**TRADE LIBERALIZATION IN MEXICO AND THE HECKSCHER-OHLIN THEOREM: AN INPUT-OUTPUT ANALYSIS**

Pablo Ruiz Nápoles\*\*

Posgrado en Economía

Facultad de Economía

Universidad Nacional Autónoma de México

ruizna@unam.mx

*Abstract*

Neoclassical trade theory is largely based on the Heckscher-Ohlin theorem. This proposition has survived all criticisms for many decades and is still the basis for orthodox free-market trade policies. According to Ohlin’s argument, in an international free-trade market, a country can optimize its production and consumption by partially specializing its economy in the areas of production in which it has comparative advantages, derived from its relative factor endowment, and by receiving in exchange those goods it produces with comparative disadvantages.

The H-O theorem has been tested by various methodologies under different scenarios. Still, the most cited test was conducted by Wassily Leontief for the U.S. economy using its 1947 input-output table. However, his results contradicted the theorem’s predictions, which gave rise to the so-called, “Leontief paradox”.

 Using Leontief’s model, we test the H-O theorem as applied to the Mexican economy during the period in which free international trade prevailed, to find out whether the economic strategy with free trade has bolstered Mexico’s comparative advantages based on its relative factor endowments, as the theorem maintains. Our results clearly show that the H-O theorem does not apply to Mexico in the period following trade liberalization.

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Introduction

In the early eighties, years before the so-called “Washington Consensus” was widely known (Williamson, 1990), a series of economic reforms were promoted by the World Bank and the International Monetary Fund for highly-indebted Latin American countries as “structural adjustment programs” or “growth-oriented adjustment programs” (Sacks, 1987; Edwards, 1989). These programs promoted the following measures: “(1) trade liberalization, especially the conversion of quantitative restrictions to low, uniform tariffs; (2) real exchange-rate depreciation and unification of the exchange rate; (3) an emphasis on the private sector as the source of growth, including the privatization of state enterprises; and (4) a general reduction in all forms of government intervention in markets (capital or factor), and in the overall level of government taxation and expenditure.” (Sacks, 1987, p. 2).

 It was clear from the beginning that these policies were inspired by so-called *mainstream economics* in which neoclassical thinking is predominant. In short, the programs aimed to promote the *free market*. There have been numerous analyses regarding the results of these and similar programs in Latin America, applied for over thirty years in the region. In this paper, we focus on *free-trade* policy, that is, the trade-liberalization policy applied in one country, Mexico, as part of a more general adjustment program initiated in 1983. In particular, we analyse whether the effects of the trade-liberalization process in Mexico in terms of its trade pattern followed the direction predicted by the Heckscher-Ohlin (H-O) theorem, assuming Mexico was, prior to its trade opening, labour-abundant, compared to its major trading partner, the United States.

 Following these introductory remarks, this paper in divided in six sections. In the first, we present the H-O theorem, its basic assumptions, and its essential character. In the second section, we review several analyses about the theorem and its validity, in particular, the “Leontief paradox”. In the third, we examine some of the characteristics of free-trade policy applied in Mexico since 1983. In the fourth section, we present the methodology followed using input-output analysis. In the fifth section, we apply the methodology to test the H-O theorem in the Mexican economy over various periods. Finally, we discuss conclusions in the last section.

I. The Heckscher-Ohlin theorem and neoclassical trade theory

Neoclassical trade theory claims that *free trade* and exchange-rate flexibility are ways of achieving a trade balance and Pareto optima in production and consumption. In the H-O theorem, by participating in a *free market* in international trade, a country is said to optimize production and consumption by partially specializing its economy in the areas of production where it has comparative advantages derived from its relative factor endowment and obtaining in exchange those goods it produces with comparative disadvantages.

