Centro de Estudios Económicos
El Colegio de México, A.C.
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*Serie documentos de trabajo*

# MACROECONOMIC EFFECTS OF TRADE LIBERALIZATION IN CANADA AND MEXICO

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DOCUMENTO DE TRABAJO

Núm. I - 1992

INTRODUCTION

A basic idea of international economics is that the reduction of tariffs and other controls on imported goods may well lower domestic production and employment in the affected sectors. Currently, this problem has important ramifications in both Canada and Mexico, even though the contexts are different - Canada has lowered some barriers as part of the Free Trade Agreement (FTA) signed with the United States, while Mexico's adhesion to the GATT required a unilateral tariff reduction, much larger than that of Canada. In both these countries, the tariff reduction has been accompanied by a recession, sharper in Mexico, where it is predominantly a result of the debt crisis. In Canada, the political opposition claims that the FTA is a major cause of the recession, while others argue that it is a result of tight monetary and fiscal policy.

This paper will attempt a comparison of the effects of the two trade liberalizations on manufacturing production and employment. The central task is to separate statistically for each country the results of liberalization and recession, and involves the implicit assumption that the recessionary effects of liberalization are essentially of a second degree of magnitude. Whatever the accuracy of that assumption, we shall see that other, longer term issues also cloud the discussion, such as a common trend towards a lowered labor intensity of production. Another comment is that the reduced trade barriers and recession will not be measured directly, in what is essentially an

exploratory essay, but rather will be estimated via dummy variables in econometric equations. Our focus on manufacturing industry responds to two considerations: 1) there have been much smaller changes in protection, and hence in trade flows for the other two sectors which should be affected, namely agriculture and mining; and 2) a general equilibrium approach, incorporating the macroeconomic effects of changes in industrial employment on the labor market for the rest of the economy, as is usually treated in standard international trade models, is beyond our means at this point.

## HISTORICAL BACKGROUND

Canada traditionally used tariffs to stimulate local industrial production, and has slowly lowered this protection as a signatory of the GATT. A more important shift in policy was the so-called auto pact in 1965, in which tariff-free trade was allowed for automobile products flowing between Canada and the United States, under an arrangement with the terminal companies (the U.S. "big three") in which more or less balanced trade in the automotive sector would be maintained. As a result of the auto pact, this sector provides a quarter of industrial employment in Canada, and over half of industrial exports,[1] and is generally considered the mainstay of the country's non-resource based manufacturing industry.

In the midst of a slowing of growth in the late 1980's, and in part as a reaction to the nationalist policies of his

predecessor, the Conservative Party's Prime Minister Brian Mulroney proposed discussions with the United States for greater economic integration, which led to the signing of the Free Trade Agreement in 1989. Currently, the Canadian economy has been suffering a prolonged recession, partially caused by the recession of its major trading partner, the United States, but, as noted, many feel that the Free Trade Agreement has hurt local industrial production. These economic problems, combined with political problems over the Constitution and the status of Quebec, have caused the Mulroney government to have very low standing in the public opinion polls.

During the 1980s, Mexico suffered severe economic problems associated with adjustments forced by the Debt Crisis. The government's response was a wide-ranging series of liberal policies, including the 1985 decision to enter the GATT. By the end of the decade, the worst threats of the Debt Crisis appeared to be receeding, and the newly elected president Carlos Salinas de Gortari attempted to ensure the permanence of these advances by securing new sources of growth, one of which is a free trade agreement (TLC) with the United States and Canada. It is fair to expect that the experience of the impact of tariff reductions, in the context of the GATT, will have important lessons regarding the prospect of further trade liberalization in the TLC.

## RECENT ECONOMIC TRENDS IN CANADA AND MEXICO

One obvious reason for comparing the experiences of Mexico

and Canada is that these two countries will probably be partners in the TLC, and economists will have to get used to such comparisons. However, in spite of the of the large gap in per capita income between them, there are other characteristics of their economies which invite comparisons. On of the first items to note in Table 1 is that in both countries, industrial production and labor force each account for less than a fourth of the respective national totals; the manufacturing labor force accounts for between 10 and 15 percent of the total, and the average productivity of manufacturing is much larger than the national average in Mexico. The relative size of imports of industrial goods, as a fraction of total value of industrial output, is actually higher in Canada than Mexico, reflecting the former country's greater integration with the United States, particularly in the automotive sector.

