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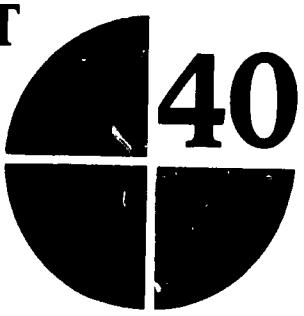

FOOD SUBSIDIES IN EGYPT: THEIR IMPACT ON FOREIGN EXCHANGE AND TRADE

Grant M. Scobie

August 1983

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FOREWORD

Analyses of consumer-oriented food subsidies are one of the original priority research areas of the International Food Policy Research Institute; a number of case studies have been completed, while others are under way. The Egyptian food subsidy system is of particular interest because of its magnitude and complexity. About two years ago, IFPRI, with support from the U.S. Agency for International Development, initiated a multifaceted, in-depth study of the Egyptian system. The study includes analyses of the existing system and alternatives to it. It examines a variety of factors including income distribution, nutrition, domestic agricultural production, agricultural incomes, government spending and investment, inflation, and foreign trade issues. Results from the study are being published in various reports as the analyses are completed.

A detailed description of the existing system was presented in *Egypt's Food Subsidy and Rationing System: A Description,* Research Report 34, by Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr. This report by Grant Scobie presents the results of an analysis of the implications of the system for selected trade and macroeconomic variables including the balance of payments, the exchange rate, domestic inflation, and government deficits. Particular attention is given to the consequences of the food subsidy scheme for the instability in industrial investment and output. Analyses of implications for domestic agriculture have been completed and will be included in "The Effects of Food Price and Subsidy Policies on Egyptian Agriculture," by Joachim von Braun and Hartwig de Haen, which will be published as a research report later this year. Results from analyses of the distribution of benefits and costs of the subsidy system will be published in a subsequent report.

Thus, this study is one of a number of analyses, including earlier IFPRI work by Grant Scobie (*Government Policy and Food Imports: The Case of Wheat in Egypt,* Research Report 29), that are expected to provide an in-depth understanding of how existing and alternative subsidy policies affect economic growth, equity, and the welfare of the poor in Egypt. Together with past and current studies of subsidy programs in other countries, these analyses are expected to contribute to a general body of knowledge useful to governments in their quest for the most appropriate food policies.

John W. Mellor

Washington, D.C.
August 1983

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1

SUMMARY

Many developing countries intervene in their markets for food, but Egypt has one of the most extensive systems of consumer subsidies for food and other commodities. In this study the impact of Egypt's consumer subsidy scheme on its foreign sector is examined. Both monetary and real consequences are analyzed.

Historical evidence from Egypt is used to examine the monetary impact of subsidy expenditures on domestic inflation, the balance of payments, and the exchange rate. These variables are simultaneously determined in a model drawn from the monetary approach to the balance of payments.

To maintain domestic prices below world prices, Egypt must rely on food imports. A rise in the world prices or a fall in export earnings could lead to a reduction in imports. If food imports are maintained, this instability may be transmitted to the imports of industrial raw materials and capital goods. This would have a destabilizing effect on both the rate of utilization of the existing capital stock and the rate of growth of that stock. In examining the real as distinct from the monetary consequences of Egypt's food subsidy scheme for industrial output and investment, this hypothesis is explored.

Controls and subsidies on basic foods have been instruments of Egyptian food policy for many centuries. Since World War II and particularly since the mid-1970s the size and coverage of these subsidies have grown rapidly. There has been a tendency, however, to view the rise in the cost of the subsidies as simply reflecting the efforts of a benevolent government to shield its populace from the vagaries of world prices. The random shocks of nature, the power of the supposed oil cartel, and the rise in food prices in 1973-74 are seen as primarily determining the recent course of events in many developing countries. In Egypt and elsewhere less attention is paid to deliberately chosen domestic policies. However, real expenditures per capita have doubled since the mid-1970s. Clearly, the transitory rise in import prices does not explain this outcome.

The mid-1970s were a time of significant political and economic changes in Egypt's external relations. The October War with Israel in 1973 ended a long period of military conflict. The capital stock of the economy was depleted and growth of real income had been held down in order to release resources for military endeavors. Since the revolution of 1952, the state had become more and more involved in domestic economic management and in foreign trade and investment largely oriented toward the Eastern Bloc. With the change in the political climate after the October War came a change in foreign economic policy, usually referred to as *al-infitah* or the economic opening. In short, this signified more trade and investment with the West and a greater reliance on private entrepreneurship in the domestic economy. Market signals were allowed a greater role in the allocation of resources, whereas in previous years a centralized approach to economic management prevailed.

However, there was no departure from the strong commitment to social equity that had its origins in the revolution of 1952 and the subsequent evolution of Arab socialism. As a consequence, real subsidies have increased substantially since the introduction of the new economic policy.

The increase in subsidies has involved larger government expenditures. Some of the resources have been acquired through additional foreign earnings, grants, and loans, but a significant part has been covered by inflationary financing of the government deficits. The study finds that a 10 percent rise in expenditures on subsidies has resulted in an increase in the inflation rate of more than 5 percent, a decrease in international assets (or alternatively a rise in foreign liabilities) of 2 percent, and a devaluation of the free market exchange rate by more than 3 percent.

The operation of the subsidy scheme has depended increasingly on imported foods. In 1969-71 the real cost of food imports was LE 6 per capita; by 1979-81 the real cost had risen to LE 35 per capita. This

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study shows that a reduction of 10 percent in real per capita subsidies would reduce the volume of food imports by 4 percent. For some products, such as wheat, the reduction would be much less. Hence cutting the subsidy while reducing government expenditures would have only a slight impact on imports. A more powerful tool for easing the dependence on imported food would be to limit access to subsidized wheat and flour. On the other hand, for commodities such as meat, real imports would respond quite directly to any cuts in the subsidy.

Because the subsidies are an important instrument of social policy, it has proved difficult to alter their extent and size. Furthermore, the demand for imported food has become quite inelastic as a consequence of the subsidy scheme. This has important ramifications for real output and investment in the industrial sector. In Egypt this sector depends on imported raw materials for current production as well as on the imports of capital goods for expansion and maintenance of the industrial capital stock. If there is a rise in the price of imported food or a fall in the supply of foreign exchange, the importation of industrial goods (both raw materials and capital goods) may well be reduced, at least temporarily. This reduction is necessary in order to allocate sufficient foreign exchange to maintain food imports. The possibility exists that instability arising in other markets (both foreign and domestic) may be transmitted to the industrial sector as a consequence of the food subsidy scheme. This would imply an indirect cost of food subsidies that has not been widely examined.

The study finds that industrial output and investment are quite responsive to changes in the level of industrial imports. There is evidence that a fall in foreign exchange supplies of 10 percent reduces real industrial output by 4 percent and investment by 6 percent. And since preference is given to food imports, a fall of U.S. $1.00 in foreign exchange would reduce imports of food and other consumer goods by 16 cents; industrial raw materials, fuel, and chemicals by 40 cents; and capital goods by 34 cents. Similarly, a 10 percent rise in the cost of imported food would result in a fall of 1-2 percent in industrial output as imports of raw materials are crowded out to provide more foreign exchange for food imports.

Egypt's extensive system of food subsidies has affected the rate of inflation, the balance of payments, and the exchange rate. In addition, it has destabilized industrial output and investment, imposing real costs on the economy. In recent years Egypt's ability to acquire additional goods and services has been bolstered by buoyant export receipts and foreign loans and grants. Some of these favorable circumstances may prove transitory. In that case the real costs of all existing subsidies will become more apparent and disruptions to the nonfarm sector more pronounced. Efforts to restrict the benefits of subsidies to those most deserving could well be rewarded by lower inflation, a decline in the real volume of imported food, and enhanced conditions for industrial output and investment. Such changes would seem to be consistent with the spirit of the economic policies introduced in the mid-1970s.

2

INTRODUCTION

Total demand for food in Egypt has been growing rapidly for three principal reasons. First, the population is growing rapidly, adding more than a million people a year. By the end of the century the present population of 43 million will have almost doubled. Second, real incomes have been rising. As a consequence, the pattern of demand has shifted toward animal products. Finally, Egypt's domestic food policies have contributed to the rise in consumption. For many centuries Egypt has intervened intermittently in basic grain markets to hold down consumer prices, but since World War II both the number of people covered and the amount of these subsidies have become much larger.[1]

These subsidies now affect every aspect of the Egyptian economy. They alter relative prices of goods both domestically and relative to traded goods; they figure prominently in government expenditures; they are an instrument of income redistribution; they affect the volume of imports and exports of food and other goods; they affect investment and economic growth; they affect the country's balance of payments; and they leave their mark on foreign policy. Their size and pervasiveness make them important to consider in any analysis of the economy. At the same time, their ramifications are so widespread that it is difficult to disentangle their effects.

This study examines how food subsidies affect Egypt's foreign sector. Two specific themes are addressed: one monetary (the supply and demand of monies), the other real (the supply and demand of foreign goods). There are obvious and important connections between the two, for which a general equilibrium model might well be appropriate. The approach taken here is less ambitious: to restrict the work to a manageable level the two themes are largely treated separately.

During World War II ration cards for sugar, tea, and kerosene were introduced. From these modest beginnings has grown an extensive system of price controls through rationing and subsidies on consumer items.[2] The scheme grew rather slowly until 1973. Until then expenditures per capita were generally less than LE 2 (in constant 1975 Egyptian pounds using the consumer price index as a deflator)[3] and the costs seldom exceeded 5 percent of the central government's revenue (see Table 1). The scheme represented about 1 percent of national income.

Since 1973 a very different picture has emerged. There has been a tendency to attribute the rapid rise in the cost of Egypt's food subsidies to the rise in world prices that occurred in that year. The country, along with other developing countries, has been seen as a victim of higher prices, and the strain on government resources has been perceived as a consequence of unfortunate external circumstances. The evidence, past and present, does not support this view. Rather, it is clear that a fundamental change in Egypt's domestic food policy was implemented.

First, world commodity prices have fluctuated in the past without engendering such massive changes in expenditures on subsidies as those since 1973. Second, if the subsidy increases were simply a reflection of a

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[1] For a review of wheat policies since the French invasion in the late eighteenth century see Grant M. Scobie, *Government Policy and Food Imports: The Case of Wheat In Egypt.* Research Report 29 (Washington, D.C.: International Food Policy Research Institute, 1981), especially Chapter 3 and the references cited there. See also E. Ashtor, *A Social and Economic History of the Near East in the Middle Ages* (Berkeley: University of California Press, 1976); B. Shoshan, "Grain Riots and the 'Moral Economy': Cairo 1350-1517," *Journal of Interdisciplinary History* 10 (Winter 1980): 459-478; and B. Shoshan, "Fatimid Grain Policy and the Post of the Muhtasib," *International Journal of Middle Eastern Studies* 13 (May 1981): 181-189.

[2] For a detailed discussion of the operation of this scheme, see Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr, *Egypt's Food Subsidy and Rationing System: A Description,* Research Report 34 (Washington, D.C.: International Food Policy Research Institute, 1982).

[3] The Egyptian pound (LE) equals 100 piasters. (See Appendix 1 for a discussion of exchange rate regimes.)

Table 1—Government expenditures on consumer subsidies, selected years

Year	Total Expenditures	Per Capita Expenditures	Real Subsidies		
			As Share of Government Revenue	As Share of Total Government Expenditure	As Share of National Income
	(LE million)	(LE)		(percent)	
1947	6	0.63	5.8	7.6	1.0
1951	7	0.58	2.8	3.4	0.7
1957	6	0.46	2.3	1.7	0.5
1961	9	0.61	1.6	1.3	0.6
1967	46	2.10	5.3	3.4	1.5
1971	42	1.60	4.8	4.0	1.4
1977	650	13.48	23.6	13.5	7.5
1981	1,861	19.15	25.3	18.2	8.6
Average[a]	238	4.65	10.3	7.3	3.0
Minimum[a]	2	0.15	0.6	0.7	0.2
Maximum[a]	1,861	22.02	40.8	23.7	13.1

Sources: Calculated from data in Appendix 2, Tables 20 and 23.

[a] This is for the period 1947-81.

policy to shelter domestic consumers from temporary vagaries of the world markets, subsidies could have returned to normal by now. Certainly, the real cost of acquiring most imported foods is lower now than before 1973, but real per capita subsidies have continued to rise. In the years 1972-74 real per capita expenditures on consumer subsidies were LE 6.2. The three-year average for the period 1979-81 was LE 20 per capita in a country with a real per capita income of about LE 230.

From 1967 to 1973 Egypt devoted an appreciable proportion of its national resources to military endeavors. Real subsidy expenditures per capita during 1968-72 were cut by 30 percent from those prevailing in the previous five-year period. Per capita domestic consumption of wheat and wheat flour fell during those years. In short, considerable sacrifices were made by the Egyptian people so that real resources could be transferred to the military.

The October War of 1973 marks a significant turning point in Egypt's domestic and foreign policies. Trade, investment, external aid, and economic management had all come to depend heavily on the Eastern Bloc countries. When these economic and political ties were for the most part severed, U.S. aid was restored, the Russian military and technical advisers departed, and an economic policy aimed at fostering trade and investment with Western countries was instituted. Simultaneously, large loans and grants were negotiated with Arab neighbors.

The open-door economic policy *(al-infitah)* for the foreign sector was to be accompanied by a contraction of state involvement in domestic economic activity. Whether this objective has been fulfilled is probably open to debate. Be that as it may, the change in foreign economic policy bore demonstrable results. Between 1972 and 1980 exports rose from 15 to 44 percent of GDP and inflows of foreign capital rose significantly. With oil export revenues, U.S. aid, and worker remittances, Egypt has benefited from its foreign reorientation in both economic and political spheres.

