NBER WORKING PAPERS SERIES

WAGE EFFECTS OF A U.S. - MEXICAN FREE TRADE AGREEMENT

Edward E. Leamer

Working Paper No. 3991

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 1992

This paper was prepared for the conference on the U.S. - Mexico Free Trade Agreement, sponsored by SECOFI. This paper has been written with the able assistance of Raul Orozco, Luis Ibarra and Luis Hernandez. Helpful comments were provided by participants at a seminar at the Federal Reserve Board of Governors. This paper is part of NBER's research program in International Studies. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Working Paper #3991
February 1992

WAGE EFFECTS OF A U.S. - MEXICAN FREE TRADE AGREEMENT

ABSTRACT

Mexico doesn't seem economically large enough now to have a significant effect on the prices of goods and the earnings of labor in the United States, but Mexican population growth and productivity gains induced by liberalization will make the Mexico of the future much larger than today, especially in those sectors that use intensively Mexico's abundant low-skilled labor. Furthermore, in a free trade agreement with the United States, Mexico has an incentive to concentrate production on those sectors that are most protected by the U.S. from third-country competition, and to export all that product to the high-priced protected U.S. market. For all these reasons, the Mexico of the future is large enough to undo current or future U.S. protection designed to maintain wages of low-skilled workers. With or without a free trade agreement, the United States faces a substantial problem with the continuing economic deterioration of the lowest skilled workers. A free trade agreement with Mexico would keep the U.S. from using protectionism to deal with this problem.

Edward E. Leamer
Anderson Graduate School
of Management
and Department of Economics
University of California
Los Angeles, CA 90024
and NBER

Wage Effects of a U.S. Mexican Free Trade Agreement

by

Edward E. Leamer *

New York Times, Wednesday, July 24, 1991:

> Edith Cresson, Prime Minister of France, denied calling the Japanese "ants," but added, "I say they work like ants."
>
> And she went on: "But we don't want to live like that. I mean, in the small flats, with two hours to go to your job and - we want to keep our social security, our holidays, and we want to live as human beings in the way that we've been always used to live."

1. INTRODUCTION

A major continuing force that has been driving the expansion of international commerce over the last several decades has been "wage equalization." The gains from this expansion of trade have been and will continue to be very unequally distributed among workers. High skilled workers in the advanced countries benefit from the integration of the world's labor market since they face relatively few foreign competitors. But our low-skilled workers face a sea of low-paid, low-skilled competitors around the world. This presents a severe policy dilemma for the developed countries of the world: Are we going to let

* Chauncey J. Medberry Professor of Management, Anderson Graduate School of Management and Professor, Department of Economics, UCLA, Los Angeles, CA 90024 ((213*) 206-1452 *Effective Nov. 2, 1991 The area code is (310). This paper has been written with the able assistance of Raul Orozco, Luis Ibarra and Luis Hernandez. Helpful comments were provided by participants at a seminar at the Federal Reserve Board of Governors.

our low-skilled workers continue to sink slowly in that sea? If not, what kind of life boat should we provide?

This is an important aspect of a U.S.-Mexican Free Trade Agreement. Relatively free international trade has produced and will continue to produce substantial changes in the relative earnings of skilled and unskilled workers. This redistribution will surely fuel the fires of protectionism. In some countries, those who lose from increased foreign competition are sufficiently compensated by private and public income redistributions that they do not insist on protection. In other countries, these relatively poor workers have little voice. But in countries like the United States with heterogenous populations, weak private social insurance networks, and democratic political systems, trade protection is an important instrument for income redistribution and increased protectionism over the next several decades is a virtual certainty. Doesn't a U.S.-Mexican Free Trade Agreement take us in diametrically the opposite direction? Maybe, and maybe not.

Most of the effect of a U.S.- Mexican free trade agreement may be a shift of U.S. imports from third countries in favor of Mexican suppliers. Then the agreement would hardly be felt in the U.S. and might substantially benefit Mexican workers and producers. U.S. labor and some Mexican industrial sectors see it differently, emphasizing the reallocation of industries within and between the U.S. and Mexico.

Trade diversion or trade creation, that is the question. This paper embeds the issue of a U.S. - Mexican Free Trade Agreement in the historical context in which U.S. imports of labor-intensive products from many sources have grown and continue to grow rapidly. The question addressed is whether a U.S. - Mexican free trade agreement would have a substantial effect on this trend or would hardly be noticed.

To discuss these issues, one is required to make guesses about the future rates of protection in the U.S. and in Mexico. The assumption on which this paper is founded is that the U.S. will have relatively high rates of protection against labor intensive imports. The form of this protection will not necessarily be as transparent as a tariff; more likely it will be nontariff barriers such as the quota system of the multi-fibre agreement, and liberal application of the anti-dumping laws. It is assumed also that a free-trade agreement allows Mexico to select a different set of trade barriers, and in particular to choose not to protect against imports from third countries of these same low-wage labor-intensive products. <u>This difference in protection rates encourages the Mexicans to export all of their product to the protected U.S. market and to import for consumption from third sources</u>. This trade diversion effect by itself is enough to allow Mexico now to play a major role in the U.S. markets for some commodities. Future increases in productivity, accumulation of capital, high birth rates and concentration on those labor intensive sectors protected by the U.S. will greatly increase the potential Mexican exports to the United States, enough, I argue, to undue any attempt by the U.S. to maintain wages of low-skilled workers by trade protection.

From the Mexican perspective, an FTA creates a windfall equal to the amount of the tariff revenue that would have been collected on U.S. imports if the imports came from third sources. Much of this revenue accrues not to the U.S. government but to third countries that administer the quota provisions of the multi-fiber agreement. <u>It is</u>

Hong-Kong and Taiwan and Korea, not the United States, who will make the contributions to Mexico in support of the FTA.

One concern with an FTA from the Mexican perspective should be the indirect imposition of the U.S. structure of protection on Mexican manufacturing which would occur if Mexico sells a substantial portion of its output in U.S. markets. Protection which would raise wages in the U.S. can lower wages in Mexico, and an FTA can have the surprising effect of lowering Mexican wages. The reason for this surprising possibility is that the moderately capital intensive commodities like textiles are in the labor-intensive segment of U.S. manufacturing which tends to concentrate on more capital intensive items, but these moderately capital intensive goods are in the capital intensive segment of Mexican production. Protection of textiles thus raises wages in the U.S. and lowers wages in Mexico.

This picture is not meant to apply the day after the agreement is signed. It could easily take a couple of uncertain decades for these effects to be fully felt. But we need to be forward looking. A free trade agreement is not likely to be signed one day and undone the next. Indeed, the commitment value of a free trade agreement is perhaps its greatest appeal from the standpoint of the United States. There are few institutions like this one that can commit a society to any course of action.

If, as I argue, an FTA prevents the U.S. from imposing trade barriers to maintain the wages of low-skilled workers, what effect will this have on wages? There is no way that this question can be answered with great precision. This paper presents a methodogy for estimating the effect of further international integration on the earnings of U.S.

productive factors. The component of the historical change in commodity prices that is associated with the commodity's labor intensity is extended into the future. Then these predicted relative price declines of labor-intensive products are mapped into the corresponding changes in factor earnings. One calculation of this type indicates that the annual earnings of a $1000 of capital would increase by $13, that the annual earnings of professional and technical workers would increase by $6,000 and the annual earnings of other workers would decline by $1900. These seem like plausible numbers.

We need to realize that we cannot have a free trade agreement with Mexico and also maintain the wages of low-skilled workers with other forms of trade protection since Mexico will become a platform for entering the U.S. market and getting around whatever protective measures apply to third countries. That being the case, we need to address the income distribution question: What other kind of life boat are we going to offer our low skilled workers, if any? The most appealing answer is education and training. If that is not enough, a commitment to redistribute through changes in the income tax might satisfy the low wage workers.

2. WAGE EQUALIZATION OVER THE LAST SEVERAL DECADES

Figure 1 is a graph of wage rates and populations in 1960 and 1978 of about 50 countries that comprise roughly 75 per cent of the world's population and 85 per cent of the world's GNP.[2] Each country is represented by a horizontal line segment with a length equal to the population and a vertical placement equal to the industrial wage rate in

[2] The actual population shares in 1960, 1978 and 1989 are 78.7, 75.6, and 74.1. The GNP shares in 1978 and 1987 are 84.0 and 86.3. Excluded are Africa, Eastern Europe, Brazil and Indonesia. Adjusting the figures for these other people is straightforward.

1985 dollars. The area under a line segment thus represents the labor earnings (wages times population), although this will be inaccurate if the industrial wage is not adequately representative of wages in other sectors and/or if the ratio of hours worked to population varies greatly across countries.

Consider first the 1960 data. The first horizontal line segment for the 1960 data applies to the United States with the highest industrial wage of roughly $8 per hour and a population of roughly 200 million. As your eye moves down the graph it passes over the United Kingdom with wages of about $6.50 and West Germany with wages of $2.10 and then moves on to India and then China which have very low wage rates and very large populations.

Think of this figure as if it were a reservoir of liquid with some very high levels and some very low levels. In the absence of dikes to maintain the difference in the levels, the liquid in the high spots would flow into the lower areas, eventually equalizing the level everywhere. This equalization produces lower wages for the high-wage countries and higher wages for the low-income countries.[3]

Wage equalization is a consequence of changes in the demand and supply of labor induced by the wage differences. The most direct force for wage equalization is labor migration from low-wage to high wage

[3] Physical liquids do not expand as they flow to eliminate differences in levels, but economic systems are different. The processes that work to eliminate wage differences also tend to raise world labor income and thereby to offset but not to eliminate the wage reductions in the higher wage countries.

areas. This labor migration reduces the supply of labor in the low-wage countries and raises the supply of labor in the high-wage countries. Other forces operate on the demand side. Migration of capital in the opposite direction of labor raises the demand for labor in the low-wage areas and reduces the demand in the high-wage areas. A more subtle reason for changes in the demand for labor are shifts in the composition of industrial output towards labor intensive activities in the low-wage countries and towards capital intensive activities in high-wage countries. The celebrated factor-price equalization theorem relies entirely on this third force and establishes conditions under which a shift in the composition of output is enough to bring about complete equalization of wages. An essential condition of this theorem is that there are no barriers to trade that prevent prices of products from equalizing.

But of course there were and there remain important economic barriers between these countries in the form of actual and threatened governmental measures that deter international commerce and international migration of capital and labor. Even if all the governmental barriers were eliminated including the exchange risk, the process of wage equalization would not be instantaneous since there are also natural barriers including transportation costs and linguistic differences. The liquid of economics is molasses not water. Regardless, none of these barriers is impermeable, and the greater is the difference in the levels, the greater is the force of profit opportunities to eliminate the difference.

Move your attention now to the data for 1978, the year when the real U.S. industrial wage peaked. There are two obvious differences in the two years. The latter year has much higher wages in many countries and also larger populations. These two changes seem to be stretching the figure along the two axes. But stretching alone will not make the 1960 figure look like the 1978 figure. The center needs to be pulled out. This is the change that is associated with the wage equalization process. This bulging of the curve is induced by the extraordinary real wage growth in Japan, West Germany, France and Korea but relatively less wage growth in the United States.

Figure 2 shows what happened over the next decade, comparing 1978 with 1989. (Keep in mind that exchange rate gyrations can cause a lot of variability in these wage rates.) One obvious point about the second graph is that the eleven years from 1978 to 1989 did not offer nearly the wage growth of the nineteen years from 1960 to 1978. But there are some interesting differences in the 1978 and 1989 data. The U.S. and German wage rates declined and the Japanese wage rate increased, surpassing the U.S. figure by a considerable margin. Except for the Japanese figure, wage equalization is evident in the figure: wages of the high-wage countries declined somewhat and wages in moderate-wage countries rose. This would be more clear if the French figure were higher. Notice also the further increases in populations among the low-wage countries.

In summary, the force of wage equalization seems very much present for the 800 million people who live in countries that are "part of the game". Among these countries, wage equalization has much farther to go and we should expect continuing pressure on U.S. wage rates. Beyond this group of countries there remain a vast number of people who have not experienced detectable economic improvement over the last three decades, including the Latin American countries. If these countries become "part of the game" the downward pressure on wages in the high wage countries will surely intensify.

The same kind of graphs are useful for examining the proposed NAFTA and comparing it with the EEC and EFTA. The data for the EEC countries, for the EFTA countries and for the proposed NAFTA countries are displayed in Figures 3, 4, 5. France, West Germany, Italy, Belgium, the Netherlands and Luxemburg formed the EEC 1957. The UK, Ireland and Denmark joined in 1973, Greece in 1981 and Spain and Portugal in 1986. There was a substantial wage difference between the UK and the other current members of the EEC in 1960. In 1978, the EEC seemed to divide into three groups: high wages in Denmark, Germany, Belgium and the Netherlands, intermediate wages in France, Italy and the UK, and low wages in Ireland, Spain, Greece and Portugal, the latter three not yea members. A considerable amount of wage equalization occurred between 1978 and 1989. Real wages in the high-wage countries fell and real wages of the low-wage countries generally rose. If the French wage were adjusted upward, the EEC would have had a very uniform collection of wages with the exceptions of Denmark on the high side and Greece and Portugal on the low side. The EFTA countries depicted in Figure 4 exhibit relatively small wage differences and fairly uniform increases in real wages from 1960 to 1978. After 1978, there is also a very significant amount of convergence, with reductions in the real wages of the high wage countries and increases in the real wages of the low wage countries. The NAFTA data tell a very different story. The U.S. and Canada have wages that are very high compared with Mexico and these differences are amplified by the decline in the Mexican wage.

The reason for looking at these figures is that the European experience may offer insights into the possible consequences of a NAFTA. Analogies with the EEC seem appropriate from the Mexican side, but not from the U.S. side. Mexico may sensibly look at Greece and Portugal to get an idea of the consequences of an NAFTA since the wage gap is similar. Indeed the Greek case is not suggestive of very rapid improvement in wages. But the U.S. cannot look to the experience of the high-wage EEC countries because the entry of Greece, Portugal, Spain and Ireland into the EEC involve either smaller wage differences or smaller relative populations. Nonetheless, the evidence of wage convergence in both the EEC and EFTA is highly suggestive of what is in store for the U.S.

I believe that in the absence of very substantial increases in trade barriers, real wages in the U.S. are virtually certain to decline over the next decade because of the forces of wage equalization. This is true regardless of the existence of a U.S.-Mexican free trade agreement. But an FTA seems likely at least to hasten the wage decline. If the effect of an FTA is to circumvent U.S. barriers against labor intensive products that would otherwise be put in place, than an FTA will lower the eventual level of wages as well as increase the speed at which we converge on it.

These figures indicate average industrial wages and do not distinguish workers by skill levels. The pressure for wage equalization is intense at the lower end of the skill mix but the most skilled workers have benefited from the integration of the world's economies. For example, according to data compiled by MaCurdy and Mroz(1991) between 1978 and 1989 wage rates of the college educated in the United

States rose by eight per cent. Wages of workers with less education declined, the greatest decline(twenty per cent) among those without a high school degree. The entry of a youthful, low-educated Mexican workforce into the U.S. labor market through the commodity trade encouraged by an FTA is likely to have similar effects: reduced U.S. wages at the lower skill levels and increased wages for the higher skilled workers.

3.0 TRENDS IN THE TRADE DATA

I argue that the wage equalization that is evident in these first figures is caused by a reduction in the worldwide barriers to international commerce which has made it possible for capital to locate in low-wage countries and earn a relatively high rate of return. This has induced a rapid accumulation of capital in moderately low-wage countries which has increased the relative supply of labor-intensive products and reduced their relative price. This change in relative prices of commodities in turn has put downward pressure on the wages of low-skilled workers in the developed countries.

This model of wage equalization is most accurately conveyed in some simple diagrams that serve as a backdrop for an examination of the trends in the data that are discussed subsequently. Wage determination within the context of a simple general equilibrium model is depicted in Figure 6. The axes are the labor and capital inputs. The three solid right angles represent unit value isoquants for three different sectors: machinery, which is the most capital intensive, textiles with an intermediate degree of capital intensity and apparel which is the most labor intensive. These unit value isoquants are combinations of capital and labor that are required to produce a dollars worth of output. These isoquants are drawn with right angles to indicate that the ratio of capital to labor is technologically fixed in each industry. This assumption of fixed input intensities is immaterial for almost every relevant aspect of the discussion that follows.

Also on this figure are two unit isocost lines, that is, combinations of capital and labor that cost one dollar to employ. The equation for a unit isocost line is $1 = wL+rK$, where w is the wage rate and r is the rental price of capital. Using this equation and setting K to zero we solve for $L = 1/w$. Thus the inverse of the wage is the intersection of the unit isocost line with the labor axis. Likewise, the intersection with the capital axis is the inverse of the rental rate of capital.

The isocost line beginning on the x-axis at the point indicated by 1/wage travels through the corner of the textile unit value isoquant and the corner of the machinery unit value isoquant. This line is the only unit isocost line that is compatible with the production of both machinery and textiles sold at the world market prices. If this line falls below the unit isoquant, then costs of production exceed the value of the output and no output would be produced. If, on the other hand, the isocost line were to cross the unit isoquant, then the production costs would fall short of the product price, and the excess profits would attract resources into the sector thereby either raising the factor prices or reducing the product prices, ultimately producing the required tangency condition.

The figure contains two isocost lines. One is compatible with the production of the more capital intensive mix of commodities: machinery and textiles. The other unit isocost line selects the factor costs that are compatible with the production of a labor intensive mix of commodities: textiles and apparel. This requires a lower wage rate and a higher return on capital. The choice between these two equilibria depends on the relative supply of capital and labor. If a country's supply of factors falls in the cone swept out by the input mixes in machinery and textiles, then the high-wage equilibrium is selected and only textiles and machinery are produced. If capital is less abundant, the low-wage equilibrium is selected and only textiles and apparel are produced.

This model serves as an initial starting point for an examination of the data. Assume that the United States lies in the high wage cone and is suited to the production of the relatively capital intensive goods: machinery and textiles. In the absence of protection, the U.S. would accordingly trade machinery for apparel. Textiles may be either exported or imported depending on the demand for apparel and textiles relative to the U.S. productive capacity in machinery and textiles.

As drawn, capital seeking the highest rate of return will locate in the low-wage countries. If countries are so scarce in capital that their ratio of capital to labor is lower even than the apparel ratio then the increase in capital leads to an increase in the output of apparel and no change in textile output. Once capital has accumulated sufficiently that the ratio of capital available to labor supply exceeds the ratio of capital to labor in the apparel sector, further increases in capital lead to an increase in the supply of textiles and a reduction of supply of apparel(The Rybczynski Theorem). The bottom line is that the supply of textiles cannot decrease and the supply of apparel may either increase or decrease depending on whether it is the most labor abundant or moderately labor abundant countries that most rapidly accumulate capital.

Changes in the relative supply of textiles and apparel in turn induce changes in the price of these goods. Changes of the price of apparel do not affect the level of U.S. wages since apparel is not produced. But reduction in the price of textiles would lower the U.S. wage rate.