 The H-O theorem and the purchasing power parity (PPP) doctrine are considered the two pillars of the neoclassical theory of international trade (Krueger[[1]](#footnote-1), 1983). Behind the H-O theorem is the comparative-costs theory developed by Ohlin[[2]](#footnote-2) as an interpretation of Ricardo’s theory of relative advantages but “independent of the classical labour theory of value” (Ohlin, 1935, p. vii). As developed in Ohlin’s original work (Ohlin, 1935), the theorem assumed a Walras-Cassel general-equilibrium model in which the theory of international trade, based on comparative costs, is just a special case of the more general theory of price determination by supply and demand. Foreign (international or interregional) trade would be the particular case in which there is no mobility of factors of production between regions or countries, whatever the cause (natural, cultural, or political). The crucial effect of factor immobility is the existence and prevalence of factor-price differences between countries, as opposed to the usually assumed equality of factor prices within an economy.

Following Ohlin, if Walras’s general equilibrium conditions and assumptions prevail in any two countries, any existing differences between their respective price systems will be exclusively determined by differences in their corresponding sets of data: (1) factor endowments, (2) technology availability, (3) distribution of factors and factor income, and (4) individuals’ preferences. These are two demand conditions and two supply conditions, respectively.

Assuming that an equal range of technology is available for the two countries, Ohlin stressed the importance of factor endowments and demand conditions to account for relative price differences between them. Since great differences in factor endowments exist between countries, Ohlin noticed that the proportions in which factors occur in each country will be *decisive* in determining their relative price rentals and, therefore, the relative commodity prices. Thus, other things being equal, the determinants of relative price differences between the two countries are the relative factor endowment differences. If there are price differences between the two countries, no transport costs, and no barriers to free commodity mobility, trade will be established between these countries, based precisely on those price differences. In order to measure relative price differentials, the respective price systems must be compared to each other. The exchange rate of the two currencies allows comparisons to be made between the systems. Consequently, Ohlin said, “When an exchange rate has been established, prices and costs of production can be compared directly. Goods requiring a large quantity of factors cheaper in A than in B, and only a small quantity of other factors, can be produced at a lower cost in A and will therefore be exported to B. On the other hand, commodities requiring a large quantity of the latter factors and a small quantity of the former can be more cheaply produced in B and will be imported from that region to A. *Each region* [country] *has an advantage in the production of commodities into which enter considerable amounts of factors abundant and cheap in that region* [country]” (Ohlin, 1935 pp.19-20).

Ohlin’s proposition regarding the main determining causes of comparative advantages was called the “Heckscher-Ohlin theorem,” after Eli Heckscher (1919), who had worked previously on the same topic and, as his professor, influenced Ohlin’s ideas.

In mathematics, a theorem is a statement that has been proven on the basis of previously established statements and generally accepted statements, such as axioms. The proof of a theorem is a logical argument for the theorem statement given according to the rules of a deductive system, in contrast to the notion of a scientific theory, which is empirical. Therefore, it can be said that the H-O theorem derives its validity from its model (the Heckscher-Ohlin model) and the axioms and assumptions on which the theorem and the model are grounded.

II. The Heckscher-Ohlin theorem tests and the Leontief paradox

Since its postulation by Bertil Ohlin in 1933, the H-O theorem has been analysed or tested in two different ways: logically and empirically. Over the ensuing eighty years, an extensive economic literature in English on this topic has accumulated. We mention here only the most cited and relevant works.

**Logical assessments**

As noted above, the validity of the theorem rests on the validity of the statements and axioms on which it is based. Yet there are two types of analyses regarding the logic of the H-O theorem. Firstly there are economists from the same school of thought (i.e., neoclassical), whose analyses are not critical of the H-O theorem but rather deal with its rather restrictive assumptions. Among these authors are Lerner (1952), Rybczynski (1955), Jones (1956-7), Johnson (1961), and Deardorff (1982). Other economists have attempted to extend the reach of the theorem in one way or another: Samuelson (1948, 1949), Vanek (1968), and Travis (1972). Thus, the theorem is sometimes called H-O-S (for Samuelson) or H-O-V (for Vanek). Much of the literature cited and other similar studies are included in *Bertil Ohlin Critical Assessments*, edited by John C. Wood (Wood, 1995).

