i>	<i>185 815</i>	<i>100</i>	<i>111 104</i>	<i>100</i>	<i>74 711</i>	<i>100</i>	<i>22.4</i>	<i>13.4</i>	<i>9</i>	<i>1.6</i>	

Source: estimates calculated by the authors on the basis of Institute of Statistics and Geography (INEGI), "Matriz de insumo-producto 2003", Mexico City, 2008.

- (ii) The three biggest manufactures-exporting sectors (66% of the total) supply 54% of the national value added that is incorporated into exports. These figures also show how relatively small the main exporting sectors' contribution to national income is.
- (iii) The contributions of these three sectors in terms of exports and domestic value added differ markedly: transport equipment represents 28% of exports of manufactured products and accounts for 32% of their value-added content; in the case of the production of computer hardware and electronics, the situation is just the opposite, as this sector produces 29% of exports of manufactures and accounts for 14% of the national value-added content of the country's total manufactured exports.
- (iv) The domestic economy and the maquila industry differ markedly in terms of these three sectors' shares of exports and of their national value-added content. In the domestic economy, these sectors account for 52% of the value added and for 56% of that economy's exports, whereas the maquila industry accounts for 72% of exports, which incorporate 59% of the national value added contained in maquila exports.
- (v) In the domestic economy, the largest difference between these indicators is found in the transport equipment sector (42% of exports and 38% of national value added), whereas, in the maquila sector, the sharpest contrast is seen in the electronics industry, which contributes 41% of total maquila

- exports and accounts for 25% of the national value added generated by this sector of the economy.
- (vi) Other manufacturing sectors make relatively small contributions to exports and to their national value-added content. For the most part, however, their share of value added is larger than their share of exports. The gap between the two is especially wide in manufacturing activities that process natural resources, such as the food industry (3.3% of value added versus 1.8% of exports), the chemicals industry (6.4% versus 3.5%) and the basic metals industry (4.6% versus 2.6%).
- (vii) The national value-added content of all of the country's exports amounts to 55% of the total (authors' calculation), which is significantly higher than the corresponding coefficient for exports of manufactures, since agricultural, mining and petroleum products all contribute more value added relative to their levels of exports than the manufacturing sector does. The corresponding coefficient for China is 47% (Chen and others, 2008, p. 14). The difference is largely explained by the fact that natural-resource-based exports account for a bigger share of total exports in Mexico's case than they do in China's.
- (viii) National value added represents 42% of the value of exports of manufactures. This coefficient is considerably higher for exports from the domestic economy (75%) than for the maquila industry's exports (22%).
- (ix) In China, as of 2002, national value added as a proportion of the value of exports of manufactures amounted to 51% for such exports as a whole; the figure for the domestic economy's exports was 88% while, for export processors, it was 25% (Koopman, Wang and Wei, 2008, p. 24). This means that the share of national value added that is contained in exports of manufactures from China is larger than it is in the case of Mexico; this is especially true for total exports and for the domestic economy's exports.
- (x) In Mexico's three largest manufacturing export sectors, the corresponding coefficients are 50% for transport equipment production, 21% for the electronics industry and 34% for the electrical equipment sector. In all these cases, there is substantially more national value-added content in the domestic economy's exports than in those of the maquila industry. For transport equipment, the coefficient is 68% in the domestic economy and 25% in the maquila industry. For electronics, the percentages are 71% (domestic economy) and 14% (maquila industry). Finally, for electrical equipment, the figures are 76% (domestic economy) and 24% (maquila industry). The corresponding percentages for these three branches of activity in China's export-processing sector are 27%, 20% and 26% (Chen and others, 2008, p. 14).
- (xi) As noted earlier, the value added by a given sector can be divided into the value generated directly (the factor income paid out directly by that sector) and the value generated indirectly (the income incorporated into the inputs required by that sector). Indirect value added can, in turn, either be national (Mexican, in this case) –when the inputs come from the export-producing country in question– or imported, in which case they constitute income for the countries that they were imported from. If export activities have strong linkages with input suppliers in the rest of the economy, then exports generate more national income. In Mexico's case, 53% of the national value-added content of exports of manufactures is generated directly. The breakdown of this figure shows that the percentage is lower for domestic-economy exports (50%) than it is for maquila exports (60%).
- (xii) The proportion of indirect national value added relative to the value of manufactured exports is 20% in Mexico but is 32% in China (see paragraph ix above and Koopman, Wang and Wei, 2008, p. 24; the data, both for total national value added and direct value added, are for 2002). This indicates that China's exports are more effective in indirectly generating income in other sectors of its economy.
- (xiii) In Mexico's three largest manufacturing export sectors, a majority of the national value-added content of exports is generated directly: in the transport equipment and electrical equipment industries, the percentage is 55% and, in the electronics industry, it is 60%. The fact that the level of indirect value added is lower is a sign that the linkages between export sectors and the industries that produce inputs for those sectors are weak. As a result, these exports do not generate as much income in other sectors of the Mexican economy as they otherwise would.
- (xiv) In view of the importance of the level of indirect value added as an indicator of the strength of the linkages between export sectors and the rest of the economy, the last two columns of table 2 show the breakdown of the proportion of the indirect value added in these sectors' exports that comes from the manufacturing sector at large and the proportion that is generated by manufacturing industries within