This simple model sets the stage for an initial examination of the data. What we are looking for are relative price declines of the labor intensive products, and a corresponding increase in imports and reduction of output. These features could be studied in highly disaggregated data but only with some cost of confusion. An analysis of aggregates is much more memorable. But the traditional aggregates were not formed to suit our purposes. The kind of problem that is endemic in the SIC aggregates is illustrated in Figure 7 which indicates the capital per man in each of the three-digit sectors. This figure is formed by first sorting the three-digit sectors into the two-digit sectors and then within each two-digit sector sorting by capital per man in ascending order. Thus in this figure, each of the two-digit groups starts with a low capital-labor ratio and ascends to a peak, on which is placed the two-digit label. The message of this figure is dramatic: There are two labor intensive two-digit sectors: 23(Apparel) and 31(Footwear). But SIC 31 has one sector that is rather capital intensive (tanning). Sectors 25(Furniture) and 27(Printing) have some labor intensive three-digit subsectors, but also some fairly capital intensive subsectors. The other two-digit sectors are very mixed, and none stands out as uniformly capital intensive. (Turn the figure upside down, if you like.)

Because of the apparent difficulties with the two-digit aggregates, I have opted instead to sort the three-digit sectors into nine categories separated by capital intensities of 15 thousand dollars per man and twenty-four thousand dollars per man, and separated by professional labor proportions of .11 and .17. (The professional category includes scientists and engineers and also managers; Current Population Survey, 1982). The full list of the three-digit categories is reported in Table 2. The largest components of these aggregates are listed in Table 3. Keep in mind that the names of these aggregates would be misleading if you were to take them to refer to types of commodities instead of the nature of production. Apparel and furniture are in the same class not because of the function they serve for consumers but instead because they both use relatively little human capital and relatively little physical capital.

If you look at the detailed list of commodities in Table 2 there will surely be features of this aggregation scheme that upset you, but there can be no scheme that is perfectly agreeable. In this case the highly unusual behavior of the price of computers calls out for some special treatment, and accordingly I have formed a tenth aggregate.

Various information about these ten aggregates is reported in Table 4. Remember that we are looking for evidence of the wage equalization hypothesis which is associated with a loss of comparative advantage in APPAREL and possibly the adjacent commodities in Table 3, and a gain in comparative advantage in CHEMICALS and adjacent commodities. The data reported in Table 4 seem quite compatible with this idea.

Prices: The history of prices over this period needs to make reference to three forces: (1) downward pressure on the prices of labor-intensive products from foreign competition, (2) the oil price shock, and (3) the computer revolution. Prices rose on average by 142 per cent from 1972 to 1985, but APPAREL prices rose by only 98 per cent. Thus the relative price of APPAREL fell by about forty-four per cent TEXTILE relative prices fell by about twenty-two per cent; CHEMICALS relative prices grew by 80 per cent, much of which is due to petroleum. The price of COMPUTERS fell tremendously in absolute terms as well as relatively.

Employment: Employment overall in manufacturing fell by three per cent, but fell most substantially in all the sectors that use little human capital, including STEEL which is physical capital intensive. This is exactly what we are looking for but employment also fell in AUTOS and CHEMICALS which is not compatible with the wage equalization hypothesis. These employment data are graphed in Figure 8.

Trade: 1972 U.S. imports and exports in manufacturing were roughly in balance at 7 per cent of home production for imports and 5 per cent for exports. An import boom in the early 1980's raised the import dependence ratio to fifteen per cent of home production by 1985. This import boom was only partly offset by increases of exports to nine per cent of home production.

The increased presence of foreigners in U.S. commerce was not uniform across all commodities. In 1972, using the net exports relative to output as a measure, the U.S. had a revealed comparative disadvantage in APPAREL, and STEEL and a comparative advantage in COMPUTERS and AIRCRAFT. From 1972 to 1985 the net trade balance as a per cent of home production deteriorated in many commodities but most in APPAREL (13 points) and in TEXTILES(14 points). These changes in trade are consistent with the wage equalization hypothesis that should be evidenced by a shift in comparative advantage away from labor-intensive manufactures.

Figures 9 and 10 display these data in a way that emphasizes differences in the economic sizes of the sectors. Figures 10 and 11 illustrate these data in a way that highlights changes in trade dependence by sector. The values of U.S. exports, imports and apparent consumption in 1972 and 1985 are depicted in Figures 9 and 10 with industries ordered by 1972 apparent consumption. Apparent consumption is defined as production plus imports minus exports. Since production data are used, not value added, the output of iron and steel, for example, is counted at least twice, once for its own industry and again as an input into other industries. As a result of this double counting, the sum of these output figures across industries is roughly twice the total manufacturing output.

There are a number of observations that may be made about these figures:

1) The 1972 data indicate a low level of trade dependence. The level of trade dependence increases markedly by 1985, more on the import side than the export side. There were big increases in imports of AUTOS and APPAREL.

2) Exports and imports seem to offset each other. In other words, the volume of intra-industry trade seems high. The exceptions are APPAREL and TEXTILES which have very low levels of exports.

4) The 1985 data indicate some important changes in the size of these industries. If there were no change then the size of the bars would fall off smoothly in 1985 as they do in 1972. But the relative decline of APPAREL, STEEL and TEXTILES is apparent in this figure. This is associated with the relative decline of the prices of APPAREL and TEXTILES, but the STEEL sector seems to have suffered from a shift of consumption toward other products, COMPUTERS being one example. lost a lot of employment REF, Petroleum Refineries, increases greatly in value, becoming the largest consumption item.

Figures 9 and 10 indicate clearly the relative size of the industries but are less clear about the role of trade in each of the sectors. Figures 11 and 12 have the reverse character: they indicate nothing about the size of the sectors but do illustrate clearly the role of international trade in each sector. These triangular figures depict for each industry three ratios: exports/production, imports/production and imports/exports. The scales for these ratios are placed along the three edges of the triangle. For example, in the 1972 figure on the edge labelled imports/exports find the number 1, indicating that imports and exports are exactly in balance. Trace a straight line from this point directly toward the vertex labelled "PRODUCTION." On every point along this straight line the ratio of imports to exports is exactly one. The AUTOS point and the TEXTILES point are slightly below this line, indicating that imports are just slightly larger than exports. Check it out in Figure 9. Now let your eye move from the number 1 on the Import/Export edge to the number 5 where imports are five times exports. Again in your mind trace a straight line from this number 5 directly toward the OUTPUT vertex. On every point along this line the ratio of imports to exports is five. You found the APPAREL point on this line and this sector accordingly has imports that are five times exports. By drawing two more straight lines through the APPAREL point toward the other two vertices you can read from this figure that the ratio of imports to production in APPAREL was about .06 and the ratio of exports to production is less than .02.

Using the imaginary lines drawn through the OUTPUT vertex and the Imports/Exports = 1 point, we can locate the sectors in which the U.S. had a revealed comparative advantage is both years in the sense of having exports exceeding imports. These sectors are: Computers, Aircraft and Rockets. The big difference between the two years is the very noticeable shift of all the points toward the import vertex in 1985. Figure 13 contains both sets of points with arrows to reveal the change from 1972 to 1985. These arrows all point generally in the direction of the IMPORTS vertex, a reflection of the import boom that afflicted every sector. None of the arrows is pointing at or below the imports vertex, which means that the ratio of exports to output of every sector is increasing, but not nearly as much as the ratio of imports to output. The one sector which best resisted this tendency was aircraft, which has an arrow pointing almost directly at the imports/exports = 1 point. This direction of movement could come about with no change in production but equal absolute increase in imports and exports.

I had hoped that this figure would indicate some points shifting toward the import vertex and others shifting toward the export vertex as the U.S. has increased its international commerce and adjusted to its newly defined comparative advantage. The shift toward the import vertex of the labor intensive sectors, Apparel and Textiles, is very evident, but the export shift is not very evident in these figures. The overvaluation of the dollar in 1985 thus seriously masks the sectors toward which U.S. comparative advantage is shifting. I would expect figures applicable to more recent data to reveal a very different pattern with some sectors moving clearly in the direction of the export vertex as the problem with the overvaluation of the dollar cures itself.

The bottom line, though, is that the trade data offer substantial support to the simple model of wage equalization through international commerce.

4. AN FTA IN THE TWO-FACTOR HECKSCHER-OHLIN MODEL

A two-factor three-good model of wage equalization has been presented in the previous section. Here this model is used to discuss the possible consequences of an FTA. In this discussion it is assumed international prices of these products are given, that the United States' factor supplies are in the high wage cone, and that Mexico, which is labor abundant, is in the low wage cone. Thus in the absence of protection, there would be no apparel output in the United States and no machinery output in Mexico. Incidentally, this is not suggested as conforming exactly with the facts since transport costs, economies of scale and immobile inputs all contribute to maintaining an industry that otherwise would be unprofitable. This theory is presented as establishing a tendency. All that is being said is that, in the absence of protection, there are economic pressures in the United States to move the production of labor-intensive products to foreign locations.

Protection which raises the price of a product shifts a unit isoquant in toward the origin since smaller amounts of capital and labor are required to produce a unit value of output. Figure 14 illustrates the effect of the protective structure of the United States which is assumed to protect the labor intensive sector, textiles and apparel. The wage rate in this protected equilibrium, wage*, is higher than the wage rate prevailing in the high-wage country, wage. Indeed that is the intent of the protection: to raise the wage rate.

This figure is offered as indication of the current state of U.S. manufacturing. Product prices in the labor intensive sectors have fallen relative to the prices in the capital intensive sectors and wages accordingly have begun to decline. This decline is resisted by protection in the labor intensive sectors. Data on 1983 tariffs and nontariff barriers are reported in Table 4 which includes the three-digit commodities for which tariff averages are highest. The NTB column indicates the percent of imports that were covered by an nontariff barrier. This is disaggregated into barriers that aim at maintaining internal prices (PRIC), quantitative restrictions(QUAN), health and safety regulations (HLTH) and threats(THR). As has been assumed in this discussion the protection rates are highest for a variety of clothing items and other labor-intensive products. Textiles seem more subject to nontariff barriers, principally the Multi-Fibre Agreement.

Figure 15 illustrates the effect of protection in Mexico. Here it is assumed that the machinery sector has been protected (at least until 1986 when Mexico joined the GATT) as part of an import substitution strategy. Incidentally, since machinery is an input into the other two sectors, protection that raises the price of machinery increases the capital input requirements in the other two sectors, which shifts their unit-value isoquants vertically upward. Also, since textiles is an input into apparel production, protection of textiles reduces the value added in apparel and this shifts the apparel unit value isoquant away from the origin. These complex linkages between sectors are ignored in this discussion.

4.1 A U.S.-MEXICAN FREE TRADE AGREEMENT: CAPITAL IMMOBILE

The two-factor general equilibrium model depicted in these figures is a useful point of departure for considering the consequences of a Mexican-U.S. Free Trade Agreement. We can suppose that the United States is capital abundant and has factor supplies that make it suited to production of the relatively capital intensive mix of commodities, machinery and textiles. Mexico, on the other hand, is labor abundant and is suited to the labor intensive mix of products: textiles and apparel. What can we expect if Mexico and the United States form a Free Trade Agreement? There are several possibilities depending on the mobility of capital and the effect that the agreement will have on product prices in Mexico and in the United States. First, assume that capital is immobile.

Before discussing the general equilibrium effects it is useful to begin with the partial equilibrium depicted in Figure 16 which conveys the important message that the effect of the FTA on the United States depends critically on the economic size of Mexico. In this figure the world price and the U.S. protected price are illustrated with horizontal lines. The downward sloping curve is the U.S. import demand and the two upward sloping lines are alternative Mexican supply curves. If Mexico is small and has the supply curve close to the vertical axis, then prior to the establishment of the FTA Mexican production would be AB and U.S. import demand would be CE. A portion of the Mexican supply would go to satisfying home demand and, if there is any left over, the rest might find its way to the U.S. market. After the FTA, all the Mexican output is sold at the high U.S. prices and Mexican demand is satisfied at the world price from third sources. The Mexican supply increases to CD which crowds out third country exports to the U.S. The total trade diversion is between CD and CD- AB, the latter figure applicable if all the Mexican product were sold in the U.S. market prior to the FTA. The facts are that very little of Mexican product is currently sold in the U.S. and the larger figure CD seems applicable. On the other hand, the simple diagram includes no transportation and marketing costs which would encourage home sales and which would prevent all the Mexican product from being the U.S.

If this first supply curve is applicable, then the FTA would not affect the prices at which goods sell inside the United States. But now move the Mexican supply to the right. At some point it will intersect the U.S. demand at the point E where all U.S. import demand is satisfied from Mexican sources. Further increases in Mexican supply will drive down the U.S. internal price. If the Mexican supply curve goes through the point F on the U.S. import demand curve then the world price would prevail in the U.S. markets. Further increases in Mexican supply would not cause further reductions in the U.S. price since Mexican suppliers would not sell at any price lower than the one prevailing in the world market. The dashed line in the lower right of Figure 16 illustrates this case. Total Mexican supply is AG. The amount AF is sold in the U.S. market at world prices and the remainder FG is sold partly at home and partly in third markets. From this figure we derive the following important conclusion: If Mexico is large encough that she can completely satisfy incipient import demand of the U.S. that would occur at world market prices, then an FTA would completely dismantle U.S. protection.

Now we may continue the discussion of the general equilibrium model. Keep in mind that it is assumed that the apparel sector in the U.S. would not exist at world prices and accordingly the incipient import demand is equal to the total U.S. demand.

CASE 1: Mexican production is too small in apparel and textiles to satisfy fully the U.S. import demand. U.S. fully protects the apparel industry.

United States:

Since both textiles and apparel are imported from third sources, the prevailing prices in the U.S. are the world market prices, adjusted upward by the U.S. level of protection. This is the case of pure trade diversion: supply of textiles and apparel from third countries is displaced by Mexican supply but there is no change in U.S. prices or the composition of U.S. output. The U.S. loses the tariff revenue on displaced imports that now come from Mexico instead of third sources.

Mexico:

Wages in the U.S. and Mexico equalize at the high U.S. level. The high Mexican wages force Mexican producers to use an excessively capital intensive method of production. Protection of the apparel sector in the U.S. requires a relatively high tariff on apparel compared with textiles. This relatively high apparel price induces Mexican producers to specialize excessively in apparel. All Mexican production of apparel and textiles is sold in the U.S. at the high prices. Textiles and apparel for consumption in Mexico are imported from the rest of the world at low prices. These are prevented from transhipment into the U.S. although leakages may occur.

Important aspects of this case are illustrated in Figure 17. The curved line in the figure represents the Mexican production possibilities of textiles and apparel. Free-trade production is found by maximizing the value of output at world prices. This maximization selects the indicated production point defined where the production possibilities curve is tangent to a straight line with slope equal to world relative prices. This line then defines the free-trade consumption possibilities on the assumption that trade is balanced (value of production = value of consumption).

A Free Trade Agreement that raises the relative price of apparel induces a shift of output in favor of apparel. More dramatically, the agreement creates a balanced trade consumption line that is entirely above the free trade line if both markets are protected by the U.S.[4]

---

[4] This FTA consumption line is found from the Mexican budget constraint:

Value of production = Value of consumption

$$p_{A,US}\, q_A^* + p_{T,US}\, q_T^* = p_A\, c_A + p_T\, c_T$$

where p_A and p_T are the prices applicable to the consumption choices, the world prices and q_A^* and q_T^* are the production levels after the FTA. This budget constraint can be rewritten as

$$c_T = (p_{A,US}\, q_A^* + p_{T,US}\, q_T^* - p_A\, c_A)/p_T$$
$$= (p_{A,US}\, q_A^* + p_{T,US}\, q_T^*)/p_T - (p_A/p_T)\, c_A$$

This compares with the free trade consumption line

$$c_T = (p_A\, q_A + p_T\, q_T)/p_T - (p_A/p_T)\, c_A$$

where the production levels without the asterisks refer to free-trade outputs. These two lines and a third parallel line through the FTA production point are depicted in Figure 14. The differences in these lines, measured along the textile axis, are the line segments AB and BC. These are just the differences in the intercepts which can be expressed as:

The amount AB measures the welfare loss caused by the excessive specialization by Mexico in the production of apparel. The amount BC is a pure transfer to Mexico. It is the difference between the value of Mexican free trade production in the U.S. market and in the world market. If the difference between U.S internal prices and world prices were entirely due to U.S. tariffs, then the U.S. government, in effect, would turn over the tariff revenues to Mexican producers who distribute the proceeds to Mexican labor and capital by bidding up the prices of inputs to U.S. levels. The amount of this tariff loss is AC. But much of the implicit tariff revenue is collected by third country suppliers in the form of quota rents. These third county suppliers accordingly are forced to effect a substantial portion of the transfer amount AC to Mexico. <u>It is Taiwan, and Hong Kong and other beneficiaries of the MFA that will pay for the U.S.-Mexican Free Trade Agreement.</u>

<u>CASE 2</u>: Mexican production is enough to satisfy fully the U.S. import demand for apparel but not for textiles.

<u>United States</u>:

The price of apparel falls below the protected price since imports come entirely from Mexico. The apparel sector disappears because it is cheaper to produce apparel in Mexico.

<u>Mexico</u>:

The excess supply of apparel in the U.S. market drives down the Mexican producer price of apparel. The decline in the price of apparel relative to textiles causes a decline in the wage rate in Mexico. The

---

AB: $(q_A - q_A*)(p_A/p_T) + (q_T - q_T*)$
BC: $\tau_A(p_A/p_T)q_A + \tau_T q_T$
AC: $\tau_A(p_A/p_T)q_A* + \tau_T q_T*$
where τ is the U.S. tariff level (plus tariff equivalents of the MFA), $(p_{US} - p)/p$.

floor price for apparel is the world market price. If the Mexican supply is enough to push the price of apparel down to its floor or close to it, then Mexico ends up with lower wages than it would have without the FTA.

The message here is an important one: Protection in the United States which is intended to maintain the wages of U.S. workers is likely to make Mexican workers worse off, if there is a free trade agreement. The reason for this contradictory outcome is that the product mixes differ greatly in Mexico and the United States. Textiles and iron and steel which are in the labor intensive wing of US production are in the capital intensive wing of Mexican production. Thus protection of textiles and iron and steel drives up the demand for labor in the U.S. as the output mix shifts away from the most capital intensive sectors such as chemicals. But the same protection in Mexico drives down the demand for labor as the output mix is shifted away from the most labor intensive sectors such as apparel and footwear.

CASE 3: Mexican production is enough to satisfy fully the U.S. import demand at the protected prices for both apparel and textiles.

United States:

Both the price of apparel and the price of textiles fall below the protected price since U.S. imports come entirely from Mexico. The prices end up between the protected prices and the unprotected prices depending on U.S. net demand and Mexican production. If Mexican supply is great enough to satisfy the combined demand for product by Mexico and the U.S. at the world prices, then prices fall to world levels in both the U.S. and Mexico. Then a portion of Mexican product is exported to third countries. The apparel sector disappears because it is cheaper to produce in Mexico. The wage in the U.S. falls with the price of textiles.

Mexico:

The relative price of textiles to apparel may be either lower or higher than the free trade relative price and consequently wages in Mexico may be either higher or lower.