 Further, there have been numerous critiques from a non-orthodox perspective, which have focused on the theory of comparative costs and its implications for trade theory and policy: Shaikh (1980, 2007), Milberg (2002), and Subasat (2002). In addition, Steedman and Metcalf (Steedman, 1979) set out a critique regarding the conceptualization of *capital* and the notion of *endowment* in the Heckscher-Ohlin model with several implications for the validity of the theorem.

 In reviewing the difficulties for complying in any particular case with all the explicit or implicit assumptions in the H-O theorem, Markusen points out that international trade, as determined by factor endowments, is likely to be most prevalent “between developed countries such as the United States and developing countries such as Mexico” (Markusen *et al.*, 1995, p. 108).

**Empirical Tests**

Leontief’s[[3]](#footnote-3) study (1953) is the most widely known and discussed empirical test of the H-O theorem. Due to its controversial results, it was called the “Leontief paradox” which, in turn, gave rise to a long and ongoing debate.

Leontief attempted to establish whether the U.S. foreign-trade pattern followed the expected prediction from the H-O theorem, by assuming that the United States was relatively abundant in capital and relatively scarce in labour in comparison to the rest of the world. Thus, he expected U.S. exports to be capital-intensive and its imports labour-intensive.

Leontief (1953, 1956) based his analysis of U.S. foreign trade on the 1947 U.S. input-output tables. Using these tables, he computed the direct and indirect capital and labour requirements to produce one-million dollars of exports and import replacements. The paradoxical conclusion of the tests was that the one-million dollars –measured in 1947 prices– of U.S. exports embodied less capital and more labour –measured in man hours per year– than would be required to expand domestic output to provide an equivalent amount of competitive imports. In other words, U.S. import-replacement industries required more capital relative to labour than did U.S. export industries (Leontief, 1953, p.126). This conclusion implied that in the international division of labour, the United States actually specialized in labour-intensive, rather than capital-intensive, goods, i.e., an open contradiction to the widely accepted view derived from the H-O theorem. Surprised by his findings, Leontief asserted that the issue was, in fact, one of measurement. “His belief was that because of superior education and training, in conjunction with better management techniques, American labour was three times more productive than foreign labour. Thus, measured in effective labour units, the United States was really labour-abundant” (Markusen *et al.*, 1995, p. 221).

 After Leontief’s analysis, there have been two types of studies: those dealing mainly with the H-O theorem testing itself (Martin, 1976; Harkness, 1978; Helpman, 1984; Hakura, 1999; O’Rourke and Williamson, 1999; Choi and Krishna, 2004), and those dealing mainly with the “Leontief paradox” (Leamer, 1980; Trefler, 1994; Maskus, 1985; Duchin, 2000).

III. Trade liberalization in Mexico

In Mexico, in the middle of the recession that arose from the 1982 foreign-debt and foreign-exchange crises, the government initiated a trade-liberalization strategy as part of a so-called “structural adjustment program” (Sachs, 1987). After almost forty years of being a relatively closed economy, this *free-market* policy opened the Mexican economy. The process, which was gradual in the beginning, accelerated in the mid-eighties when Mexico joined the GATT (today WTO) and peaked when Mexico joined the North American Free Trade Agreement (NAFTA) in 1994.

The strategy consisted in inducing growth by increasing exports, in particular manufacturing exports, without the help of state subsidies. Internally, one of the main reasons that justified abandoning protectionism was that it was biased against exports (Levy, 1981; Balassa, 1983; Clavijo and Valdivieso, 1983; Lustig, 1992; Lustig *et al.*, 1992). Therefore exports were the engine, and the growth of output and employment the result. However, while some Asian countries implemented successful export-led growth strategies, they did not adopt liberalization policies simultaneously as a way to promote exports. On the contrary, the East Asian experience showed that successful export-promoting policies had regularly been accompanied by import controls and rigid regulations on the movement of capital (Sachs, 1987, p.19).

