Sectoral Origins of the Mexican Trade Deficit

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I. Introduction and Relation to Recent Literature

The 1982 decision to let the peso float for the second time in six years dramatically underlined Mexico's continuing trade and payments problems. Despite newfound export potential in the energy sector and an overall rapid rate of growth in real GDP (6.1 percent per year over the period between the two floats)[1], Mexico has not been able to control inflation and avoid downward pressure on its currency.

Most recent analyses concerned with the balance of payments (BOP) use a monetary approach.[2] The monetary BOP approach hypothesizes that trade and capital flows reflect aggregate portfolio decisions by both foreign and domestic economic entitites. In this view, deficits (surpluses) in the balance of payments are associated with either an excess demand for money on the part of foreign (domestic) economic units or an excess supply of money in the domestic economy (foreign economies). Thus, BOP deficits

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1 Nacional Financiera, *La economia mexicana en cifras,* Mexico, D. F., 1981, p. 29, and Banco Nacional de Mexico, *Review of the Economic Situation of Mexico,* Dec. 1981, p. 377.

2 See, for example, Dornbush (1971), Frenkel (1975), Johnson (1972), Kemp (1975), and Mundell (1978).

(surpluses) reflect the rate at which domestic money balances are being reduced (increased), and a disequilibrium in the BOP is one way in which actual money balances are adjusted to desired levels (where the quantity demanded of money balances equals the quantity supplied).[3]

The monetary approaches to the balance of payments use a version of the following basic model for a given country i.

$$MS_i = a_i (R_i + D_i) \tag{1}$$

where MSi = quantity of money supplied in country i,
ai = money multiplier in country i,
Ri = official holdings of international reserves in country i,
Di = domestic component of the monetary base, and
$Ri + Di$ = the monetary base.

$$MD_i = \frac{Y_i^{\alpha_1} P_i}{r_i^{\alpha_2}} \tag{2}$$

where MDi = the quantity of money demanded in country i,
yi = aggregate real income in country i.
ri = the real rate of interest, and
pi = the price index in country i.

Finally, the quantity of money supplied is assumed to be equal to the quantity demanded:

$$MSi = MDi. \tag{3}$$

By substituting for MSi and MDi from equations (1) and (2) into equation (3) we obtain

$$a(R + D) = \frac{y^{\alpha_1} P}{r^{\alpha_2}} \tag{4}$$

Transforming (3) using logarithms and differentiating with respect to time, we derive

3 See Kemp, 1975, p. 14.

$$\frac{R}{R+D}\, g_R = \alpha_1\, g_y - \alpha_2\, g_r + g_p - g_a - \frac{D}{R+D}\, g_D{}^4. \quad (4)$$

A version of equation (4), with the addition of an error term, is then estimated by those using the monetary approach.

In general, estimates of equation (4) in the recent literature have produced values for the coefficient of multiple determination (R^2) ranging from .71 to .95. The results with respect to the signs, size, and significance of the coefficients vary.[5] Nevertheless, Magee concludes:

> The vice of the approach is that they may be attempting to explain too much with this single equation. The virtues of the approach are that fixed exchange rate coefficients of money demand can be carried over to floating rate periods and vice versa; in the absence of structural shifts, three systems (fixed, floating, and managed floating) can be explained using a single equation. Occam would be pleased.[6]

While it seems to be possible to achieve a high degree of correlation between the growth rate of international reserves for a country and the other variables mentioned above using the monetary approach, we believe that such studies fail to disclose some of the important sectoral relationships that affect the balance of trade, and correspondingly, the balance of payments. Moreover, as with any type of regression analysis, a high degree of correlation does not necessarily imply anything about cause and effect. We would expect that a sectoral approach would be especially important for gaining insights into trade relationships in a developing country like Mexico, where structural bottlenecks frequently do occur in the domestic economy.

II. Mexico's Foreign Borrowing and its Balance of Trade

As we have noted, in the MBOP models the fact that there is a

4 In general, $g_x = \frac{d \ln x}{dt}$ for variable x.
We have dropped the subscript *i*, since it should now be clear to the reader that the values of these variables are for a specific country.

