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The Mexican trade liberalization process and its net effects on employment: 1988-2004

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- **Abstract**: This paper examines the direct and indirect effects of trade liberalization on employment in Mexico. First, we estimate the net effect that export and import growth has had on employment; and second, inasmuch as Mexico is a country relatively abundant in unskilled labor, we seek to verify whether the most dynamic sectors in terms of employment creation have been those expected by trade reform promoters, i.e., tradable-goods sectors such as manufacturing, where unskilled labor is used more intensively. We find that, between 1988 and 2004, the net balance of job creation by foreign trade was positive and increasing until 2000. Unskilled-labor-intensive manufactures and non-tradable goods and services (in an indirect way) sectors have been the main contributors to employment growth associated with foreign trade. The net effect of foreign trade on employment tends to be negative in skilled labor-intensive manufacturing sectors.

- **Resumen**: En este trabajo se analizan los efectos directos e indirectos de la liberalización comercial en el empleo, en México. Primero, estimamos el efecto neto que el crecimiento de las exportaciones y las importaciones ha tenido en el empleo; y, en segundo lugar, dado que México es un país relativamente abundante en trabajo no calificado, buscamos verificar si los sectores más dinámicos en términos de creación de empleo han sido aquéllos esperados por los promotores de la reforma comercial: sectores de bienes transables tales como las manufacturas intensivas en trabajo no calificado. Encontramos que, entre 1988 y 2004, el balance neto de creación de empleo asociado al comercio internacional fue positivo y creciente hasta el año 2000. Las manufacturas intensivas y los bienes y servicios no transables (de manera indirecta) han sido los sectores principales en contribuir al crecimiento del empleo asociado al comercio exterior. El efecto neto del comercio exterior en el empleo tiende a ser negativo en los sectores manufactureros intensivos en trabajo calificado.

- **Keywords:** Trade Liberalization; Trade and Labor Market Interactions; Employment; Mexico.

- **JEL Classification:** F13, F16.

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■ *Introduction*

Free trade assumes that if you throw men out of work in one direction you re-employ them in another. As soon as that link in the chain is broken the whole of the free trade argument breaks down.
J. M. Keynes

Although it is well known that the structural reform programs followed by Latin American economies did not result in higher economic growth rates, a decrease in volatility, or a lower exposure to risk (BID, 1997; Stallings and Peres, 2000; French-Davis, 2005), the effects that this policy had on employment and its long-term structure are less known. One of the main traits of the economic reforms was trade liberalization. In Mexico, this process took place rapidly. As a result, Mexican export and import coefficients experienced accelerated growth. It was expected that, given the relative strength of resources in the Mexican economy, trade liberalization would generate an increase in the employment of unskilled labor, which would be partially offset by a decline in skilled labor. Therefore, the net effect for the country would be positive, and would additionally lead to a reduction in differential wages between these two groups of workers.

Most international trade theories suggest that free trade will lead to a pattern of specialization in production. Since Adam Smith to the most recent theories, free trade affects labor markets through a process of resource reallocation. In the static models of these theories, production will increase in some sectors and decrease in others and employment demand will follow this pattern. Surveys that compile studies regarding the relationship between trade and employment, among others, are Hoekman and Winters (2005), Wood (1994) and Cervantes (2008).

There are several studies attempting to establish the effect of trade liberalization on employment in Mexico. Research has been conducted on the effect of the policy change on employment generation through growth in the export sector and the changes in demand by type of employment and their impact on wage dispersion. In general, between 1970 and 1992, export growth did not increase labor demand (Dussel, 1995, 2003). Relying on econometric techniques, Dussel (1995) shows that, in terms of employment creation, the exports coefficient is statistically non-significant for those sectors of the economy displaying the highest employment growth rates. However, based on the input-output analysis, Ruiz-Nápoles (2004) finds that the share of total employment generated by exports between 1980 and 2000 has actually increased. In the same way, it has been established that free trade caused a higher relative growth in the demand for skilled labor, which contributed to a growing wage gap (Cragg and Epelbaum, 1996; Revenga, 1997; and Feenstra and Hanson, 1997). In this paper, we

will show that when estimating the foreign trade factor composition (including the indirect effects on labor demand), opposite balances are revealed: the unskilled labor embodied in exports is more significant both in absolute and in relative terms whereas there is more skilled labor embodied in imports. Hence, by relying upon an alternative approach, we conclude that the wage gap increase is not likely to be associated with trade liberalization and not necessarily with FDI. According to the National Account System, in Mexico, the maquiladora industry[2] uses up to three times more production workers than the non-maquiladora manufacturing sectors (Fujii and Cervantes, 2010).