Growth rates for some important macroeconomic variables are presented in Table 2, wherein we see the decline in growth of GDP and manufacturing employment during the 1980s. The two countries experienced opposite trends in production per worker, with the growth of this variable slowing in Mexico during the 1980s, due to "labor hoarding" and lower real wages, while its growth appears to have accelerated in Canada. Most recent trends, for 1989-1991, involve a recuperation of growth in Mexico, a slight decline (1%) of GDP in Canada, accompanied by a drastic fall of 11% in manufacturing production.

## A SIMPLE MODEL FOR MEASURING THE IMPACT OF IMPORT ADJUSTMENTS

Table 1. Descriptive Statistics; Canada and Mexico, circa 1990.

| | Canada | Mexico |
|---|---|---|
| GDP Per Capita (US$) | 19,030 | 2,010 |
| Mfg/GDP | 16 | 23 |
| MfgLabor/Total | 14 | 11 |
| MfgImports/MfgOutput | 25 | 17 |

Sources: GDP per capita from the 1991 World Development Report, referring to 1989. Other data from countries' official sources.

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Table 2. Annual Growth Rates of Major Economic Variables, Mexico and Canada.

| | 1960s | 1970s | 1980s |
|---|---|---|---|
| Mexico | | | |
| GDP | 6.3 | 6.4 | 1.3 |
| Manufacturing: | | | |
| Output | 7.3 | 6.6 | 2.0 |
| Value Added | 7.8 | 6.9 | 1.5 |
| Employ | | 3.4 | 0.3 |
| Output/worker | | 3.2 | 1.7 |
| Value Added/worker | | 3.5 | 1.2 |
| Canada | | | |
| GDP | | 4.4 | 2.9 |
| Manufacturing: | | | |
| Value Added | | 1.7 | 1.9 |
| Employment | | 1.6 | -0.3 |
| Value Added/worker | | 0.1 | 2.2 |

We will use two routes to estimate the impact of trade liberalization; a direct estimate of an import function, and an indirect estimate of changes in an implicit supply function for domestic output.[2] Rather than attempt an analysis using detailed data on prices of imports and national output, we will use dummy variables for the periods of greater trade liberalization. This avoids the problems of non-observability of non-tariff barriers. Implicitly treating all industrial goods as traded goods, we estimate the impact of increased imports, and hence trade liberalization, both directly, as the increase indicated by the dummy on the import function, and indirectly as the decline in production, implied by the dummy in the output function.

The results for both countries, taking manufacturing as a whole, were encouraging enough to motivate a more detailed look at a disaggregated industrial sector in Mexico; a similar exercise will be performed for Canada shortly.

The total output equation takes the form of $Q_i = f(Q_t, dQ_t, \text{Dummy})$, where $Q_i$ is either total manufacturing output (t) or sectoral output (i), and $Q_t$ is GDP. $dQ_t$ is the deviation of observed GDP from trend, and was hypothesized to have a positive sign, due to an assumed greater weight of industry in (presumably cyclical) investment. All variables are in "real" terms. In order to achieve correspondence with imports, output is gross value for the Mexican data. Under the assumption that the degree of import expansion would increase with time, a different dummy

was used for each year of the post-liberalization phase. As the equations are estimated with the dependent variable in logarithms, the interpretation of a coefficient on a dummy estimated as the value z is that the level of the dependent variable would be changed by the amount $(1-e^{-z})$, which, for values of z close to zero, is approximately z. The import functions take the form of $I_i = f(Q_t, RER, Dummy)$, where RER is the real exchange rate, of the form E*P'/P, where E is the domestic price of foreign currency, P' is foreign prices, and P is a domestic price index. The Mexican data is a trade-weighted balance of real exchange rates. Finally, an equation of industrial employment was estimated, of the form $L_i=f(Q_i, W/P,$ dummies), where $L_i$ is either total or sectoral employment, W/P is the corresonding real wage.

All data come from official sources. For Mexico, the primary source was the various publications of INEGI/SPP Cuentas Nacionales (1970-1978, 1979-1981, 1981-1987, 1986-1989). Data on real wages, employment and output for 1990-1991 were taken from several issues of INEGI Avance de Información Económica, which presents results from a survey which presumably has a smaller coverage than the subsequent national income data. More recent data on import growth rates was taken from issues of Comercio Exterior, and is also an approximation to the official data. The real exchange rate was taken from the Bank of Mexico Indicadores Económicos. The time span was 1970-1991 for Mexico, and 1971-1991 for Canada; the liberalization dummies were assigned for the

years beginning in 1987 for Mexico, and 1989 for Canada.