At the same time, however, there was a renewal of the government's commitment to the social policies that had their origins in the revolution of 1952. While a freer economic environment was fostered in both the domestic and foreign sectors, government expenditures on social programs, including consumer subsidies, were increased. A complete series of data on food subsidies per se is not available; for this report total consumer subsidies are generally used.[4] Some

[4] The sources for this information are given in Appendix 2, Table 22.

Table 2—Government expenditures on food subsidies, selected years

Year	Wheat and Flour		All Food	
	Total Expenditures	Per Capita Expenditures	Total Expenditures	Per Capita Expenditures
	(LE million)	(LE)	(LE million)	(LE)
1950	9	0.4	n.a.	n.a.
1955	3	0.1	n.a.	n.a.
1960	4	0.1	n.a.	n.a.
1965	19	0.7	n.a.	n.a.
1970	28	0.8	4	0.1
1975	293	7.9	491	13.2
1980	279	6.6	605	14.4

Sources: Except for 1980, the wheat and flour subsidies are from F. Shalaby, "A Report on Wheat Consumption in Egypt," Program Economist's Office, U.S. Agency for International Development, Cairo, December 1978, p. 17. (Mimeographed.) The 1980 figures are from the Office of the U.S. Agricultural Attaché, Cairo, and refer to the budget and allocation for 1980/81. The food subsidies are from Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr, *Egypt's Food Subsidy and Rationing System: A Description*, Research Report 34 (Washington, D.C.: International Food Policy Research Institute, 1982), p. 14.

Notes: All figures are deflated by the consumer price index, where 1975 = 100. Prices are given in constant LE 1975. Indicative of the difficulties of obtaining consistent series is the fact that total food subsidies are shown to be less than those reported for wheat and flour in 1970. n.a. means not available.

data for wheat and food subsidies are shown in Table 2. Wheat and flour subsidies are a larger proportion of food subsidies, which in turn comprise a significant share of total consumer subsidies.

Perhaps the most convincing evidence in support of the argument that Egypt's food policy underwent major changes comes from the data on net imports of staple foods (Table 3). These rose from 115 kilograms per capita to 154 kilograms per capita between 1975 and 1980. If the rise in subsidy expenditures in the mid-1970s had merely been a consequence of a transitory change in world prices, there would not have been an accompanying rise in the per capita quantity of foods imported.

There have been some increases in the subsidies per ton on imported foods, although these have not been dramatic for the major commodities (Table 4). Rather, the volume of subsidized commodities has grown significantly both in per capita terms and in total (Table 3). In addition, the average annual growth rate of the subsidies budgeted for these commodities ranges from 19 percent for edible oils to 62 percent for fish and meat (Table 5).

The continued growth in the real volume of subsidized commodities has meant increasing reliance on imports (Table 6). The only exception is rice, which has always been an important export crop. Because of the rapid growth in domestic consumption fueled by the subsidized price, the volume of rice exports has declined significantly.[5] It

Table 3—Net imports of basic foodgrains and pulses, selected years

Year	Net Imports	Imports Per Capita
	(1,000 metric tons)	(kilograms)
1950	536	26
1955	−154	−6
1960	1,094	42
1965	1,813	62
1970	671	20
1975	4,261	115
1980	6,445	154

Sources: The data refer to net imports of cereals and pulses and are calculated from data in Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, various years, except for 1980 which were obtained from the Office of the U.S. Agricultural Attaché, Cairo.

Note: A negative sign indicates net exports.

[5] Data on the volumes of food imports for the years 1949-80 are given in Appendix 2, Tables 18 and 19.

Table 4—Real subsidies per ton on principal imported supply commodities, selected years, and the average annual growth rate

Commodity	Year			Average Annual Rate of Growth
	1973	1975	1978	
		(LE)		(percent)
Wheat	36	78	34	−1
Flour	22	39	25	3
Maize	26	58	51	14
Beans	n.a.	42	51	7
Lentils	56	124	177	26
Oil	148	298	86	−10
Frozen fish	20	51	76	31

Source: Basic data are from Khalid Ikram, *Egypt: Economic Management in a Period of Transition* (Baltimore: Johns Hopkins University Press, 1980), p. 330.

Notes: All prices are in constant LE 1975, deflated by the consumer price index where 1975 = 100. n.a. means not available.

is almost certain that Egypt will become a rice importer in the near future.

The growth in real per capita subsidy expenditures and real per capita food imports is illustrated in Figure 1. The growth of the subsidy program and the concomitant rise in food imports is evident. A simple least squares regression model is used to quantify the relation between expenditures on imported food and subsidies. In the equation,

$$V = \alpha S^{\beta} \varepsilon,$$

where V = real expenditure on imported food per capita and S = real expenditure on subsidies per capita. The equation is fitted in logarithmic form, yielding an estimate of the elasticity (β) of 0.4. This implies that a 10 percent increase in expenditures on food subsidies has been associated with a 4 percent increase in imports. At lower real prices, the elasticity of demand for food falls, so that

Table 5—Budgeted subsidy allocations for supply commodities, selected years, and the average annual growth rate

Commodity	Year					Average Annual Rate of Growth
	1970/71	1973	1976	1978	1980/81	
			(LE million)			(percent)
Wheat and flour	28	96	162	107	255	22
Maize	1	5	21	36	32	37
Lentils	n.a.	1	8	11	12	36
Edible oils	14	20	37	32	97	19
Fish and meat	n.a.	1	0	39	47	62

Sources: Basic data for 1970/71 are from Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr, *Egypt's Food Subsidy and Rationing System: A Description*, Research Report 34 (Washington, DC: International Food Policy Research Institute, 1982), p. 16. Data for 1973, 1976, and 1978 are from Khalid Ikram, *Egypt: Economic Management in a Period of Transition* (Baltimore: Johns Hopkins University Press, 1980), p. 328. Data for 1980/81 are from the Office of the U.S. Agricultural Attaché, Cairo.

Notes: All prices are in constant LE 1975, deflated by the consumer price index where 1975 = 100. n.a. means not available.

Table 6—Share of imports in the total supply of basic food commodities, 1977 and 1980

Commodity	1977	1980
	(percent)	
Wheat and wheat flour	72	75
Rice	0	0
Corn	7	7
Beans	8	14
Lentils	64	91
Vegetable oil	75	66
Sugar	30	43
Meat	19	25
Poultry	5	38
Total	41	45

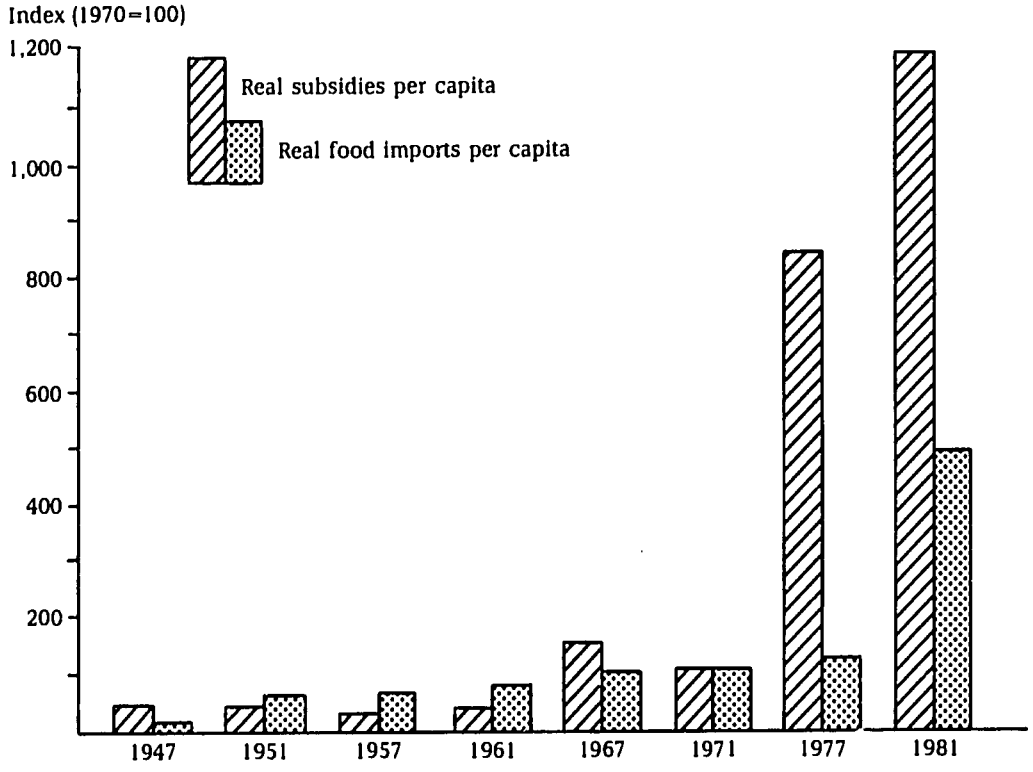
Source: Office of the U.S. Agricultural Attaché, Cairo.

over time the rise in import volumes associated with higher subsidies would decline, as expected.[6] When the demand for subsidized food becomes completely inelastic, increases in the subsidy serve only as an income transfer, increasing government expenditures but having no direct cost in foreign exchange.

As a consequence, a reduction in food subsidies would have a quite different effect on imports depending on the underlying elasticity of demand. For wheat and flour the elasticity is likely to be quite low, so that marginal cuts in the subsidy would have a minor effect on imports. The converse is true for animal products.

Meat and poultry, although still a small part of total food subsidies, have grown

Figure 1—Index of real subsidies and food imports per capita, selected years



[6] See Scoble, *Government Policy and Food Imports*, p. 57.

rapidly in both subsidies and associated imports (Tables 5 and 6). As the underlying price elasticity of demand is likely to be much higher, any reduction in the rate of subsidy would reduce imports significantly.

If Egypt wanted to adopt a policy to reduce the amount of foreign exchange allocated to food imports, then the course of action would be clear. For basic staples with a low price elasticity of demand, imports are relatively insensitive to changes in the subsidy. A more powerful instrument would be to limit access to the subsidized commodities and so reduce the total demand for imported staples. Recent attempts to remove some upper-income groups from the ration rolls are consistent with limiting the amount of foreign exchange allocated to food imports. Eventually, a scheme that limits the availability of basic staples to a more carefully defined target population will be needed to make any significant reduction in expenditures on imports. On the other hand, the recent increase of subsidies on animal products with higher elasticities of demand has resulted in a more rapid growth in imports. In this case, a reduction in access together with a decline in the rate of subsidy could be expected to significantly dampen the growth of import expenditures.

3

A MONETARY APPROACH TO EXCHANGE RATE DETERMINATION, THE BALANCE OF PAYMENTS, AND INFLATION

The cost of food subsidies has been met by current government revenues, foreign aid, concessional loans, and external borrowings. However, a significant part of the government deficit has been financed by an expansion of domestic credit through the creation of government liabilities at the Central Bank.

In this chapter a model is presented that permits the effects of government spending to be traced to the rate of domestic inflation, the balance of payments, and the exchange rate. In the model the presence of multiple official exchange rates and the use of exchange restrictions that have led to the development of a black market for foreign currency are explicitly recognized.

The role of monetary variables in the determination of exchange rates and the balance of payments for both floating and fixed rate systems has received renewed theoretical attention.[7] Studies pertaining directly to Third World countries are reviewed by Wilford, a case study for Panama is given by Borts and Hanson, and the monetary approach is applied to developing countries by Connolly and Taylor.[8] The monetary approach has also been the subject of a growing number of empirical studies.[9] The following model draws on all of these studies and endeavors to integrate aspects of a number of them and to reflect Egyptian circumstances.

All foreign trade was nationalized in 1961 and the allocation of foreign exchange has been on the basis of an annual foreign exchange budget. Official rates (generally multiple—either explicitly so, or through systems of discounts and premiums) have been overvalued. The excess demand at official rates has been transmitted to an extensive, well-organized black market. This market, which is referred to as the own or free exchange market, now reputedly handles more than one third of all foreign currency transactions under varying degrees of official sanction.

Although the economy was unshackled under the policy of *al-infitah*, concern for equity has remained a major cornerstone of

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[7] Jacob A. Frenkel "A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence," in *The Economics of Exchange Rates*, ed. Jacob A. Frenkel and Harry G. Johnson (Reading, Mass.: Addison-Wesley Publishing Co., 1978), pp. 1-26; J. Cauas and J. Desormeaux, "Equilibrio Monetario, Inflación y Balanza de Pagos," *Cuadernos de Economía* 51 (August 1980): 155-175; M. Connolly, "The Monetary Approach to an Open Economy: The Fundamental Theory," in *The Monetary Approach to International Adjustment*, ed. B. H. Putnam and D. S. Wilford (New York: Praeger Publishers, 1979), pp. 6-18; R. Dornbusch, "Theory of Flexible Exchange Rate Regimes and Macroeconomic Policy," in *The Economics of Exchange Rates*, pp. 27-46; and M. I. Blejer, "Devaluation, Inflation and the Balance of Payments: A Short-Run Monetary Approach," *Economic Record* 55 (March 1979): 33-40.

[8] W. T. Wilford, "Some Observations on the Monetary Approach to the Balance of Payments and the Third World," in *The Monetary Approach to International Adjustment*, pp. 98-116; G. H. Borts and J. A. Hanson, "The Monetary Approach to the Balance of Payments with an Empirical Application to the Case of Panama," in *Short-Term Macroeconomic Policy in Latin America*, National Bureau of Economic Research Other Conference Series 14, ed. J. Behrman and J. A. Hanson (Cambridge, Mass.: Ballinger Publishing Co., 1979), pp. 257-288; M. Connolly and D. Taylor, "Testing the Monetary Approach to Devaluation in Developing Countries," *Journal of Political Economy* 84 (August 1976): 849-859.