5 See Blejer (1977), Wilford and Wilton (1978), and Zecher (1974).

6 Magee, 1976, p. 168.

connection between monetary expansion and the balance of payments appears to be firmly established. However, the approach used by the investigators does not get at the underlying real variables that led to the fact of high rates of growth in the money supply. This is a particularly valid question when foreign borrowing contributes substantially to the monetary base. Banamex, the nation's leading private bank, is quite clear on Mexico's reasons for stepped-up foreign borrowing in 1981:

> Expansion of domestic demand, the differential between internal prices and those abroad, and a loss in revenue from oil exports combined to create a deficit on current account twice as high as that recorded in 1980. Net outflow of foreign exchange under the headings Current Account and Errors and Omissions will amount to US$15bn in 1981, representing 7.5% of GDP (1980: 4%).
>
> In order to finance that deficit, US$16bn net will enter the country on capital account. This will push up the total external debt to more than US$60bn, the public sector accounting for just under US$49bn and the private sector for some US$15bn of that total.[7]

Thus, it appears that immediately prior to the 1982 float Mexico's borrowing was tied to (1) expansion of its current account deficit, and (2) capital flight. Expectations surely played a role in both of these phenomena, since the widespread belief that the peso would fall both stimulated imports and provided a strong incentive to move funds out of the country. However, the stable door has already been left open for some time once expectations come to play such a dominant role. It is useful, then, to ask what underlying long-term problems in the Mexican economy caused the door to open up in the first place. For this purpose, we now turn our attention to a fundamental real phenomenon, the balance of merchandise trade.

It is axiomatic that a country with an import balance of trade will have to find some way to finance that balance if its currency is to maintain a stable exchange value. Although financing an ever-increasing merchandise trade deficit is not the only cause for the Mexican government's persistent and growing foreign borrowing,

7 Banco Nacional de Mexico, *Review.* ..., Dec. 1981, p. 378.

the cumulative effects of years and years of running substantial trade deficits certainly contribute to the buildup of public long-term external debt and debt service obligations.

Data on the evolution of the trade deficit since 1960 are presented in Table 1. Given the heavy weighting of imports from the U.S. in Mexico's foreign purchases and the presumption that producers' goods typically make up the lion's share of imports, the

Table 1

MEXICO'S MERCHANDISE TRADE DEFICIT: 1961-1981
(MILLION U.S. DOLLARS)

Year	Trade Deficit	
	Current Prices	1967 Prices
1981	4,000	1,351
1980	3,265	1,187
1979	2,908	1,227
1978	2,273	1,088
1977*	1,373	704
1976	3,024	1,662
1975	4,066	2,364
1974	3,692	2,413
1973	2,094	1,662
1972	1,297	1,099
1971*	1,058	928
1970	1,211	1,011
1969	693	654
1968	779	756
1967	645	645
1966	442	446
1965*	446	465
1964	471	496
1963	304	320
1962	244	257
1961	335	335

Sources: Nacional Financiera, *La economia mexicana en cifras,* Mexico D. F. 1981, p. 336, and Banco Nacional de Mexico, *Review of the Economic Situation of Mexico,* Dec. 1981, p. 377.

data have been adjusted to constant prices using the United States producer price index. As Table 1 shows, Mexico has run a trade deficit every year since 1961. In fact, the last year in which Mexico had a trade surplus was 1949.

There appears to be a political cycle in the deficit. For any given "sexenio" or presidential term, the deficit is lowest in the first year or two but thereafter rapidly expands. (The first years of the last three sexenios are marked with asterisks in the table). In constant dollars, the deficit has more than tripled over the last two decades. The growth rate of the real trade deficit was slightly higher than the growth rate of real GDP over this period (6.9% compared with 6.5%). In addition, the political cycle would seem to indicate that the expansion of GDP which occurs during a sexenio tends to worsen the trade balance. Furthermore, over the long haul, the prospects for moving from deficit to surplus seem to be elusive, especially since the decline of petroleum prices in 1981.

What are the sources of the trade deficit? Since Mexico is an example *par excellence* of import-substitution economic development, it is to be expected that the deficit is in part attributable to a dependence on imported raw materials, intermediate goods, and capital goods for industries that are specialized in assembly or the final stages of manufacture of a wide variety of goods. In a paper written in early 1981, we presented the table herein reproduced as Table 2, which shows the trade balance of the Mexican motor vehicle industry. We were not surprised that the industry typically ran a trade deficit, but we were startled to find that its deficit in recent years approached 30 percent of the *entire* Mexican trade deficit.

Disaggregation of the trade deficit to the sectoral or industry level has not been done for Mexico, although such analysis would certainly be most useful from a development policy standpoint. (Indeed, the revelation contained in Table 2 is said to have

8 IMCE, The Mexican Foreign Trade Institute, reported that in 1974 Pemex imported almost 300 million dollars worth of goods from the U.S. Inflation alone would make this figure approach a billion dollars in recent years, and Pemex's stepped up investment activities would further increase it. (Source: IMCE, "Importaciones 1974 de E.E.U.U. a Mexico," computer printout, 1975, p. 1,830.)