For Canada, most data come from several issues of the Bank of Canada Review, supplemented by data from the Canada Year Book. It was not possible to obtain a time series of sectorally disaggregated data for industry, so only the total was estimated.

ECONOMETRIC ESTIMATES

With the intention of highlighting the comparability of the experiences of Mexico and Canada, the estimated equations referring to total industrial output will be presented for both countries, after which are shown the results for Mexico's manufacturing subsectors.

The first equation to be discussed has manufacturing output (value added for Canada) as the dependent variable and is presented for each country in Tables 3 and 4. The elasticity of output with respect to GDP is slightly less than unity in Mexico, which is not surprising. However, estimates of that elasticity vary strongly for Canada, being also less than unity when a time trend is not included, but doubling in size when that trend is included. The variable representing cyclical factors (dGDP) has the expected positive sign, and again is much higher in Canada.

With regard to manufacturing and the dummy variables representing the trade liberalization, these are positive when the time trend is included, and, in Canada, negative without it. The hypothesized sign of these variables was negative. Of course, there are obvious problems of an econometric nature

Table 3. Regression Results for Mexico, 1970-1991

| Dependent Variable | Consta | GDP | dGDP | Year | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | R2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Manufact. Output | -1.22 (.03) | 0.87 (12.0) | -.004 (0.96) | 0.004 (1.47) | | | | | | 0.99 |
| Manufact. Output | 6.61 (41.4) | 0.96 (49.1) | 0.39 (3.60) | | 0.003 (0.20) | 0.02 (1.24) | 0.05 (2.74) | 0.06 (3.32) | 0.06 (3.41) | 0.99 |
| Manufact. Output | 6.19 (0.68) | 0.95 (10.9) | 0.40 (2.52) | .001 (0.01) | 0.003 (0.16) | 0.02 (0.02) | 0.05 (1.56) | 0.06 (1.79) | 0.06 (1.78) | 0.99 |

| | Consta | Manufact. Output | dMfg | RER | Year | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | R2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Imports | -1.61 (0.40) | 1.24 (5.04) | 1.81 (1.40) | -0.88 (1.91) | | 0.09 (0.35) | 0.28 (1.21) | 0.25 (1.06) | 0.39 (1.72) | 0.54 (2.36) | |
| Imports | 182. (3.25) | 3.14 (5.19) | 0.26 (0.24) | -0.49 (1.33) | -0.10 (3.28) | 0.39 (1.76) | 0.70 (3.28) | 0.74 (3.24) | 0.89 (3.93) | 1.05 (4.58) | 0.93 |

| | Consta | Manufact. Output | dMfg | W/P | Year | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | R2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manufact. Employ. | 7.29 (22.5) | 0.50 (22.6) | -0.01 (0.11) | | | -0.01 (0.36) | -0.02 (1.10) | -0.70 (1.32) | -0.05 (2.54) | -0.09 (4.32) | 0.98 |
| Manufact. Employ. | 18.50 (3.03) | 0.62 (9.23) | -0.14 (1.23) | | -.006 (1.83) | 0.02 (0.83) | 0.01 (0.32) | 0.01 (0.20) | -0.02 (0.82) | -0.06 (2.18) | 0.97 |
| Manufact. Employ. | 7.14 (15.86 | 0.50 (21.8) | -0.03 (0.22) | 0.23 (0.49) | | -.002 (0.07) | -0.02 (0.76) | -0.02 (1.02) | -0.01 (2.25) | -0.09 (4.05) | 0.98 |
| Manufact. Employ. | 44.90 (4.25) | 0.89 (8.05) | -0.25 (2.50) | -0.20 (2.80) | -0.02 (3.56) | 0.03 (1.71) | 0.03 (1.59) | 0.03 (1.76) | 0.03 (0.97) | 0.01 (0.27) | 0.99 |

The following variables were included in logarithms; GDP, Manufacturing Output RER, Imports, Employmnet.

Dum1 takes a value of 1 in 1987, Dum2 a value of 1 in 1988,..Dum5 a value of

Absolute Value of 't-statistics' in parenthesis.