In both of these cases I take it as given that the U.S. machinery sector is large enough to satisfy the total Mexican demand. Competition with U.S. suppliers accordingly will drive out of business the protected capital intensive sectors in Mexico and the internal price of these reverts to the unprotected price. This "trade creation" is accompanied by a shift of resources into the more labor intensive sectors where they are more productive. The level of Mexican GNP accordingly rises. Figure 17 is misleading in that it does not indicate the efficiency gain from shutting down the capital-intensive sectors.

CASE 4: Mexican production is enough to satisfy fully the U.S. import demand for textiles, but not for apparel.

Left as an exercise.

5. A THREE FACTOR MODEL WITH MOBILE CAPITAL

The discussion in the previous section has been based on the assumption that the accumulation and location of capital is not affected by a free trade agreement. But it is highly likely that the rate of capital accumulation in Mexico would increase if a serious agreement were put in place. Some of this additional capital would come from increased Mexican savings, some from the United States and some from third countries who will find Mexico a useful location for gaining access to the U.S. market.

The preceding discussion is easily amended to allow capital mobility. In the two-factor three-good model, an increase of capital in Mexico shifts production in favor of the moderately capital intensive sectors, textiles. A standard trade result, the Rybczynski theorem, suggests that the size of the labor intensive sector, apparel, shrinks, absolutely as well as relatively with this increase in capital. Likewise, a reduction in capital in the United States shifts output from machinery toward textiles. This paradoxical result seems worth repeating for emphasis: An FTA accompanied by capital mobility from the U.S. shifts the structure of U.S. production toward the U.S. labor intensive sectors, textiles, for example.

If this model with only two factors is used as a guide, the capital flow into Mexico continues until Mexico adopts the high wages and low capital costs of the United States. This can occur only when Mexico and the United States have the same product mix. The complete equalization of wages from capital mobility is a necessary implication of a two-factor model. But a three factor model discussed in Leamer(1987) offers some richer alternatives. One three factor model with high-skilled and low-skilled workers as well as capital is illustrated in Figure 18. This triangular figure allows one to display the three factor ratios at the same time, each along a different side of the triangle. Each vertex of the triangle is labelled with one of the three factors. The ratio of capital to low-skilled labor, for example, is scaled along the bottom side of the triangle connecting the capital and labor vertex. Points closer to the labor vertex are labor intensive; points closer to the capital vertex are more capital intensive. As drawn, therefore, textiles is more capital intensive than apparel. The capital/low skilled labor ratio of any other point in the triangle can be found by drawing a line that begins at the "Professional" vertex and extends to the bottom of the triangle through the point For example, an imaginary line from the professional vertex through the machinery point intersects the bottom of the triangle to the left of the textile point. This means that the capital per low-skilled ratio in machinery is higher than in textiles. The textile and apparel points lie on the bottom of the triangle, indicating that they use no professional workers as inputs. Automobiles and banking lie on the left edge of the triangle indicating that they use no low-skilled workers. If this isn't clear, pause a minute to get it straight since these triangular diagrams will prove extremely useful.

There are five different industrial sectors illustrated in this figure. The labels and locations of these industries in the triangle are suggestive, not exact. For example, the banking sector stands for an array of financial and other professional services which are produced with professional labor, very little physical capital and very little unskilled labor. The machinery point is connected to the other commodities to divide the figure into "cones of diversification." The United States which is relatively well endowed with physical capital and professional workers lies in the cone with banking, automobiles and machinery vertices. Mexico lies in the more labor intensive cone with apparel, textiles and machinery vertices.

The factor price equalization theorem implies that factor prices are constant within a cone of diversification. To get a partial handle on how factor prices change between cones we can trace lines from one cone to another in the direction of one of the factor vertices. For example, it is possible to go from the U.S. cone into the Mexican cone on a straight line to the labor vertex. This movement toward the labor vertex represents an increase in the supply of unskilled labor and accordingly the wage rate must either fall or stay the same (result of Samuelson). This implies that wages of low-skilled workers are lower in the Mexican cone than in the U.S. cone. The ordering of the other factor returns is not clear since it is impossible to trace a line from one cone to the other straight toward either the capital vertex or the professional vertex. If the machinery point were a little to the right, with a capital/skilled labor ratio less than textiles, a line can be drawn from the Mexican cone and U.S. cone straight at the professional vertex. This increase in the professional workforce would imply that the wages of professionals were lower in the U.S. than in Mexico. But as the figure is drawn there is no necessary relationship between Mexican and US capital returns or wages of professionals. If, as seems to be the case, the price of banking services is high enough, the wages of professionals would be higher in the U.S. than in Mexico. Since both types of labor would then command higher wages in the U.S. and since both Mexico and the U.S. produce machinery, the third factor, capital, has to be cheaper in the U.S. than in Mexico. If that is the case there is an incentive for capital to migrate from the U.S. to Mexico, which migration is illustrated by the arrows in the figure, Mexico toward the capital vertex and the U.S. away. This migration leaves unchanged the returns to capital until the product mix changes, that is until either the U.S. or Mexico gets to the edge of its cone. If Mexico is small enough and close enough to its edge, then she will be the first to exit a cone. In this case the apparel sector disappears from Mexico and the textile sector grows. The corresponding capital outflow from the U.S. leaves unchanged the returns to factors but does shrink the automobiles sector and expands the banking sector. If the capital flow is great enough, the U.S. may lose its automobiles sector. Thus the capital flows induced by an FTA put pressure on those sectors in the United States that use large amounts of capital and relatively small amounts of professional and unskilled labor. In Mexico, the pressure is put on the most labor intensive products.

EVIDENCE

Reality is a great deal more complicated than Figure 18 suggests, but, I would argue, the main ideas underlying the figure carry a ring of truth. The sectors in the United States that will fare well use relatively large amounts of high-skilled labor which is abundant in the U.S. but scarce in Mexico. Figure 19 displays the industrial characteristics of the ten commodity aggreagates that were earlier discussed. Figure 20 displays the resource supplies of a set of countries for which there exist ILO data on proportion of the labor force in the "professional" category and also capital stock figures (1982) formed by accumulating and discounting investment flows. The Mexican and U.S. resource supply points have been placed in the industrial characteristics triangle, figure 19. Transfer in your mind the other countries into the diagram for industrial characteristics. It appears that as countries accumulate human and physical capital they seem intially to follow a very similar path through the thicket of commodities beginning at the labor vertex and passing very close to the apparel point. Here the development paths may diverge. Some countries, like Singapore and Japan accumulate physical capital relatively rapidly and have resource mixes more suited to steel and autos than to aircraft and computers. Other countries, like Austria and Sweden place relatively heavy investments in human capital and have resource supplies more suited to machinery, printing and aircraft.

If the theory is taken literally with respect to this set of commodities then we would divide Figure 19 into a set of triangular "cones of diversification" by connecting the commodity points with lines. Production would concentrate exclusively on the three commodities that surround the resource supply point. The way that this diagram would be divided into cones of diversification depends on product prices. Commodities with high relative prices should be connected with as many cones as possible since then they are produced over the greatest range of factor endowments. Unless apparel is very expensive, it will be separated from the U.S. point by at least one of these lines and absent protection would not be produced in the U.S. If technological change and price movements have made textiles a high-profit sector then the U.S. would lie in a cone formed from the chemicals, machinery and textiles points, or from chemicals, aircraft and textiles. Other prices would place the U.S. in cones not including textiles as a vertex, and like apparel, the U.S. would not be producing textiles absent protection.

Real production patterns do not conform with the extreme implications of the model, but they do conform in the sense that production concentrates on those products that use inputs in ratios similar to their supply. Since the Mexican factor supplies are very close to the input mix in apparel, liberalization of the Mexican economy should induce a concentration of production on these labor intensive products including food products, furniture and footwear. Capital accumulation would take Mexico directly toward the textile point and would be accompanied by a shift out of apparel and into textiles and household appliances. The relative supply of human capital to unskilled labor is not likely to increase in Mexico for some time and we should not be expecting much production of Machinery or certainly aircraft and rockets.

It is unlikely that the capital flows associated with an FTA would alter the location of the U.S. resource point very much, and therefore would have little effect on U.S. comparative advantage. But Mexican production of apparel and textiles will make it difficult for the U.S. to protect these sectors and the U.S. will be forced to adjust out of apparel and possible out of textiles in the longer run. A liberalized Mexico would import more of those products that are intensive in skilled labor and very intensive in capital: steel, chemicals, and aircraft (including metalworking machinery and electrical machinery). U.S. manufacturers are well positioned to satisfy this new Mexican demand.

6.0 WAGES AND EMPLOYMENT IN A MULTI-SECTORAL MODEL [5]

Is international competition causing the fall in the real wages of low-skilled workers? More specifically, is the wage decline related to three features of the international commerce of the United States: (1) the increased level of international trade as a per cent of GNP, (2) the large trade deficit that the United States has had during the 1980's and/or (3) the shift in the commodity composition of trade, especially the increased imports of labor-intensive products.

5 This is a condensed version of this section. The fuller version formally lays out a Heckscher-Ohlin-Samuelson model with nontraded goods and with and without a full complement of traded goods. The algebra of these models is presented in Tables 5 and 6.

The literature on the relationship between trade and wages that has come out of the labor economics tradition has focussed on the trade deficit as the cause of the fall in the wages. This literature has three basic problems with it. First of all, the trade deficit is a temporary phenomenon, but the intensity of interest in the wage decline reflects the concern that the decline is permanent and will not disappear if the deficit improves. Secondly, the counterfactual implicit in pointing to the trade deficit as the "cause" of the wage decline is quite unclear. Exactly what change in the economy is imagined? Is it increased barriers against imports? Is it a reduction of government expenditure? Is it looser monetary policy? Do these all have the same effect on wages? The third problem is related to the second: these calculations have no clear theoretical foundation.

The general equilibrium model that is commonly employed in international economics links wages with product prices through the "Stolper-Samuelson" functions. The path by which international competition affects wages travels first through product prices. Changes in international trade that are not accompanied by product price changes leave the returns to factors unchanged. In particular, an overvalued exchange rate that would be associated with a trade deficit increases the demand for tradeables and therefore the level of imports, but need not have any impact on the levels of factor prices. Factor migration also may also have no affect on wages. The potential affect on wages of an increase in the labor force may be fully dissipated by a shift in the product mix in favor of commodities that use labor intensively.

If this model is taken as a guide, the empirical evidence of the link between trade and wages needs to be established in two steps. One step is the estimation of the "Stolper-Samuelson" equations that map product prices into wages. The other step isolates those changes in product prices that can be attributed to relevant changes in the international markets.

The data that might be used to estimate the Stolper-Samuelson functions has three components of variability: country, commodity and time. None of these is likely to reveal much about the Stolper-Samuelson functions. Cross-industry comparisons of wages and prices cannot be used to estimate these functions since an explicit assumption of the model is that factors are mobile across sectors and command the same returns. Cross-country comparisons are not likely to be fruitful because differences in internal product prices and wages are too small and measured with too much error to be very informative. Cross-time comparisons probably do not get at the long-run aspect of the model, and when they do they are subject to the criticism that the Stolper-Samuelson mapping depends on the technology which cannot be taken as constant for long stretches of time.

Though the prospects for direct estimation of the Stolper-Samuelson effects ($\partial w/\partial p$) seem small, it is possible to obtain estimates of the "Rybczynski" effects ($\partial q/\partial v$) that link output levels (q) with resource supplies(v). The enterprise is then saved by the duality between the Stolper-Samuelson and the Rybczynski effects, $(\partial w/\partial p) = (\partial q/\partial v)$. The Rybczynski derivatives can be estimated by regressing output levels of particular industries on country factor supplies at one point in time. For example, the cross country variation of the output of textiles might be explained by the country's supplies of college graduates, high-school graduates, and less-than high-school graduates.

If each extra high-school graduate is associated with \$700 additional dollars of textile output, then the duality result implies that a reduction in the price of textiles by ten percent raises the wages of the high-school graduates by 700x.1 = \$70 per year ($pdq/dv = pdw/dp$).

The other step in the empirical argument is to link the changes in relative product prices to events in the international marketplace. One phenomenon that I wish to emphasize is the substantial global integration that has greatly increased the access of producers to low wage labor in other countries. We can use the zero profit conditions to get a handle on the effects that access to low-wage labor is likely to have on product prices. A zero profit condition applicable to commodity k is $p_k = A_k'w$. Logarithmic differentiation of this pricing equation, holding fixed the technology A_k, produces an expression for the percentage change in price: $dp_k/p_k = \theta_k'(dw_i/w_i)$ where θ is a vector of input shares $(w_i A_{ki}/p_k)$ and (dw_i/w_i) is a vector of percentage changes in factor costs. This points to the estimation of a cross-commodity regression with the price change over some interval of time as the dependent variable and input shares as the explanatory variables:

$$\Delta p_k/p_k = \sum_i \beta_i * (\text{Input share})_{ik}.$$

In this equation β_i represents the change in the factor costs. Using this equation we can ask what would prices have been if the low-cost alternative labor supply were not available. The answer is prices would have been higher by $-\beta$*(Low skilled labor share). Left out of this equation are the effects of technological improvements on the input intensities, A. The regression analysis is based implicitly on the assumption that the cross industry variability of rates of technological improvements are independent of the input shares, for example, there is no tendency for technological improvements to be concentrated in capital intensive sectors. The obvious association between research inputs and technological improvements can be accomodated by including scientists as one of the input categories.

6.1 ESTIMATES USING OECD DATA

Ideally, one would estimate a Heckscher-Ohlin model using data from a long list of countries. Important sensitivity questions would be studied, especially looking for evidence of substantial nonlinearities that would suggest defects in the structure of the model. Unfortunately, data are very limited. The best data set that includes levels of output has been compiled by the OECD and includes the structure of production (ISIC) for only thirteen countries. A fairly simple model is therefore estimated with these limited data. The factor supplies that are used as explanatory variables are the level of the capital stock, the number of professional workers (ILO classification) and the number of others classified as "economically active." The variability of these resources is not as great as one might hope, as can be seen by looking at Figure 20, restricting attention to the OECD countries. But data on the composition of output of countries like Korea, the Philippines and Pakistan are not available.

Estimates using 1972 data are reported in Table 7. Commodities are sorted according to the sign patterns of the coefficients. Comparative advantage of the first group of products, wood products and footwear, comes from abundance of nonprofessional workers; comparative disadvantage comes from abundance of capital and professional workers.

Many of these coefficients seem pretty much what one would expect from the data on industrial characteristics, Figure 19. Textiles and iron and steel are located in countries that are abundant in capital and nonprofessional workers. Motor vehicles use capital and professional workers. But there are some surprises. There is a large group of commodities that have all positive coefficients, fewer in 1985 than 1972. The Rybczynski theorem suggests that there will be at least one negative coefficient. The all-positives finding might lead one to question the applicability of the Rybczynski theorem to this multi-commodity setting. It might suggest, for example, economies of scale. Alternatively, the finding might be dismissed as due to sampling uncertainty: there is no commodity that has all three t-values larger than one.

Another observation about these tables is that there are some commodities with very low R^2's. These measures of fit do not include the scale effect since they come from a regression with output divided by capital as the dependent variables. Thus one should not expect the R^2's to be very high. But the model is virtually informationless regarding the location of production of several of the commodities. It does do a pretty good job for many of the labor-intensive products including footwear(1985), leather products, textiles, and wearing apparel.

The message that I want to extract from these tables: resource supplies matter. The substantial difference in Mexican and U.S. capital/labor ratios is an important aspect of an FTA.

7.0 ESTIMATES OF THE EFFECTS OF AN FTA

7.1 HOW BIG IS MEXICO?

I have argued in Section 4 that the effects on the United States of a free trade agreement depend critically on the impact that Mexican product will have in the U.S. markets. Is Mexico so small that the agreement will hardly be felt in the U.S.? Or is Mexico large enough to substantially decrease the relative prices of labor-intensive products in the U.S.?

The Mexican and LDC shares of the U.S. import markets in 1972 and 1985 are depicted in figures 21 and 22. In 1972 more than fifty per cent of imports originated in LDC's for REFineries, APParel, and FOOD products. The increasing presence of LDC exporters in U.S. trade is evident in the 1985 figure. In addition to apparel, refineries and food, LDC's captured more than fifty per cent of U.S. imports of SHOEs, PLAStics and TOBacco. TEXTiles is very nearly in this category as well.

In both years Mexico had a very small share of these markets. Roughly ten percent of imports of Ot.N (Cement) came from Mexico in 1972. In 1985 Mexico captured roughly nine per cent of the markets for GLaSS, ELECtrical machinery and OTHer industries(e.g. jewelry and sporting goods). Mexico had hardly any presence in the labor intensive sectors of APParel, SHOEs and LEAther.

Based on these figures, it seems unlikely that Mexico could export enough to have much of an effect on the U.S. markets. Certainly, with import shares of less than ten per cent, we would not expect the U.S. markets to be much affected by a free trade agreement. But there are four counterarguements to that viewpoint. First, a free trade agreement that has high barriers into the U.S. against labor intensive products creates an incentive for Mexico to export all of its product to the U.S. and to import from third sources for domestic needs. This might be called a platform affect: Mexico becomes a platform for springing into the U.S. market. Secondly, the liberalization of the Mexican markets that has been occurring since joining GATT in 1985 may be accompanied by substantial productivity increases, a trend which is likely to be accentuated by a free trade agreement. Third, liberalization should induce greater specialization of Mexican production in commodities that are suited to her comparative advantage, namely the labor intensive sectors. Also the platform affect will encourage concentration of production on those products against which the U.S. has relatively high protection. This concentration should be accompanied by a greater presence of Mexico in the U.S. markets for these commodities. Fourth, a free trade agreement is likely to attract capital to Mexico from the U.S. and from third countries.

These are complicated issues but it is possible to draw conclusions about some of them. Consider first the trade-diverting aspect of a free trade agreement on the extreme assumption that all Mexican production is sold in the U.S. market and displaces imports from LDC's. Figure 23 adjusts Figure 22 to account for this possibility by substituting Mexican production in place of U.S. imports from Mexico on the horizontal axis and by adjusting the LDC trade on the vertical axis to account for the displacement effect.[6] When the value on the horizontal axis is one or above, Mexican production is enough to fully satisfy U.S. import demand. This occurs for FOOD, OTHer, OtherChemicals, BEVerages, TEXTiles and synthetic resins. When the verticle value is negative, LDC trade is more than fully displaceable by Mexican production. Iron and steel and CHEMicals are examples. Overall, this figure further confirms that Mexican exports to the United States are unlikely to put much pressure on U.S. prices. Indeed, in

[6] The year 1984 was selected here because of data limitations in Mexican 1985 information on production. The 1984 data are from ****.

several of the labor intensive sectors including APParel, SHOES and LEAther, current Mexican production is well below the level of U.S. imports, and thus very greatly below the level of U.S. production.

Thus if we didn't expect Mexico to change much as a result of trade liberalization and a free trade agreement, the image of a gnat and an elephant seems pretty accurate. But presumably the intent of an FTA is to render a major change in Mexican production and trade. One way to get an idea where this may take Mexico is to use the model of production that was discussed in Section 6.4. This model is estimated with data from 13 OECD countries and explains the level of output of each of these ISIC categories as functions of the countries' supplies of capital, professional and nonprofessional labor. We can use the model to predict what Mexican trade would be like if she became like these countries, not in the sense of having the same structure of trade, but rather in the sense of having the same relationship between trade and resource supplies. Of course, this assumption is suspect for two reasons. First, the model is estimated with data from industrialized OECD countries and the estimates may not properly be extended as far as is necessary to include Mexico. Secondly, the model ignores the pressure to concentrate production on those sectors for which U.S. protection is highest. With those caveats in mind, we may forge ahead.