Hence, the aim of this paper is to present an estimate of the effect that export and import growth, owing to trade liberalization, has had on employment in Mexico. Regarding the employment generated by exports, this method enables an estimate of the direct as well as indirect effects of job creation resulting from foreign trade. To the best of our knowledge, this is the first time that input-output analysis is utilized for the Mexican case in order to estimate the flows and balances of labor demand for different industrial sectors, as well as according to the labor intensity of unskilled or skilled labor.

The estimate is based on data from the Mexican System of National Accounts and on State Matrix Input-Output Matrices prepared by Consultoría Internacional Especializada, S. A.

The paper is organized as follows: section one outlines a background of the evolution of foreign trade in Mexico since trade liberalization; the second section describes the input-output methodology used to calculate the employment content of exports and imports; the third section presents the results of these estimates. In the last section, a conclusion including a brief summary of our findings is presented.

■ *Dynamics of foreign trade since trade liberalization*

Before we describe the evolution of the Mexican trade variables, briefly, we will explain how free trade could affect the structure of labor markets.

Since Adam Smith, the free trade theory has evolved from very restrictive assumptions to more realistic models. In the new trade theory, it is possible for a country to engage in trade even though the country has not comparative advantage, due to increasing returns in some manufactures.

Regardless of the reason why countries trade and why it is possible for them to gain from trade, most theories predict some level of specialization in production. This specialization in the short run follows after a change in the structure of the labor market, measured as the share of employment by sector. The latter since some sectors will demand relatively more labor than others in order to satisfy their expanding demand and because some sectors will lose participation in the domestic market.

Nonetheless, since the analysis covers a period of thirteen years, it must be recognized that there are several factors that affect labor demand in the long run. Such

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2 The Maquiladora industry or "maquila" consists of foreign owned assembly plants that "re-export" materials and equipment that have been exported from the U.S. or other countries to them" (Truett and Truett, 1984: 45-46).

factors include inter alia, technological change, an increase in labor productivity, and changes in the structure of domestic demand. In fact, there are many studies that find that in developed economies, the relative fall in unskilled labor demand is explained by technological change and not by the trade with developing countries (Lawrence, 1996; Morrison Paul and Siegel, 2001; Boyle and MacCormack, 2002). On the other hand, Wood (1994), with a factor content of trade methodology, estimates that trade would reduce the employment of unskilled workers in developed countries and increase the employment of these in the developing economies.

Until the early 1980s, Mexican industrial policy aimed at promoting the country's industrialization. As a result, such policy was import-substitution oriented: the Mexican market was protected from foreign competition. The beginning of the trade liberalization process in Mexico can be dated back to 1987, the year of Mexico's accession to GATT. Such accession meant that "official prices" and import licenses were substituted for taxes on imports which were only temporary, i.e., they were to be reduced later on. The process of tariffs reduction was a rather quick one. Consequently, in 1980 the average import tariff was 22.8 percent whereas, by 1988, it came down to 10.2 percent. Similarly, in 1988 the highest tariff was cut down from 100 to 20 percent. In addition, the number of products subject to import quotas fell from 1,200 to 325. Moreover, by 1996, the weighed average import tax was reduced to 3 percent, whereas the number of tariff levels fell from 11 in 1986 to 5 in the subsequent years. In the same way, owing to the North American Free Trade Agreement (NAFTA), which started off in 1994, 41 percent of Mexican imports from the United States and Canada were tariff-free by such year (Dussel, 2000: 86; Clavijo, 2000: Cuadro A 26).

As the Mexican government opened up the economy to imports, it also set in place a number of programs designed to promote exports, particularly those associated to the manufacturing sector. Between 1992 and 2006, Mexico's total exports experienced a remarkable growth: from 46.2 to 250 billion dollars. From 1989 to 2006, the average annual growth rate of exports was 9.6%; from 1989 to 1993, 5.8%; and from 1994 to 2006, 11.1%. This led to an increase, between 1988 and 2006, in the trade openness coefficient, from 25.5 to 85.7%[3]. As Table 1 shows, since 1994, when NAFTA came into effect, the trade openness coefficient has increased dramatically.