Table 4. Regression Results for Canada, 1971-1991

| Dependent Variable | Constant | GDP | dGDP | Year | Lagged Depend | Dum1 | Dum2 | Dum3 | R2 |
|---|---|---|---|---|---|---|---|---|---|
| Manufactured Value Added | 1.99 | 0.71 | 1.51 | | | 0.03 | 0.01 | -0.01 | 0.92 |
| | (2.72) | (12.6) | (4.06) | | | (0.86) | (0.38) | (0.30) | |
| | 2.44 | 0.68 | | | | 0.03 | -0.03 | -0.08 | 0.88 |
| | (2.32) | (8.38) | | | | (0.06) | (0.05) | (1.51) | |
| | 71.30 | 2.00 | | -0.04 | | 0.02 | 0.001 | 0.01 | 0.90 |
| | (3.40) | (4.92) | | (3.29) | | (0.45) | (0.03) | (0.17) | |
| | 50.80 | 1.64 | 1.18 | -0.03 | | 0.02 | 0.03 | 0.04 | 0.97 |
| | (3.32) | (5.58) | (3.94) | (3.13) | | (0.83) | (0.84) | (1.05) | |
| | 1.96 | 0.71 | 1.32 | | 0.003 | 0.00 | -0.01 | -0.03 | 0.98 |
| | (1.94) | (8.98) | (5.10) | | (1.29) | | (0.19) | (0.89) | |
| | 1.87 | 0.86 | | | -0.16 | 0.001 | -0.05 | -0.11 | 0.89 |
| | (1.10) | (4.65) | | | (0.66) | (0.02) | (1.00) | (2.07) | |
| | 99.40 | 2.58 | | -0.06 | -0.11 | 0.00 | 0.002 | 0.03 | 0.97 |
| | (6.23) | (9.36) | | (6.18) | (1.48) | (0.01) | (0.06) | (0.07) | |

| | Const. | Man. ValAdd | RER | Year | Lagged Depend | Dum1 | Dum2 | Dum3 | R2 |
|---|---|---|---|---|---|---|---|---|---|
| Manufactured Imports | -13.60 | 2.08 | 0.22 | | | 0.08 | 0.18 | 0.35 | 0.96 |
| | (6.14) | (10.9) | (0.58) | | | (0.96) | (2.29) | (4.67) | |
| | -65.9 | 1.49 | 0.05 | 0.03 | | 0.01 | 0.05 | 0.15 | 0.99 |
| | (5.26) | (8.73) | (0.24) | (4.19) | | (0.24) | (0.90) | (2.36) | |
| | -12.9 | 2.07 | 0.11 | | 0.01 | 0.07 | 0.15 | 0.33 | 0.98 |
| | (10.8) | (19.2) | (0.46) | | (2.28) | (1.11) | (3.10) | (6.36) | |

| | Constant | Man. ValAd. | ManVA | Year | Lagged Depend | Dum1 | Dum2 | Dum3 | R2 |
|---|---|---|---|---|---|---|---|---|---|
| Manufactured Employment | 24.40 | 0.62 | -0.27 | -0.01 | | 0.01 | -0.04 | -0.12 | 0.91 |
| | (6.51) | (5.99) | (2.74) | (5.06) | | (0.22) | (1.67) | (4.76) | |
| | 5.66 | 0.17 | -0.06 | | | 0.01 | -0.60 | -0.18 | 0.69 |
| | (5.60) | (1.84) | (0.36) | | | (0.31) | (1.37) | (4.46) | |
| | 14.68 | 0.40 | 0.21 | -0.01 | 0.78 | 0.01 | -0.03 | -0.07 | 0.97 |
| | (8.86) | (2.12) | (0.69) | (2.71) | (1.23) | (1.09) | (2.51) | (1.93) | |

Note: The following variables were transformed to logarithms; Manufacturing output, GDP, Imports, Manufacturing Employment, and the Real Exchange Rate.

involving the inclusion of a time trend in OLS estimates.[3] However, alternative explanations will be explored here. In Mexico, it could well be that the short term effect of the liberalization is smaller in size than the longer term effect of the recession associated with the debt problems, from which the economy is currently recovering, and, moreover, that the $dQ_t$ variable does not adequately capture the effects of the "lost decade." However, another interpretation will be explored later in this paper, focusing on a disaggregation of industry into 9 sub-sectors, and looking for differences at the subsectoral level. In Canada, the data currently utilized does not allow us to distinguish between interpretations of the decline in manufacturing as due to some special factor in 1990-1991 (e.g., trade liberalization), or as a normal, if high, response to a recession.