[9] See M. I. Blejer and L. Leiderman, "A Monetary Approach to the Crawling Peg System: Theory and Evidence," *Journal of Political Economy* 81 (February 1981): 132-151; Jacob A. Frenkel and K. W. Clements, "Exchange Rates in the 1920's: A Monetary Approach," in *Development in an Inflationary World*, ed. M. J. Flanders and A. Razim (New York: Academic Press, 1981), pp. 283-319; L. Girton and D. Roper, "A Monetary Model of Exchange Market Pressure Applied to the Post War Canadian Experience," *American Economic Review* 67 (September 1977): 537-548; R. J. Hodrick, "An Empirical Analysis of the Monetary Approach to the Determination of the Exchange Rate," in *The Economics of Exchange Rates*, pp. 97-116; J. Ujlie, "A Stock Adjustment Approach to Monetary Policy and the Balance of Payments," in *The Economics of Exchange Rates*, pp. 179-192.

social and economic policy. Real government expenditures on subsidies increased markedly, which affected the monetary system and the balance of payments (Figure 2). The rapid rise in government expenditures was largely financed by expansion of the domestic credit component of the monetary base. This was accompanied by an increase in the inflation rate, a decline in net foreign assets, and a steady devaluation of the free market exchange rate. These outcomes suggest that the monetary approach to determining the balance of payments and the exchange rate might provide a useful framework for quantifying the relationships. The model assumes that goods markets clear; that domestic prices for tradable goods are governed by world prices together with exchange rate and commercial policies; and that there is a stable demand for real money balances. The latter issue is addressed explicitly by including a money demand function in the model.

The Model

The Money Market in an Open Economy

Let

m_d = demand for real money balances,

y^* = permanent income,

c^* = expected opportunity cost of holding money balances,

M_d = demand for nominal money balances,

P = domestic price level,

M_s = supply of nominal money balances,

H = monetary base,

R = foreign asset component of the monetary base,

D = domestic credit component of the monetary base, and

a = money multiplier.

Then,

$$m_d = m_d(y^*, c^*), \quad (1)$$

$$M_s = aH = a(R + D), \text{ and} \quad (2)$$

$$M_d = P \cdot m_d. \quad (3)$$

If E denotes the logarithmic differential operator, then

$$EM_s = Ea + \gamma ED + (1 - \gamma)ER, \quad (4)$$

and

$$EM_d = EP + Em_d, \quad (5)$$

where $\gamma = D/(R+D)$, or the proportion of the monetary base held as liabilities of domestic institutions. For the money market to clear, the flow equilibrium condition $EM_s = EM_d$ must be satisfied.

Domestic Inflation

The model follows the "Australian tradition" in distinguishing between traded (T) and nontraded (N) goods.[10] Further, it assumes that Egypt is a small economy and faces given prices for its traded goods. The domestic inflation rate is the weighted average of the inflation rates in the domestic currency prices of both traded and nontraded goods.

Thus,

$$EP = \beta P_T + (1 - \beta)EP_N, \quad (6)$$

where $0 \leq \beta \leq 1$ is the coefficient measuring the degree of openness of the economy.

Consider the formation of the domestic currency price of tradables. If there is a unified exchange rate and no impediments to trade, then

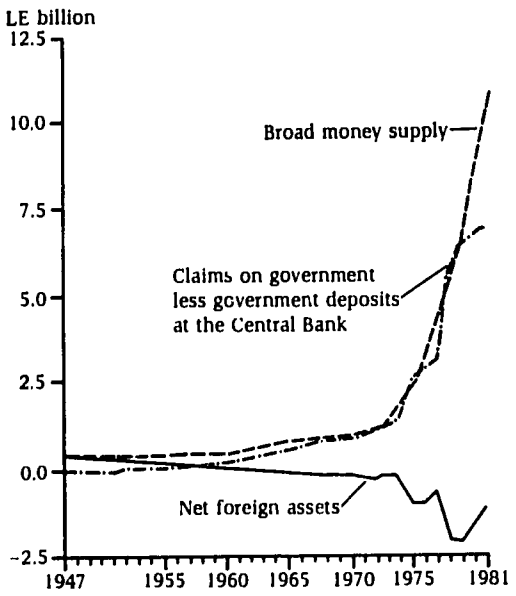
$$P_T = P_T^w \cdot \pi, \quad (7)$$

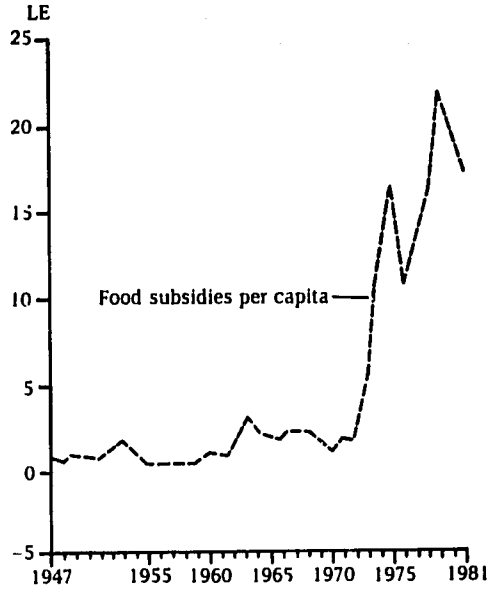
where P_T^w is the world price of tradables and the exchange rate is measured in domestic currency (Egyptian pounds) per unit of foreign currency (taken as U.S. dollars).

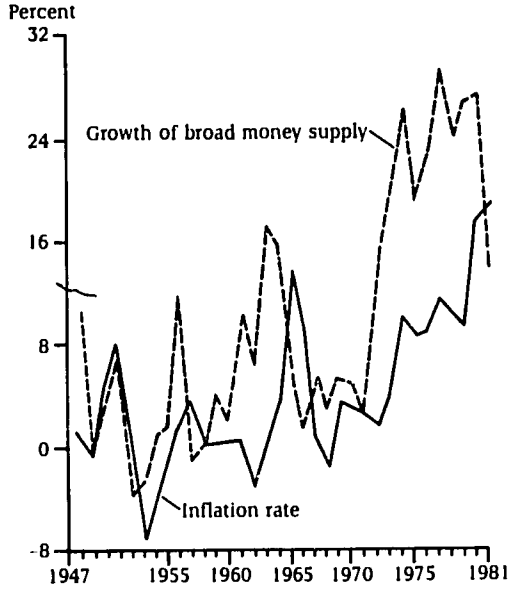
Equation (7) must be modified in order to reflect the government's role in the foreign exchange market. First, there is a system of multiple official exchange rates. Second, the exchange restrictions have resulted in a

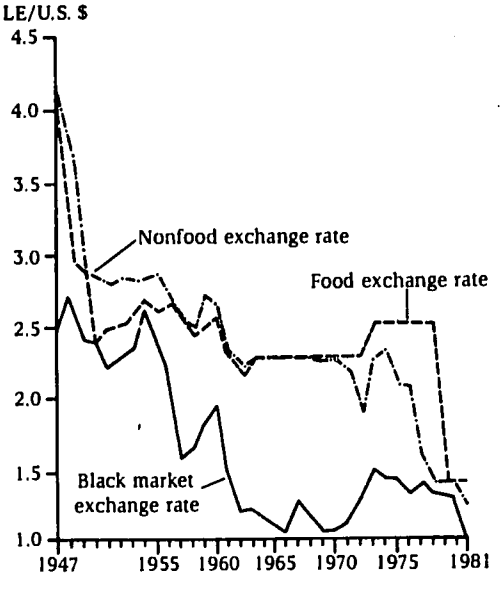
[10] W. E. G. Salter, "Internal and External Balance: The Role of Price and Expenditure Effects," *Economic Record* 35 (August 1959): 226-238; W. Max Corden, *Inflation, Exchange Rates and the World Economy—Lectures on International Monetary Economics* (Chicago: University of Chicago Press, 1977).

Figure 2—Key monetary variables, 1947-81









black market for foreign currency, and finally, Egypt has employed the usual battery of tariff and nontariff barriers and export taxes, both explicit and implicit. Any model of the traded goods sector must therefore recognize the existence of multiple official exchange rates (π_{0i}), the black market rate (π_b), and the trade impediments (t_i). Equation (7) is therefore written as:

$$P_T = \sum_i \beta_{0i} P^w_{0i}(1 + t_i)\pi_{0i} + \beta_b P^w_b \pi_b, \quad (8)$$

where there are $i = 1, \ldots, n$ multiple official rates and the black market rate, with respective weights β_{0i} and β_b. If it is assumed that the taxes on trade have not changed significantly or are captured in the implicit official rates, then the logarithmic differential of equation (8), which yields the inflation in the domestic currency price of tradables, is given by

$$EP_T = \sum_i \beta_{0i}(EP^w_{0i} + E\pi_{0i}) + \beta_b(EP^w_b + E\pi_b). \quad (9)$$

Following Blejer, the notion of an ex ante excess supply of money balances is introduced.[11] In a small open economy with pegged exchange rates the nominal money supply is not under the control of the monetary authority, which can only determine the domestic credit element of the monetary base. Changes in the flow supply of nominal money balances by the Central Bank interact with the flow demand for money balances. This flow demand stems from adjustment in the desired stock of real money balances, which in turn reflects changes in real variables and expectations of the opportunity cost of holding money balances. To reestablish equilibrium, the public responds to the excess supply of money balances and in the process determines the rate of change in the foreign reserve component of the monetary base. Thus the nominal supply of money balances is endogenous.[12]

Let g represent the monetary disequilibrium or ex ante gap, defined as

$$g = Ea + \gamma ED - EP - Em_d. \quad (10)$$

The first two terms reflect the Central Bank's control over nominal money balances, either directly through the domestic component of the base or by inducing changes in the money multiplier.

It is assumed that the change in the relative prices of traded to nontraded goods varies monotonically with the excess demand for goods, or alternatively with g, the excess supply of money balances. If λ is the elasticity of relative prices with respect to the ex ante disequilibrium in the money market, then

$$EP_N - EP_T = \lambda g. \quad (11)$$

The value of λ is likely to be lower the higher is the marginal rate of substitution in production and consumption between traded and nontraded goods. Using equations (9) and (10) in (11) yields

$$EP_N = \sum_i \beta_{0i}(EP^w_{0i} + E\pi_{0i}) + \beta_b(EP^w_b + E\pi_b) + \lambda(Ea + \lambda ED - Em_d) - \lambda EP. \quad (12)$$

Equations (9) and (12) give the inflation rates of the domestic currency prices of tradable and nontradable goods. Together they give the expression for the domestic inflation rate when substituted into equation (6):

$$EP = P_0[\sum_i \beta_{0i}(EP^w_{0i} + E\pi_{0i}) + \beta_b(EP^w_b + E\pi_b)] + P_1(Ea + \gamma ED - Em_d), \quad (13)$$

where

$$P_0 = \beta/[1 + \lambda(1 - \beta)]$$

and

$$P_1 = \lambda(1 - \beta)/[1 + \lambda(1 - \beta)].$$

[11] Blejer, "Devaluation, Inflation and the Balance of Payments."

[12] It is assumed that the monetary authority chooses not to sterilize flows of foreign reserves or cannot do so. As only a small proportion of the total sources of the Egyptian monetary base is represented by liabilities of the Central Bank to the nonbank public, open market operations to achieve sterilization—that is, to offset changes in the domestic credit component of the monetary base—are quite limited.

As a special case, consider a fully open economy ($\beta = 1$), with a unified fixed exchange rate ($E\pi_0 = 0$) and no black market in foreign currency. In this instance, $EP = EP_T^w$, or the domestic rate of inflation is equal to the world rate and independent of disturbances in the domestic money market. In general, however, the domestic inflation rate depends on the world prices of tradables, the exchange rate policy, and domestic monetary disequilibrium. Equation (14) shows that the government has to manipulate exchange rates to hold down the domestic prices of certain commodities. Basic foodstuffs continue to be imported at a rate below other official rates and well below current black market rates. Moderating the rate of *measured* domestic price inflation and disguising the cost to the treasury of food subsidies are apparent objectives of this exchange rate manipulation.

Balance of Payments

The monetary approach stresses the role of flows in adjusting stock imbalances. When real variables, expectations, or government interventions in the exchange, money, or commodity markets generate such disequilibriums, the public will try to achieve the mix of foreign and domestic assets they desire, stimulating flows of foreign currency. The portfolio behavior implied by the monetary approach is particularly important for understanding recent developments in the Egyptian foreign exchange market. Striking increases have occurred in foreign earnings flowing from Egypt's "natural" resources (its location, history, people, and oil) in the form of Suez Canal dues, worker remittances, tourism, and petroleum exports.[13] At the same time, the ratio of private foreign currency deposits in commercial banks to the domestic money supply rose from 9 percent in 1976 to 22 percent in 1980.[14]

From equation (6),

$$ER = 1/(1 - \gamma) \cdot [(Em_d - Ea - \gamma ED) + EP]. \quad (14)$$

After substituting from equation (13),

$$ER = r_0[\sum_i \beta_{0i}(EP_{0i}^w + E\pi_{0i}) + \beta_b(EP_b^w + E\pi_b)] + r_1(Ea + \gamma ED - Em_d), \quad (15)$$

where

$$r_0 = [\beta/(1 - \gamma)]/[1 + \lambda(1 - \beta)]$$

and

$$r_1 = [-1/(1 - \gamma)]/[1 + \lambda(1 - \beta)].$$

Equation (15) reveals, first, that an increase in the ex ante surplus money supply reduces the level of foreign reserves, because the coefficient r_1 is always negative. Second, if the economy is completely open ($\beta = 1$), then a 1 percent rise in world prices will have exactly the opposite effect of a 1 percent increase in the "surplus" nominal money supply. A rise in the price of traded goods relative to domestic goods induces substitution in production and consumption. The supply of tradables rises and the domestic demand for them falls as consumers substitute relatively cheaper nontraded goods. The balance of payments improves with an accumulation of foreign reserves.