the export sector (the column headed “indirect intra-industry”). As shown in the table, the indirect value added originating in the manufacturing sector represents 4.3% for exports of manufactures overall, while the corresponding figure for the maquila industry is just 1.6%. The weakness of the linkages between exporters of manufactured goods and the rest of the manufacturing sector is mirrored

within each branch of export activity as well, and it is particularly marked in the maquila industry. For example, in the computer and electronics industry, which accounts for such a large share of the country’s exports, the indirect value added originating in other branches of manufacturing activity amounts to just 0.2% of the value of the manufacturing sector’s exports.

## VI

### Conclusions

The objective of this study has been to help to explain why, even though Mexico’s export sector has displayed extraordinarily robust growth and has become much more mature in recent decades, it has contributed so little to the overall economy’s growth.

In the authors’ view, the main reason for this is the weakness of the linkages existing between manufacturing exporters and the domestic market. As a result, the national value-added content of Mexico’s exports is relatively small. This is especially true of the exports of the maquila industry, which produces more than 60% of the country’s manufactured exports.

The national value added that is contained in exports can be divided into its direct and indirect components. The greater the linkages between export activities and domestic suppliers of parts and inputs, the higher the level of indirect value added, measured as a proportion of total national value-added content. This analysis has demonstrated that there is more direct value added than indirect value added in Mexican exports of manufactured goods, which is indicative of the export sector’s relative isolation from the rest of the country’s economy.

## STATISTICAL APPENDIX

TABLE A1

**Mexico: composition of manufacturing-sector exports, 2003**  
(Millions of pesos)

Subsector	Total		Domestic-economy exports (DE)		Maquila exports (ME)		Percentages	
	Exports	Percentages	Exports	Percentages	Exports	Percentages	Domestic economy	Maquila exports
Food products	24 186	1.8	18 873	3.7	5 312	0.6	78	22
Beverages and tobacco	14 795	1.1	13 981	2.8	814	0.1	94.5	5.5
Textile inputs	16 804	1.3	6 631	1.3	10 174	1.2	39.5	60.5
Textile products	11 103	0.8	2 549	0.5	8 554	1	23	77
Wearing apparel	73 418	5.5	15 323	3	58 096	7	20.9	79.1
Leather products	7 511	0.6	2 944	0.6	4 567	0.6	39.2	60.8
Wood products	2 363	0.2	1 061	0.2	1 302	0.2	44.9	55.1
Paper products	9 240	0.7	4 030	0.8	5 211	0.6	43.6	56.4
Printing and related products	3 977	0.3	1 196	0.2	2 781	0.3	30.1	69.9
Coke and petroleum products	14 794	1.1	14 791	2.9	4	0	100	0
Chemicals	46 117	3.5	40 792	8	5 325	0.6	88.5	11.5
Rubber and plastics products	37 055	2.8	10 100	2	26 954	3.3	27.3	72.7
Non-metallic mineral products	18 523	1.4	11 309	2.2	7 214	0.9	61.1	38.9
Basic metals	34 172	2.6	27 346	5.4	6 825	0.8	80	20
Metal products	42 803	3.2	19 137	3.8	23 666	2.9	44.7	55.3
Machinery and equipment	43 406	3.3	24 048	4.7	19 358	2.3	55.4	44.6
Electronics	385 317	28.9	47 741	9.4	337 576	40.8	12.4	87.6
Electrical equipment	122 366	9.2	23 135	4.6	99 231	12	18.9	81.1
Transport equipment	366 969	27.5	211 203	41.6	155 766	18.8	57.6	42.4
Furniture	18 256	1.4	4 415	0.9	13 841	1.7	24.2	75.8
Other manufactures	41 990	3.1	6 488	1.3	35 501	4.3	15.5	84.5
<i>Total exports</i>	<i>1 335 165</i>	<i>100</i>	<i>507 093</i>	<i>100</i>	<i>828 072</i>	<i>100</i>	<i>38</i>	<i>62</i>

Source: estimates calculated by the authors on the basis of Institute of Statistics and Geography (INEGI), "Matriz de insumo-producto 2003", Mexico City, 2008.