The most important result for the equations on imports in Tables 3 and 4 was the high and signficant values for the dummies representing liberalization. Generally, the size of the estimated coefficients on the dummies increased over time, as expected, reflecting the growing impact of this policy. That the coefficients were higher in Mexico also responds to conventional wisdom about that country's greater steps towards trade liberaliztion. One uncomfortable result was the hypothetically wrong sign on the coefficient on relative prices for Canada. While one can explain that away by reference to small overall price changes, such an explanation implicitly challenges the

underlying theoretical model of the paper.

Turning finally to the labor equations in Tables 3 and 4, we see in each country that the elasticity of demand for labor was less than unity, that the time trend was negative, and that the estimated effect on manufacturing employment, given output, was a loss of up to ten percent in Mexico, and roughly double that in Canada. Real wages have the expected negative sign when included in the equation for Mexico, which reduced, but did not eliminate the overall negative trend in labor utilization.

In summary, the trade liberalization appears to have had clear impacts on imports, to have had little impact on overall Mexican production, an appreciable negative impact on Canadian production, and larger, negative impacts on employment in both countries.

A richer, and arguably more accurate appreciation of the effects of liberalization can be obtained by disaggregating the data on manufacturing production, which was possible for Mexico, with the data locally available. The equations for output and imports are presented in Tables 5 and 6. As would be expected, the equations for sectoral ouput repeat many of the messages from Table 3 with regards to the manufacturing total; an income elasticity close to one, a positive cyclical response, and increasing coefficients on the time dummies. The signs of the time trends differ, presumably identifying dynamic and stagnant industries. A suggestive result is the positive sign and relatively large magnitude of the dummies on the metal products

Table 5. Production Disaggregation. Regression Results for Mexico, 1970-1991

The Dependent Variable is Production.

| Sector | Constan | GDP | dGDP | Year | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | R2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 6.19 | 0.95 | 0.40 | 0.0002 | 0.00 | 0.02 | 0.05 | 0.06 | 0.07 | 0.99 |
| | (0.69) | (10.9) | (2.52) | (0.05) | (0.10) | (0.77) | (1.56) | (1.79) | (1.98) | |
| Alimentos | -16.0 | 0.56 | -0.21 | 0.01 | -0.02 | -0.04 | -0.01 | -0.02 | -0.03 | 0.99 |
| | (3.63) | (13.3) | (2.74) | (5.21) | (1.62) | (2.91) | (0.94) | (0.99) | (1.56) | |
| Textiles | 34.60 | 0.83 | 0.45 | -0.01 | -0.06 | -0.05 | -0.05 | -0.05 | -0.09 | 0.98 |
| | (3.42) | (8.52) | (2.54) | (2.67) | (2.07) | (1.54) | (1.35) | (1.40) | (2.35) | |
| Madera | 22.80 | 1.17 | 0.40 | -0.01 | 0.02 | -0.01 | -0.05 | -0.18 | -0.16 | 0.98 |
| | (1.21) | (6.43) | (1.19) | (1.05) | (0.44) | (0.15) | (0.73) | (2.51) | (2.10) | |
| Papel&Impren | -19.6 | 0.82 | 0.28 | 0.01 | -0.01 | -0.01 | -0.03 | 0.05 | -0.02 | 0.99 |
| | (1.59) | (6.93) | (1.28) | (1.83) | (0.16) | (0.21) | (0.74) | (1.17) | (0.47) | |
| Quimica | -51.9 | 0.81 | 0.15 | 0.03 | -0.001 | -0.02 | 0.005 | -0.03 | -0.03 | 0.99 |
| | (5.89) | (9.53) | (0.97) | (6.10) | (0.04) | (0.85) | (0.16) | (0.76 | (0.93) | |
| Productos Minerales | 13.20 | 1.02 | 0.44 | -0.005 | 0.07 | 0.05 | 0.05 | 0.07 | 0.07 | 0.99 |
| | (0.89) | (6.84) | (1.62) | (0.64) | (1.63) | (1.00) | (1.10) | (1.26) | (1.11) | |
| Metales Basicas | -10.3 | 0.86 | 1.43 | 0.01 | 0.01 | 0.04 | 0.01 | 0.04 | -0.06 | 0.98 |
| | (0.49) | (4.25) | (3.88) | (0.67) | (0.18) | (0.64) | (0.12) | (0.45) | (0.68) | |
| Productos Metalicos | 79.30 | 1.83 | 1.32 | -0.04 | 0.06 | 0.22 | 0.30 | 0.38 | 0.50 | 0.97 |
| | (2.54) | (6.05) | (2.39) | (2.43) | (0.71) | (2.22) | (2.71) | (3.24) | (4.09) | |
| Otras | 28.20 | 0.95 | 0.85 | -0.01 | -0.06 | -0.005 | 0.03 | 0.09 | 0.06 | 0.94 |
| | (1.07) | (3.74) | (1.82) | (0.90) | (0.78) | (0.06) | (0.36) | (0.89) | (0.59) | |
| Todos menos Productos Metalicos | 10.20 | 0.76 | 0.21 | 0.01 | -0.01 | -0.02 | -0.003 | -0.01 | -0.03 | 0.99 |
| | (1.70) | (13.1) | (1.98) | (2.82) | (0.61) | (1.01) | (0.15) | (0.39) | (1.21) | |