An alternative view of this same phenomenon comes from considering the effect of a rise in the price of traded goods. This reduces the real value of existing money balances, resulting in an excess flow demand for money balances to restore the desired stock position and a corresponding excess supply in the commodity markets. Accumulation of foreign currency through reserve holdings restores the real money balances to their desired amount, albeit with a change in the portfolio composition of money balances. In part, this mechanism explains the currency diversification in Egypt noted above. Rising real wages for Egyptian workers in the Gulf states, higher prices for petroleum exports, and increased dues from the Suez Canal all represent an increase in the price of traded

[13] Henry J. Bruton, *Egypt's Development in the Seventies*, Research Memorandum 84 (Williamstown, Mass.: Center for Development Economics, Williams College, 1981).

[14] J. de Macedo, *Currency Diversification and Export Competitiveness: A Model of the Egyptian Disease*, Working Paper 776 (New York: National Bureau of Economic Research, October 1981), p. 36.

goods, and therefore greater foreign currency balances can be expected.

Third, consider a 1 percent rise in the exchange rate; that is, a depreciation of the Egyptian pound (π_{0i} and π_b are measured in units of domestic currency per unit of foreign currency). The effect on the flow of foreign reserves will be exactly the same as a 1 percent rise in the price of traded goods relative to domestic goods. Clearly, devaluation is equivalent to a change in the relative price of national and foreign monies. For a small open economy facing given world commodity prices, this implies that traded goods prices rise relative to domestic goods.

In a fully open economy ($\beta = 1$) an increase in the flow of the domestic money supply can be exactly offset by a depreciation of the currency. This result is evident from equation (16), as $r_0 = -r_i$ when $\beta = 1$. Alternately stated, an excess flow supply of nominal money balances can be offset by a decline in foreign reserves, by a devaluation, or in the case of a movable peg exchange rate policy by a combination of the two. Girton and Roper have built a model of the exchange market pressure based on this proposition and applied it to the United States and Canada.[15] Connolly and Da Silveira have adapted it for Brazil (with the second country represented by the rest of the world).[16] It is interesting to compare the model developed by these authors with the one presented here.

Consider a fully open economy (implying $\beta = 1$), with a unitary elasticity of relative prices with respect to domestic monetary disequilibrium. Let there be one unified official exchange rate and no black market for foreign currency, implying $\pi_{0i} = \pi_0$ and $E\pi_b = 0$. Assume that the monetary authority's only instrument is control of the domestic component of the monetary base ($Ea = 0$). With these restrictions, equation (15) can be written as

$$ER = (1/1 - \gamma)[EP^w + E\pi_0] - (1/1 - \gamma)[\gamma_q ED - Em_d]. \quad (16)$$

If the demand for real money balances is assumed to depend on shifts in real variables captured by real income changes, then

$$(1 - \gamma)ER - E\pi_0 = \gamma ED + EP^w + Ey. \quad (17)$$

This is precisely the equation derived by Connolly and Da Silveira.[17] An appreciation of the Egyptian pound will correspond to a negative value of $E\pi_0$ and consequently one can write the left-hand side of equation (17) as $(1-\gamma)\ ER + E\pi_0$, as do Connolly and Da Silveira. They note that this equation states that an increase in the rate of growth of domestic credit "will result in an equi-proportionate loss in reserves with no change in the exchange rate, or an equi-proportionate depreciation of the cruzeiro, or some combination of the two."[18] The dependent variable is a measure of the exchange market pressure generated by the monetary disequilibrium. Thus, the Girton-Roper model is a special case of the present model: it describes a world where all goods are tradable, there is a unified exchange rate, there is no black market for foreign currency, and the monetary authority only influences the domestic credit component of the monetary base.

The principal sources of supply of currency to the black market are tourism, workers' remittances, overinvoicing of imports, and underinvoicing of exports. Discrepancies between the official and black market rates increase the supply of currency transactions from tourism. And, the greater the differential, the larger the profit from false invoicing. It is therefore postulated that the supply to the black market is in direct relation to the differential, or

$$F_b^s = (\pi_b/\bar{\pi}_0)\phi^s, \quad (18)$$

where ϕ_s is the elasticity of supply of black market currency with respect to relative ex-

[15] Girton and Roper, "A Monetary Model of Exchange Market Pressure."

[16] M. Connolly and J. D. Da Silveira, "Exchange Market Pressure in Post War Brazil: An Application of the Girton-Roper Model," *American Economic Review* 69 (June 1979): 448-454.

[17] Ibid., p. 449.

[18] Ibid.

change rates, and $\bar{\pi}_0^*$ is the weighted official rate. Taking the logarithmic differential of equation (18) yields

$$EF_b^s = \phi_s(E\pi_b - E\bar{\pi}_0). \quad (19)$$

The demand for foreign currency stems from the demand for commodities or for financial assets. If there is implicit rationing of goods at the official rates, then there will be excess demand for certain classes of commodities. For some commodities there may be no official transactions (implying $\pi_{0i} \to \infty$). It is clear that the demand for foreign currency balances per se has been significant in Egypt, and because holding assets denominated in foreign currency is simply holding claims over foreign goods, it is the financial or portfolio demand for foreign currency that is pursued here.

An investor with I units of domestic currency who acquires an interest-bearing security denominated in foreign currency will earn $(I/\pi_b)\, i_w$ units of foreign currency, which he can repatriate at some future time at an expected black market rate of π_b^*. He compares the return from such a transaction with that which he can obtain from holding an asset denominated in domestic currency. The relative return is then

$$I(\pi_b^*/\pi_b)\, i_w/i_l,$$

or

$$\pi_b^*[r_w + (EP_b^w)^*]/\pi_b(r + EP^*) \quad (20)$$

where an asterisk denotes an expected value, and r_w and r are real rates of return in the rest of the world and Egypt, respectively. Assume that inflationary expectations dominate in the formation of short-term interest rates, and choose units so that initially $\pi_b = 1$. Then, the logarithmic differential of the demand for foreign currency on the black market can be represented as

$$EF_b^d = \phi_d[E\pi_b^* + (EP_b^w)^* - EP^*]. \quad (21)$$

Consider the expected depreciation of the Egyptian pound on the black market. Blejer notes that

> when . . . people compare past behavior of the exchange rate with the behavior of the ratio between the domestic and foreign prices and conclude domestic prices have been rising faster than foreign prices and this has not led to a corresponding depreciation of the black market rate (because of short term imperfections stemming from uncertainties generated by government intervention) they will expect as large a depreciation of the black market rate as is the observed inflation differential. In addition . . . people are likely to anticipate that any expected excess of domestic over foreign inflation will also be transmitted to the exchange rate.[19]

Consequently,

$$E\pi_b^* = (EP - EP_T^w - E\pi_b) + [EP^* - (EP_b^w)^*]. \quad (22)$$

In the event that the current rate is fully incorporated, the existing inflation differential—the first term on the right-hand side—will be zero, leaving only the expected differential. Substituting equation (22) into (21) yields

$$EF_b^d = \phi_d(EP - EP_b^w - E\pi_b). \quad (23)$$

For the black market to clear will require the following flow equilibrium condition to hold in every period: $EF_b^s = EF_b^d$, or from equations (19) and (23),

$$\phi_s(E\pi_b - E\bar{\pi}_0) = \phi_d(EP - EP_b^w - E\pi_b),$$

which yields

$$E\pi_b = f_1 E\bar{\pi}_0 + f_2(EP - EP_b^w), \quad (24)$$

where

$$f_1 = \phi_s/(\phi_s + \phi_d)$$

[19] M. I. Blejer, "Exchange Restrictions and the Monetary Approach to the Exchange Rate," in *The Economics of Exchange Rates*, p. 121.

and

$$f_2 = \phi_d/(\phi_s + \phi_d).$$

Substituting equation (13) into (24) yields

$$E\pi_b = b_1 E\bar{\pi}_0 + b_2[\sum_i \beta_{0i}(E\pi_{0i} + EP^w_{0i})] + b_3 EP^w_b + b_4(Ea + \gamma ED - Em_d). \quad (25)$$

The price in Egyptian pounds of a unit of foreign currency on the black market will fall (that is, π_b will rise) with a rise in the official exchange rates, with an increase in the foreign currency prices of tradable goods, or with an increase in the flow money supply. A rise in inflationary expectations will reduce the demand for real domestic money balances and, for a given rate of domestic credit creation, will result in an excess flow supply of money. This will be matched by an excess demand for tradable goods and hence for foreign currency. Moreover, Egyptians will increase their holdings of foreign currency relative to domestic currency in order to escape the inflationary tax on domestic money balances. As a consequence, the price of foreign currency on the black market will rise, devaluing the Egyptian pound; that is, $E\pi_b$ will rise as indicated in equation (25). In fact, increases in domestic inflation and inflationary expectations together with higher foreign interest rates have encouraged exactly this type of currency diversification in recent years, with an attendant devaluation of the black market pound.

The Demand for Real Money Balances

The demand for real money balances is postulated to depend on permanent income and the expected cost of holding money balances represented by the expected inflation rate. Because neither of these variables can be observed, a pair of adaptive expectation equations are imposed, which, after applying the Koyck transform twice, yield[20]

$$Em_d = m_0 + m_1 EM_{t-1} + m_2 EM_{t-2} + m_3 EP_t + m_4 EP_{t-1} + m_5 EY_t + m_6 EY_{t-1}. \quad (26)$$

Estimation and Results

The model consists of four structural equations to which are added stochastic error terms. They are the domestic inflation rate, equation (13); the balance of payments, equation (15); the black market exchange rate, equation (25); and the demand for real money balances, equation (26). these are estimated using two-stage least squares, incorporating equality restrictions on the coefficients of the ex ante supply ($Ea + \gamma ED$) and the demand for money (Em_d) in the first three equations. Annual data are used for the years 1947-81. All variables are in logarithmic differential form. Two official exchange rates are used: one for food and one for other official transactions.[21]

Structural Estimates

The exchange rates are given in Appendix 1, Table 17, and the data for estimating the model are given in Appendix 2, Tables 18-23.

Table 7 summarizes the estimates of the parameters of the structural equation. Figure 3 plots the actual and predicted values of the four endogenous variables. In both the domestic inflation rate and the balance-of-payments equations, the coefficients have the predicted signs and are significant. From the exchange rate equation, devaluation is significantly related to an excess ex ante flow supply of money. However, the official rates and the inflation rate are not significant.

The following elasticities can be derived from the money demand function. The elasticity of demand for real money balances for income is 0.38 in the short run and 1.42 in the long run. That for expected inflation is -0.86 in the short run and -2.71 in the long run. Crockett and Evans have estimated the long-run income elasticity of demand

[20] J. Kmenta, *Principles of Econometrics* (New York: Wiley and Sons, 1971), p. 478.

[21] There are no published series on the proportions of foreign trade transactions at the different rates. A series of different weighting schemes was tried, but as the rates are highly colinear the results were quite insensitive to the weights used.

Table 7—Estimates of structural parameters, two-stage restricted least squares

Explanatory Variable	Inflation Rate (EP)	Balance of Payments (ER)	Black Market Exchange Rate ($E\pi_b$)	Demand for Money (Em_d)
Intercept	...	...	...	0.01 (0.82)
WEXP	0.10 (1.96)*	0.09 (2.03)*	...	...
$Ea + \gamma ED$	0.33 (4.67)*	−0.59 (−9.35)*	0.29 (1.72)*	...
Em_d	−0.33 (4.67)*	0.59 (9.35)*	−0.29 (−1.72)*	...
$E\bar{\pi}_0$	−0.33 (4.67)*	0.59 (9.35)*	−0.30 (1.12)	...
WOEXP	...	...	0.14 (1.28)	...
EP_b^w	...	...	−0.30 (−1.02)	...
EP_t	...	...	...	−0.86 (−2.28)*
EP_{t-1}	...	...	...	0.21 (0.69)
EY_t	...	...	...	0.38 (1.78)*
EY_{t-1}	...	...	...	0.04 (0.23)
EM_{t-1}	...	...	...	0.66 (3.26)*
EM_{t-2}	...	...	...	−0.10 (−0.39)

Notes: t-values are given in parentheses. An asterisk indicates significance at the 10 percent level.

WEXP = $\sum_i \beta_{0i}(EP_{0i}^w + E\pi_{0i}) + \beta_b(EP_b^w + E\pi)$; E is the logarithmic differential operator; a is the money multiplier; D is the domestic credit component of the monetary base; m_d is the demand for real money balances; $\bar{\pi}_0$ is the weighted official exchange rate; WOEXP = $\sum_i \beta_{0i}(EP_{0i}^w + E\pi_{0i})$; P_t^w is the index of world prices for nonfood items; P_t is the domestic price level; P_{t-1} is P_t lagged one year; Y_t is GNP; Y_{t-1} is Y_t lagged one year; M_t is the money supply; and M_{t-1} and M_{t-2} are M_t lagged one and two years.

for broad money balances in Egypt at 1.83, using annual data for 1965-78.[22] In their work neither the inflation rate nor the London Eurodollar rate were significant in explaining the opportunity cost of holding money. In this study, however, the expected inflation rate has a significant negative effect.