9 Our data sources were the following:
Nacional Financiera, S.A., *La economia mexicana en cifras*, Mexico, D.F., 1981, pp. 26-31, 109-110, 225-226, 233-236.
Banco Nacional de Mexico, *Review of the Economic Situation of Mexico*, December 1981, pp. 397-401, 407; March 1980, p. 58.

Table 2

TRADE DEFICIT OF MEXICAN MOTOR VEHICLE INDUSTRY

Year	Industry Exports	Industry Imports	Industry Deficit: Amount	Industry Deficit: As Percent of Total Merchandise Imports	Industry Deficit: As Percent of Total Trade Deficit
	($1,000 U.S., 1978 prices)				
1979	330,018	1,231,580	901,562	8.1	28.3
1978	338,507	924,697	586,190	7.2	25.3
1977	255,445	713,282	458,837	7.8	29.0
1976	162,659	355,030	192,371	5.6	13.1
1975	92,675	299,428	206,753	7.1	12.5
1974	73,594	190,858	117,264	5.0	9.5
1973	57,275	130,103	72,828	5.1	11.1
1972	29,808	99,482	69,674	7.0	17.2
1971	18,872	89,986	71,114	8.7	20.1
1970	13,372	82,140	68,768	8.1	17.4

Sources: *La industria automotriz en cifras, 1976,* Mexico: Asociación Mexicana de la Industria Automotriz, 1977, 160, 161, 164; *Statistics on the Mexican Economy,* Mexico: Nacional Financiera, 1977, 389-392; *Anuario estadístico de los Estados Unidos Mexicanos, 1976,* Mexico: Secretaría de Programación y Presupuesto, 1977; *La industria automotriz en México,* Mexico: Secretaría de Programación y Presupuesto, 1981, 138-39; *Mexico Statistical Data 1970-79,* Mexico: Banamex, 1980; and *Boletin mensual de información económica,* Mexico: Secretaría de Programación y Presupuesto, feb. 1981, 94.

resulted in a marked tightening of import controls on automobile assembly parts beginning in 1982). There are some scraps of data, however, that provide clues to the sectoral and industry-level problem. One of these is the Banco de Mexico's series on sectoral origins of imports and exports. For 1975, 77, and 79, these data are shown in Table 3.

Note that these data cannot be used to calculate a sectoral balance of trade because they are focused on *origins* of both exports and imports. To calculate sectoral balance, one would need to know the origins of exports but the *destinations* of imports. The problem becomes clearer if one considers the petroleum industry as a case in point. This is an industry that recently has absorbed imported inputs whose value amounts to a billion or more dollars per

Table 3

MEXICO: IMPORTS AND EXPORTS OF MERCHANDISE BY SECTORAL ORIGIN, 1975, 77, AND 79 (MILLION U.S. DOLLARS)

	IMPORTS			EXPORTS		
	1975	1977	1979	1975	1977	1979
TOTAL VALUE	6,582	5,570	11,706	3,062	4,650	8,798
Agriculture and Forestry	729	566	810	719	1,181	1,616
Livestock and Fish	622	68	162	173	131	163
Extractive Industries	220	121	242	645	1,210	4,082
Petroleum and gas	65	4	8	438	993	3,765
Metallic minerals	19	30	58	80	81	131
Nonmetallic minerals	136	87	176	128	136	186
Manufactures	5,562	4,805	10,480	1,525	2,125	2,936
Food and similar	160	196	342	455	648	799
Textiles and apparel	74	62	161	168	180	209
Wood and wood products	20	23	45	26	51	72
Paper and graphic arts	256	240	379	40	64	74
Petroleum derivatives	263	150	251	26	39	96
Petrochemicals	104	224	340	16	5	113
Chemicals	716	598	1,104	205	241	336
Rubber and plastics	60	66	159	7	16	20
Nonmetallic materials	63	39	112	62	140	136
Steel products	563	351	1,127	48	92	132
Nonferrous metals	93	76	268	123	85	146
Machinery and equipment	3,159	2,754	6,130	326	542	755
Other manufactures	31	27	63	22	32	47
Other services	6	8	8	—	1	1
Non-Classified products	4	1	4	—	1	1

Source: Nacional Financiera, *La economía mexicana en cifras*, Mexico, D.F., 1981, p. 346.

year. Yet, in Table 3, petroleum sector imports are shown to be only $242 million as recently as 1979. The reason for this small figure is that these imports are products that originated in the petroleum industries of other countries (primarily the U.S.). Much of what Petroleos Mexicanos imported was machinery and equipment ($6 billion in 1979) which is found under "manufactures" but

cannot be disaggregated from machinery and equipment destined for other industries. Given the data problem, it is difficult to establish precisely the extent to which the petroleum industry has been a net exporter over the past few years, since both its imports and its exports have expanded dramatically.