Table 6. Import Disaggregation. Regression Results for Mexico, 1970-1991

The Dependent Variable is Imports.

| Sector | Constant | GDP | RER | Year | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | $\bar{R}2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 183.1 | 3.07 | -0.54 | -0.11 | 0.41 | 0.72 | 0.77 | 0.92 | 1.07 | 0.93 |
| | (3.89) | (5.89) | (1.65) | (3.88) | (2.24) | (5.92) | (4.09) | (4.72) | (5.21) | |
| Alimentos | 133.7 | 3.72 | -0.24 | -0.09 | -0.02 | 0.65 | 1.01 | 1.15 | 0.98 | 0.91 |
| | (1.48) | (3.26) | (0.38) | (1.67) | (0.04) | (1.86) | (2.78) | (3.05) | (2.45) | |
| Textiles | 264.0 | 2.53 | -0.69 | -0.15 | 0.82 | 1.65 | 2.17 | 2.37 | 2.62 | 0.86 |
| | (2.46) | (2.15) | (0.91) | (2.31) | (1.93) | (3.94) | (5.03) | (5.30) | (5.54) | |
| Madera | 156.0 | 1.62 | -0.62 | -0.09 | 0.46 | 0.76 | 0.88 | 1.27 | 1.76 | 0.85 |
| | (2.29) | (2.19) | (1.31) | (2.13) | (1.73) | (2.87) | (3.25) | (4.49) | (5.89) | |
| Papel&Impr. | 166.0 | 2.23 | -0.31 | -0.10 | 0.59 | 0.77 | 0.84 | 0.90 | 1.02 | 0.84 |
| | (3.10) | (3.81) | (0.84) | (3.00) | (2.76) | (3.69) | (3.93) | (4.04) | (4.29) | |
| Química | 23.0 | 0.89 | -0.59 | -0.01 | 0.32 | 0.44 | 0.52 | 0.53 | 0.77 | 0.84 |
| | (0.40) | (1.44) | (1.48) | (0.34) | (1.45) | (1.98) | (2.31) | (2.26) | (3.09) | |
| Productos Minerales | 305.0 | 4.07 | -0.35 | -0.18 | 0.60 | 1.13 | 1.44 | 1.67 | 1.93 | 0.89 |
| | (4.08) | (4.98) | (0.66) | (4.06) | (2.03) | (3.88) | (4.80) | (5.36) | (5.84) | |
| Metales Basicas | 373.0 | 6.98 | -0.17 | -0.23 | 0.35 | 0.69 | 0.59 | 0.58 | 0.77 | 0.89 |
| | (3.91) | (6.71) | (0.26) | (4.17) | (0.93) | (1.86) | (1.54) | (1.45) | (1.82) | |
| Productos Metalicos | 239.0 | 3.51 | -0.57 | -0.14 | 0.49 | 0.86 | 0.81 | 1.05 | 1.25 | 0.88 |
| | (3.99) | (5.38) | (1.36) | (3.94) | (2.09) | (3.66) | (3.99) | (4.22) | (4.72) | |
| Otros | 120.1 | 2.53 | -0.52 | -0.07 | 0.40 | 0.54 | 0.72 | 0.89 | 0.53 | 0.83 |
| | (1.63) | (3.15) | (1.00) | (1.68) | (1.39) | (1.87) | (2.44) | (2.92) | (1.65) | |
| Todos menos Productos Metalicos | 127.3 | 2.64 | -0.49 | -0.07 | 0.33 | 0.59 | 0.73 | 0.80 | 0.92 | 0.94 |
| | (2.92) | (5.54) | (1.57) | (2.98) | (1.94) | (3.45) | (4.15) | (4.80) | (2.92) | |

industry.[4] That this sector would show a positive response during the liberalization period should not surprise us, for the growth of automobile production and exports is well known. However, this growth does not respond solely to the trade liberalization, but in fact reflects the success of a specific sectoral policy, which should not distract us from the opposite side of the coin; excluding the Metal Products sector, the rest of manufacturing has a negative coefficient on the liberalization dummy, implying that its production has declined as a result of this policy.