The combination of *free trade* and export-led growth was based on the notion that Mexico, being a labour-abundant country, should specialize in labour-intensive goods. The thinking was that, given the relatively low level of local wages, the economy would be highly competitive in these goods in the world market, if the exchange rate was adequately managed, but crucially, if *free trade* prevailed. This new trade policy was totally opposed to the relatively successful protectionism that was prevalent in Mexico since the early 1950s as part of an import-substitution and state-led growth strategy.

 In other words, for an export-led growth strategy to be successful, the trade pattern should be based on comparative advantages under *free trade*, which, according to the H-O theorem, would be determined by the country’s relative factor endowment. All analysts and policy makers assumed that Mexico was *labour-abundant* relative to its major trading partner, the United States, with which it shared a long-time economic and financial relationship, given their two-thousand-mile border. Thus, an important indicator of the degree of success of free-trade policy applied during these past thirty years would involve positive economic growth and increased employment in a context of Mexico’s export specialization along the lines predicted by the H-O theorem. We use input-output (I-O) analysis, as Leontief did, to test if the H-O theorem actually holds in the case of Mexico, or if it produces another “Leontief paradox”.

IV Input-Output and the H-O Theorem

Despite the open contradiction, i.e., expected and actual results, that surfaced from Leontief’s empirical tests of the H-O theorem as applied to the U.S. economy, there is a lack of relevant criticism over Leontief’s I-O methodology.

 The problem most researchers have had is one of I-O and trade information, which in reality means not one but several problems: industrial classification comparable between countries; availability of labour and capital data; comparability of I-O information with capital, labour, and trade data, in terms of periods and classification, and the very existence of an I-O matrix in some underdeveloped countries. Thus, it is only recently that some H-O theorem empirical tests using I-O have appeared with the re-emergence of I-O country and regional data and specialized software.

**Model specification**

In Leontief’s model, four equations were originally established (Leontief 1956, p. 122) to determine capital and labour requirements for the replacement of a given value of competitive imports and the production of an equivalent value of exports.

*Notation[[4]](#footnote-4)*

**x** = column vector of gross output of the *n* sectors of the economy in money terms.

**A** = square matrix of input-output coefficients [*aij*] for all *n* sectors,

 *i* = 1, 2,…, *n* and *j* = 1,2,…, *n*

**b =** column vector of export coefficients *b****i* =** *ei* /*xi*

**e =** column vector of exports in money terms.

**c** = column vector of competitive import coefficients *ci* = *mi* /*xi*

**m =** column vector of competitive imports in money terms.

**k =** raw vector of capital coefficients *kj* = *hj* /*xj*

**h =** raw vector of capital stocks per sector in money terms.

**l** = raw vector of labour coefficients *lj* = *tj* / *xj*

**t** = raw vector of labour units per sector in number of people.

*krb* = capital requirements per unit of export output in money terms (a scalar)

*krc* = capital requirements per unit of export output in money terms (a scalar)

*lrb* = labour requirements per unit of export output in number of people (a scalar)

*lrb* = labour requirements per unit of competitive import output in number of people.

*Equations*

With these variables we define four equations regarding factor requirements.

 For capital requirements in exports,

 *krb* = **k** (**I – A**)-1**b**  (1)

 For capital requirements in competitive imports,

 *krc* = **k** (**I – A**)-1**c**  (2)

 For labour requirements in exports,

 *lrb* = **l** (**I – A**)-1**b**  (3)

 For labour requirements in competitive imports,

 *lrc* = **l** (**I – A**)-1**c**  (4)