Reduced-Form Elasticities

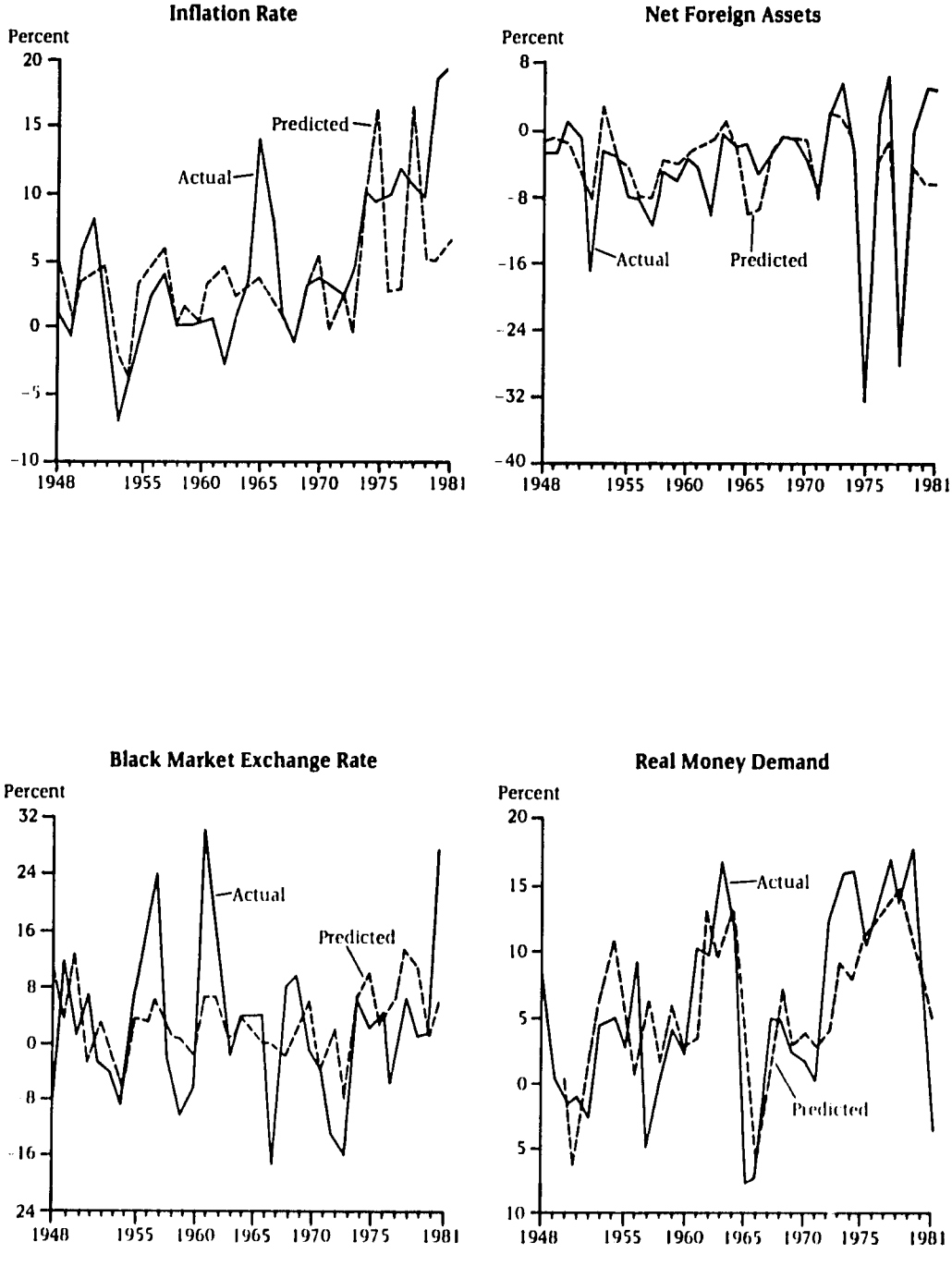
The four structural equations were used to derive estimates of the reduced-form parameters. Because the purpose is to examine the effects of government expenditures on inflation, the exchange rate, and the balance of payments, another nonstochastic structural equation is added.

Let the domestic credit component of the monetary base be made up of claims held by the Central Bank against the public (CU) and private (CP) sectors. Then

$$ED \equiv \gamma_u ECU + (1 - \gamma)ECP. \quad (27)$$

[22] A. D. Crockett and O. J. Evans, "The Demand for Money in Middle Eastern Countries," *International Monetary Fund Staff Papers* 27 (September 1980): 543-577.

Figure 3—Actual and predicted values of four endogenous variables, 1948-81



Assuming that the government deficit is financed by creation of additional liabilities at the Central Bank, then

$$CU_t - CU_{t-1} \equiv G - T,$$

or

$$ECU_t = \alpha_G EG - \alpha_T ET, \qquad (28)$$

which when substituted into equation (27) yields an identity for ED that is added to the structure to derive the reduced form. By breaking down current government expenditures into those for subsidies and the remainder, it is possible to derive reduced-form multipliers relating the principal endogenous variables to Egyptian government subsidy payments.[23] These have been expressed as elasticities using 1981 weights.

A 10 percent rise in government expenditures on food subsidies would increase the inflation rate by 5.3 percent, so that if the inflation rate were 20 percent it would be raised to 21 percent. The balance of payments worsens as a consequence of the monetary ramifications of deficit financing. In this model the endogenous variable measuring the balance of payments is defined as the change in net foreign assets and is expressed as a ratio of the broad money supply.

A 10 percent rise in subsidy expenditures lowers the ratio of the change in net foreign assets to the money supply (M2) by 35 percent. Alternatively, a rise of 10 percent in subsidies will reduce the stock of net foreign assets by 1.7 percent. Finally, the same increase in expenditures on subsidies can be expected to result in a devaluation of the black market exchange rate by 3.3 percent.

An Estimation of the Girton-Roper Model

In the discussion of the balance-of-payments equation the current equation was equated to that which Girton and Roper derived under some simplifying assumptions. The data for Egypt are now fitted to their model (as Connolly and Da Silveira did for Brazil). The model expresses the dependent variable (exchange market pressure) as a function of the growth in the domestic credit component of the monetary bases, changes in the foreign price level, and changes in real income, which act as shifters of the demand for money balances.

The results of this estimation are shown in Table 8. The basic model (version 1) is run for the full period from 1948-81. The estimates all have the correct signs and are generally significant, although the effect of real income is significantly less than unity. The second version includes a dummy variable for the years following the change of economic policy *(al-infitah)* because it was felt that the more open economy resulting from this change in policy would mean a closer relation between independent variables and the exchange market pressure. However, there is no empirical support for this hypothesis. Finally, a third version is estimated, restricting the observations to the years 1961-81 (see Table 8 and Figure 4). This corresponds to the period following the nationalization of foreign trade and the introduction of the exchange control system. The institutional arrangements are supposedly more uniform during this subperiod than during the total period. Certainly, the results for this version are superior; the R^2 value is now a healthy 0.62 and none of the coefficients differ from unity. The equation is remarkably similar to that of Connolly and Da Silveira for Brazil, shown in Table 8. Coefficients that conform closely to theoretical values and higher R^2 values are generally welcome, but in this case the problem remains of explaining why a model based on the free movement of goods and capital should perform in a superior manner when restricted to a period with extensive state interventions, at least up until the late 1970s. The results of estimating the Girton-Roper model for three different subperiods are shown in Figure 5.

In sum, inflation, the balance of payments, and exchange rates are determined by a host of real and monetary forces, both systematic and random. However, starting from simple propositions about the supply and demand for domestic and foreign monies, a series of equations can be directly estimated, as this chapter shows. The monetary approach is applied to a lengthy time series

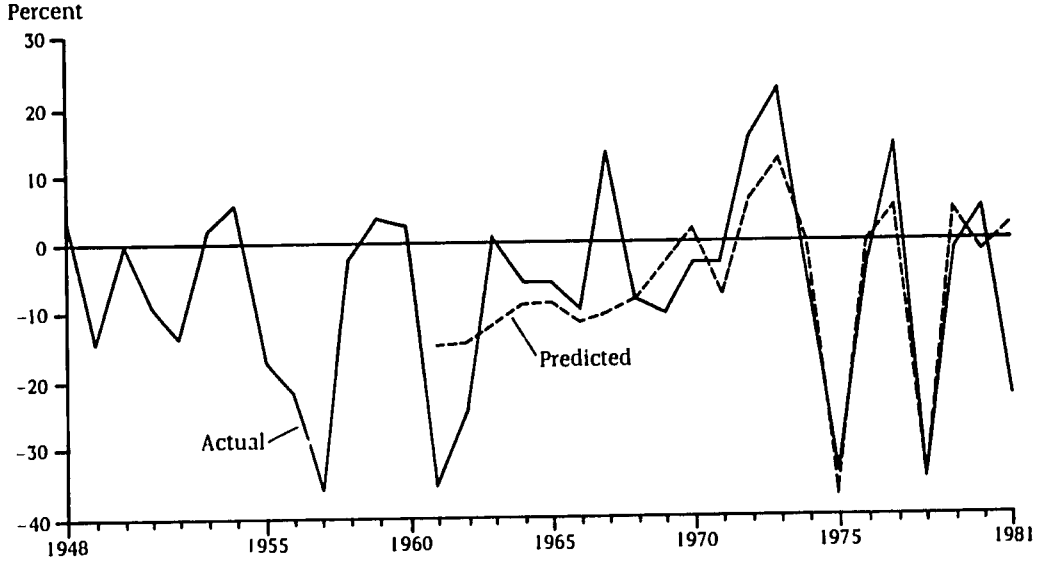
[23] It should be quite apparent that implying that the marginal unit of government expenditure is for subsidies rather than other government objectives is purely arbitrary.

Table 8—Estimates of a model of Egyptian exchange market pressure and a comparison with Brazil

Version	Country/ Period	Dependent Variable	Estimated Coefficients of the Independent Variables: Domestic Credit (ED)	Foreign Prices (EP^w)	Real Income (Ey)	al-Infitah	R^2 / F	D.W. / ρ	SSR / SER
1	Egypt 1948-81	$ER + E\pi_b$	−0.826 (−4.36)	0.65 (1.82)	0.41 (1.48)	---	0.42 7.51	1.97 −0.03	0.37 0.13
2	Egypt 1948-81	$ER + E\pi_b$	−0.86 (−4.40)	0.45 (1.03)	0.33 (1.12)	0.06 (0.81)	0.43 5.73	1.95 −0.04	0.38 0.13
3	Egypt 1961-81	$ER + E\pi_b$	−1.07 (−4.42)	1.26 (2.75)	0.92 (1.77)	---	0.62 6.82	1.56 0.01	0.38 0.12
1	Brazil 1955-75	$ER + E\pi_b$	−1.01 (−7.42)	1.29 (1.27)	1.27 (1.26)	---	0.68 17.68	2.22 −0.11	0.81 0.22

Notes: *Al-infitah* (the opening) is a dummy variable that represents the change in economic policy after 1973; ρ is the estimate of the first-order autocorrelation coefficient; SSR is the sum of squares due to regression; SER is the standard error of regression; R is the foreign asset component of the monetary base; and π_b is the black market exchange rate. The t-values are given in parentheses. The Brazilian equation is from M. Connolly and J. D. Da Silveira, "Exchange Market Pressure in Post War Brazil: An Application of the Girton-Roper Model," *American Economic Review* 69 (June 1979): 450.

Figure 4—Actual values of exchange market pressure, 1948-81, and predicted values, 1961-81

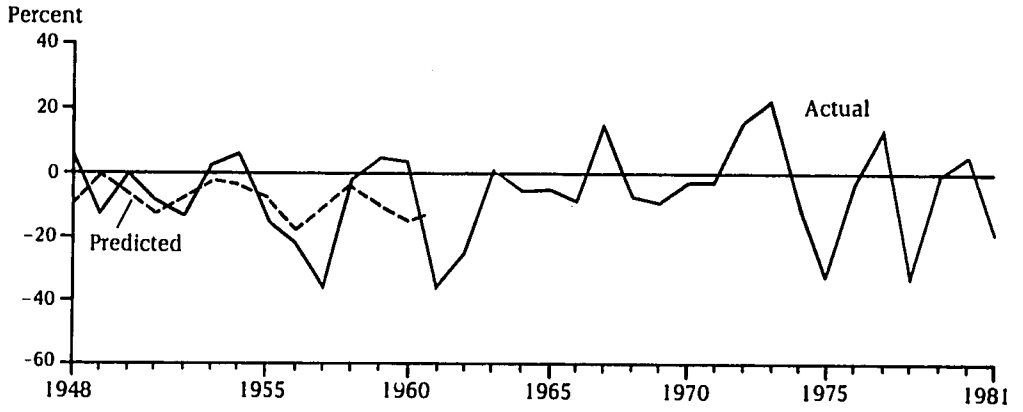


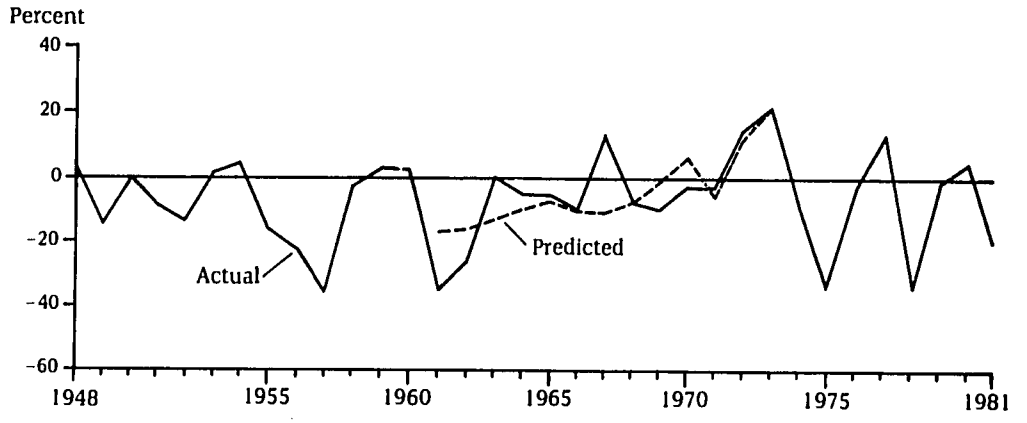
of annual Egyptian data, the existence of multiple official exchange rates is acknowledged, and a simultaneous equation model, which includes the black market rate, equations for the balance of payments, and the inflation rate, is estimated. Further work might include policy reaction functions that explain changes in the official exchange rates and in government expenditures. The predictive power of the model improves after 1973, when the economic policy became more open. Under the monetary approach, the control domestic credit component of the base might .tself be influenced by flows of net foreign assets. The need for such recognition of the role of sterilization is raised by Johannes.[24]

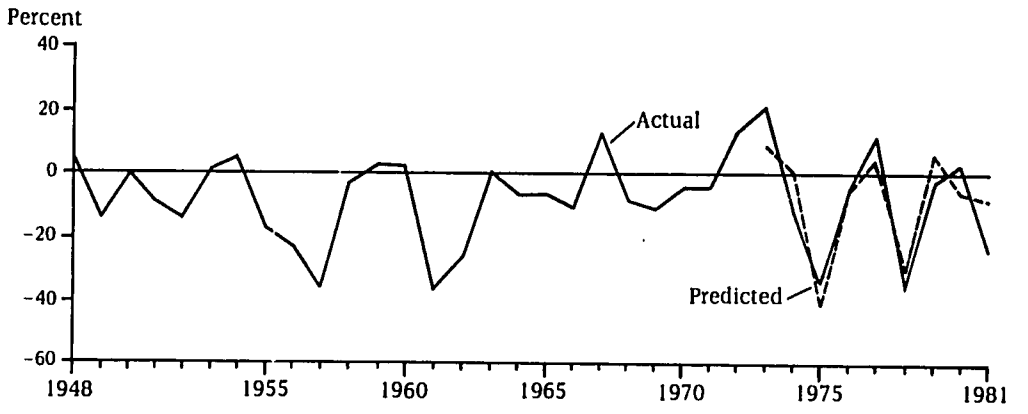
The results indicate that internal monetary disequilibriums are significant in explaining movements in all three major endogenous variables. Moreover, increases in Egyptian government deficit spending on the extensive system of consumer subsidies leads to accelerated inflation, a decline in net foreign assets, and a devaluation of the black market exchange rate. Although these are all nominal changes, they undoubtedly operate with enough lags to cause at least temporary disturbances of relative prices. As a consequence, the deficit financing of consumer subsidies could be expected to have repercussions for real resource allocation. To explore these effects would require a dynamic model. However a potentially important real effect of the food subsidy scheme is examined in Chapter 4.