The estimated equations on imports provide no surprises, indicating that the increase in this variable during the end of the 1980s and early 1990s was quite large.

After looking at the results for these two variables separately, it is of some interest to compare the results for production and imports, the basic calculations for which are provided in Table 7. Columns (3) and (4) of that table show that the percentage growth of imports was much higher than that of production, as we saw earlier. The more relevant comparison, however, of the absolute change in quantities is to a common denominator, for which we use the total demand, approximated by summing production plus imports. The results are presented in columns (5) and (6) of Table 7. Some of the main results are worth highlighting. The largest declines in production occur in Wood and Textiles, followed by Basic Metals. The increase of production in Metal Products is quite atypical, being repeated

Table 7. Mexico. Estimated Percentage Changes in Production, Imports and Total Demand, 1991.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Production | Imports | Percentage Change attributed to Liberalization | | Change as Percentage of Total Demand | |
| | (observed levels, mil milliones pesos in 1980 prices) | | Production | Imports | Production | Imports |
| Mfg.Total | 3014 | 611 | 6.8 | 65.7 | 6 | 11 |
| Alimentos,Beb | 894 | 47 | -3.0 | 62.5 | -3 | 3 |
| Textiles,Pren | 262 | 27 | -9.4 | 92.7 | -9 | 9 |
| Madera | 80 | 6 | -17.4 | 82.8 | -16 | 6 |
| PapelImprenta | 148 | 21 | -2.0 | 63.9 | -2 | 8 |
| QuimicasCauch | 577 | 133 | -3.0 | 53.7 | -2 | 10 |
| MineralesNoMe | 138 | 9 | 6.8 | 85.5 | 6 | 5 |
| MetalicasBasi | 196 | 38 | -6.2 | 53.7 | -5 | 9 |
| ProductosMeta | 659 | 303 | 39.3 | 71.3 | 27 | 22 |
| Otras Industr | 54 | 20 | 5.8 | 41.1 | 4 | 11 |
| Total without Metal Products | | | | | -3 | 7 |

only in Non-Metallic Minerals and "Others", the former being one of the other sectors whose export activity has grown. There does seem to be a general correlation between the increase in imports and the decline in production, if Metal Products is excluded.

What can be said about manufacturing employment? sing the results in Table 8, we see that the output elasticity of demand for workers appears to be less than unity (and quite responsive to the inclusion of the real wage variable), and there is a signficant countercyclical effect, as theory and emprical evidence from other countries suggest. In all cases but one, the time trend is negative, and usually statistically significant. While the coefficient on the liberalization dummy is vaguely positive, which is to say small and not statistically significant, what is it more noteworthy is the few cases where it is negative, namely Basic Metals and Metal Products, with the latter being the major growth area in Mexican manufacturing. Thus even in that sector the overall effect of liberalization on employment, according to these estimates, is much reduced, being the production elasticity multiplied by the production dummy minus the labor demand dummy, which in round number is $0.7 \times 0.5 - 0.2 = 0.15$, or fifteen percent.

While these estimates and calculations suggest a negative impact of liberalization on production and employment, in this author's judgment the more relevant comparison is not liberalization versus the prior protectionist regime, but rather involves a quite different scenario, involving the recession

Table 8. Employment Disaggregation. Regression Results for Mexico, 1970-1991

The Dependent Variable is Manufacturing Employment.