The dynamism of exports coincided with a change in the structure of exported goods. By the late 1980s, the share of manufacturing exports was 71% of total exports (1988). Manufacturing exports have been supported by several government initiatives. For instance, the Programa de la Industria Maquiladora para la Exportación (Maquiladora Industry Exporting Program), created in 1965, was later on complemented by PITEX (Programa para la Importación Temporal para Producir Artículos para Exportación). PITEX allows Mexican producers who import inputs in order to produce exports to bring such inputs into the country tariff-free; they do not pay value-added tax either. The objective of these programs was to incorporate Mexico into the international

[3] These coefficients were estimated using exports, imports and GDP annual series in constant Mexican pesos. When we estimate trade coefficients using current values in US dollars (or values in Mexican pesos using real exchange rates), the proportion of foreign trade to GDP seems significantly lower.

Table 1
Mexico. Trade openness coefficient, 1988-2006 (% of GDP)

	1988-1993	1994-2000	2001-2006
Exports (X)/GDP	14.3	27.5	36.5
Imports(M)/GDP	15.8	27.7	39.7
(X+M)/GDP	30.1	55.2	76.2
Total variation (X+M)/GDP	8.9	33.3	14.7
Annual average variation (X+M)/GDP	1.8	5.5	2.2

Source: Authors' calculations based on INEGI, Economic Information Bank. Joint Economic Indicators. Supply and demand of goods and services

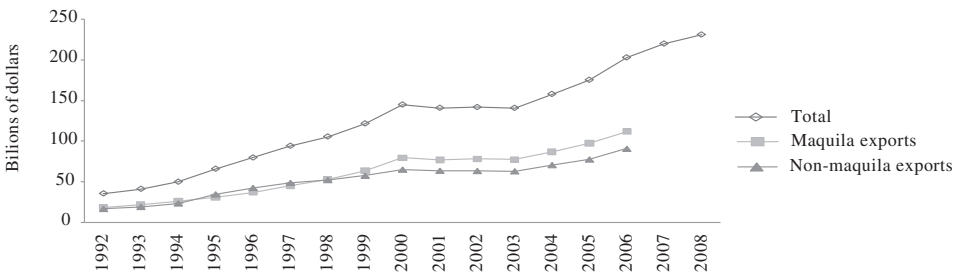
production network by taking advantage of NAFTA and of the natural Mexico-USA vicinity. In order to encourage investments in manufacturing and maquila activities, Mexico emphasized its large labor force and its correspondent low cost, among other advantages for businesses. As it is well known, labor cost gaps, both in wage and non-wage terms, are likely to result in the fragmentation of the production process according to the advantages each country has regarding the process itself. In this way, when the product is to be assembled, a phase of production which normally relies on unskilled labor, it tends to be the case that this particular activity takes place in low-wage countries whereas the design and engineering stages tend to be developed in those countries where labor is well qualified (and wages are higher)[4]. Some sectors in the maquiladora -such as the electronic industry- are clearly part of this fragmentation, since they import semi-manufactured inputs, and most of the tasks performed in the country consist of assembly. In addition, the Mexican government set in place the Programa para Empresas Altamente Exportadoras (Program for Heavy Exporting Firms), which grants administrative support and assistance to this enterprises, such as the quick reimbursement of any value-added tax they have paid and have the right to claim for, as well as speeding up inspections at customs check points (Dussel, 2000: 87).

The performance of the maquiladora export industry has been remarkable. Actually, by the late 1980s, almost half of the Mexican manufacturing exports originated in that industry. Maquila exports also represented 33 percent of total exports, whereas the non-maquila industry contributed with 38 percent of such total. Toward 2006, the maquila share over total exports increased to 45 per cent while the non-maquila one decreased to 36 percent. Figure 1 shows the growth of manufacturing exports, both maquila and non-maquila, from 1992 to 2006, which is the last year for which separate data for maquila and non-maquila manufacturing are available. From 1998, the value of maquila exports has been higher than that of the rest of the manufacturing exports. In this way, the maquila industry became the most dynamic sector of the entire Mexican manufacturing export industry. In fact, in 2006, Mexican manufacturing exports amounted to 203 billion US dollars, out of which 112 billion (well over 50 percent of

4 Grossman and Rossi-Hansberg (2008) and Baldwin (2006), among others, state that off - shoring could happen for non-production activities.

the total) corresponded to maquila exports. Hence, Mexico has become a country that specializes in the stages of the production process which are highly intensive in the use of low-skilled labor and, simultaneously, an important exporter: "Mexico is a major exporter among developing countries of manufactured goods, such as textiles and clothing, automobiles and automotive parts, and electrical and electronics goods, which have been very important in international production networks" (UNCTAD, 2007: 71).