Figure 24 reports the 1984 composition of Mexican output and the predicted levels of output using the regression model. Commodities are ordered by the value of U.S. output in 1972, the same as several earlier figures. Above each item is the predicted change in per centage terms. This model suggests huge predicted changes in many of these sectors. The sectors that are predicted to grow by more than 500% are ELEC, WOOD, FURN, comp, TOB, ship, LEA,and POT. Several sectors are predicted to contract. These are cars, MET, N_FR, and drug. Other low growth sectors are FOOD, and BEV.

How do these hypothetical production figures compare with the size of the U.S. market? Figure 25 indicates the ratios of hypothetical Mexican product to apparent U.S. consumption under three different hypotheses. The first uses the regression estimates and the 1984 figures for Mexican capital, professional and nonprofessional labor. The second increases the capital per man in Mexico to close half of the gap between the U.S. capital per man and the Mexican capital per man. The last hypothesis projects Mexico to have the same productivity as Italy. These production data are found by taking the Italian data and multiplying by the ratio of Mexican labor to Italian labor. Italy is one of the thirteen countries that are used to estimate the model, indeed is the one with the lowest capital per man. The point of this third series is to remind us that the regression-based prediction is based on analogies between Mexico and the OECD countries. Roughly speaking Mexico is viewed as similar to the capital scarce OECD countries, with adjustments for the greater scarcity of capital.

A logarithmic scale is used to plot the data in Figure 25. The sectors in which the first series exceeds total U.S. consumption are LEA, OTH, res and POT. The SHOE sector is almost as large. Capital accumulation seems not be have a dramatic effect on these numbers. The real jump comes from the productivity increases that are implicit in treating Mexico as if she were an advanced industrialized economy with less capital resources than the other OECD countries. Indeed the numbers are similar if Italian productivity is assumed.

This discussion has not dealt at all with the incentive for Mexico to concentrate production on sectors that the U.S. protects. Absent that effect, Mexico seems unlikely to control enough of the U.S. market to eliminate completely the U.S. protection, but with productivity increases that may come from Mexican liberalization there are many U.S. import markets that will be dominated by Mexico and there are quite a few domestic sectors that will affected by Mexican competition.

How big is Mexico? Big enough for the U.S. to be concerned.

7.2 HOW MUCH WILL THIS AFFECT WAGES?

Last I would like to make some conjectures about the effect of an FTA on the returns to labor and capital in the United States. I use the word conjecture advisedly, since there is no direct evidence that can be brought to bear on this important question. What I do in this section is to carry out the steps that are discussed in Section 6 first to form predictions about the probable changes in prices and then to link these hypothetical price changes with changes in factor costs using the duality between the Stolper-Samuelson effects and the Rybczynski effects. Details of these calculations are saved for an appendix. The results reported in Table 10. This table contains three scenarios depending on the amount of change in relative prices. I assume that the component of variability of price from 1972-1985 that was correlated with capital intensity is associated with foreign competition, and this component can be projected into the future particularly if the Mexican-U.S. FTA is put in place. Thus the relative price of labor-intensive goods is assumed to fall and capital intensive goods to rise. The scenario $m = 1$ is based on the assumption that future foreign competition is like the 1972-85 history. The scenario $m = .5$ makes the relative price changes half as much, and m = 5 makes them 5 times as large. As it turns out this calculation depends greatly on whether petroleum refining is included or not because this is the most capital intensive sector and the method of projecting prices assigns a very large relative price increase to that sector. Accordingly, the calculations are presented with and without refining included. The hypothetical price changes excluding refining are reported in Table 9, where you can see that the m = 1 scenario has apparel declining by 23 per cent and plastics increasing by 47 per cent.

The numbers in the row m = 1 in the top panel indicate that foreign competition has increased the earnings of $1000 of capital by $13, has raised the annual earnings of the professional/technical workforce by $6077 and has lowered the annual earnings of other workers by -$1862. If competition were to intensify, the relative price effect could conceivably increase as much as the m=5 scenario. Then the earnings of the low-skilled would decline by -$9312 and the earnings of the professional would increase by $30384. These numbers are reduced by about a third if petroleum is excluded.

The numbers in Table 10 are highly uncertain both because there is econometric uncertainty in the estimates and also because the precise economic theory that underlies the computation is not compelling. But I would argue that the numbers are in the right ballpark, and they serve to focus attention on the important fact that everyone need not benefit from increased international commerce. Indeed if the reason for the expansion of international commerce is increased access to low-wage unskilled foreign labor it is virtually certain that our low-skilled workers will have the earning reduced. Earning reductions on the order of $1000 per year such as those in Table 10 seem very plausible.

APPENDIX

To determine the historical relationship between price changes and capital intensity, I have estimated the following equation using the NBER data for the period 1972 to 1985.

$$\% \Delta(\text{price})_i = \alpha + \theta \text{ (capital/man)}_i$$

I assume that the component of variability of price that is correlated with capital intensity is associated with foreign competition, and therefore I use the following equation to project the continuing effect of foreign competition on prices:

$$\text{Projected } \% \Delta(\text{price}_i) = m\, \theta \text{ (capital/man)}_i$$

Here the multiplier m is one if the intensity of foreign competition is similar to the period 1972 to 1985 and greater than one if the competition is more intense.

Next we need to adjust these figures to maintain the overall level of prices so that we are dealing with price relatives only. To do this an index weighted by output value is formed:

$$I = \sum_i \% \Delta(\text{price})_i\, p_i Q_i \,/\, \sum_i p_i Q_i$$

Then the predicted price change is

$$\pi_i = m\, \theta \text{ (capital/man)}_i - I$$

These predictions are at the three-digit SIC level of commodities. These need to be concorded to the two-digit ISIC to get to predicted price changes for each two-digit ISIC class.

For each two-digit ISIC sector(indexed by i) Table 7 has estimated an equation of the form

$$Q_i = \alpha_i + \beta_{1i}\text{CAPITAL} + \beta_{2i}\text{PROF} + \beta_{3i}\text{OTHER}$$

For output of services we have a similar expression.

$$\text{NONTRADED} = \alpha + \gamma_1\text{CAPITAL} + \gamma_2\text{PROF} + \gamma_3\text{OTHER}$$

Now define the consumption share

s_i = (total output of sector i over all 13 OECD countries)/(total GNP - total Service GNP)

Then according to the model discussed in Section 6, the induced changes in factor rewards are:

$$\sum_i \pi_i(\beta_{1i} + \gamma_1 s_i) = \text{change in CAPITAL real earnings}$$
$$\sum_i \pi_i(\beta_{2i} + \gamma_2 s_i) = \text{change in PROF real earnings}$$
$$\sum_i \pi_i(\beta_{3i} + \gamma_3 s_i) = \text{change in OTHER real earnings}$$

References

Abowd, John M., eds. (1991), Immigration, Trade, and the Labor Market , New York: National Bureau of Economic Research.

Banco Nacional de Mexico, (1991), "The Textile Industry," Review of the Economic Situation of Mexico , LXVII, 249-255.

Ben-David, Dan (1991), "Equalizing Exchange: A Study of the Effects of Trade Liberalization," NBER Working Paper No. 3706.

Borjas, George J., Freeman, Richard B. and Katz, Lawrence F. (1991), "On the Labor Market Effects of Immigration and Trade," NBER Working Paper No. 3761, June.

Botella C., Ovidio, Garcia C., Enrique and Giral B., Jose (1991), "Textiles: The Mexican Perspective," in U.S.-Mexican Industrial Integration: The Road to Free Trade , eds. Sidney Weintraub, Luis Rubio F. and Alan D. Jones, Boulder, Colorado: Westview Press, 193-220.

Clague, Christopher K. (1991), "Factor proportions, relative efficiency and developing countries' trade," Journal of Development Economics , 35, 357-380.

Cline, William (1987), The Future of World Trade in Textiles and Apparel , Washington, D.C.: Institute for International Economics.

Diez-Canedo R., Juan (1991), "The Effect of Policy Restrictions on Capital and Labor Flows in Mexico," in Immigration, Trade and the Labor Market , eds. John M. Abowd and Richard B. Freeman, New York: National Bureau of Economic Research, 101-119.

Eliason, Gunnar and Lundberg, Lars (1989), "The Creation of the EC Internal Market and its Effects on the Competitiveness of Producers in Oth. Ind. Econ.," The Industrial Institute for Economic and Social Research, Stockholm, Working Paper 229

Erzan, Refik, Goto, Junichi and Holmes, Paula (1989), "Effects of the MFA on Developing Countries' Trade," Institute for International Economic Studies, Stockholm, Seminar Paper No. 449, September.

Freeman, Richard B. and Katz, Lawrence (1991), "Industrial Wage and Employment Determination in an Open Economy," in Immigration, Trade, and the Labor Market , eds. John. M. Abowd and Richard B. Freeman, New York: National Bureau of Economic Research, 235-260.

Gregory, R.G., Anstie, R. and Klug, E. (1991), "Why Are Low-Skilled Immigrants in the United States Poorly Paid Relative to Their Austral. Counterparts?," in Immigration, Trade and the Labor Market , eds. John M. Abowd and Richard B. Freeman, New York: National Bureau of Economic Research, 385-421.

Krueger, Alan B. and Summers, Laurence H. (1988), "Efficiency Wages and the Inter-industry Wage Structure," Econometrica , 56, 259-293.

Kuhn, Peter and Wooton, Ian (1991), "Immigration, International Trade, and the Wages of Native Workers," in Immigration, Trade and the Labor Market , eds. John M. Abowd and Richard B. Freeman, New York: National Bureau of Economic Research, 285-304.

Lande, Stephen (1991), "Textiles: U.S. Perspective," in U.S.-Mexican Industrial Integration: The Road to Free Trade , eds. Sidney Weintraub, Luis Rubio F. and Alan D. Jones, Boulder, Colorado: Westview Press, 221-248.

MaCurdy, Thomas and Mroz, Thomas (1991), "Measuring Macroeconomic Trends in Wages From Cohort Specifications," Stanford discussion paper, April.

Palmeter, N. David (1991), "The Rhetoric and Reality of US Anti-Dumping Law," The World Economy , 14, 19-36.

Ramirez de la O, Rogelio (1991), "Economic Outlook in the 1990s: Mexico," in U.S.-Mexican Industrial Integration: The Road to Free Trade , eds. Sidney Weintraub, Luis Rubio F. and Alan D. Jones, Boulder, Colorado: Westview Press, 3-33.

Reynolds, Clark W. (1991), "Economic Outlook in the 1990's: The United States," in U.S.-Mexican Industrial Integration , eds. Sidney Weintraub, Luis Rubio F. and Alan D. Jones, Boulder, Colorado: Westview Press, 49-62.

Schott, Jeffrey J. (1991), "Trading Blocks and the World Trading System," The World Economy , 14, 1-18.

Trela, Irene and Whalley, John (1989), "Unravelling the Threads of the MFA," Institute for International Economic Studies, Seminar Paper No. 448, September.

Vousden, Neil (1990), The economics of trade protection , Cambridge: Cambridge University Press.

Warntz, William (1965), Macrogeography and Income Fronts, Philadelphia, Pa.: Regional Science Research Institute.

Weintraub, Sidney (1991), "Industrial Integration Policy: U.S. Perspective," in U.S. Mexican Industrial Integration, eds. Sidney Weintraub, Luis Rubio F. and Alan D. Jones, Boulder, Colorado: Westview Press, 49-62.

Weintraub, Sidney, Rubio, Luis F., eds. (1991), U.S. Mexican Industrial Integration: The Road to Free Trade, Boulder, Colorado: Westview Press.

Winters, L. Alan, eds. (1991), European Integration: Trade and Industry, Cambridge: Cambridge University Press.

Wolf, Martin (1989), "How to Cut the Textile Knot: Alternative Paths to Liberalisation of the MFA," Insitute for International Economic Studies, Stockholm, Seminar Paper No. 453, October.

Wonnacott, Paul (1987), The United States and Canada: The Quest for Free Trade, Washington, D.C.: Institute for International Economics.

Table 1

Ten Aggregates formed from 3-Digit SIC Codes

	Description	1985 capital	1985 emp (thous.)	cap/ emp	% Prof	% Prof & Eng	% unsk
	APPAREL						
1	201 Meat Products	4434.6	303.3	14.62	0.075	0.090	0.206
1	205 Bakery Products	2757.1	208.8	13.20	0.082	0.088	0.102
1	224 Narrow Fabric Mills	225	16.9	13.31	0.041	0.062	0.062
1	225 Knitting Mills	2466.5	192.7	12.80	0.066	0.066	0.066
1	231 Men's and Boys' Suits and Clothes	272.7	64.9	4.20	0.052	0.055	0.047
1	232 Men's and Boys' Furnishings	1189.4	272.2	4.37	0.052	0.055	0.047
1	233 Women's and Misses' Outerwear	1188.1	354.7	3.35	0.052	0.055	0.047
1	234 Women's and Children Undergarments	272.6	73.3	3.72	0.052	0.055	0.047
1	235 Hats, Caps, and Millinery	54.3	14.2	3.82	0.052	0.055	0.047
1	236 Children's Outerwear	176.2	59.9	2.94	0.052	0.055	0.047
1	237 Fur Goods	13.8	2.5	5.52	0.052	0.055	0.047
1	238 Miscellaneous Apparel and Accesories	177.1	42.5	4.17	0.052	0.055	0.047
1	243 Millwork, Plywood and Structural Members	2140.9	196.1	10.92	0.080	0.084	0.107
1	244 Wood Containers	364.7	33	11.05	0.077	0.088	0.121
1	251 Household Furniture	2176.8	271.7	8.01	0.077	0.088	0.077
1	252 Office Furniture	789.6	68.3	11.56	0.077	0.088	0.077
1	253 Public Building and Related Furniture	214.5	21.2	10.12	0.077	0.088	0.077
1	254 Partitions and Fixtures	535.3	67.9	7.88	0.077	0.088	0.077
1	259 Miscellaneous Furniture and Fixtures	295.8	43.2	6.85	0.077	0.088	0.077
1	313 Boot and Shoe Cut Stock and Findings	43.1	5.4	7.98	0.039	0.039	0.045
1	314 Footwear, except Rubber	480.4	86.1	5.58	0.039	0.039	0.045
1	326 Pottery and Related Products	474.6	33.5	14.17	0.000	0.087	0.174
	PRINTING						
2	239 Miscellaneous Fabricated Textile Products	1179.6	175	6.74	0.124	0.135	0.022
2	272 Periodicals	1139.2	95.8	11.89	0.155	0.162	0.045
2	273 Books &2741 Misc Publishing	1640.3	114.3	14.35	0.155	0.162	0.045
2	274 Miscellaneous Publishing	388.7	52	7.48	0.155	0.162	0.045
2	275 Commercial Printing	6840.7	491.9	13.91	0.155	0.162	0.045
2	278 Blankbooks and Bookbinding	562	61.2	9.18	0.155	0.162	0.045
2	279 Printing Trade Services	791.4	59.4	13.32	0.155	0.162	0.045
2	302 Rubber and Plastic Footwear	167.2	12	13.93	0.091	0.125	0.091
2	303 Reclaimed Rubber	13	0.9	14.44	0.091	0.125	0.091
2	315 Leather Gloves and Mittens	12.3	3.5	3.51	0.118	0.137	0.039
2	316 Luggage	82.3	13.1	6.28	0.118	0.137	0.039
2	317 Handbags and Personal Leather Goods	77.6	18.4	4.22	0.118	0.137	0.039
2	319 Leather Goods N E C	55.2	6	9.20	0.118	0.137	0.039
2	328 Cut Stone and Stone Products	138.6	11.2	12.38	0.094	0.106	0.035
2	347 Metal Services, N E C	1265	112.3	11.26	0.089	0.117	0.062
2	359 Misc Mach exc Electr, &3714 M V Parts	4045.4	284.2	14.23	0.116	0.157	0.028
2	383 Optical Instruments and Lenses	602.4	53.2	11.32	0.084	0.148	0.026
2	384 Medical Instruments and Supplies	1990.8	152.1	13.09	0.084	0.148	0.026
2	385 Ophthalmic Goods	294	24.9	11.81	0.084	0.148	0.026
2	391 Jewelry, Silverware and Plated Ware	418.8	47.1	8.89	0.102	0.106	0.032
2	393 Musical Instruments	177.9	12.1	14.70	0.102	0.106	0.032
2	396 Costume Jewelry and Notions	463.8	38.8	11.95	0.102	0.106	0.032
2	399 Miscellaneous Manufactures	1720.3	128.6	13.38	0.102	0.106	0.032

Description	1985 capital	1985 emp	cap/ emp	% Prof	% Prof & Eng	% unsk
ROCKETS						
3 245 Wood Buildings and Mobile Homes	653.2	63	10.37	0.222	0.244	0.022
3 344 Fabricated Structural Metal Products	5531.2	391.1	14.14	0.171	0.178	0.024
3 348 Ordnance and Accesories, N E C	971.4	82.4	11.79	0.063	0.188	0.063
3 364 Electric Lighting and Wiring Equipment	2458.3	164.2	14.97	0.093	0.192	0.029
3 366 Communication Equipment	9865.7	672	14.68	0.119	0.226	0.024
3 376 Guided Missiles, Space Vehicles, Parts	2826.7	217.8	12.98	0.188	0.572	0.014
3 379 Miscellaneous Transportation Equipment	576.8	47.3	12.19	0.121	0.212	0.000
3 381 Engineering and Scientific Instruments	607.8	46.7	13.01	0.135	0.213	0.021
3 382 Measuring and Controlling Devices	2975.4	217.1	13.71	0.135	0.213	0.021
TEXTILES						
4 203 Preserved Fruits and Vegetables	4951.8	221	22.41	0.078	0.099	0.156
4 222 Weaving Mills,Synth &2262 Syn Finishing	2265.9	115	19.70	0.041	0.062	0.062
4 223 Weaving and Finishing Mills, Wool	288.5	13.1	22.02	0.041	0.062	0.062
4 226 Textile Finishing, except Wool	1104.3	52.2	21.16	0.000	0.000	0.154
4 227 Floor Covering Mills	938.8	48.1	19.52	0.054	0.054	0.027
4 228 Yarn and Thread Mills &2269 Finishing NEC	2129.9	104.1	20.46	0.041	0.062	0.062
4 249 Miscellaneous Wood Products	1286.5	79.8	16.12	0.077	0.088	0.121
4 265 Paperboard Containers and Boxes	3851.5	187.5	20.54	0.068	0.068	0.107
4 311 Leather Tanning and Finishing	279	14.2	19.65	0.000	0.000	0.333
4 323 Products of Purchased Glass	691.2	42.7	16.19	0.034	0.034	0.148
4 345 Screw Machine Products, Bolts, etc	1619.7	97.2	16.66	0.053	0.079	0.053
4 363 Household Appliances	2262.6	124.4	18.19	0.078	0.089	0.033
MACHINERY						
5 209 Miscellaneous Foods and Kindred Products	3257.4	144.2	22.59	0.105	0.114	0.133
5 212 Cigars	60.2	4	15.05	0.139	0.139	0.056
5 271 Newspapers	6475	411	15.75	0.125	0.134	0.013
5 276 Manifold Business Forms	878.2	54.2	16.20	0.155	0.162	0.045
5 277 Greeting Card Publishing	369.8	19.9	18.58	0.155	0.162	0.045
5 306 Fabricated Rubber Products N E C	1441.7	94.3	15.29	0.091	0.125	0.091
5 307 Miscellaneous Plastics Products	8612.6	541.2	15.91	0.094	0.112	0.061
5 343 Plumbing and Heating, except Electric	729.2	48	15.19	0.089	0.117	0.062
5 346 Metal Forgings and Stampings	2319.5	134.6	17.23	0.092	0.122	0.031
5 349 Miscellaneous Fabricated Metal Products	4259.6	275.4	15.47	0.089	0.117	0.062
5 355 Special Industry Machinery	2869	166.1	17.27	0.116	0.157	0.028
5 356 General Industrial Machinery	5360.7	269.4	19.90	0.116	0.157	0.028
5 358 Refrigeration and Service Machinery	3107.2	182.8	17.00	0.116	0.157	0.028
5 373 Ship and Boat Building and Repairing	2778.5	175.4	15.84	0.055	0.105	0.041
5 394 Toys and Sporting Goods	1448	73.9	19.59	0.109	0.130	0.011
5 395 Pens, Pencils, Office and Art Supplies	453.6	27.5	16.49	0.102	0.106	0.032