Despite the oil industry problem, Table 3 does provide some useful impressions regarding the sectoral origin of the trade deficit. In particular, it shows that Mexico is, as expected, a heavy net importer of manufactures, with machinery and equipment topping the list. As expected, a wide variety of other manufactured products also show net trade deficits. Only the extractive industries and agriculture appear to have strong net export potential in Table 3, but their true net effect on trade cannot be determined from these data since their imports of capital goods and other inputs are unknown.

III. Sectoral Growth and the Trade Deficit: A Multiple Regression Model

Given the strong suspicion that the trade deficit can be traced to certain sectors of the economy and a global hypothesis that sectoral expansion would have predictable results on the deficit, we sought out data that could be employed to describe and analyze the relationship between sectoral growth and the balance of trade.

Mexico regularly publishes merchandise trade balance figures in dollar terms. In addition, its industrial production series provides certain sectoral output data in constant prices. Thus, we were able to formulate our hypothesis in terms of the dependence of the trade balance on expansion of several key economic sectors.

We isolated four sectors of the Mexican economy that we believed had a relatively large impact on the balance of trade — the energy sector, the manufacturing sector, the capital goods sector, and the agricultural sector. We estimated the following relationship for Mexico using annual data from 1961-1981.

$$RTB_t = \alpha + \beta_1 ES_t + \beta_2 MS_t + \beta_3 CS_t + \beta_4 AS_t + \beta_5 Dummy + \beta_6 MPPI + e_t,$$

where RTB = the trade balance of Mexico in real dollars,
ES = the real output of the energy sector,
MS = the real output of the manufacturing sector,
CS = the real output of the capital goods sector,
AS = the real output of the agricultural sector,
Dummy = a dummy variable reflecting the peso depreciation in the fall of 1976, with a value of zero through 1976, and one thereafter,
MPPI = the Mexican producer price index, and
e = an error term.[10]

We hypothesized that as a result of exports of crude oil and other energy-related products, particularly in the last half of the 1970s, β_1 would be positive. Because the expansion of output in the manufacturing and capital goods sectors required large imports of capital goods during the time period under consideration, we hypothesized that β_2 and β_3 would be negative. Expansion of agricultural production in Mexico reflects both export growth and import substitution; consequently, we hypothesized that β_4 would

Table 4

REGRESSION RESULTS FOR MEXICAN BALANCE OF TRADE
(t values)

$$RTB_t = 986.034 + .288\ ES_t - .085\ MS_t - .045\ CS_t + 1157.144\ Dummy + 4.196\ AS_t - 10.086\ MPPI$$

$$(1.933)^{**} \quad (-1.946)^{***} \quad (-.283) \quad (2.245)^{***} \quad (.6107) \quad (-1.552)^{*}$$

R^2 = .85 D-W = 1.67

* Significant at the ten percent level of significance.
** Significant at the five percent level of significance.
*** Significant at the two and one-half level of significance.

10 We used the real balance of trade in U.S. dollars rather than pesos because the Mexican government reported the data in that form.

be positive. If the depreciation of the peso in 1976 had a positive impact on the real balance of trade, β_5 would be positive. Finally, we expected that increases in the Mexican producer price index would have a negative effect on the real balance of trade and, thus, that β_6 was negative.

Our results are shown in Table 4. All of the estimates of the coefficients had the hypothesized sign. β_6 was significant at the ten percent level of significance. β_1 and β_2 were significant at the five percent level of significance, while β_5 was significant at the two and one-half percent level. The F-value for the entire relationship was 13.675, significant at the one percent level of significance.

IV. Conclusions

Our results are consistent with the following conclusions. First of all, the expansion of the energy sector has so far improved Mexico's balance of trade. The expansion of the manufacturing sector has on balance worsened it. While expansion of the capital goods sector does require increased imports to Mexico, the fact that β_3 is not significant may mean that the capital goods sector is performing a noteworthy role in the area of import substitution. Moreover, depreciations in the peso to improve the real balance of trade, but increases in the Mexican producer price index worsen it. These last two results should both encourage and caution the Mexican authorities: the 1982 depreciation of the peso will tend to help the balance of trade, but only if there is not offsetting inflation in the Mexican economy.

Finally, we believe that even more interesting results would be obtained if production data were further disaggregated, particularly with respect to the manufacturing sector, for the reasons noted earlier in this paper. Unfortunately, as already stated, such sectoral data are not yet available.

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