Figure 1
Manufacturing and maquila exports (billions of dollars)



Source: Authors' calculations based on INEGI, Economic Information Bank.

It is reasonable to assume that the striking growth of foreign trade as a share of the economy and the change in the structure of exports must have had a substantial effect on employment. On the one hand, export growth creates jobs in direct and indirect ways while, on the other hand, imports, insofar as they replace domestic production, are either job-destroying or they evince the potential to generate employment to the extent that they are replaced by domestic products.

Employment shares throughout the economy changed significantly in the 1988-2004 period. In this way, the participation in total employment of the sectors producing tradable goods fell from 41.3 per cent in 1988 to 33.1 in 2004. This is basically a result of a fall in agricultural employment, whose share dropped from 28 to 21 per cent. The share of employment in the manufacturing sector also fell: in 1988, it represented 13.4 per cent of total employment; by 2004 it was only 11.4 per cent. Simultaneously, the composition of manufacturing employment changed in regards to the levels of qualification it actually demands. In this way, whereas the employment share of highly-skilled labor intensive manufactures fell from 5.9 to 4.2 percent, that belonging to the low-skilled labor intensive manufactures increased from 6.4 to 7.2 percent. This higher share for the low-skilled labor sectors is entirely explained by the behavior of the maquila industry: its employment share increased from 1.5 per cent of the total to 3.5 percent. At the same time, the share of other low-skilled labor intensive manufactures dropped.

■ *Input-output analysis applied to the estimate of labor content of foreign trade*

Input-output methodology enables us to estimate total employment (direct and indirect) associated with the production of a certain good. So the analysis presented in this paper can be related to Vanek's (1968) prediction in the sense that we assume that the factor content of Mexican trade should reflect the relative factor endowments of the country. As Trefler and Zhu (2010) show, the input-output matrices are useful tools to estimate the factor content of trade for short periods. Nevertheless, when applying such methodology to the changes in foreign trade patterns in Mexico some limitations arise. National Accounts classifications are made by type of product, meaning that small, medium, and large enterprises that are heterogeneous in forms of production and productivity levels are classified in the same sector. Therefore, the observed averages in technical coefficients of national inputs and employment may not be representative if enterprises respond in different ways to changes in trade policy.

However, the major limitation of the methodology proposed in this study lies on the assumptions underlying the estimates of employment associated with imports. First, it is necessary to assume that imported goods could be produced internally using the same combination of inputs and factors as those already used in domestic production. Moreover, in order to estimate the job-destruction effect of imports, it can be assumed that imports completely replace domestic production, or that only some of them are job-destroying as a result of the change in trade policy. Thus, there are two types of problems: 1) how would the goods imported be produced in Mexico? and 2) what is the proportion of imports that could realistically be produced domestically?

Assuming that imports destroy the same number of jobs that they create in their country of origin is not reasonable. This is the case because one of the basis of international trade is productivity differences. Therefore, we will retain the assumption that imported goods would be produced in Mexico according to the technology and forms of production already found in the country. However, although it is extremely unrealistic to assume that all of the products currently imported could be produced in Mexico, in this study we present only one type of the estimates to measure the impact of import growth on employment and its mobility among sectors. We calculate the total labor content of imports, direct and indirect, with the aim of verifying whether there is a tendency to import more skilled labor-intensive goods after trade liberalization. More precise estimates could be obtained either by assuming that the growth in import coefficients has only a job destruction effect or from a deeper study of the production capabilities of the Mexican economy.

This section presents the methodology used to calculate the employment content of exports and of imports.

From input-output analysis we can calculate the labor content of foreign trade. However, certain assumptions are necessary. First, we assume there are no significant differences in the forms of production of exported goods compared with their production for internal consumption; and second, we suppose that imported goods (final or intermediate products) are perfect substitutes for national production, i.e., that

they could be produced with an identical combination of inputs and factors. The output associated with the volume of exports and imports written in matrix notation is:

(1) $$x_e^d = \left(I - A^d\right)^{-1} f^e$$

(2) $$x_m^d = \left(I - A^d\right)^{-1} f^m$$

where x_e^d and x_m^d are total production vectors (direct and indirect) associated with exports, f^e, and with the imported goods, f^m, and where $\left(I - A^d\right)^{-1}$ is the Leontief inverse matrix, with I as the identity matrix of dimension, *rxr*, where *r* is the number of economic branches or sectors and A^d is the technical coefficient matrix, which represents the proportion of domestic inputs needed to produced a unit of a given good.