Description	1985 capital	1985 emp	cap/ emp	% Prof	% Prof & Eng	% unsk
AIRCRAFT						
6 264 Miscellaneous Converted Paper Products	4930.1	210.9	23.38	0.115	0.183	0.069
6 336 Nonferrous Foundries	1589.2	82.6	19.24	0.152	0.209	0.078
6 339 Miscellaneous Primary Metal Products	617.9	28.5	21.68	0.099	0.174	0.066
6 342 Cutlery, Handtools, and Hardware	2488.1	145.6	17.09	0.159	0.170	0.034
6 354 Metalworking Machinery	5022.9	264.4	19.00	0.139	0.179	0.023
6 361 Electric Distributing Equipment	1451.6	93.4	15.54	0.093	0.192	0.029
6 362 Electrical Industrial Apparatus	3491.1	178.9	19.51	0.093	0.192	0.029
6 367 Electronic Component and Accessories	12444.1	558	22.30	0.093	0.192	0.029
6 369 Miscellaneous Electrical Equip and Suppl	2861.9	157	18.23	0.093	0.192	0.029
6 372 Aircraft and Parts	8717.1	528.2	16.50	0.115	0.268	0.003
6 375 Motorcycles, Bicycles, and Parts	188.2	9.2	20.46	0.121	0.212	0.000
6 387 Watches, Clocks and Watchcases	208.1	11.8	17.64	0.143	0.286	0.000
STEEL						
7 221 Weaving Mills,Cotton &2261 Cot Finishing	1788.3	62.1	28.80	0.041	0.062	0.062
7 241 Logging Camps and Logging Contractors	2299.3	76.3	30.13	0.061	0.076	0.053
7 242 Sawmills and Planing Mills	4131.2	164.7	25.08	0.080	0.084	0.107
7 321 Flat Glass	1102.5	15.2	72.53	0.034	0.034	0.148
7 322 Glass and Glassware, Pressed or Blown	3310.2	80.1	41.33	0.034	0.034	0.148
7 331 Blast Furnace and Basic Steel Products	23969.6	278	86.22	0.052	0.077	0.093
7 332 Iron and Steel Foundries	5124.8	135.7	37.77	0.012	0.059	0.082
AUTOS						
8 202 Dairy Products	3896.5	137.6	28.32	0.108	0.108	0.144
8 204 Grain Mill Products	4442.4	99.2	44.78	0.145	0.169	0.084
8 206 Sugar and Confectionery Products	2905.6	91.2	31.86	0.128	0.128	0.105
8 207 Fats and Oils	2061.8	33.8	61.00	0.105	0.114	0.133
8 208 Beverages	9112.2	183.4	49.68	0.138	0.159	0.097
8 211 Cigarettes	1942.4	35.5	54.72	0.139	0.139	0.056
8 213 Chewing and Smoking Tobacco	91.8	3	30.60	0.139	0.139	0.056
8 214 Tobacco Stemming and Redrying	343.3	6.7	51.24	0.139	0.139	0.056
8 229 Miscellaneous Textile Goods	1336.3	54.1	24.70	0.138	0.138	0.069
8 261 Pulp Mills	2873	16.3	176.26	0.059	0.122	0.080
8 262 Paper Mills, except Building Paper	11223.9	131.8	85.16	0.059	0.122	0.080
8 263 Paperboard Mills	6699.5	53.9	124.29	0.059	0.122	0.080
8 266 Building Paper and Board Mills	307.3	3.7	83.05	0.059	0.122	0.080
8 284 Soaps, Cleaners, and Toilet Goods	3850.7	123.4	31.21	0.114	0.148	0.068
8 285 Paints and Allied Products	1564.5	55.5	28.19	0.074	0.148	0.037
8 301 Tires and Inner Tubes	3248.3	70.3	46.21	0.047	0.109	0.109
8 304 Rubber and Plastics Hose and Beltings	657.9	23.8	27.64	0.091	0.125	0.091
8 324 Cement, Hydraulic	2685.7	21.2	126.68	0.126	0.126	0.101
8 325 Structural Clay Products	931.3	35.2	26.46	0.118	0.118	0.235
8 327 Concrete, Gypsum, and Plaster Products	5415.2	173.3	31.25	0.126	0.126	0.101
8 329 Misc Nonmetallic Mineral Products	3018.3	107.1	28.18	0.094	0.106	0.035
8 341 Metal Cans and Shipping Containers	1903.4	52	36.60	0.089	0.117	0.062
8 353 Construction and Related Machinery	7389.8	229.2	32.24	0.096	0.136	0.032
8 371 Motor Vehicles and Equipment	28540	751.5	37.98	0.075	0.143	0.029
8 374 Railroad Equipment	941.4	27.6	34.11	0.000	0.167	0.000
8 386 Photographic Equipment and Supplies	4176	98.5	42.40	0.076	0.152	0.000

	Description	1985 capital	1985 emp	cap/ emp	% Prof	% Prof & Eng	% unsk
	CHEMICALS						
9 281	Industrial Inorganic Chemicals	7854.2	105	74.80	0.161	0.283	0.027
9 282	Plastics Materials and Synthetics	12796.2	128.2	99.81	0.063	0.175	0.000
9 283	Drugs	6446.7	163.7	39.38	0.180	0.279	0.072
9 286	Industrial Organic Chemicals	20456.9	123.2	166.05	0.161	0.283	0.027
9 287	Agricultural Chemicals	5737.2	44.9	127.78	0.120	0.240	0.080
9 289	Miscellaneous Chemical Products	2918.9	82.3	35.47	0.161	0.283	0.027
9 291	Petroleum Refining	27682.7	85.7	323.02	0.148	0.313	0.035
9 295	Paving and Roofing Materials	1064.4	29	36.70	0.154	0.231	0.231
9 299	Miscellaneous Petroleum and Coal Products	575.8	12.8	44.98	0.154	0.231	0.231
9 333	Primary Nonferrous Metals	4428.7	37.4	118.41	0.142	0.203	0.076
9 334	Secondary Nonferrous Metals	809.6	16	50.60	0.132	0.196	0.074
9 335	Nonferrous Rolling and Drawing	6368.2	163.7	38.90	0.128	0.193	0.072
9 351	Engines and Turbines	3613.6	98.9	36.54	0.062	0.215	0.031
9 352	Farm and Garden Machinery	2758.6	89.4	30.86	0.088	0.188	0.050
9 365	Radio and TV Receiving Equipment	1500.4	59.1	25.39	0.119	0.226	0.024
	COMPUTERS						
**357	Office and Computing Machines	12090.3	406.7	29.73	0.145	0.263	0.013
	TOTAL	451763.1	17368.5	26.01			

1	APPAREL	20743.1	2432.3	8.53	0.063	0.071	0.084
2	PRINTING	24066.5	1968	12.23	0.126	0.147	0.038
3	ROCKETS	26466.5	1901.6	13.92	0.139	0.241	0.024
4	TEXTILES	21669.7	1099.3	19.71	0.058	0.071	0.099
5	MACHINERY	44420.2	2621.9	16.94	0.103	0.129	0.045
6	AIRCRAFT	44010.3	2268.5	19.40	0.113	0.208	0.028
7	STEEL	41725.9	812.1	51.38	0.049	0.069	0.094
8	AUTOS	111558.5	2618.8	42.60	0.096	0.136	0.064
9	CHEMICALS	105012.1	1239.3	84.74	0.130	0.240	0.049
**	COMPUTERS	12090.3	406.7	29.73	0.145	0.263	0.013

Table 2
Principle Elements of Aggregates

	Skilled < 11%	11% < Sk <17%	17% < Skilled
K/L < 15000	APPAREL Food Products Furniture Footwear	PRINTING Misc. non-elec machinery	ROCKETS Fab. Struc. Metal Guided Missles Measuring and Cont Devices
15 < K/L < 24	TEXTILES Paperboard Appliance	MACHINERY Misc. Food Misc. Plastics Misc.fab. metl.	AIRCRAFT Converted paper Metalworking mach Elect. Mach.
24000 < K/L	STEEL Sawmills Plaining Mills	AUTOS Dairy Products Paper mills Soaps Concrete	CHEMICALS Petro. Ref. Engines and turb. Radio and TV equi Computers*

* Selected for special attention

\agg_data.doc

Table 3
Aggregated Data

Year	Industry	Labor	Capital	Output	Value added	Payroll	Imports	Exports	Consump.	Price	Valueadd real	Output real	Capital/ Emp	Value/ Emp	Payroll/ Labor	Imports/ Output	Exports/ Output	Net Exp/ Output
1972	Apparel	2946.9	17625.4	93463.1	36106.3	18696.4	5757.0	1117.1	98103.0	1.0	36108.3	93463.1	6.0	12.3	6.3	0.06	0.01	-0.05
1972	Textiles	1317.7	18690.4	48615.5	21529.7	9760.9	1829.0	1204.5	49240.1	1.0	21529.7	48615.5	14.2	16.3	7.4	0.04	0.02	-0.01
1972	Steel	1317.2	45835.5	51132.1	24278.7	12600.3	5079.0	2067.9	54143.2	1.0	24278.7	51132.1	34.8	18.4	9.6	0.10	0.04	-0.06
1972	Printing	1626.1	15213.1	44600.7	27035.1	13445.3	2866.0	1498.4	45968.3	1.0	27035.1	44600.7	9.4	16.6	8.3	0.06	0.03	-0.03
1972	Machinery	2435.1	31972.0	78965.1	44407.0	21161.8	3498.0	4702.5	77760.6	1.0	44407.0	78965.1	13.1	18.2	8.7	0.04	0.06	0.02
1972	Autos	3020.2	77047.3	199120.1	82287.1	30807.4	14321.0	11772.1	201669.0	1.0	82287.1	199120.1	25.5	27.2	10.2	0.07	0.06	-0.01
1972	Rockets	1647.8	16660.3	53503.6	29784.1	16185.3	1389.0	2881.4	52011.3	1.0	29784.1	53503.8	10.1	18.1	9.8	0.03	0.05	0.03
1972	Aircraft	1969.9	29381.7	63130.6	36895.4	19195.4	4011.0	6990.0	60151.6	1.0	36895.4	63130.6	14.9	18.7	9.7	0.06	0.11	0.05
1972	Chemicals	1411.2	76226.2	109474.0	43914.3	14660.5	10625.0	7204.6	112894.4	1.0	43914.3	109474.0	54.0	31.1	10.4	0.10	0.07	-0.03
1972	Computers	208.5	3315.6	8604.9	4904.4	2277.5	951.0	1776.7	7779.2	1.0	4904.4	8604.9	15.9	23.5	10.9	0.11	0.21	0.10
1972	TOTAL	17900.6	331967.5	750609.7	351142.1	158790.8	50326	41215.11	759720.6	1.0	351142.1	750609.7	18.5	19.6	8.9	0.07	0.05	-0.01
1985	Apparel	2432.3	20743.1	201034.1	81735.7	35552.2	40570.0	4792.5	236811.6	1.98	41329.4	101652.2	8.5	33.6	14.6	0.20	0.02	-0.18
1985	Textiles	1099.3	21669.7	124873.5	51757.2	20148.4	22792.0	3850.7	143814.9	2.20	23540.7	56796.1	19.7	47.1	18.3	0.18	0.03	-0.15
1985	Steel	812.1	41725.9	95730.5	37944.5	19274.6	16453.0	4337.6	107845.9	2.56	14824.8	37401.6	51.4	46.7	23.7	0.17	0.05	-0.13
1985	Printing	1968.0	24066.5	154447.4	92742.6	39421.0	22792.0	8633.8	168605.6	2.31	40135.7	66839.4	12.2	47.1	20.0	0.15	0.06	-0.09
1985	Machinery	2621.9	44420.2	243173.0	131292.7	54332.8	23810.0	15380.9	251602.1	2.52	52066.8	96435.3	16.9	50.1	20.7	0.10	0.06	-0.03
1985	Autos	2618.8	111558.5	557846.3	219296.0	70649.7	86541.0	41288.2	603099.1	2.32	94696.4	240694.4	42.6	83.7	27.0	0.16	0.07	-0.08
1985	Rockets	1901.6	26466.5	181953.1	105753.3	48992.8	12949.0	13695.4	181206.8	2.23	47455.5	81649.2	13.9	55.8	25.8	0.07	0.08	0.00
1985	Aircraft	2268.5	44010.3	225254.0	126154.6	56506.2	33335.0	45758.7	212830.3	2.23	56618.9	101095.3	19.4	55.6	24.9	0.15	0.20	0.06
1985	Chemicals	1239.3	105012.1	415516.1	117310.0	35328.2	66174.0	39329.8	442360.3	3.23	36358.0	128781.5	84.7	94.7	28.5	0.16	0.09	-0.06
1985	Computers	406.7	12090.3	62221.4	27331.4	12090.7	13713.0	15568.8	60365.6	0.14	197974.6	450699.9	29.7	87.2	29.7	0.22	0.25	0.03
1985	TOTAL	17368.5	451763.1	2262049	991317.9	392298.6	339129	192636.3	*********	2.4	605003	1362245	26.0	57.1	22.6	0.15	0.09	-0.06

Rates of Growth 1972-1985 (per cent) / Changes: 1972-1985

	Industry	Labor	Capital	Output	Value added	Payroll	Imports	Exports	Consump.	Price	Valueadd real	Output real	Capital/ Emp	Value/ Emp	Payroll/ Labor	Imports/ Output	Exports/ Output	Net Exp/ Output
	Apparel	-17.5	17.7	115.1	126.4	90.2	604.7	329.0	390.8	97.8	14.5	8.8	42.6	174.3	130.4	0.14	0.01	-0.13
	Textiles	-16.6	15.9	156.9	140.4	106.4	1146.1	219.7	1083.3	119.9	9.3	16.8	39.0	188.2	147.4	0.14	0.01	-0.14
	Steel	-38.3	-9.0	87.2	56.3	53.0	223.9	109.8	201.4	156.0	-38.9	-26.9	47.7	153.5	148.1	0.07	0.00	-0.07
	Printing	21.0	58.2	246.3	243.0	193.2	695.3	476.2	465.3	131.1	48.5	49.9	30.7	183.4	142.3	0.08	0.02	-0.06
	Machinery	7.7	38.9	207.9	195.7	156.7	580.7	227.1	561.5	152.2	17.2	22.1	29.0	174.6	138.5	0.05	0.00	-0.05
	Autos	-13.3	44.8	180.2	166.5	129.3	504.3	250.7	433.7	131.6	15.1	21.0	67.0	207.3	164.5	0.08	0.01	-0.07
	Rockets	15.4	58.9	240.1	255.1	202.7	832.3	375.3	697.0	122.8	59.3	52.6	37.7	207.7	162.3	0.05	0.02	-0.02
	Aircraft	15.2	49.8	256.8	241.9	194.4	731.1	554.6	433.3	122.8	53.5	60.1	30.1	196.9	155.6	0.08	0.09	0.01
	Chemicals	-12.2	37.8	279.6	167.1	141.0	522.8	445.9	356.5	222.7	-17.2	17.6	56.9	204.2	174.4	0.06	0.03	-0.03
	Computers	95.1	264.6	623.1	457.3	430.9	1342.0	776.3	1188.8	-86.2	3936.7	5137.7	86.9	165.7	172.2	0.11	0.04	-0.07
	TOTAL	-3.0	36.1	201.4	182.3	147.1	573.9	367.4	407.8	141.9	72.3	81.5	40.3	191.0	154.6	0.08	0.03	-0.05

/research/mexico/tabl_tar.doc

Table 4

Revealed Comparative Advantage and Trade Barriers: 1983
Sorted by Tariff Average
M-Imp, X-Exp, S-Ship, C-Cons

SIC3	DESCR	S/C	M/C	X/C	M/S	X/S	TAR	NTB	PRIC	QUAN	HLTH	THR
302	Rubber Footwear	.67	.34	.01	.50	.02	.42					
223	Wool	.88	.13	.01	.15	.01	.32	.04				.04
236	Kids Outerwear	.90	.16	.05	.17	.06	.25	.09				.09
232	Male Furnish.	.85	.16	.01	.19	.01	.25	.09		.01		.08
234	Female Underwr.	.95	.09	.03	.09	.03	.24	.65		.61		.04
233	Female Outerwr.	.79	.21		.27	.01	.24	.08				.08
231	Male Suits	.79	.22		.28	.01	.23	.07				.07
211	Cigarettes	1.10		.10		.09	.22	1.00	1.00			
225	Knitting	1.00		.01		.01	.22	.40		.39		.01
325	Clay Prod.	.94	.10	.04	.11	.04	.19	.13	.08			.11
222	Syn Weav&Finish	.97	.06	.03	.06	.03	.17	.59	.34	.08		.51
315	Leather Gloves	.76	.28	.04	.37	.05	.17					
316	Luggage	.81	.22	.03	.28	.04	.16	.01				.01
203	Canned Fruit	.98	.04	.03	.04	.03	.15	.45	.45			.22
317	Handbags	.54	.47	.01	.87	.01	.15	.25	.23			.02
396	Costume Jewel.	.87	.18	.05	.20	.05	.14					
322	Glassware	.95	.07	.02	.08	.02	.13					
228	Yarn, Thread	.99	.02	.01	.02	.01	.12	.56	.20	.50		.07
239	Misc Fabr Text.	.98	.05	.03	.05	.03	.12	.48	.03	.36		.14
326	Pottery	.71	.36	.08	.51	.11	.12	.03	.03			
224	Narrow Fabric	1.05	.04	.09	.04	.08	.11	.49	.12	.49		
395	Pens, Pencils	.98	.08	.07	.08	.07	.11	.24		.24		
221	Cot Weav&Finish	.93	.10	.03	.11	.04	.11	.84	.03	.71		.13
206	Confectionery	.92	.10	.02	.11	.02	.11	.63	.60	.62		
235	Hats	.81	.21	.02	.26	.03	.11	.59		.55		.04
238	Misc Apparel	.74	.27	.01	.37	.02	.11	.23	.04	.13		.09
213	Tobacco	.68	.36	.03	.53	.05	.11					