[24] G. M. Johannes, "Testing the Exogeneity Specification Underlying the Monetary Approach to the Balance of Payments," *Review of Economics and Statistics* 63 (February 1981): 29-34. For a simultaneous equation model of exchange market pressure with policy reaction functions see J. S. Hodgson and R. G. Schneck, "Stability of the Relationship between Monetary Variables and Exchange Market Pressure: Empirical Evidence," *Southern Economic Journal* 47 (April 1981): 941-958.

Figure 5—Actual and predicted values of exchange market pressure using three different subperiods







4

FOOD SUBSIDIES: A SOURCE OF INSTABILITY IN THE INDUSTRIAL SECTOR

The Egyptian government is committed to a system of consumer subsidies; moreover, past evidence suggests that it is politically difficult to alter subsidies by an appreciable amount. The program of food subsidies relies heavily on imported food, and it is probable that both the own-price and income elasticities of demand for imported food are relatively low. Transitory changes in the price of wheat, for example, would probably have little effect on wheat imports. A political commitment to a food subsidy scheme is likely to mean considerable reluctance to make year-to-year changes in the quantities and prices of subsidized goods.

Consider, for example, the effects of a rise in the world price of imported wheat. If this leads to only a minor adjustment in the quantity of wheat imported, then the foreign exchange allocation for wheat must rise. This can be met by drawing down reserves, by borrowing, or by reducing other imports. Unexpected changes in the level of imports of raw materials, parts, and intermediate products will destabilize industrial output. As a consequence, the existing capital stock is likely to be underutilized. Furthermore, the rate of growth of the capital stock itself may be destabilized if food imports take priority over imports of machinery and capital goods.

The possibility of food imports crowding out the imports of essential raw materials and capital goods has been noted by a number of researchers. Bhagwati states that "'essential' consumer goods such as food have remained relatively large proportions of total imports in many LDCs. Furthermore, as in Chile, whenever foreign exchange 'shortages' become acute, governments have often tended to postpone their importation of capital goods rather than of essential consumer goods for obvious reasons."[25]

In the case of Indonesia, Pitt notes that "with export receipts falling, cuts in imports were necessary. Food shortages mandated the use of much of the available foreign exchange for food imports. As a result imports of raw materials were cut back drastically."[26]

Further evidence of this phenomenon comes from Tanzania. Lofchie argues that "due to the severe shortage of foreign exchange and the urgent need to use remaining currency reserves to finance immediate food requirements, the Government was compelled to impose stringent limitations on other imports. Since Tanzania had long since all but eliminated the acquisition of luxury items and other non-essentials, the new restrictions affected the importation of economically vital items such as raw materials for industry, new capital goods and spare parts. The result was a serious economic slump."[27]

Finally, Carr makes explicit the problem in Egypt: "The worsening foreign exchange crisis which was directly related to the rise in public consumption, made it difficult for many firms to obtain imports of raw materials and spare parts .... Capacity utilization rates consequently fell."[28]

It is the aim of this chapter to examine and quantify whether food imports have indeed replaced capital goods and raw materials in Egypt. There are two principal

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[25] Jagdish N. Bhagwati, *Foreign Trade Regimes and Economic Development: Anatomy and Consequences of Exchange Control Regimes* (Cambridge, Mass.: Ballinger Publishing Co., 1978), p. 22.

[26] M. M. Pitt, "Alternative Trade Strategies and Employment: Indonesia," in *Trade and Employment in Developing Countries*, ed. A. O. Krueger, H. B. Lary, T. Monson, and N. Akrasanee, vol. 1: *Individual Studies* (Chicago: University of Chicago Press, 1981), p. 134.

[27] M. F. Lofchie, "Agrarian Crisis and Economic Liberalization in Tanzania," *Journal of Modern African Studies* 16 (No. 3, 1978): 451-475.

[28] David W. Carr, *Foreign Investment and Development in Egypt* (New York: Praeger Publishers, 1979), p. 29.

steps involved. The first is to consider the effect of changes in imports of industrial raw materials and capital goods on the rate of output and the level of investment in the industrial sector. The second is to examine the relation between food imports and industrial imports. Finally, these two steps can be combined to consider the effect of exogenous changes in world food prices and foreign exchange on industrial output and growth.

Industrial Output, Investment, and Imports

The basic data for industrial output, investment, and imports are given in Appendix 2, Table 24, in constant 1975 LE. The variables were expressed as deviations (D) around the trend, estimated by the least squares regression against time. The value of industrial output and investment, their trends, and deviations from trend are shown in Figure 6. The deviations around the trend for four categories of industrial imports are summarized in Figure 7.

The next step is to use these deviations from trend values in models of the form

$$DY_j = a + \beta DX_i + \varepsilon, \qquad (29)$$

where DY_j is the deviation from trend of either industrial output or investment, and DX_i is the deviation from trend in each of the four categories of imports. The results of estimating these models are also given in Table 9. The proportion of total variation explained is consistently high, with the exception of the imports of raw materials. However, the slope coefficients are all significantly different from zero at 1 percent. The elasticities evaluated for the average of the years 1977-79 are also shown in this table, and all are between 0.7 and 1.0 with the exception of raw materials, which are about 0.4 for both models. The values of the actual and predicted levels of industrial output and investment from each of the four equations are shown in Figures 8 and 9.

Clearly, the ability of these simple models to track deviations in industrial output and investment is quite adequate. The models make no allowances for changes in inventories, and this could well account for discrepancies between output and imports of industrial plants. Faced with the knowledge that supplies of imported inputs are likely to fluctuate, manufacturers could be expected to hold larger inventories.

Kanovsky argues that even if imported supplies of raw materials and parts had been adequate, poor internal distribution arising from the cumbersome centralized system of controls could well account for some of the

Table 9—Effect of changes in the level of imported industrial materials on industrial output and investment

	Dependent Variable			
	Industrial Output		Investment in Industry	
Explanatory Variable	Slope	R^2	Slope	R^2
Imports of raw materials	2.13 (0.74) [0.41]	0.30	2.74 (0.93) [0.42]	0.28
Imports of basic manufactured goods	1.08 (0.21) [0.72]	0.54	1.63 (0.17) [0.89]	0.81
Imports of machinery and transport equipment	0.61 (0.08) [0.92]	0.74	0.74 (0.10) [0.90]	0.72
Total industrial imports	0.33 (0.05) [0.83]	0.64	0.43 (0.05) [0.88]	0.74

Notes: All variables are expressed in real terms as deviations from trend. Standard errors appear in parentheses. Elasticities for the average of the years 1977-79 are given in square brackets.