The total labor content of exports and imports is obtained by multiplying the labor coefficient vector by the gross output associated with tradable goods.

(3) $$n_e = \lambda \hat{Y}_e$$

(4) $$n_m = \lambda \hat{Y}_m$$

(5) $$\lambda = n/x$$

where λ is the vector for employment by sector; n is the vector whose elements are given by the number of workers in each sector; x is the gross product by sector; and finally $\hat{Y}_e$ and $\hat{Y}_m$, which are the diagonal matrices of the gross value of exports and imports, i.e., each sector includes an estimate of the content of traded inputs and not only the value added.

To separate direct from total employment, the labor coefficient vector is multiplied by the diagonal matrices of the value of exports and imports, $\hat{E}$ and $\hat{M}$.

(6) $$l_e = \lambda \hat{E}$$

(7) $$l_m = \lambda \hat{M}$$

■ *Employment creation and destruction due to foreign trade*

Relying on the method outlined above, in this section we present the estimate of the effects on employment derived from growth in foreign trade between 1988 and 2004,[5] as well as its distribution by economic sector. First, we submit estimation by economic branches of direct and indirect employment generated by the manufacturing industry

[5] Since the last input-output matrix estimated for the Mexican economy -based on the National Account System classification- is for the year 2000, we are unable to estimate more recent levels of employment associated with trade flows.

exports according to their labor intensity (section Labor content of exports). Then, we introduce the total (direct and indirect) labor content of imports (section Labor content of imports). In section Balance between labor content of imports and exports, we present the balance between the labor content of exports and that of imports: this is the net result of the effects of foreign trade on employment and its composition owing to the process of trade liberalization.

Labor content of exports

Table 2 shows the direct and indirect labor content of exports from 1988 to 2004, estimated using the method previously discussed. Key results are as follows:

a) The number of paid jobs associated with exports, both directly and indirectly, grew remarkably between 1988 and 2004: from 2 million to almost 5 million. Hence, the share of total employment attached to exports increased from 8.8 to 16.1 per cent.
b) Most of the additional 2.94 million jobs derived from export growth are explained by manufacturing exports, whose content of labor increased by 1.4 million, from 697,000 jobs in the first year to 2.1 million in 2004.
c) The greater part of this expansion resulted from the growth of employment in the unskilled-labor-intensive export manufacturing sector,[6] whose number of jobs increased from 538,000 in 1998 to 1.7 million in 2004. The employment share of unskilled-labor-intensive manufacturing exports, relative to total employment associated with exports, increased from 27% to 34%.
d) Employment in these activities reached its maximum level in 2000, when it amounted to 1.9 million jobs. Given the weight of employment associated with exports of the products of these activities, relative to total jobs derived from exports, 2000 saw the maximum level of total employment derived from export activity.
e) Direct and indirect employment derived from skilled labor-intensive manufacturing exports increased from 159,000 jobs in 1988 to 408,000 in 2004. However, given that employment grew much faster in other export sectors, particularly unskilled-labor-intensive manufacturing, in relative terms the proportion of skilled labor to total employment associated with exports remained at 8%.
f) Finally, exports growth has also affected employment on two other non-qualified-labor intensive sectors: the number of paid jobs under the "Other goods and services" category increased from half a million in 1988 to 1.6 million in 2004. In the same period, agricultural employment expanded from 641,000 to 1.2 million posts.

In Table 2, the total labor content of exports is presented for both direct and indirect employment.[7] The most significant findings are the following:

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6 The unskilled-labor-intensive sector includes all the manufacturing branches with a ratio of more than three production workers per nonproduction worker.