Table 5

Notation

Exogenous Variables:	
Factor supplies	v
Product prices	p. $P = \mathrm{diag}(p)$
Taste/technolgy	t
Trade Surplus	B
Total Expenditure	Y
Endogenous Variables	
Factor prices	w
Input intensities	A
Inverse intensities	$E = A^{-1}$
Production	q
Consumption	C
Net Exports	T
Consumption shares	$\alpha(p)$
Subscripts	
h	traded goods produced at home
f	traded goods not produced at home
n	nontraded goods

Table 6

The Heckscher-Ohlin Samuelson Model:

I. Full, Fixed Set of Traded Commodities

Equilibrium conditions	
Cost minimization	$A = f(w,t)$
Zero Profits	$w = E_h' p_h$
Factor market equilibrium	$A_h q_h = v$
Uneconomic products	$p_f < A_f' w$
Equilibrium equations	
Factor price equalization	$w = w(p_h, t)$
Production	$q_h = E_h v$
GNP	$GNP = p_h' E_h v$
Total expenditure	$Y = GNP - B$
Consumption	$C = P^{-1}\,\alpha(p) Y,$
Net exports	$T_h = E_h v - P_h^{-1}\,\alpha_h(p)\; Y,$
	$T_f = \quad - P_f^{-1}\,\alpha_f(p)\; Y,$

II. Incomplete, Fixed Set of Traded Commodities (One nontraded good); Fixed input intensities

Definition	
Inverse intensities	$E' = A'^{-1} = [E_h, E_N]$
Equilibrium conditions	
Zero Profits	$w = E_h p_h + E_N p_N$
Factor market equilibrium	$A_h q_h + A_N q_N = v$
Equilibrium equations	
Factor prices	$w = E_h p_h + E_N[\alpha_N/(1-\alpha_N)](p_h' q_h - B)/q_N$
Traded goods output	$q_h = E_h' v$,
Nontraded goods output	$q_N = E_N' v$
Nontraded goods prices	$p_N = [\alpha_N/(1-\alpha_N)]\;(p_h' q_h - B)/q_N$
GNP	$GNP = p_h' q_h + p_N' q_N$

Table 7

REGRESSION COEFFICIENTS ORDERED BY SIGN PATTERN
Year = 1972

Model:

$$Q = \alpha + \beta_1 CAPITAL + \beta_2 PROF + \beta_3 OTHER + \varepsilon CAPITAL$$

ISIC	Name	β_1	β_2	β_3	α	R^2	Adj. R^2
		(-)	(-)	(+)			
331	Wood Prod	-8.09	-837.78	419.11	248241	0.29	0.05
324	Footwear	-0.74	-269.22	72.31	15685	0.43	0.18
		(-)	(+)	(-)			
3411	Pulp,Pape	-8.13	1626.78	-54.02	825276	0.54	0.38
341	Paper,Pro	-6.16	2042.31	-9.02	825402	0.57	0.40
		(-)	(+)	(+)			
323	Leather,P	-29.68	1525.23	210.32	87686	0.82	0.74
361	Pottery,C	-25.62	1524.79	164.32	-54949	0.93	0.89
314	Tobacco	-15.60	1222.86	131.22	-142477	0.85	0.81
342	Print.,Pu	-15.16	3479.34	11.15	-196246	0.75	0.67
3513	Synth.Res	-7.55	682.89	113.76	-66456	0.55	0.36
354	Petrol.Pr	-2.10	294.15	16.73	536	0.23	-0.03
381	Metal Pro	-1.95	3129.31	118.59	-589598	0.68	0.58
		(+)	(-)	(+)			
3211	Spinning	5.68	-795.57	240.36	-110647	0.74	0.65
369	Oth.Non-M	3.44	-370.12	147.04	26713	0.51	0.30
356	Plastic P	1.97	-122.72	102.22	-64985	0.61	0.49
332	Furniture	1.49	-28.34	78.49	-76014	0.59	0.46
321	Textiles	9.24	-403.89	309.50	-225065	0.70	0.59
362	Glas,Prod	3.35	-22.76	16.07	-31413	0.13	-0.17
371	Iron,Stee	26.80	-1563.28	334.46	-134884	0.31	0.06
384	Trnsprt E	56.40	-1602.62	273.48	-1010459	0.66	0.54
		(+)	(+)	(-)			
372	Non-Ferro	2.81	6733.97	-581.51	-221896	0.47	0.29
311	Food	38.01	3303.44	-133.42	341287	0.42	0.23
3843	Motor Veh	44.74	675.23	-12.75	-948633	0.61	0.49
3841	Shipbuild	4.63	25.32	-5.38	337369	0.53	0.35
		(+)	(+)	(+)			
3522	Drugs,Med	5.49	117.54	0.52	-115753	0.43	0.24
353	Petr.Refi	14.95	453.41	11.23	-220161	0.17	-0.11
3511	Basic Che	1.98	1117.94	19.74	-169910	0.45	0.27
390	Oth.Indus	0.74	335.27	25.20	-117752	0.55	0.41
355	Rubber Pr	2.02	326.55	27.05	-137558	0.88	0.84
322	Wearing A	9.37	214.68	29.90	-83580	0.24	-0.02
3825	Office,Co	1.60	105.91	33.52	-128672	0.76	0.66
385	Professio	1.56	336.92	34.88	-179476	0.64	0.52
352	Oth.Chemi	10.08	321.50	96.22	-236320	0.66	0.54
313	Beverages	0.35	469.46	111.94	-176174	0.59	0.43
3832	Radio,TV	2.53	613.99	117.85	-312534	0.55	0.40
351	Indust.Ch	0.26	1539.21	138.14	-247149	0.63	0.48
382	Machinery	2.44	3542.31	171.00	-865329	0.63	0.50
383	Electr.Ma	10.98	1330.76	217.08	-565868	0.68	0.58
3	Manufactu	54.90	28961.17	2518.99	-4138238	0.92	0.89

Number of observations = 13
PROF and OTHER in thousands; CAPITAL in millions

Table 8

REGRESSION COEFFICIENTS ORDERED BY SIGN PATTERN
Year = 1985

Model:

$$Q = \alpha + \beta_1 CAPITAL + \beta_2 PROF + \beta_3 OTHER + \varepsilon CAPITAL$$

ISIC	Name	β_1	β_2	β_3	α	R^2	Adj. R^2
		(-)	(-)	(+)			
331	Wood Prod	-19.63	-1179.88	1315.46	1793842	0.32	0.07
324	Footwear	-3.22	-349.45	221.31	192865	0.62	0.49
		(-)	(+)	(+)			
314	Tobacco	-3.03	440.58	205.27	-256285	0.44	0.26
323	Leather,P	-19.31	518.91	663.43	776642	0.72	0.63
361	Pottery,C	-14.48	805.61	511.49	-68518	0.71	0.61
3411	Pulp,Pape	-16.07	2890.80	142.66	3013741	0.51	0.35
341	Paper,Pro	-13.37	4281.70	98.59	2838333	0.47	0.24
		(+)	(-)	(+)			
384	Trnsprt E	44.38	-4711.07	1113.15	-3000106	0.64	0.52
321	Textiles	1.66	-1757.23	777.55	-26687	0.66	0.54
3211	Spinning	0.51	-1210.63	486.22	-98777	0.70	0.58
371	Iron,Stee	0.36	-939.78	1009.14	129386	0.51	0.35
369	Oth.Non-M	1.73	-937.97	355.84	521637	0.32	0.09
356	Plastic P	8.84	-770.00	161.56	-371382	0.45	0.27
3511	Basic Che	8.74	-587.87	363.47	-236813	0.28	0.01
322	Wearing A	0.13	-552.95	364.55	-25011	0.58	0.44
332	Furniture	1.18	-518.46	240.74	-318	0.55	0.40
3841	Shipbuild	2.82	-478.39	50.94	829769	0.51	0.33
351	Indust.Ch	13.30	-394.42	562.84	-99974	0.16	-0.12
362	Glas,Prod	2.05	-108.60	55.31	-67403	0.37	0.14
3513	Synth.Res	2.31	-91.01	186.94	291780	0.10	-0.20
390	Oth.Indus	2.16	-42.78	111.21	-310450	0.51	0.35
355	Rubber Pr	2.10	-10.31	109.53	-273416	0.76	0.65
		(+)	(+)	(-)			
372	Non-Ferro	24.51	11527.13	-2195.47	-2291449	0.68	0.58
3843	Motor Veh	48.93	1120.31	-343.79	-3764712	0.51	0.35
381	Metal Pro	26.04	2013.33	-302.45	-1609393	0.34	0.09
3522	Drugs,Med	5.63	430.90	-43.22	-551458	0.40	0.17
385	Professio	6.67	413.73	-10.44	-828237	0.42	0.23
342	Print.,Pu	3.23	2649.06	-3.06	-1011	0.35	0.13
		(+)	(+)	(+)			
3825	Office,Co	3.86	499.04	11.46	-674013	0.34	0.12
354	Petrol.Pr	0.63	282.35	19.49	-75236	0.15	-0.16
353	Petr.Refi	21.05	4111.58	39.41	-1522410	0.13	-0.16
382	Machinery	19.02	3882.94	149.54	-2333022	0.36	0.15
3832	Radio,TV	12.34	246.33	154.77	-1371870	0.33	0.10
352	Oth.Chemi	10.79	466.54	199.56	-958392	0.60	0.46
313	Beverages	1.42	304.43	243.37	-401458	0.47	0.30
311	Food Prod	22.99	1380.94	525.69	941338	0.20	-0.06
383	Electr.Ma	17.51	472.06	525.93	-1945206	0.39	0.17
3	Manufactu	164.32	18822.08	6853.62	-8645906	0.40	0.20

Number of observations = 13

PROF and OTHER in thousands; CAPITAL in millions

Table 9

ISIC W/o Petroleum			Difference between the Change in Price 1972-85 and the Weighted Average m=0.5	m=1	m=5	Weights	Sj
311	Food Produc	FOOD	-2.1%	-4.2%	-21.0%	0.110	0.185
313	Beverages	BEV	5.1%	10.2%	51.2%	0.021	0.036
314	Tobacco	TOB	0.8%	1.7%	8.3%	0.010	0.017
321	Textiles	TEXT	-5.6%	-11.2%	-55.8%	0.036	0.061
322	Wearing App	APP	-11.5%	-23.0%	-115.1%	0.019	0.032
323	Leather,Prd	LEA	-9.8%	-19.7%	-98.5%	0.005	0.009
324	Footwear	SHOE	-10.5%	-21.0%	-105.0%	0.003	0.004
331	Wood Produc	WOOD	-6.7%	-13.4%	-66.8%	0.027	0.045
332	Furniture	FURN	-9.7%	-19.5%	-97.3%	0.013	0.022
341	Paper,Prod.	PAPR	18.1%	36.3%	181.4%	0.040	0.068
342	Print.,Publ	PRNT	-8.1%	-16.2%	-80.8%	0.043	0.073
351	Indust.Chem	CHEM	14.3%	28.5%	142.7%	0.066	0.111
352	Oth.Chemic.	O.Ch	13.0%	26.0%	130.1%	0.043	0.072
355	Rubber Prod	RUBB	-4.9%	-9.7%	-48.7%	0.010	0.018
356	Plastic Prd	PLAS	23.4%	46.8%	233.8%	0.026	0.043
361	Pottery,Chn	POT	-5.6%	-11.1%	-55.7%	0.005	0.008
362	Glas,Produc	GLSS	2.8%	5.6%	28.2%	0.007	0.012
369	Oth.Non-Met	OTH	5.1%	10.2%	51.0%	0.015	0.026
371	Iron,Steel	IRON	9.6%	19.2%	96.1%	0.056	0.094
372	Non-Ferrous	N-FR	5.2%	10.3%	51.5%	0.029	0.048
381	Metal Prod.	MET	-6.7%	-13.4%	-66.8%	0.065	0.109
382	Machinery	MACH	-4.1%	-8.2%	-41.2%	0.104	0.176
383	Electr.Mach	ELEC	-5.8%	-11.7%	-58.5%	0.082	0.139
384	Trnsprt Equ	TRAN	-5.2%	-10.3%	-51.6%	0.130	0.220
385	Profession.	PROF	-6.6%	-13.1%	-65.7%	0.022	0.038
390	Oth.Industr	OTH	-7.8%	-15.6%	-78.1%	0.012	0.021

Table 10

Changes in Real Earnings Induced by Foreign Low-wage Competition

Petroleum included:

scenario	CAPITAL	PROF	OTHER
m = .5	7	3038	-931
m = 1	13	6077	-1862
m = 5	67	30384	-9312

Petroleum excluded:

scenario	CAPITAL	PROF	OTHER
m = .5	1	959	-232
m = 1	3	1919	-465
m = 5	13	9596	-2323

\mexico\wage_tbl.doc

Figure 1

Industrial Wages and Population

1960-1978

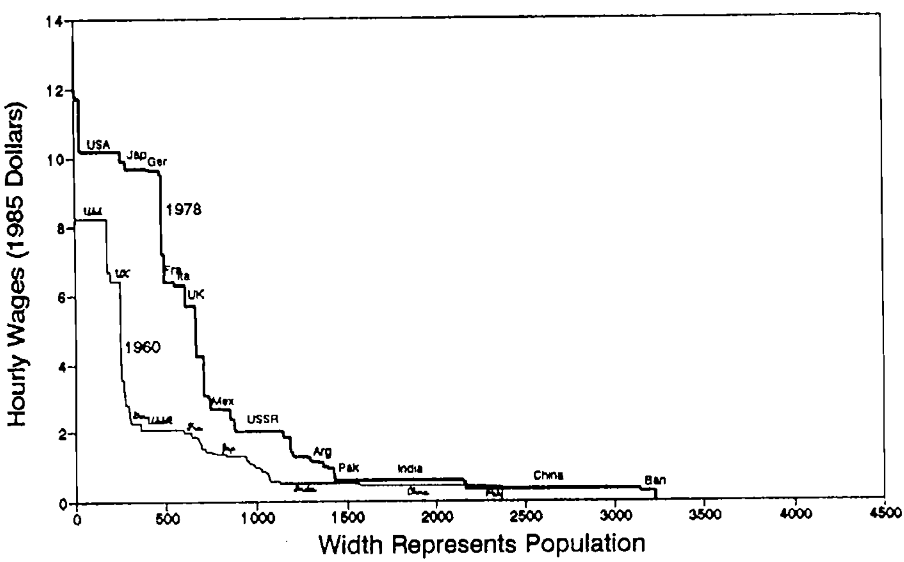


Figure 2

Industrial Wages and Population

1978-1989

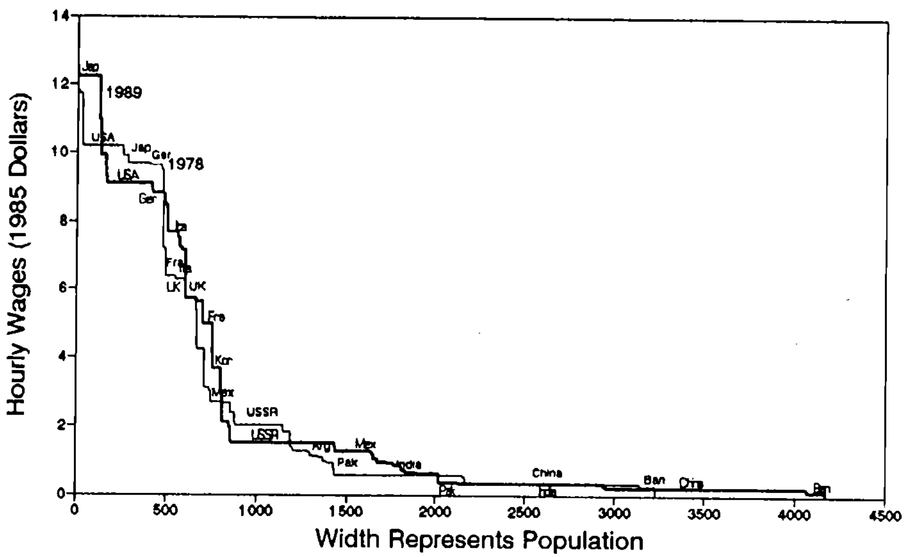
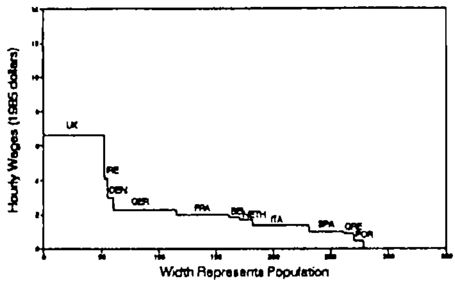
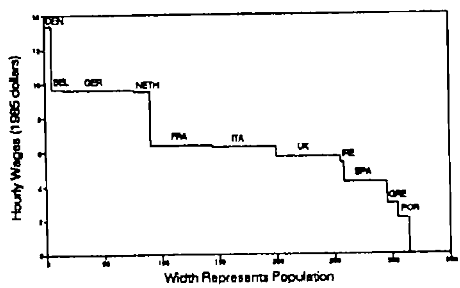


Figure 3

Industrial Wages and Population, 1960
EEC



Industrial Wages and Population, 1978
EEC



Industrial Wages and Population, 1989
EEC

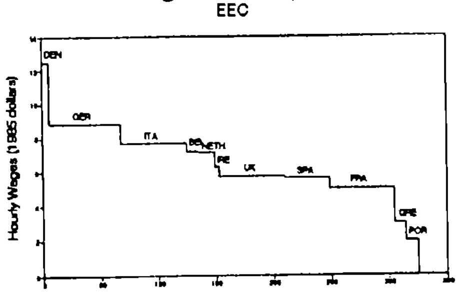
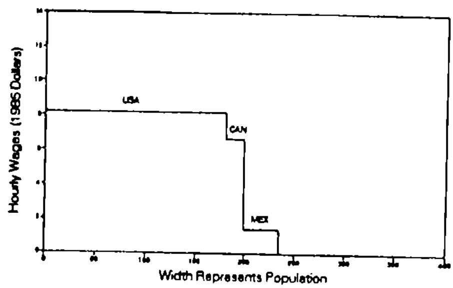
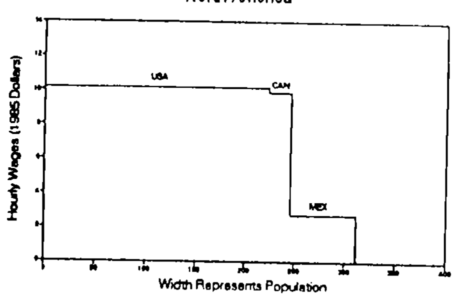