**Mexico: total national value-added content in exports of manufactures, 2003**

(Millions of pesos)

	Manufacturing sector - total										
	Total value added					Percentages of national value added over value of exports					
	Pesos	Percentages	Pesos	Percentages	Indirect value added	Percentages	Total	Direct	Indirect	Indirect - manufacturing	Indirect - intra-industry
Food products	18 845	3.3	8 476	2.8	10 369	3.9	77.9	35.0	42.9	7.1	4.5
Beverages and tobacco	12 738	2.3	6 045	2.0	6 693	2.5	86.1	40.9	45.2	12.6	0.5
Textile inputs	9 184	1.6	4 195	1.4	4 990	1.9	54.7	25.0	29.7	4.9	2.2
Textile products	4 235	0.7	2 573	0.9	1 662	0.6	38.1	23.2	15.0	2.9	0.3
Wearing apparel	31 952	5.7	19 804	6.6	12 148	4.6	43.5	27.0	16.5	4.0	1.2
Leather products	3 606	0.6	1 889	0.6	1 717	0.6	48.0	25.1	22.9	8.0	4.2
Wood products	1 515	0.3	774	0.3	741	0.3	64.1	32.8	31.3	4.8	2.2
Paper products	4 645	0.8	2 365	0.8	2 281	0.9	50.3	25.6	24.7	5.6	2.9
Printing and related products	1 917	0.3	1 025	0.3	892	0.3	48.2	25.8	22.4	3.9	0.5
Coke and petroleum products	13 527	2.4	2 068	0.7	11 459	4.3	91.4	14.0	77.5	2.7	0.3
Chemicals	35 961	6.4	13 311	4.4	22 651	8.6	78.0	28.9	49.1	5.8	3.9
Rubber and plastics products	16 349	2.9	8 603	2.9	7 746	2.9	44.1	23.2	20.9	3.8	0.7
Non-metallic mineral products	12 686	2.2	7 566	2.5	5 120	1.9	68.5	40.8	27.6	5.3	2.2
Basic metals	24 174	4.3	11 157	3.7	13 017	4.9	70.7	32.7	38.1	10.0	7.5
Metal products	21 605	3.8	11 414	3.8	10 191	3.9	50.5	26.7	23.8	6.5	0.6
Machinery and equipment	22 852	4.0	12 711	4.2	10 142	3.8	52.6	29.3	23.4	5.6	0.7
Electronics	81 024	14.3	48 505	16.1	32 520	12.3	21.0	12.6	8.4	1.8	0.5
Electrical equipment	41 578	7.4	23 002	7.7	18 576	7.0	34.0	18.8	15.2	3.8	0.2
Transport equipment	182 741	32.4	100 446	33.4	82 294	31.1	49.8	27.4	22.4	5.7	2.7
Furniture	8 200	1.5	4 700	1.6	3 501	1.3	44.9	25.7	19.2	4.7	0.2
Other manufactures	15 423	2.7	9 921	3.3	5 503	2.1	36.7	23.6	13.1	2.7	0.4
<i>Total manufactures</i>	<i>564 759</i>	<i>100.0</i>	<i>300 549</i>	<i>100.0</i>	<i>264 210</i>	<i>100.0</i>	<i>42.3</i>	<i>22.5</i>	<i>19.8</i>	<i>4.3</i>	<i>1.6</i>
							Domestic-economy exports (DE)				
Food products	16 302	4.3	7 240	3.8	9 062	4.8	86.4	38.4	48.0	8.0	5.4
Beverages and tobacco	12 087	3.2	5 889	3.1	6 198	3.3	86.5	42.1	44.3	12.0	0.5
Textile inputs	4 606	1.2	2 265	1.2	2 341	1.2	69.5	34.2	35.3	4.8	1.8
Textile products	1 888	0.5	985	0.5	903	0.5	74.1	38.6	35.4	8.3	1.1
Wearing apparel	11 853	3.1	7 317	3.9	4 536	2.4	77.4	47.8	29.6	8.6	2.2
Leather products	2 335	0.6	1 092	0.6	1 244	0.7	79.3	37.1	42.2	17.1	9.9
Wood products	971	0.3	461	0.2	510	0.3	91.5	43.4	48.1	6.2	4.4
Paper products	2 944	0.8	1 325	0.7	1 618	0.9	73.0	32.9	40.2	9.9	5.7
Printing and related products	943	0.2	479	0.3	463	0.2	78.8	40.1	38.7	9.2	1.3
Coke and petroleum products	13 526	3.6	2 068	1.1	11 459	6.0	91.5	14.0	77.5	2.7	0.3
Chemicals	34 176	9.0	12 354	6.5	21 822	11.5	83.8	30.3	53.5	6.2	4.3
Rubber and plastics products	7 261	1.9	3 473	1.8	3 788	2.0	71.9	34.4	37.5	7.0	0.6