V. The H-O Theorem and the Mexican Economy

**Previous studies**

A pioneer analysis of the Mexican manufacturing export boom that ensued from Mexico’s import-substitution strategy (Boatler, 1974) shows that in the early seventies capital-intensive exports tended to increase, in contrast to what was expected according to the relative factor proportions of the H-O theorem. However, one can hardly take this result as a test of the H-O theorem, mainly because the most important assumption for comparative advantages to reveal, and thus the H-O theorem to apply, is the presence of *free trade*. Yet in the early seventies, the Mexican economy was under a very rigid and complex protectionist system. Thus, this study can be seen instead as a starting point to analyse what happened when Mexico’s economy opened up, starting in 1983 with the implementation of a *free trade* strategy. In a study of Mexican manufacturing during 1978-1987, Casar (1989) finds that intra-industry trade grew as a proportion of total trade in manufacturing, as opposed to what was expected, that is, that inter-industry trade would be predominant. Apparently inter-industry trade still represented most manufacturing trade but was losing importance vis-a-vis intra-industry trade.

 Finally, in another recent study of Mexico’s foreign trade (Ruiz-Nápoles, 2007), there is an attempt to test the H-O theorem in Mexico under conditions of free trade. Due to the lack of data at that time regarding capital stocks by sector, input-proportions were used as a proxy for capital. This idea is based on the Marxist concept of *circulating capital* in which inputs enter the production process, as opposed to *fixed capital* (Marx, 1893). Comparisons of various periods are shown in Table 1[[5]](#footnote-5).



 The figures in Table 1 show how basic indicators of Mexico’s economic structure trended over a period of thirty years, considering only four years during this period: 1970, 1980, 1990, and 2000. The two following tendencies are important for our study:

(1) From 1970 to 2000, the number of labour-intensive industries fell from 48 to 31 (of a total of 61 tradable-goods industries); these industries’ GDP in real terms, that is, in constant Mexican pesos, fell as a share of total GDP of tradable goods, from 86.2 percent to 52.5, in the same period. Meanwhile, the input-intensive industries went in the opposite direction: the number of industries increased from 13 in 1970 to 30 in 2000, and their GDP increased their share of total tradable-goods GDP, from 13.8 percent in 1970 to 47.5 percent in 2000.

(2) With respect to trade, exports of labour-intensive goods industries decreased their share of total exports from 85.9 in 1970 to 37.7, while the exports of input-intensive goods industries increased their share from 14.1 percent in 1970 to 62.3 percent in 2000. In 2000 (under a free-trade regime), imports of labour-intensive goods industries were 63.8 percent of total imports, while those of input-intensive goods were 36.2 percent.

In short, the Mexican economy moved from being highly-protected in 1970, in which labour-intensive goods industries were predominant in absolute and relative terms, to being very open to free trade in 2000, in which the input-intensive goods industries increased their importance and were predominant in exports, while the labour-intensive good industries were predominant in imports.

**Leontief’s model applied to the Mexican economy**

The Input-Output model, described above, used by Leontief (1953) to test the H-O theorem in the case of the U.S. economy, is also utilised here to test the Mexican economy. We used the same source of information (INEGI) for 2003 and 2008. In both years, the variables are:

**x***t* = vector of gross output of the 750 subsectors of the economy in thousands of current pesos, *t* =years 2003 and 2008

**A**t = square matrix of input-output coefficients [*aij*] for 750 subsectors.

 *i* = 1,,..,,750 and *j* = 1,…750

**e***t* **=** column vector of exports in thousands of current pesos.

**b***t* **=** column vector of export coefficients *b****i* =** *ei* /*xi*

**c***t*= column vector of competitive import coefficients *ci* = *mi* /*xi*

**m***t* **=** column vector of competitive imports in thousands of current pesos.

**k***t* **=** raw vector of capital coefficients *kj* = *hj* /*xj*

**h***t* **=** raw vector of capital stocks per sector in thousands of current pesos.

**l***t* = raw vector of labor coefficients *lj* = *tj* / *xj*

**T** = raw vector of labor units per sector in number of people.

*krb* = capital requirements per unit of export output in thousands of current pesos.

*krc* = capital requirements per unit of export output in thousands of current pesos.

*lrb* = labor requirements per unit of exports output in number of people.

*lrb* = labor requirements per unit of competitive imports output in number of people.