Figure 4

Industrial Wages and Population, 1960
North America



Industrial Wages and Population, 1978
North America



Industrial Wages and Population, 1989
North America

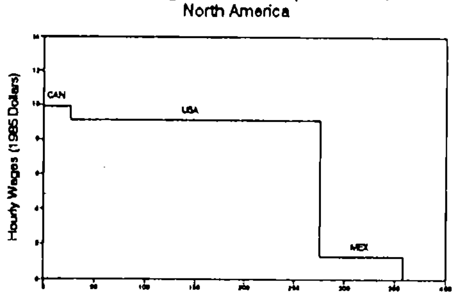
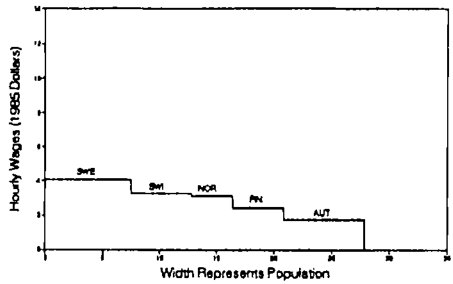
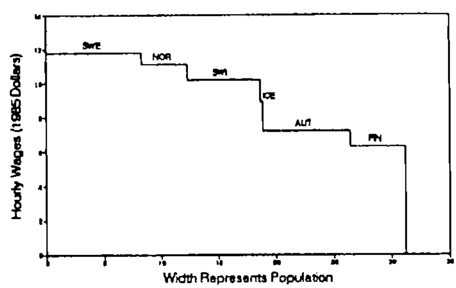


Figure 5

Industrial Wages and Population, 1960
EFTA



Industrial Wages and Population, 1978
EFTA



Industrial Wages and Population, 1989
EFTA

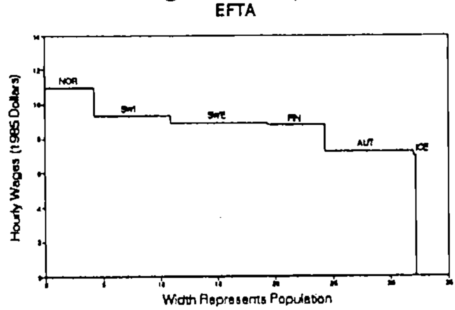


Figure 6

Unit Value Isoquants

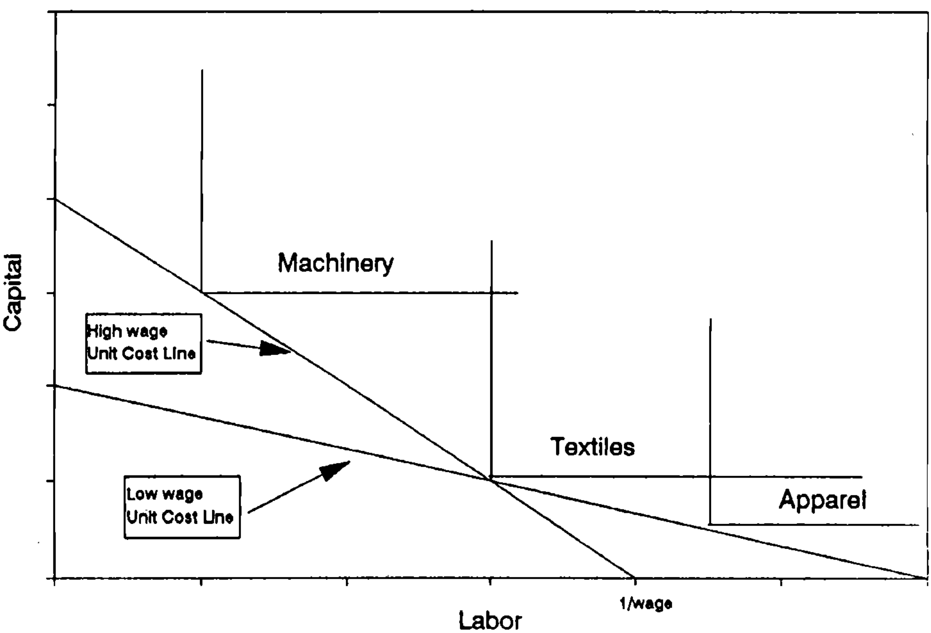


Figure 7

Capital Per Man
Three-digit SIC sectors

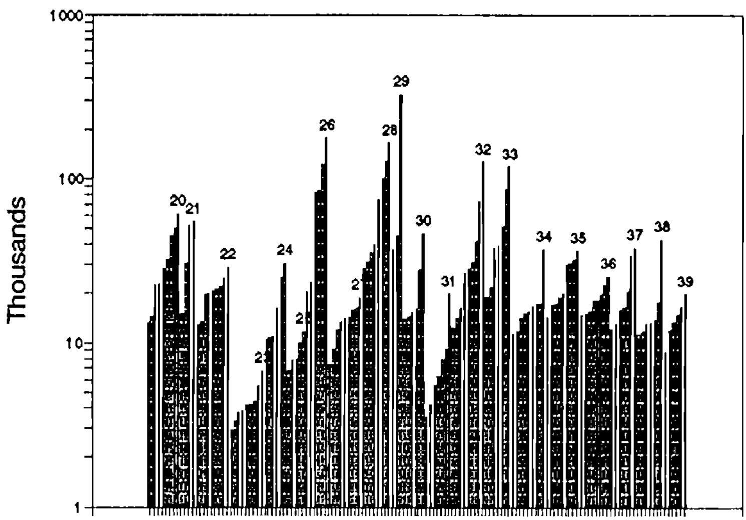
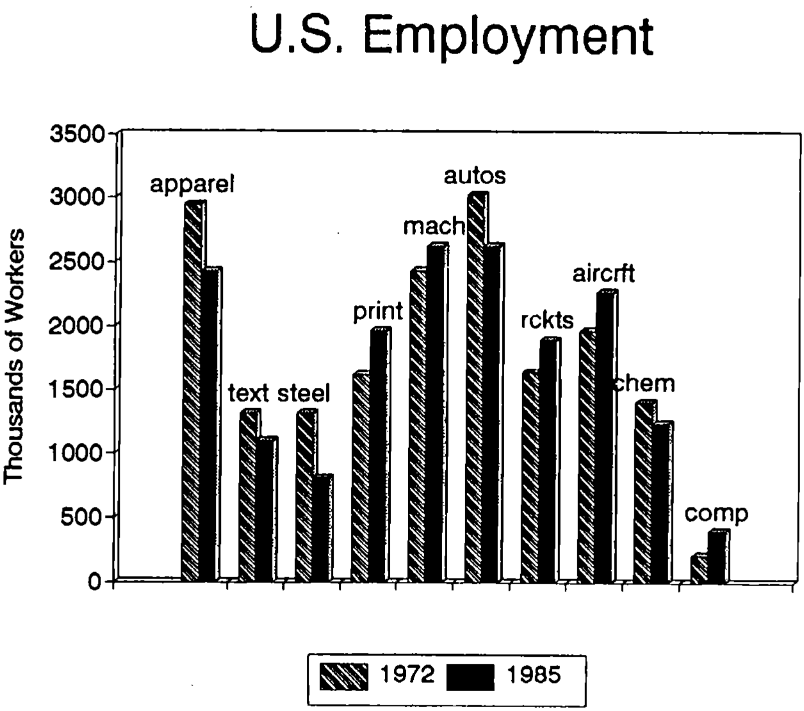
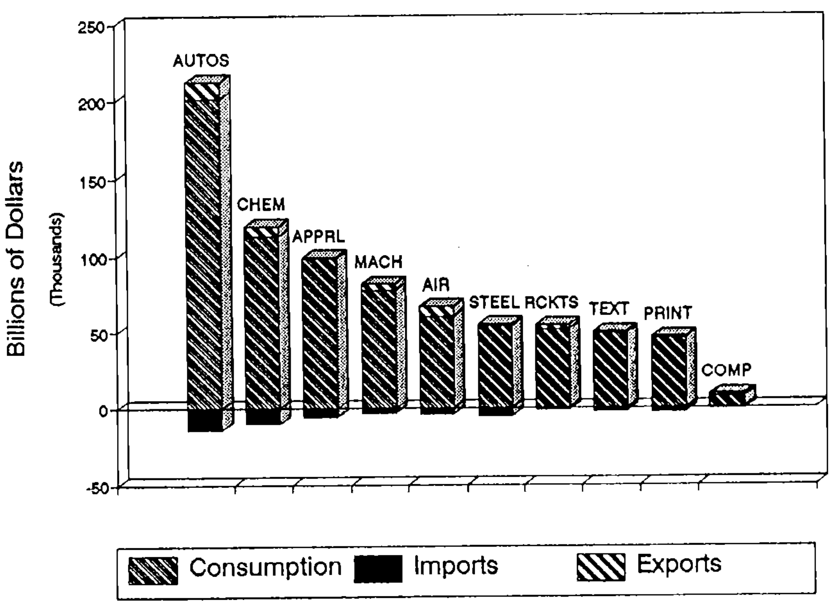


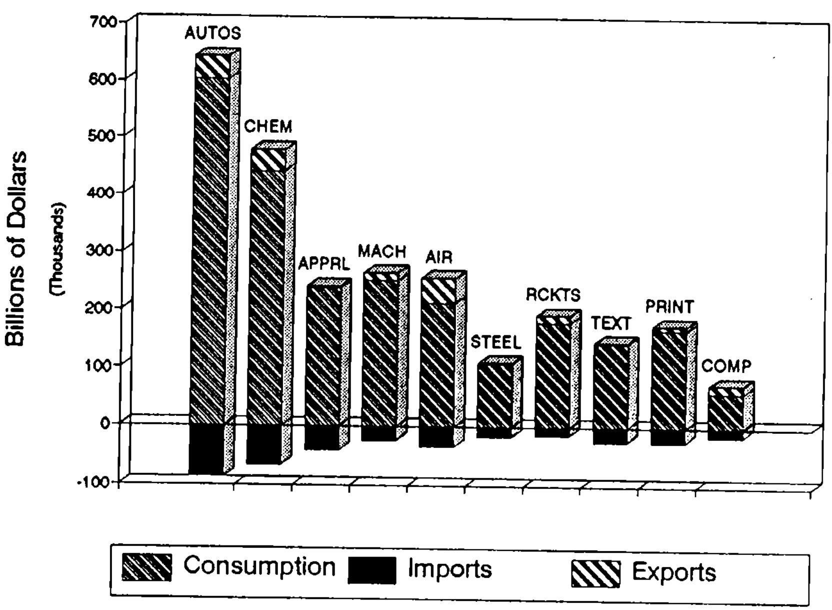
Figure 8


U.S. Employment
Thousands of Workers
3500
3000
2500
2000
1500
1000
500
0
apparel
text
steel
print
mach
autos
rckts
aircrft
chem
comp
1972
1985

U.S. Consumption and Trade: 1972



U.S. Consumption and Trade: 1985



Imports, Exports and Output 1972

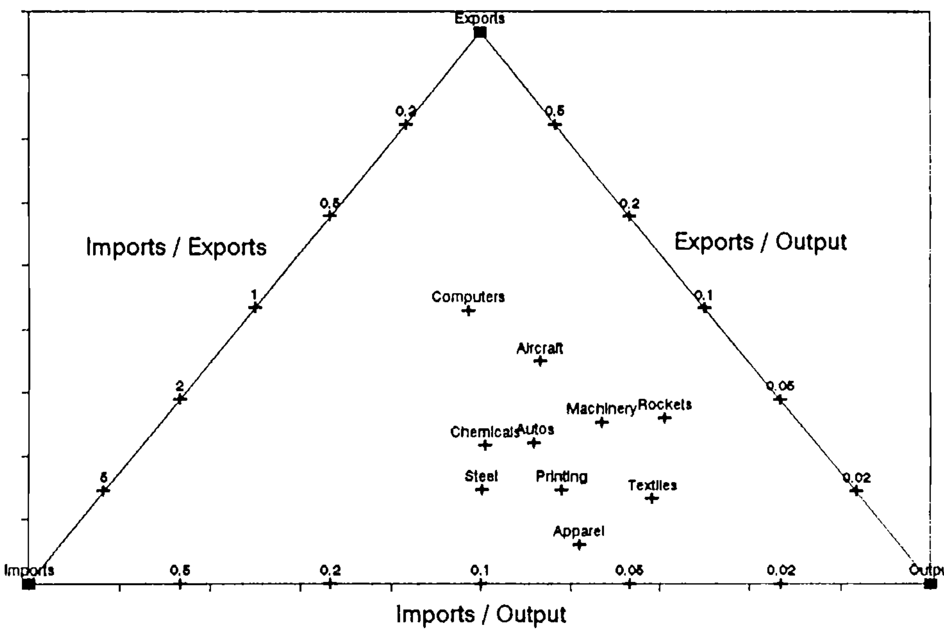


Figure 12

Imports, Exports and Output 1985

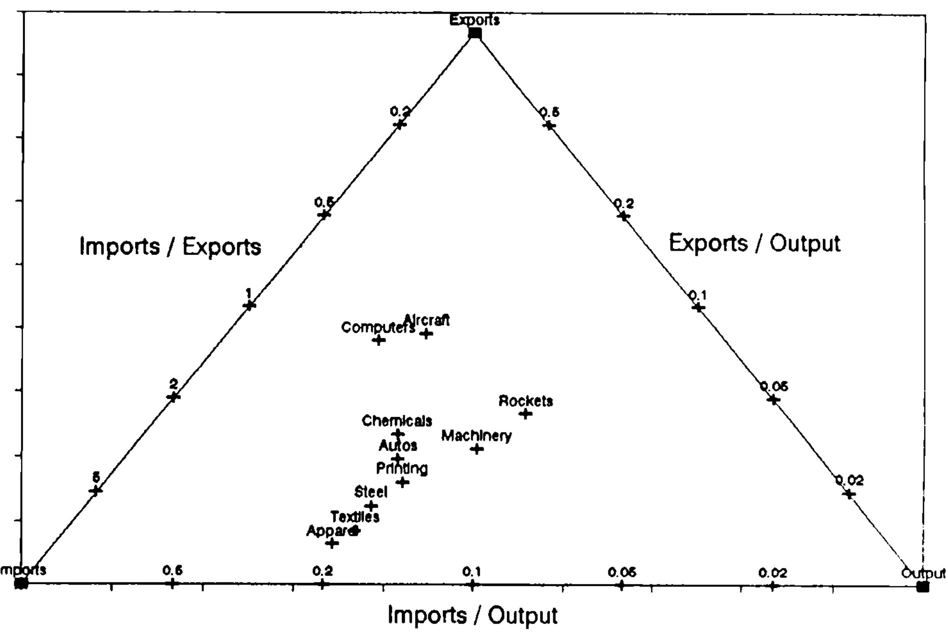


Figure 13

Imports, Exports and Output 1985

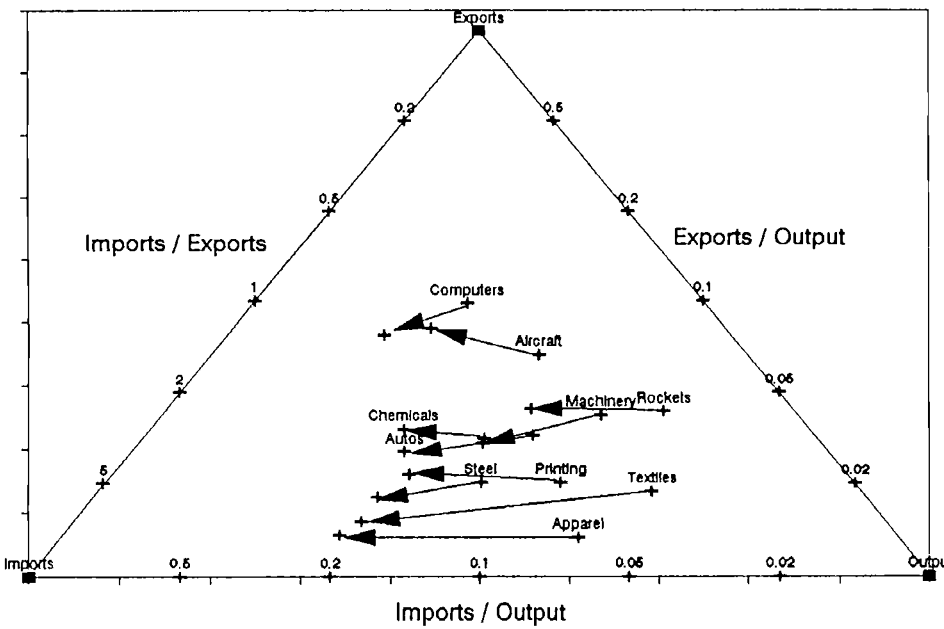


Figure 14

Unit Value Isoquants: U.S.