| Sector | Consta | Sectoral Output | dQi | Year | W/P | Dum1 | Dum2 | Dum3 | Dum4 | Dum5 | R2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 44.90 | 0.89 | -0.25 | -0.02 | -0.20 | 0.03 | 0.03 | 0.04 | 0.03 | 0.01 | 0.99 |
| | (4.23) | (8.04) | (2.50) | (3.56) | (2.80) | (1.71) | (1.59) | (1.77) | (0.97) | (0.27) | |
| Alimentos | 26.10 | 0.85 | -0.12 | -0.01 | -0.14 | 0.03 | 0.01 | 0.01 | 0.11 | 0.12 | 0.99 |
| | (1.92) | (2.32) | (0.36) | (0.71) | (1.50) | (0.77) | (0.14) | (0.26) | (1.15) | (1.11) | |
| Textiles | 22.40 | 0.67 | -0.29 | -0.01 | -0.02 | 0.04 | 0.04 | 0.06 | 0.16 | -0.20 | 0.93 |
| | (2.98) | (6.71) | (1.88) | (2.10) | (0.76) | (1.33) | (1.07) | (1.44) | (0.38) | (0.40) | |
| Madera | 69.10 | 1.24 | -0.19 | -0.03 | -0.07 | 0.07 | 0.10 | 0.15 | 0.30 | 0.29 | 0.98 |
| | (3.99) | (6.02) | (1.22) | (3.79) | (0.50) | (2.42) | (3.30) | (3.76) | (2.21) | (1.84) | |
| Papel&Impr | 68.20 | 1.00 | -0.43 | -0.03 | -0.15 | 0.05 | 0.06 | 0.08 | 0.05 | 0.07 | 0.94 |
| | (1.34) | (1.98) | (1.47) | (1.21) | (0.68) | (1.05) | (1.01) | (1.03) | (0.75) | (0.74) | |
| Química | 13.40 | 0.52 | 0.07 | -0.03 | -0.11 | -0.004 | 0.02 | -0.01 | -0.07 | -0.09 | 0.99 |
| | (0.63) | (3.35) | (0.30) | (0.29) | (1.46) | (0.12) | (0.52) | (0.13) | (1.62) | (2.20) | |
| Productos Minerales | 32.40 | 0.66 | -0.15 | -0.01 | -0.28 | 0.05 | 0.02 | 0.10 | 0.13 | 0.10 | 0.98 |
| | (2.67) | (5.79) | (1.17) | (2.01) | (3.82) | (1.80) | (0.58) | (2.89) | (3.12) | (2.19) | |
| Metales Basicas | -20.0 | 0.52 | -0.05 | -0.01 | 0.18 | -0.17 | -0.20 | -0.26 | -0.29 | -0.34 | 0.98 |
| | (14.9) | (3.18) | (0.29) | (1.49) | (1.64) | (3.77) | (4.69) | (5.75) | (5.27) | (6.33) | |
| Productos Metalicos | 20.00 | 0.69 | -0.21 | -0.01 | -0.07 | 0.02 | -0.03 | -0.05 | -0.11 | -0.19 | 0.99 |
| | (4.91) | (10.4) | (3.93) | (2.86) | (1.15) | (0.64) | (1.08) | (1.81) | (3.85) | (6.26) | |
| Otros | -22.4 | 0.31 | -0.06 | 0.01 | 0.04 | 0.13 | 0.18 | 0.26 | 0.27 | 0.26 | 0.99 |
| | (2.08) | (1.98) | (0.54) | (2.48) | (0.55) | (4.33) | (5.59) | (7.72) | (7.74) | (6.40) | |

associated with the debt crisis and its aftermath. Specifically, had total output continued to grow during the 1980s as it had in the previous two decades, GDP would have been roughtly 65% higher in 1991 than it actually was. With an output elasticity of demand for labor of 0.9, manufacturing employment would have been more than 50% higher than occurred. Both the negative time trend, and the loss of demand due to the long recession, appear to have had much more severe effects on Mexican industrial employment than did the trade liberalization.

# NOTES

1. Excluding natural resource based materials, such as pulp and paper, fertilizers, and other energy based products.

2. After this work was completed, the author became aware of a paper with a similar orientation; "México: un modelo econométrico del impacto de la apertura comercial en la balanza comercial, actividad económica y precios," by Joaquín Tapia Maruri and Jesús Cervantes González, in México: hacia la globalización edited by Federico Rubli K. and Benito Solís M., published in 1992 by Diana. They estimate equations for imports, exports, output and inflation, using quarterly data from 1977 thru the first half of 1988. At first glance, their results for imports are similar to those presented below, in that there is a significant increase due to liberalization. They estimate an equation for imports as a function of the nominal exchange rate, relative prices, income, average tariff, unexpected growth in the money supply, and the percentage of imports requiring permits, a variable representing commercial liberalization.

3. Equations were also estimated with a lagged dependent variable, estimating the autocorrelation via Cochrane-Orcutt transformations, and in first differences. There was no obviously superior specfication which produced results different from those of the two tables.

4. An important exception is metal products. One can see here the pattern of a larger coefficients on income and the time dummies when the time trend is included.

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