7 The direct employment in one sector represents the content of employment required to produce a given amount of exports in the same sector. On the other hand, the indirect employment in one sector represents the content of employment required to produce the inputs for the total amount of exports. Thus, in Table 2 the row of indirect employment for the maquila industry is empty because there is not a single sector demanding in-

a) The direct employment content of exports is three times that of indirect employment in almost all of the years considered. This reflects the relatively weak production linkages of export activities, particularly those of maquila industry. In addition, in 1988-2004, the ratio of direct over indirect employment generated by exports increased from 3.1 to 3.4, which implies that employment linkages associated to exports are turning weaker. This is particularly relevant for the maquiladora industry, since 90 per cent of the inputs it utilizes are imported, which implies that this industry's indirect effects on employment are almost trivial. In this way, the pattern sketched throughout the period shows a slight increase in direct employment per indirect employment. Nevertheless, it must be highlighted that during 1995-1997, the ratio of direct over indirect employment was about 2.6, which suggests that, somehow, the 1995 financial crisis might have generated a process of import substitution regarding intermediate inputs.
b) The demand of indirect employment has grown at almost the same rate as that of direct employment. The average annual growth of direct employment associated with exports, including maquila, is 5.8%; of direct employment without maquila, 5.4%; and of indirect employment, 5.2%.
c) The greater part of direct employment generated by exports derives from manufacturing exports, particularly those that are unskilled-labor-intensive, and within those, by maquila industry exports, which on average use up to three times more production workers per nonproduction worker than the rest of Mexican manufacturing. Figure 2 shows that maquila industry suffered a relative loss in terms of the generation of employment by exports, especially around the years when NAFTA took effect; however, on average, more than 65% of the employment in unskilled-labor-intensive sectors associated with exports was attributable to maquila.
d) Other important and expanding sectors for direct employment generation are agricultural exports and other goods and services exports.[8]
e) The growth of indirect employment is mainly concentrated in unskilled-labor-intensive sectors. On average, the annual growth rate of direct labor content of exports of unskilled-labor-intensive manufactures is greater than 4.5%, while indirect employment in these sectors grew at an average annual rate exceeding 14%. However, this huge increase is partly explained by only one fact: the indirect demand of 27,000 jobs for non-maquila exports in 1988 had risen to 256,000 by 2004. Given this expansion, the indirect labor content of exports in unskilled-labor-intensive sectors rose from 14% of total employment generated by labor-intensive sectors to 42% (excluding employment generated by maquila industry). Other export activities with important indirect effects on employment are agriculture and those grouped in the category of other goods and services.

puts to them; furthermore, we are assuming that the maquila industry does not demand national inputs either, so the growth of maquila exports does not affect the indirect employment in any other sector.

8 Sectors that export or import goods and services in a direct way from the sector "other goods and service" are: Electricity, Gas and Water, Professional Services, Recreation Services and Other Services

Figure 2
Maquila employment as proportion of labor content of exports (percent)

Source: Authors' calculations based on INEGI, System of National Accounts, and Input-Output matrices

Table 2
Direct, Indirect and Total Employment on Exports
(annual average; thousands of paid jobs)

	1988-1993	1994-2000	2001-2004
Total employment			
Primary Products	713	961	1114
Agriculture, livestock, etc.	602	875	1022
Manufacturing Products	785	1692	2069
Unskilled-labor intensive	623	1376	1687
Non Maquila	192	504	608
Maquila	431	872	1079
Skilled-labor intensive	162	316	382
Other goods and services	647	1270	1554
Total	2146	3923	4737
Direct employment			
Primary Products	527	683	864
Agriculture, livestock, etc.	447	627	804
Manufacturing Products	717	1429	1723
Unskilled-labor intensive	596	1183	1422
Non Maquila	165	311	343
Maquila	431	872	1079
Skilled-labor intensive	122	246	301

	1988-1993	1994-2000	2001-2004
Other goods and services	432	873	1080
Total	1677	2985	3667
Indirect employment			
Primary Products	186	278	251
Agriculture, livestock, etc.	155	248	218
Manufacturing Products	68	263	346
Unskilled-labor intensive	27	193	266
Non Maquila	27	193	266
Maquila	0	0	0
Skilled-labor intensive	41	70	80
Other goods and services	215	396	474
Total	469	938	1070

Source: Authors' calculations based on INEGI, System of National Accounts, and Input-Output matrices

Labor content of imports

Table 3 shows total, direct and indirect labor content of total imports assuming that those goods were produced in Mexico with the same combination of inputs and factors as similar domestically-produced goods. This allows us to establish whether imported goods are mainly skilled-labor-intensive, in accordance with the production capacity and technology of the country. The fact that this estimate is based on the technology used in Mexico to produce these goods results in a very high labor content of imports, owing to the low labor productivity in some sectors of the economy. This is particularly striking for the agricultural sector, as we will show below.