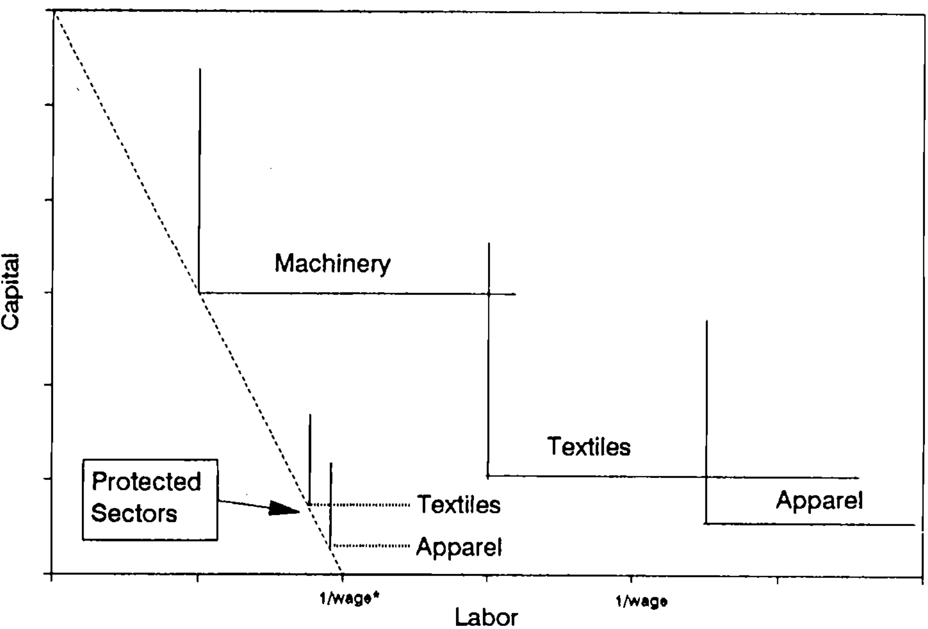


Figure 15

Unit Value Isoquants: Mexico

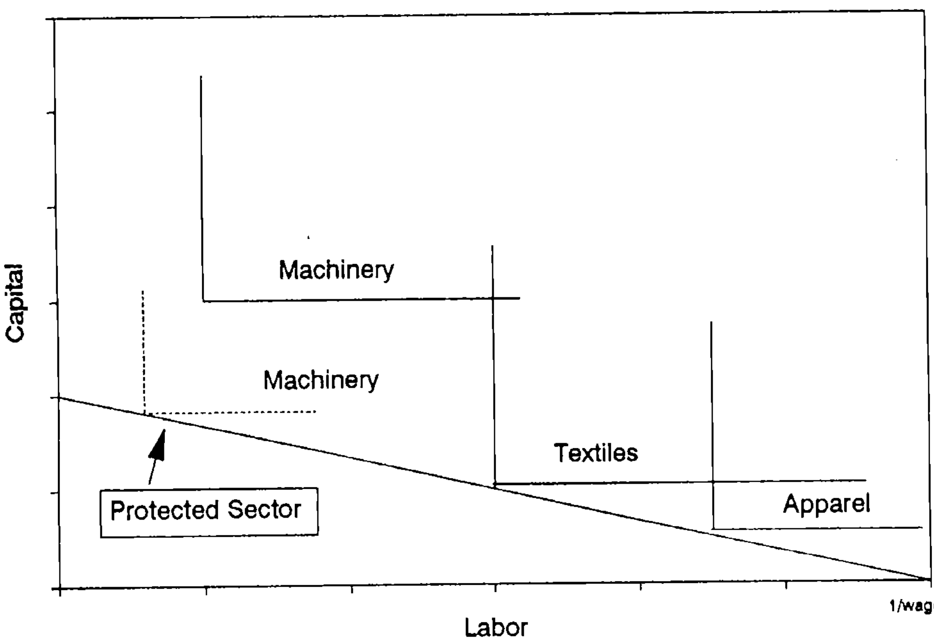
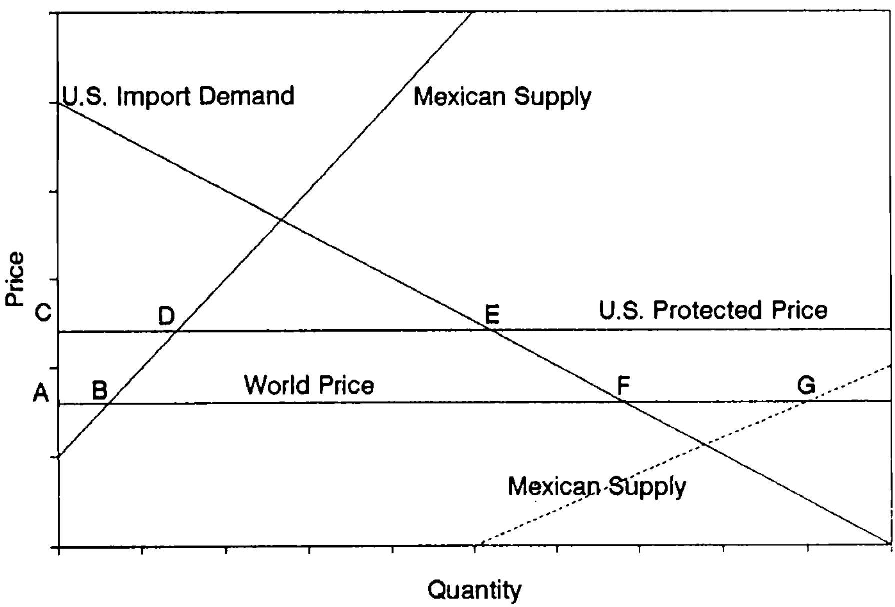
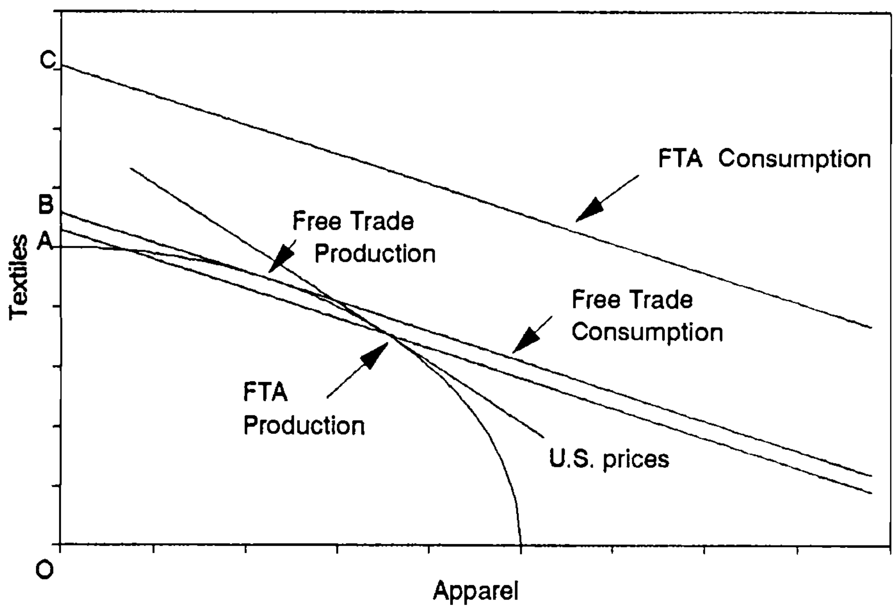


Figure 16

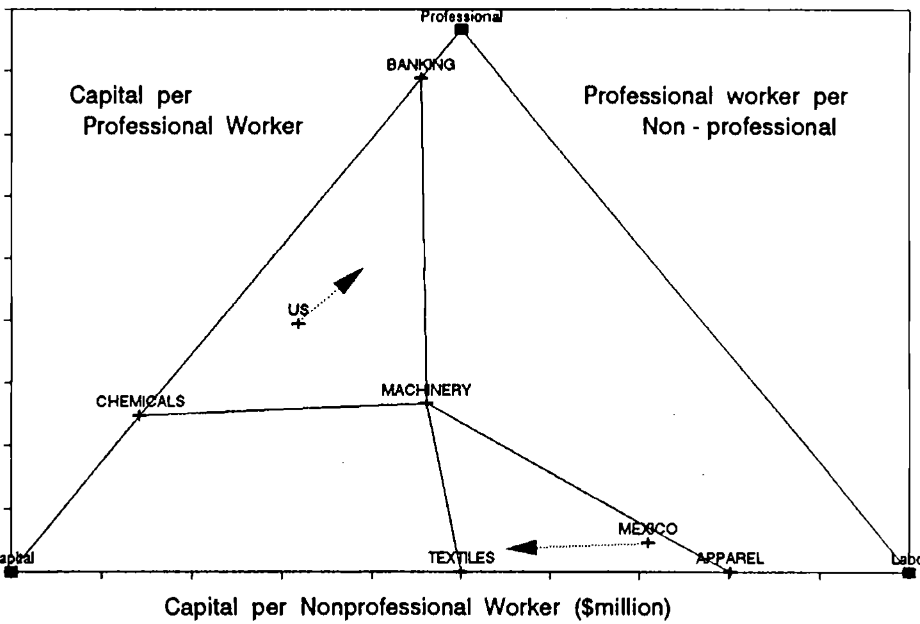
Trade Diversion and an FTA



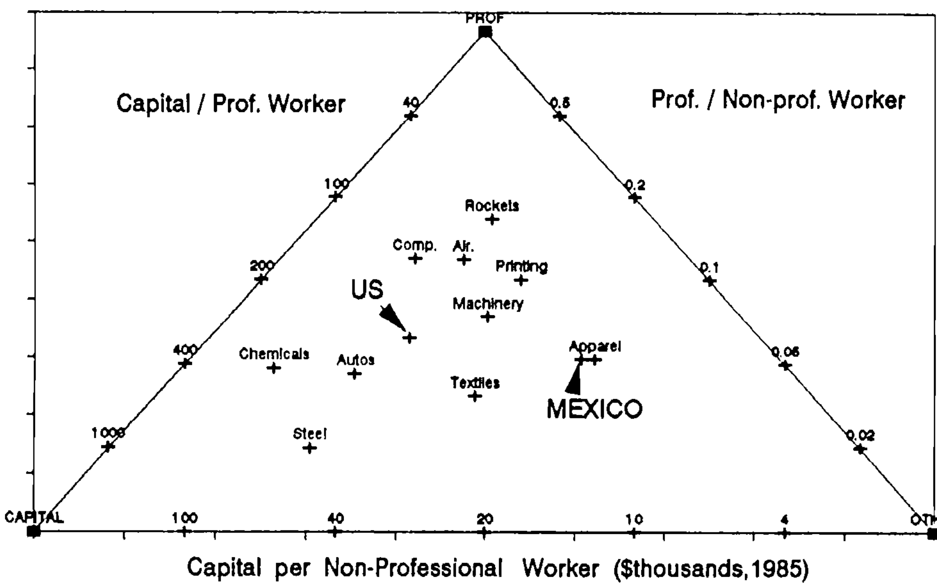
A Mexican View of the FTA



Capital Migration and an FTA



Industrial Characteristics
Capital and Labor Categories



Resource Supplies, 1985
Capital(1982) and Labor Categories

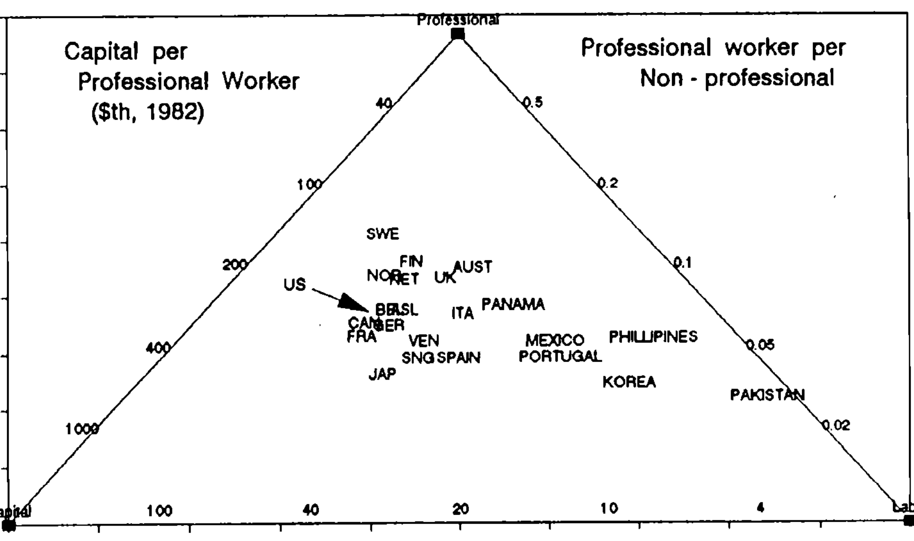


Figure 2

Mexican and LDC Import Shares

1972 Imports/Total Imports

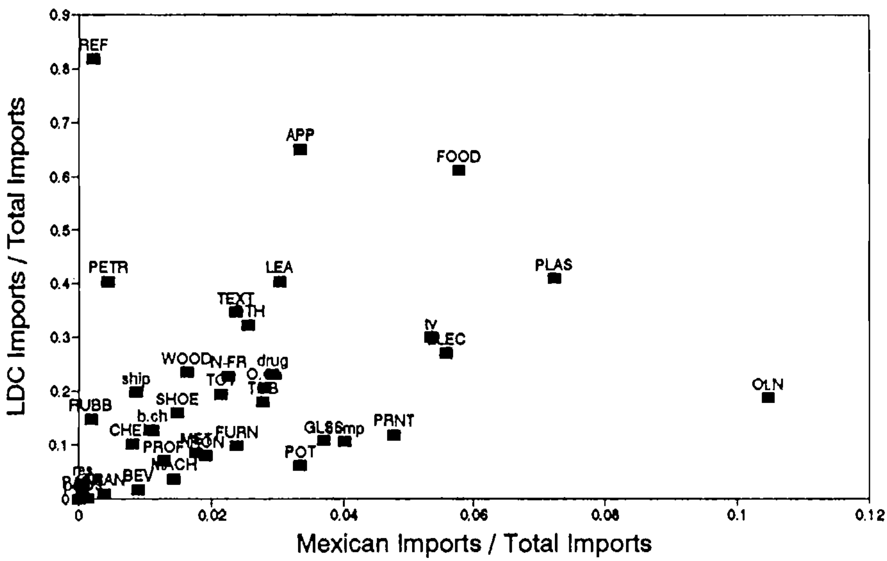


Figure 22

Mexican and LDC Import Shares

1985 Imports/Total Imports

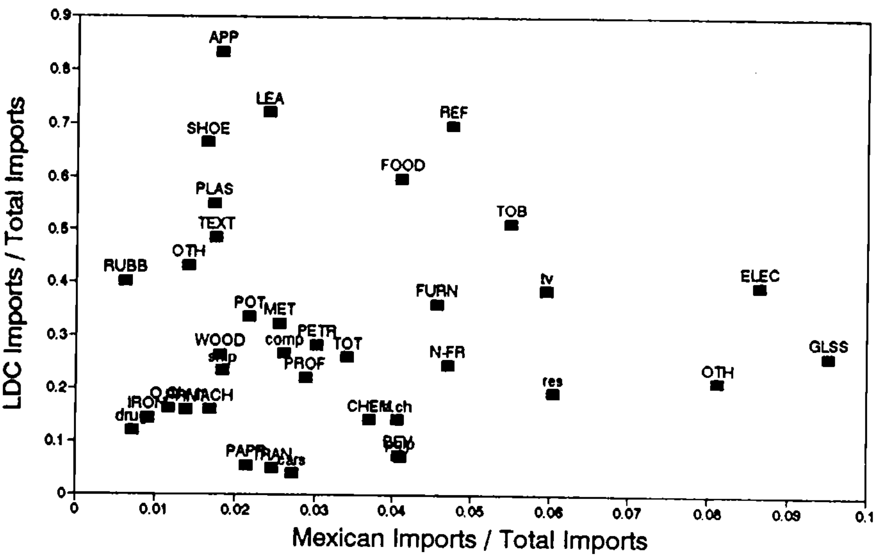
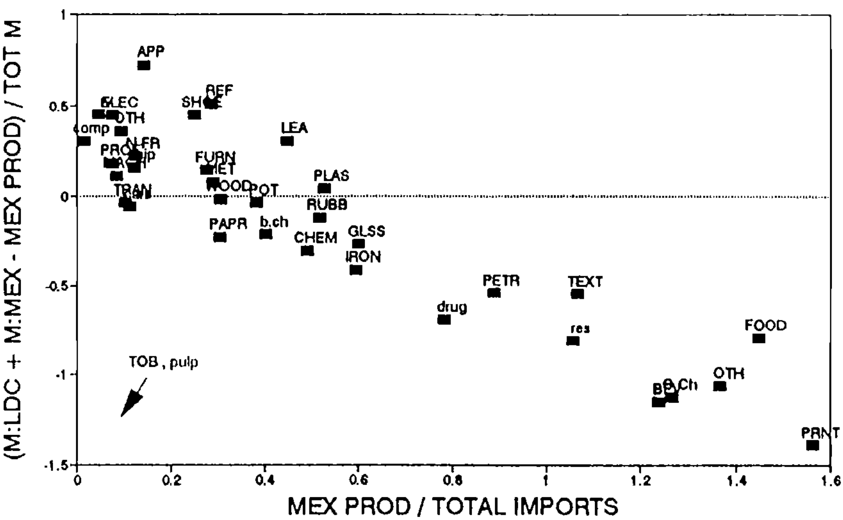


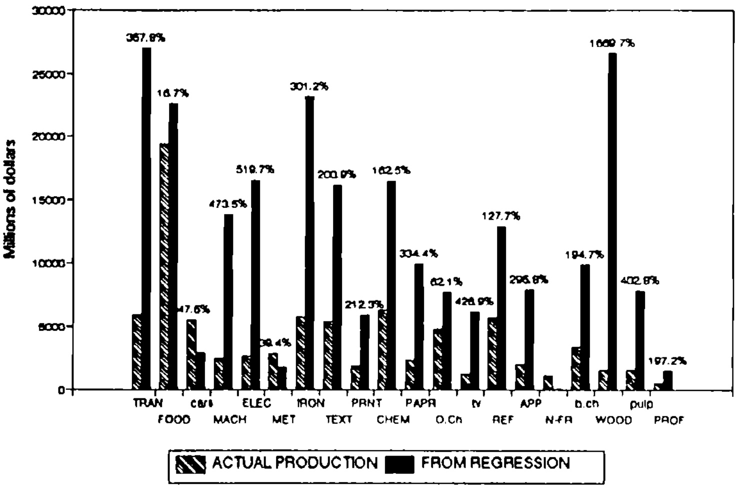
Figure 23

HYPOTHETICAL IMPORTS SHARES 198

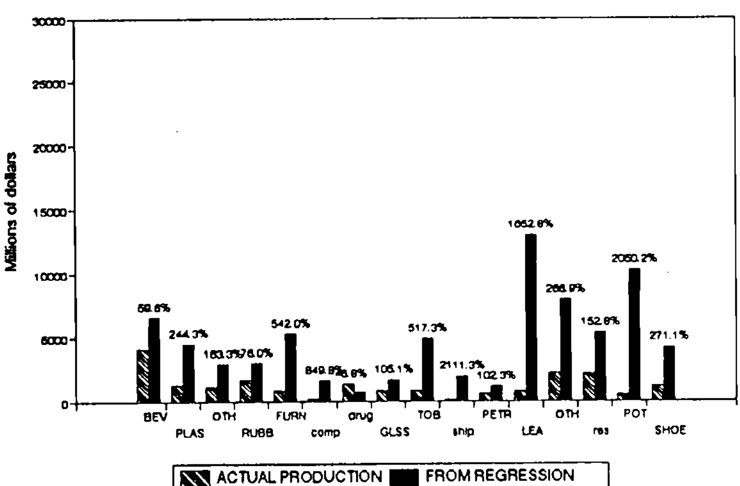
FROM MEXICO AND LDC



MEXICAN PRODUCTION
ACTUAL AND HYPOTHETICAL

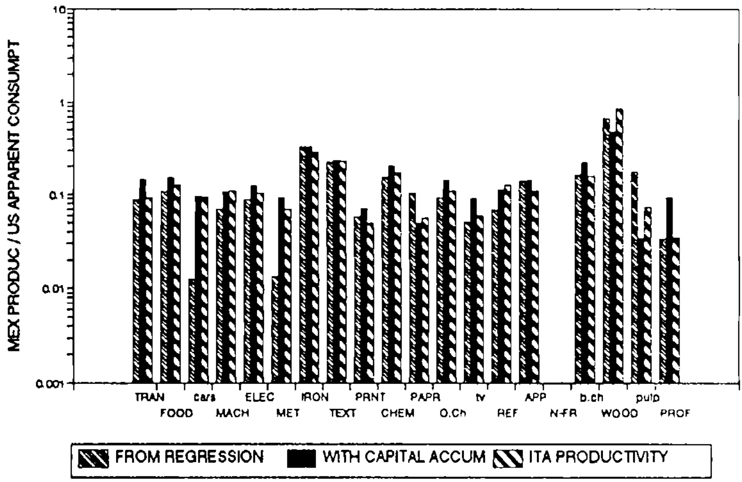


MEXICAN PRODUCTION
ACTUAL AND HYPOTHETICAL



MEX PROD - US APP CONSUMP RATIOS

USING HYPOTHETICAL MEXICAN PRODUCTION



MEX PROD - US APP CONSUMP RATIOS

USING HYPOTHETICAL MEXICAN PRODUCTION