Non-metallic mineral products	10 118	2.7	6 098	3.2	4 020	2.1	89.5	53.9	35.5	6.7	3.2
Basic metals	21 751	5.7	9 939	5.2	11 812	6.2	79.5	36.3	43.2	11.5	8.9
Metal products	15 016	4.0	7 536	4.0	7 480	3.9	78.5	39.4	39.1	12.2	0.9
Machinery and equipment	18 345	4.8	10 408	5.5	7 938	4.2	76.3	43.3	33.0	8.8	1.1
Electronics	33 812	8.9	20 878	11.0	12 934	6.8	70.8	43.7	27.1	7.0	2.8
Electrical equipment	17 551	4.6	9 398	5.0	8 153	4.3	75.9	40.6	35.2	10.4	4.5
Transport equipment	144 396	38.1	74 718	39.4	69 678	36.8	68.4	35.4	33.0	8.9	4.6
Furniture	3 670	1.0	2 151	1.1	1 519	0.8	83.1	48.7	34.4	10.9	0.6
Other manufactures	5 393	1.4	3 371	1.8	2 023	1.1	83.1	51.9	31.2	7.8	0.5
<i>Total manufactures</i>	<i>378 944</i>	<i>100.0</i>	<i>189 445</i>	<i>100.0</i>	<i>189 499</i>	<i>100.0</i>	<i>74.7</i>	<i>37.4</i>	<i>37.4</i>	<i>8.6</i>	<i>3.6</i>
Maquila exports (ME)											
Food products	2 543	1.4	1 236	1.1	1 307	1.7	47.9	23.3	24.6	3.9	1.2
Beverages and tobacco	651	0.4	156	0.1	495	0.7	80.0	19.2	60.9	22.9	0.0
Textile inputs	4 578	2.5	1 929	1.7	2 649	3.5	45.0	19.0	26.0	5.0	2.4
Textile products	2 347	1.3	1 588	1.4	759	1.0	27.4	18.6	8.9	1.3	0.0
Wearing apparel	20 099	10.8	12 487	11.2	7 612	10.2	34.6	21.5	13.1	2.7	0.9
Leather products	1 270	0.7	797	0.7	473	0.6	27.8	17.5	10.4	2.1	0.5
Wood products	544	0.3	313	0.3	231	0.3	41.8	24.1	17.7	3.7	0.5
Paper products	1 702	0.9	1 039	0.9	663	0.9	32.7	19.9	12.7	2.3	0.6
Printing and related products	974	0.5	545	0.5	429	0.6	35.0	19.6	15.4	1.7	0.1
Coke and petroleum products	1	0.0	1	0.0	0	0.0	20.8	14.6	6.3	0.9	0.2
Chemicals	1 785	1.0	957	0.9	829	1.1	33.5	18.0	15.6	2.9	1.1
Rubber and plastics products	9 088	4.9	5 130	4.6	3 957	5.3	33.7	19.0	14.7	2.6	0.8
Non-metallic mineral products	2 568	1.4	1 467	1.3	1 101	1.5	35.6	20.3	15.3	3.1	0.5
Basic metals	2 423	1.3	1 218	1.1	1 205	1.6	35.5	17.8	17.7	3.9	1.8
Metal products	6 589	3.5	3 878	3.5	2 711	3.6	27.8	16.4	11.5	1.9	0.3
Machinery and equipment	4 507	2.4	2 303	2.1	2 204	2.9	23.3	11.9	11.4	1.7	0.2
Electronics	47 212	25.4	27 627	24.9	19 585	26.2	14.0	8.2	5.8	1.1	0.2
Electrical equipment	24 027	12.9	13 604	12.2	10 423	14.0	24.2	13.7	10.5	2.2	0.1
Transport equipment	38 344	20.6	25 728	23.2	12 616	16.9	24.6	16.5	8.1	1.2	0.1
Furniture	4 531	2.4	2 549	2.3	1 982	2.7	32.7	18.4	14.3	2.8	0.0
Other manufactures	10 030	5.4	6 550	5.9	3 480	4.7	28.3	18.5	9.8	1.7	0.3
<i>Total manufactures</i>	<i>185 815</i>		<i>111 104</i>		<i>74 711</i>		<i>22.4</i>	<i>13.4</i>	<i>9.0</i>	<i>1.6</i>	<i>0.3</i>

Source: estimates calculated by the authors on the basis of Institute of Statistics and Geography (INEGI), "Matriz de insumo-producto 2003", Mexico City, 2008.

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