The equations applied are the same from (1) to (4). The results reported are:

For 2003: For 2008:

*krb* = 270.251 *krb* = 110.916

*krc* = 1225.6 *krc* = 331.905

*lrb* = 0.755694 *lrb* = 0.239823

*lrb* = 3.43847 *lrb* = 0.843047

**Results analysis**

Using the same format that Leontief (1953) used to present his results, we have the following figures:





These results show that in the Mexican economy, one-million U.S. dollars of import replacements incorporated more labor and more capital than the same value of exports in both 2003 and 2008. In 2003 the amount of labor in imports is 4.6 greater than in exports and the amount of capital is 4.5. In 2008 this relation is 3.5 for labor and 3 for capital. In 2003 the capital-labor ratio is for exports $33,127 U.S. dollars per worker and for imports $33,003. In 2008 the capital-labor ratio for exports is $41,471 U.S. dollars per worker and $35,303 for imports.

**Labor-intensive versus input-intensive goods industries**

To complete the study we include an analysis of the labor-intensive and input-intensive industries for 2003 and 2008, with results reported in Table 4[[6]](#footnote-6).

 Table 4 shows the same tendencies we saw in the 1970 to 2000 period, i.e., there is a strong tendency for the tradable-goods sector to move from labor-intensive goods industries to input-intensive goods industries. The division line between labor-intensive and input-intensive goods industries was the mean ratio of the number of workers per one-million dollars’ worth of GDP, which was 51.5 in 2003 and 34.3 in 2008. All economic indicators point in that same direction. Moreover, the 2008 crisis affected the level of employment in the labor-intensive goods industries to a greater degree, which was reduced by 15.1 percent compared to 2003. Thus, for 2008, the number of workers in each type of industry is almost the same, while in 1970 the proportion of labor employed was more than 30 to one workers compared to input-intensive goods industries (see Table 1).



Discussion

If information regarding capital stocks had been available for 1970, 1980, 1990, and 2000, we could have tested how the H-O theorem evolved during these years. This is one important limitation of our analysis.

Regarding the H-O theorem results using I-O for 2003 and 2008, it seems clear that in both years import replacements incorporated more labor than capital, with respect to exports, even though the margin is very small. The Heckscher-Ohlin theorem posits that when an economy is opened to free trade in a labor-abundant economy such as Mexico’s, production and specialization should move to labor-intensive goods. This clearly did not occur in Mexico.

According to the results of our analysis, we can say that, at least in the case of the Mexican economy, the H-O theorem does not hold. When opened to free trade, the Mexican economy did not move toward specialization in labor-intensive goods; quite the contrary, it moved towards the production of capital-intensive goods in the tradable-goods sector.

The fact that trade liberalization did not produce the results desired under free trade (expand overall production and employment by taking advantage of the boom in exports), has been thoroughly analyzed in several well-known studies, the best perhaps being Moreno-Brid and Ros’s (2009, Ch.8). These authors recognize that trade liberalization played an important role in stimulating the export boom that occurred basically after NAFTA and succeeded in purposely changing the structure of exports from primary goods to manufacturing. Notwithstanding the success of this process, it was not strong enough to drive the economy to a high and sustained rate of growth and employment. Moreno-Brid and Ross claim that this aspect failed due to the lack of a number of regulatory policies to oversee the privatization of previously state-owned firms. Second, the massive surge of imports displaced domestic production and increased the economy’s structural dependence on imports. Third, capital movements went unregulated when the capital account of the balance of payments opened. Fourth, government authorities inadequately managed the exchange rate and failed to implement other measures in a timely manner (Moreno-Brid and Ros, pp. 181-205).

There are other implications derived from the results of this model. On the one hand, in Tables 1 and 4 the productivity of labor had been permanently improving, as we can see in the line items regarding workers per given value of GDP and, in Tables 2 and 3, in the number of workers needed to produce one-million dollars of export or import replacements. This contradicts claims made by the OECD and the Mexican government that the lack of labor productivity is one of the reasons for the slowdown of the Mexican economy. On the other hand, capital also became more productive in this period (2003-2005), both in export and in import replacement, according to Tables 2 and 3.