Given their accelerating growth, the labor content of imports increased substantially in the period of study, from 1.35 million to 3.85 million paid jobs. The greatest absolute increases occurred between 1996 and 2000, i.e., in the years that followed the coming into effect of NAFTA. In spite of the fact that the value of imports in the primary sector never exceeded 4% of total imported goods during the period, the low productivity in the agricultural and livestock sector in Mexico, which has its counterpart in the high level of employment concentrated in these activities, meant that a large proportion of the jobs associated with imports was concentrated in this sector, averaging 37% of the total.

The total labor content in manufacturing imports grew from 529 to 1,640 thousand jobs. In 1988, skilled-labor-intensive manufactures represented the second-highest share of employment associated with imports and, to a lesser extent, the direct and indirect labor content of unskilled-labor-intensive sectors was also significant. By the end of the period the share of employment was slightly higher in the unskilled-labor-intensive sectors.

When separating the indirect effect of imports,[9] it can be appreciated that, between 1988 and 2004, their average direct labor content was close to 60 per cent of the total labor associated to them. Similarly, during the 1995 crash, the share of direct employment

[9] In order to separate the direct and indirect effects of imports on employment, we used the same method as in the case of exports, i.e., the direct employment, that is estimated by multiplying the employment coefficient by the value of imports, is subtracted from the total labor content of imports.

in the total employment linked to imports decreased. Such situation can be explained by the devaluation the Mexican peso suffered which, in turn, encouraged the substitution of imports, especially of final goods. By using the same technical coefficients of national inputs, the methodology allows us to infer that imported goods tend to be relatively less labor-intensive, in accordance with the forms of production that exist in Mexico. Thus, even if goods that haven't been classified as skilled-labor-intensive are imported, there is a tendency to import goods that contain relatively less labor.

The methodology thus reveals that in an indirect way, import growth significantly affected the tertiary sector: the number of jobs associated with it increased by more than a factor of 3[10]. In 1988, total imports represented 207,000 indirect jobs in the other goods and services sector; in 2004, the number was close to 704,000. Marketing and transport services are included in this sector, however, the economic branch most affected indirectly by import growth was professional services, where indirect employment grew more than tenfold in the period, increasing from 7,000 to 73,000 jobs.

There is a low effect of imports on direct employment in the tertiary sector because Mexico "imports" only small values of services in the electricity, gas, water, professional services and entertainment services branches. Actually, the share of imports belonging to the latter represent less than one percent of total imports.

Table 3
Direct, indirect, and total employment associated with imports
(annual average; thousands of paid jobs)

	1988-1993	1994-2000	2001-2004
Total employment			
Primary Products	788	1134	1474
Agriculture, livestock, etc.	725	1074	1392
Manufacturing Products	839	1324	1680
Unskilled-labor intensive	394	660	849
Skilled-labor intensive	444	664	831
Other goods and services	340	523	694
Total	1966	2981	3848
Direct employment			
Primary Products	506	773	1008
Agriculture, livestock, etc.	492	761	993
Manufacturing Products	725	1023	1263
Unskilled-labor intensive	353	461	558
Skilled-labor intensive	371	563	705
Other goods and services	2	4	16
Total	1233	1800	2286

[10] Although the methodology used does not allow us to know the origin of the inputs contained in imports, calculation of the estimate of indirect employment associated with imports shows that if the volume of imported manufactured goods increases significantly, this will affect the productive chains.

	1988-1993	1994-2000	2001-2004
Indirect employment			
Primary Products	281	360	466
Agriculture, livestock, etc.	233	313	398
Manufacturing Products	114	300	417
Unskilled-labor intensive	41	199	291
Skilled-labor intensive	73	101	126
Other goods and services	338	520	678
Total	734	1180	1562

Source: authors' based on INEGI, System of National Accounts and Input-Output matrices

■ *Balance between labor content of imports and exports*

The balance of the effect of foreign trade on labor demand is summarized in Table 4.