Figure 6—Industrial output and investment, 1956-79

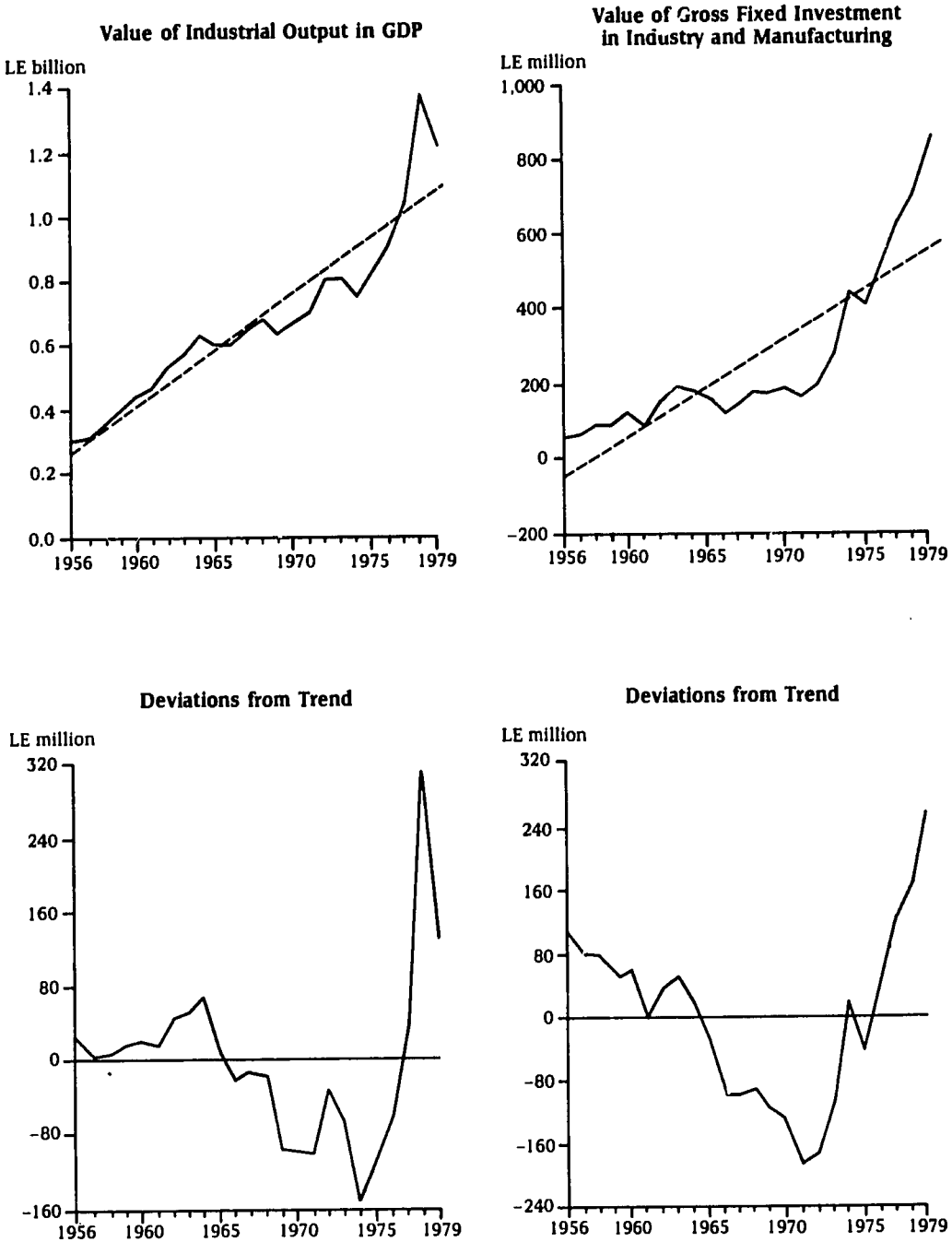


Figure 7—Deviations from trend of industrial imports, 1956-79

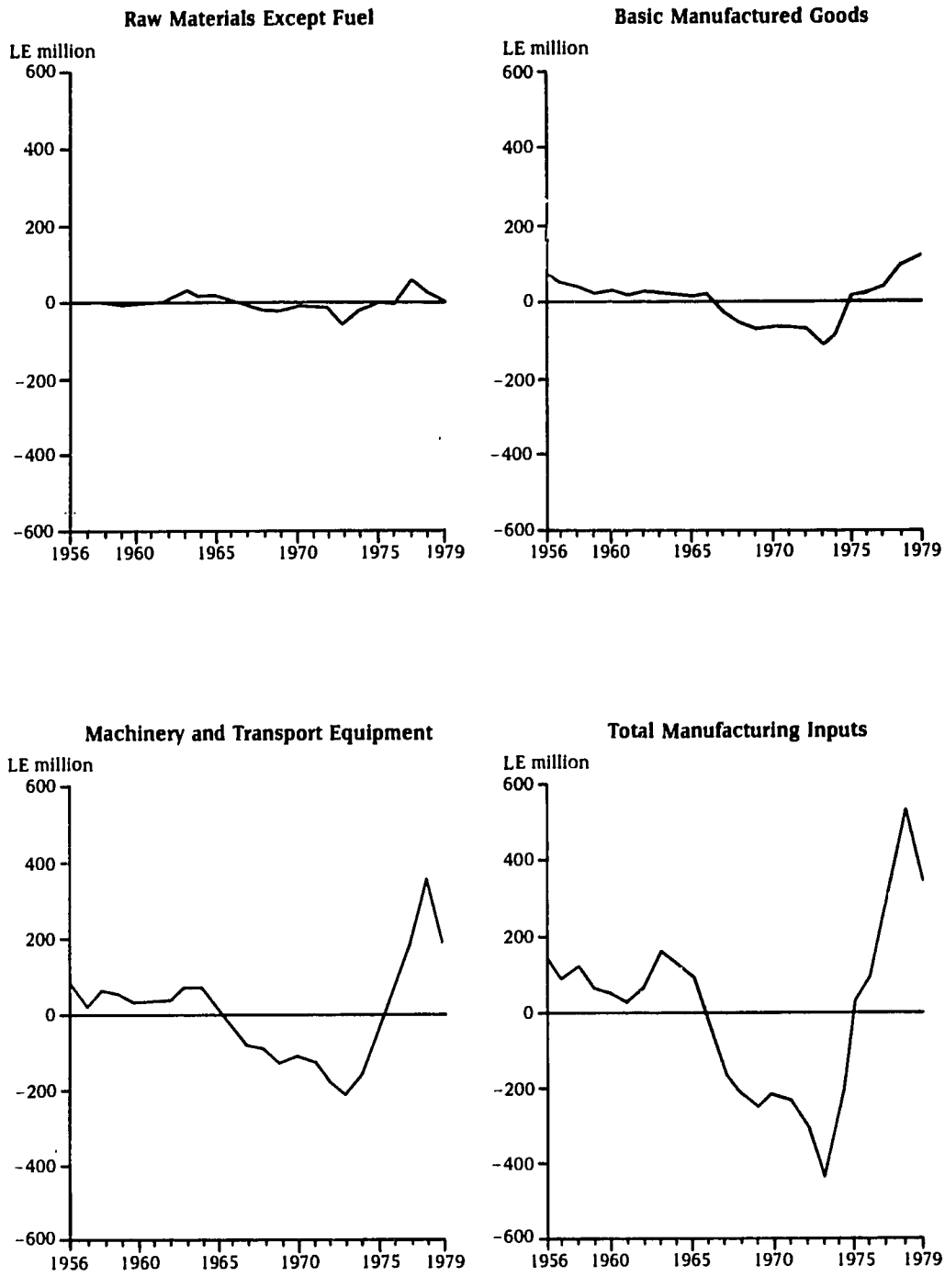


Figure 8—Relationship between output and four categories of industrial imports, 1956-79

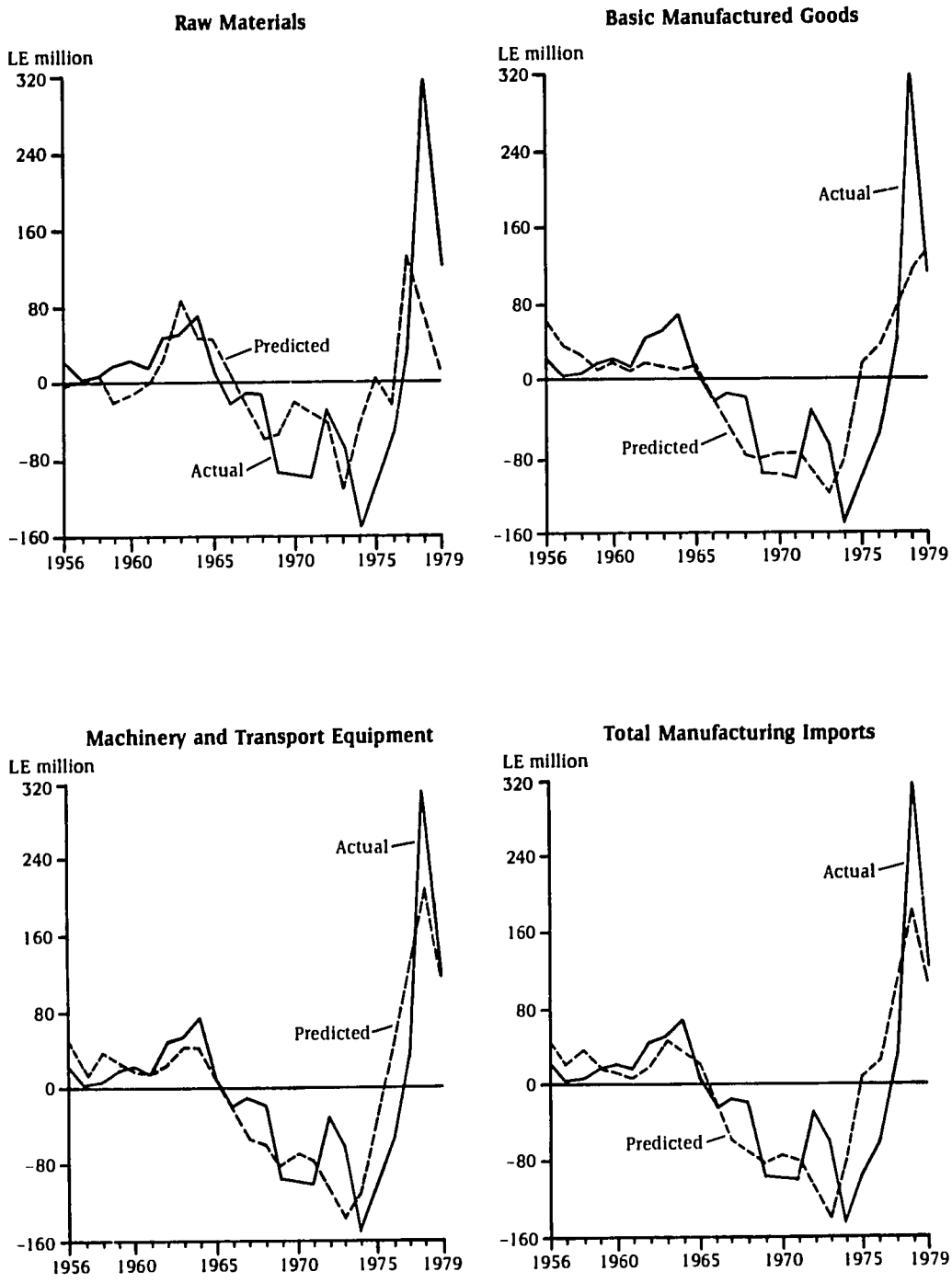
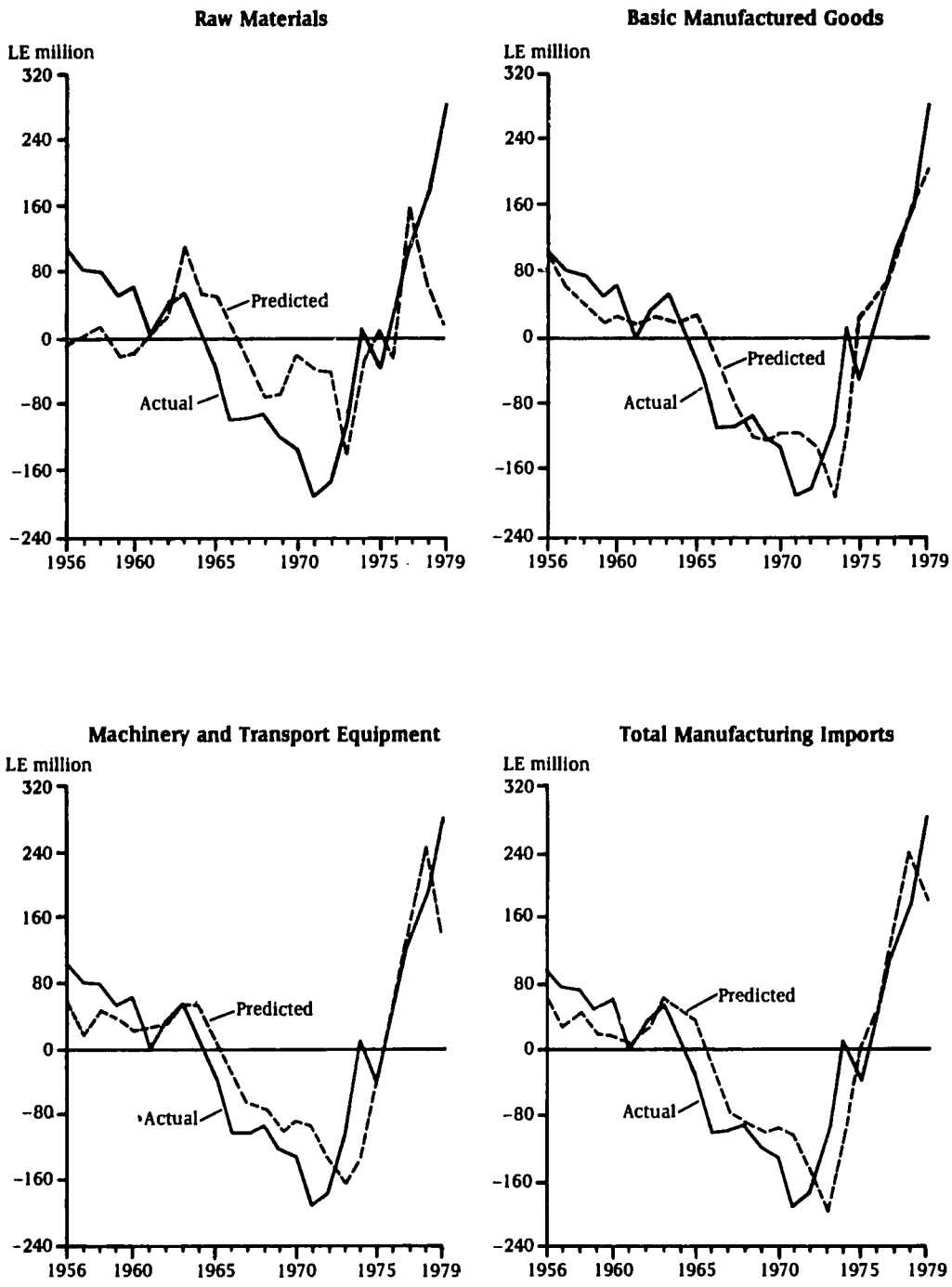


Figure 9—Relationship between investment and four categories of industrial imports, 1956-79



variations in industrial output.[29] However, the results in Table 9 leave little doubt that fluctuations in imported supplies are related to output and investment. Caution is needed in inferring causality, because it is conceivable that cyclical variations in aggregate demand are reflected in changes in the demand for industrial imports. However, under Egypt's system of foreign exchange budgeting, it is plausible that changes in aggregate demand affect imports less directly than administrative controls on imports or output. Furthermore, if the cyclical impact of aggregate demand on imports lasts longer than one year, its effect will be at least partially removed by the detrending of the variables.

In examining the relation between different classes of imports, previous work has suggested that fluctuations in world wheat prices did result in changes in the level of other imports.[30] A study by Junginger-Dittel and Reisen used disaggregated classes of imports but imposed a restriction that all elasticity of demand for imported food was zero.[31] The failure to use a complete system of demand equations resulted in difficulties with their estimation procedure, as food expenditures and total import expenditures were colinear.[32]

In both of these studies it was assumed that total import expenditures constituted all appropriate budget constraints. This is only appropriate if imports comprise a separable class of goods, a proposition that can be tested. The following approach uses a complete system of disaggregated import demand equations and tests the hypothesis of separability.

A Complete Systems Approach to Import Demand

The use of a systems approach to commodity or factor demand has become increasingly widespread as a means of consistently estimating response parameters.[33] The method has been used in import demand studies.[34]

The first step is to test the assumption of weak separability between domestic and imported goods. This means that the marginal rate of substitution between any two imported goods is independent of the quantity of any domestic good and vice versa.[35]

For this purpose only three categories of goods are considered: food, machinery and manufactured products, and the remainder. Annual data for the years 1962-74 are used. The gross value of domestic production less exports is used for the domestic components, each deflated by an appropriate index of prices. International commodity trade statistics are used for the imported components. However, because price indexes for categories of imports are not available, international price indexes are used. These refer to the unit prices of different categories of commodities traded between and among market and nonmarket countries and developing countries. They are not specific to Egypt. The presumption is that the prices actually paid by Egypt are highly colinear with these series. This matter will be addressed later.

The test for separability is constructed as follows. A completely general utility function would take the form

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[29] E. Kanovsky, *The Egyptian Economy Since the Mid 1960s: The Micro Sectors*, Occasional Paper, Shiloah Centre for Middle Eastern and African Studies (Tel Aviv: Tel Aviv University, June 1978).

[30] Scobie, *Government Policy and Food Imports*.

[31] K. O. Junginger-Dittel and H. Reisen, "Import Instability and LDCs' Response: The Destabilization of the Inflow of Capital and Intermediate Goods," *Weltwirtschaftliches Archiv* 115 (No. 4, 1979): 653-669.

[32] Ibid., p. 660.

[33] Henri Theil, *The System-Wide Approach to Microeconomics* (Chicago: University of Chicago Press, 1980).

[34] See, for example, A.P. Barten, "An Import Allocation Model for the Common Market," *Cahiers Economiques de Bruxelles* 50 (Second Trimester, 1971): 153-164; D. F. Burgess, "A Cost Minimization Approach to Import Demand Equations," *Review of Economics and Statistics* 55 (May 1974): 225-234; and R. G. Gregory, "United States Imports and Internal Pressure of Demand: 1948-1968," *American Economic Review* 61 (March 1971): 28-47.

[35] For further details see Mostafa Ez Elarab, "Separability and the Demand for Egyptian Imports" (Ph.D. thesis, North Carolina State University, 1982). I am grateful to the author for permission to draw on this work.

$$U = U(q_1^d, q_2^d, q_3^d, q_1^m, q_2^m, q_3^m), \quad (30)$$

where the sum of expenditures on the three classes of domestic and imported goods would constitute the relevant budget constraint for the derivation of a reduced-form system of demand equations. If domestic and imported goods are weakly separable then the utility function can be written as

$$U = U[U^d(q_1^d, q_2^d, q_3^d), U^m(q_1^m, q_2^m, q_3^m)]. \quad (31)$$

This implies a two-stage budgeting system where total expenditures are first allocated between the two groups of goods and then, as Philips states, "a subset of demand equations inside a branch can be estimated using only the prices of goods in the branch and total expenditureson goods in the branch."[36]

To test whether this structure is appropriate, it is necessary to derive the implications of separable utility for the parameters of the implied demand systems.