The lack of output growth in Mexico after the trade opening is well documented in many studies (see, for instance, Moreno-Brid and Ros, 2009 p.188). Employment dynamics are, however, more complicated to assess. The unemployment rate in Mexico utilized by the government for official documents disguises two important factors of these dynamics. First, the phenomenon of *underemployment*, euphemistically called “informal” employment, which accounts for more than half of total employment (ILO, 2014), and second, even though it dates from many years back, the flow of labor migration to the United States increased substantially after trade liberalization: Before 2008, migration averaged half a million people a year (Zúñiga and Molina, 2008).

Thus, it is clear that pure trade liberalization, i.e., with no accompanying state policy, failed to absorb the labor force displaced by foreign competition in the country. This was so because, on the one hand, some primary activities were almost completely abandoned given the low price of imported goods. On the other hand, the amount of jobs lost in local manufacturing firms, displaced by foreign competitive firms due to trade liberalization, were not compensated by the new jobs created through the inflow of foreign investment, mostly to exports, but also to local activities. Some of these jobs, such as those in high-tech production for exports, are rather *capital* intensive.

 Several authors have analyzed this question from the angle of wage differentials between wages paid to skilled and to unskilled labor, assuming that skilled labor is complementary to fixed capital and associated, thereby, to capital-intensive goods industries in our analysis. The differential between wages to skilled and unskilled labor has increased substantially with trade liberalization in favor of skilled labor, as opposed to what was expected, assuming that Mexico was, in fact, unskilled labor-abundant, and that the Stolper-Samuelson theorem (Stolper & Samuelson, 1941), applied[[7]](#footnote-7) (Moreno-Brid and Ros, 2009, p.195). While this reinforces our conclusion that the H-O theorem did not apply to Mexico after trade liberalization, it does not explain why. There are some important arguments, detailed in Moreno-Brid and Ros’s (2009) study, that all seem to conclude that labor-saving technological change occurred, brought about by trade liberalization and other free-trade-oriented reforms. With the boom in exports, there was a new demand for labor, but this labor was *skilled*-labor, the *scarce* factor, not the *abundant* factor.

Data Source and Software

Instituto Nacional de Estadística y Geografía (INEGI), website: http://www.inegi.org.mx/

*Mathematica 10*, Wolfram, Campaign, Ill.

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1. Anne Krueger was the World Bank Chief Economist from 1982 to 1986 and the first deputy managing director of the International Monetary Fund (IMF) from 2001 to 2006. [↑](#footnote-ref-1)
2. Bertil Ohlin was awarded the 1977 Nobel Memorial Prize in Economics. [↑](#footnote-ref-2)
3. Wassily Leontief won the 1973 Nobel Memorial Prize in Economics. [↑](#footnote-ref-3)
4. We have tried to use Leontief’s own notation as much as possible (Leontief, 1956). [↑](#footnote-ref-4)
5. The criterion to divide labor-intensive from input-intensive goods industries was the minimum ratio of two thousand workers per million constant 1980 Mexican pesos of GDP; this ratio was close to the mean throughout the period. [↑](#footnote-ref-5)
6. This table is not strictly comparable to Table 1 for various reasons: In Table 4, the money measures are all in U.S. dollars at current prices, while in Table 1 all figures are in Mexican pesos at constant 1980 prices; in Table 4, the number of productive industries in the economy is 78, while in Table 1 there are 72; in Table 1 we used the International Standard Industrial Classification (ISIC) and in Table 4 we used the North American Industry Classification System (NAICS), due to changes in the Mexican I-O matrix classification system. [↑](#footnote-ref-6)
7. The Stolper-Samuelson theorem follows from the H-O theorem and states that, once trade opens, the abundant factor (labor or capital) will increase its reward relative to the scarce factor (capital or labor), due to the increase in its use in exports. [↑](#footnote-ref-7)