a) Throughout the period analyzed, the balance was positive. After 1995, when the country's trade liberalization coefficient increased dramatically, foreign trade had an important positive net effect on employment. By the end of the period, in 2001 and 2002, this surplus had fallen sharply, but it recovered in 2003 and 2004.
b) Of all the categories of tradable goods represented in Table 4, manufactured goods caused the greatest positive balance in the employment generated. In the rest of the post-NAFTA period, with a negative employment balance between 1990 and 1994, net job creation derived from foreign trade in manufactured goods averaged more than 430,000 jobs.
c) Such balance is explained by the employment effect derived from foreign trade in unskilled-labor-intensive manufactures, which was positive and increasing, in some years approaching one million jobs. However, toward the end of the studied period, this balance tended to fall, in part because of the displacement of Mexican unskilled-labor-intensive manufacturing exports to the United States caused by the growth of Chinese exports (Bracho, 2003).
d) The employment balance of skilled-labor-intensive manufactures had been negative but increasing since 1996. However, its magnitude was considerably less than the positive balance of employment derived from foreign trade in unskilled-labor-intensive manufactures.
e) The positive net effect of employment derived from foreign trade in manufactures was significantly offset by the negative balance of agricultural employment, which exceeded 400,000 jobs in the last years of the period studied, explaining most of the drop in the balance of employment derived from foreign trade.
f) Table 4 shows as well that the positive balance of total labor content present in the "Other goods and services" sector augmented importantly, a result that is mainly explained by the increase in the direct employment balance registered in such sector itself.

Table 4
Balance between labor content of imports and exports
(annual average; thousands of paid jobs)

	1988-1993	1994-2000	2001-2004
Total employment			
Primary Products	-75	-173	-360
Agriculture, livestock, etc.	-123	-199	-370
Manufacturing Products	-54	368	389
Unskilled-labor intensive	229	716	838
Skilled-labor intensive	-282	-348	-449
Other goods and services	307	747	860
Total	180	942	889
Direct employment			
Primary Products	21	-90	-144
Agriculture, livestock, etc.	-45	-134	-189
Manufacturing Products	-8	406	460
Unskilled-labor intensive	243	722	864
Skilled-labor intensive	-249	-317	-404
Other goods and services	430	869	1064
Total	444	1185	1381
Indirect employment			
Primary Products	-95	-82	-215
Agriculture, livestock, etc.	-78	-65	-180
Manufacturing Products	-46	-37	-71
Unskilled-labor intensive	-14	-6	-25
Skilled-labor intensive	-32	-31	-46
Other goods and services	-123	-124	-204
Total	-265	-242	-492

Source: Authors' calculations based on INEGI, System of National Accounts, and Input-Output matrices

It has been shown that trade openness has had a net positive effect on employment creation in Mexico. However, these results must be assessed in the context of the challenges the country faces in terms of employment needs. We believe that the most pressing issue in the Mexican labor market is the quality of the jobs being generated. Actually, data from the Mexican National Institute for Geography and Statistics, from the UN Economic Commission for Latin America and from the International Labor Organization reveals that more than 25 per cent of working Mexicans are employed in the underground economy (2008); 46 per cent of urban employment corresponds to low productivity activities, which are in turn linked to microbusinesses and low-skilled independent work (2006); the salaries of over 80% of wage-earners do not exceed five times the minimum wage (the Mexican minimum wage lies in the vicinity of 140 US dollars per month (2009)); and 45 per cent of wage-earners have no health insurance at

all (2009). As it has been discussed, most of the jobs generated by trade liberalization are low-skilled-labor intensive. Hence, they tend to be of low quality.

■ *Conclusions*

Using the input-output analysis, in this paper we have found that the economic orientation toward a pattern in which exports began to display a growing importance for global demand had a significant effect on employment, particularly in the period 1993-2000. On the other hand, trade liberalization led to a parallel growth in imports; however, the net effect of foreign trade on employment has been positive.

Confirming Vanek's prediction, trade liberalization led to a restructuring of employment towards a greater concentration in unskilled-labor-intensive manufacturing sectors, i.e., in activities which do not necessarily generate good quality employment.

Nevertheless the positive effect on employment, we are far from achieving a full employment situation for the Mexican economy. So, any economic policy should consider: a) how much employment is not being generated due to the increasing imports of intermediate inputs; b) that if most of the employment demand is for unskilled labor then most likely this employment would have a low impact in the domestic market; and c) that Mexico now has been displaced by China as the second major exporter to the U.S. market. That is, we consider it is crucial to design an industrial policy that favors the import substitution of some inputs (those with a high level of value added), and/or promotes an increase in labor productivity in order to restore some of our competitiveness. As a consequence, Mexican exporting sectors could generate more employment (due to the increase of indirect effects of exports), better quality of this indirect employment, and/or an increase in the wage rate.

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