In general, the compensated cross-substitution terms (K_{ij}) are given by

$$K_{ij} = (\partial q_i/\partial P_j) + [q_j(\partial q_i/\partial y)]. \quad (32)$$

Under weak separability, it can be shown that these terms are proportional to the income derivatives, so

$$k_{ij} = \phi(\partial q_i/\partial y) \cdot (\partial q_j/\partial y). \quad (33)$$

The specific estimation model used here is known as the Rotterdam model and is given by

$$\bar{w}_{it}^r Dq_{it}^r = \mu_i DQ_t + \sum_r \sum_j \pi_{ij}^r D\phi_{jt}^r + \varepsilon_{it}^r, \quad (34)$$

where

r = the group index (either domestic or imported),

$\bar{w}_{it}^r$ = the average budget share calculated as $\frac{1}{2}(w_{it}^r + w_{it-1}^r)$,

$Dq_{it}^r = d\ln q_{it}^r$,

$DQ_t = \sum_i \bar{w}_{it}^r Dq_{it}^r$, and

$Dp_{jt}^r = d\ln p_{jt}^r$.

The following general restrictions apply to the parameters (the marginal budget shares) and π_{ij}^r (the compensated cross-substitution terms):

Symmetry: $\pi_{ij}^r = \pi_{ji}^r$,

Homogeneity: $\sum_r \sum_j \pi_{ij}^r = 0$,

Additivity: $\sum_r \sum_i \mu_i^r = 1$, and

Negativity: $\pi_{ii}^r < 0$.

Homogeneity is imposed by expressing prices and incomes in deflated terms. And, because additivity implies a singular variance-covariance matrix, one equation is deleted (the last, for other imported goods). The negativity condition is not imposed but instead will be examined after the estimation. Finally, symmetry will be imposed.

These four general sets of restrictions hold for any utility function. Imposition of weak separability imposes some additional restrictions. The condition on the cross-substitution effect can be written:

$$\pi_{ik} = \phi\mu_i\mu_i,$$

and

$$\pi_{ji} = \phi\mu_j\mu_k,$$

or

$$\pi_{ik}/\pi_{jk} = \mu_i/\mu_k. \quad (35)$$

These comprise a set of nonlinear restrictions on the parameters of the Rotterdam model. The model is estimated subject to symmetry restrictions but without the separability restrictions. A second set of estimates is derived when both types of restrictions are imposed. A comparison of the error

[36] L. Philips, *Applied Consumption Analysis* (Amsterdam: North Holland, 1978), p. 74.

sums of squares reveals no significant increases as a result of the imposition of separability constraints. The null hypothesis that Egyptian import demands are determined by an allocation of total import expenditures among the different categories cannot be rejected.

This is an important finding, implying as it does that it is legitimate to proceed with a system of import demand equations using import prices and total import expenditures as their arguments. The model can now be estimated.

First, six categories of inputs are defined using the United Nations Standard International Trade Classification (SITC):

Commodity	SITC Code
Food	0 + 1
Raw materials	2 + 4
Fuel	3
Chemical products	5
Machinery	7
Other manufactures	6 + 8

Annual data for the import expenditures on each category are given in Table 10. Again, in the absence of specific Egyptian unit value import price indexes, United Nations data are used for exports from developed market to developing market economies (see Table 11).[37] The data period was extended to cover 1962-78.

The first set of unrestricted estimates is given in Table 12. The proportion of the variation in the real volume of imports that is explained is extremely satisfactory. The models included a dummy variable for the years 1967-73 to allow for the possible influence of military endeavors on the amount and composition of imports. Food imports were significantly lower in these years, whereas the volume of chemical products imported significantly increased. All own-price elasticities are negative (as required), and all total expenditure elasticities are positive with the exception of that for food.

The results from imposing symmetry are given in the form of elasticities in Table 13. Own-price elasticities are all negative except for raw materials, and expenditure elasticities are all positive, with food having the lowest value.

In both the constrained and unconstrained estimates, the own-price elasticity of imported food is large in absolute size (−2.33 and −0.95, respectively). This arouses the suspicion that the United Nations' price indexes may not be as appropriate a proxy for the prices actually paid by Egypt as had been hoped. Therefore, a direct Egyptian index is constructed. It is to be expected that a price index based on the averaging of many trade flows would be less variable than that for the imports of any given country. If this is so, it could well account for the apparently elastic price response, as any given quantity change would be associated with an artificially small variation in price.

The following commodities are used in constructing the price index.

Commodity	SITC Code
Meat (fresh, chilled, and frozen)	011
Meat (tinned n.e.s. or prepared)	013
Milk and cream	022
Butter	023
Cheese and curd	024
Fish (fresh and simply preserved)	031
Fish (tinned and prepared)	032
Wheat (unmilled)	041
Maize (unmilled)	044
Wheat (meal or flour)	046
Fruit (fresh) and nuts (fresh and dry)	051
Vegetables (fresh and simply preserved)	054
Sugar and honey	061
Coffee	071
Tea and maté	074
Animal feedstuffs	081
Tobacco (unmanufactured)	121
Tobacco (manufactured)	122

For the years 1962-78 the value and quantity of Egyptian imports of each of these commodities is used to form the im-

[37] United Nations, Department of International Economic and Social Affairs, *Commodity Trade Statistics*, various issues (New York: UN, various years).

Table 10—Import expenditures, food and nonfood sectors, 1962-78

Year	Food	Raw Materials	Fuel	Chemical Products	Machinery	Other Manufactures	Total
				(US $ 1,000)			
1962	173,857	76,540	73,416	66,976	176,640	123,530	690,959
1963	204,534	108,422	86,733	108,650	233,910	136,230	914,479
1964	257,370	115,782	91,356	93,840	252,770	140,300	951,058
1965	244,237	113,482	74,865	116,750	217,860	165,146	932,334
1966	281,796	115,105	78,039	134,751	274,530	180,688	1,067,409
1967	285,338	110,689	24,490	29,720	69,210	110,016	630,463
1968	194,215	84,640	52,189	76,140	162,638	96,131	665,953
1969	135,545	90,865	56,489	94,756	153,155	106,983	637,793
1970	136,155	129,437	73,862	102,051	208,952	136,046	786,596
1971	216,014	144,438	70,659	111,929	222,709	153,986	919,753
1972	182,192	172,339	59,757	123,754	196,439	163,736	892,260
1973	243,168	120,710	23,797	139,082	226,481	161,155	914,415
1974	907,229	298,552	65,595	327,117	422,751	329,422	2,350,690
1975	105,344	612,642	272,416	518,507	804,949	667,205	3,933,730
1976	977,170	338,627	221,457	369,341	1,174,601	779,785	3,861,733
1977	1,012,153	546,210	109,129	494,009	1,672,396	978,208	4,815,281
1978	1,551,618	601,618	109,922	633,769	2,452,611	1,353,130	6,726,640

Source: United Nations, Department of International Economic and Social Affairs, Statistical Office, *Commodity Trade Statistics* (New York: UN, various years).

Note: The average share of food in total imports is 26.3 percent; of raw materials, 13.2 percent; of fuel, 6.5 percent; of chemical products, 11.7 percent; of machinery, 25.0 percent; and of other manufactures, 17.2 percent.

Table 11—Unit value import prices, food and nonfood sectors, 1962-78

Year	Food	Raw Materials	Fuel	Chemical Products	Machinery	Other Manufactures
1962	83	103	102	99	113	111
1963	88	104	101	97	114	112
1964	93	106	101	97	116	114
1965	96	102	99	107	92	93
1966	97	103	98	105	93	95
1967	98	101	96	102	97	95
1968	96	93	96	94	89	91
1969	99	96	97	97	87	94
1970	100	100	100	100	100	100
1971	104	102	124	103	113	102
1972	115	105	131	107	126	110
1973	158	134	179	139	147	135
1974	221	192	528	214	166	176
1975	222	192	563	219	200	191
1976	209	198	605	198	214	188
1977	220	216	654	208	235	200
1978	234	232	656	232	284	234

Source: United Nations, Department of International Economic and Social Affairs, Statistical Office, *Yearbook of International Trade Statistics* (New York: UN, various years).

Note: 1970 = 100.

Table 12—Unrestricted estimates of parameters of a complete system of import demand equations

Change in the Real Import Volume of	Dummy Variable for 1967-73	Change in the Price of					Change in Import Expenditures	F	R^2
		Food	Raw Materials	Fuel	Chemical Products	Machinery			
Food	−0.10 (0.05)*	−0.25 (0.52) [−0.95]	−1.01 (0.65)	0.50 (0.14)	0.38 (0.43)	0.27 (0.33)	0.08 (0.11) [0.33]	4.47*	0.80
Raw materials	−0.01 (0.03)	−0.07 (0.37)	−0.54 (0.46) [−1.14]	0.03 (0.09)	0.35 (0.30)	0.20 (0.23)	0.09 (0.08) [0.69]	1.58	0.58
Fuel	0.02 (0.02)	0.10 (0.19)	−0.03 (0.24)	−0.09 (0.05) [−1.22]	−0.07 (0.16)	−0.04 (0.12)	0.14 (0.04)* [2.06]	3.45	0.75
Chemical products	0.04 (0.01)*	0.30 (0.15)	−0.17 (0.19)*	−0.13 (0.04)*	−0.23 (0.12)* [−1.90]	0.20 (0.09)*	0.26 (0.03)* [2.16]	14.72*	0.93
Machinery	0.05 (0.04)	0.15 (0.47)	1.17 (0.59)*	−0.27 (0.13)*	−0.66 (0.38)	−0.40 (0.30) [−1.61]	0.45 (0.10)* [1.81]	4.97	0.81

Notes: Standard errors are given in parentheses below the estimated coefficient. Own-price and total expenditure elasticities are given in square brackets and are computed as $\eta_{ii} = \hat{\pi}_{ii}/\overline{w}_i$; $\eta_i = \hat{\mu}_i/\overline{w}_i$.

An asterisk indicates significance at the 10 percent level.

Table 13—Elasticities constrained by symmetry from a complete system of import demand equations

Percentage Change in the Real Import Volume of	1 Percent Change in the Price of					1 Percent Change in Import Expenditures
	Food	Raw Materials	Fuel	Chemical Products	Machinery	
Food	−2.33*	−0.11	0.99*	1.21*	0.72	0.14
Raw materials	−0.21	1.46	−1.02*	−0.39	−0.40	1.50*
Fuel	3.67*	−1.90*	−0.91	−0.98*	0.33	2.05*
Chemical products	2.61*	−0.42	−0.57*	−1.59*	−1.73*	1.87*
Machinery	0.75	−0.21	0.08	−0.83*	−0.58	1.10*

Notes: The model was estimated with an interest variable and a dummy variable (1976-73 = 1) in each equation. An asterisk indicates that the coefficient was significant at the 10 percent level.

plicit price. The prices are then used to form an index of imported food prices:

$$P_t = \sum_i \alpha_{it} \ln \hat{P}_{it},$$

where α_{it} is the share of each food in total food imports. Without access to the commodity trade statistics on tape this process was sufficiently laborious to limit its use to food. The use of this variable for food prices reduces the own-price elasticity to a value not significantly different from zero (Table 14). This is consistent with the expectation that the subsidy scheme would lead to an inelastic demand for food.

Separate figures for wheat are of interest because an average of 60 percent of the food import bill has been for wheat (and wheat flour). The food group was split into two groups: wheat (comprising SITC codes 041 + 046) and the remainder (designated "other food"). The results for this model are given in Table 15. Again, a dummy variable for the years 1967-73 was included. It is interesting to note that the real volume of wheat imports was not significantly reduced during the "war" years, but that imports of other food were significantly lower. Again the real volume of chemical imports was higher. The R^2 values given in the last column of Table 15 indicate that a significant amount of the variation in the real volume of imports is explained by this model.

The own-price elasticity of demand for imported wheat is not significantly different from zero, whereas the own-price elasticity of other food imports is −2.13. This is consistent with the importance of wheat in the subsidy program and with a highly inelastic import demand. Table 15 also shows the elasticities for the residual category of other manufactures. The coefficients from which these elasticities are derived are found by applying the homogeneity and additivity restrictions. The elasticities of both wheat and other food with respect to total import expenditures are low compared to most categories of nonfood imports. This implies

Table 14—Elasticities constrained by symmetry from a complete system of import demand equations using a constructed price index for imported food

Percentage Change in the Real Import Volume of	1 Percent Change in the Price of					1 Percent Change in Import Expenditures
	Food	Raw Materials	Fuel	Chemical Products	Machinery	
Food	0.08	0.14	0.05	−0.13	−0.21	0.72*
Raw materials	0.28	−0.94	0.37	0.76	1.37	1.19*
Fuel	0.20	−0.70	−0.10	−0.52	0.57	1.50*
Chemical products	−0.27	0.82	−0.30	−0.25	−1.75*	1.57*
Machinery	−0.21	0.70	0.16	−0.84*	−1.01*	1.03*

Notes: The model was estimated with an intercept and a dummy variable (1967-73 = 1) in each equation. An asterisk indicates that the coefficient was significant at the 10 percent level.

Table 15—Elasticities constrained by symmetry from a complete system of import demand equations using a constructed price index for imported wheat and other food

Percentage Change in the Real Import Volume of	Dummy Variable (1967-73 = 1.00)	1 Percent Change in the Price of							1 Percent Change in Import Expenditures	R^2
		Wheat	Other Food	Raw Materials	Fuel	Chemical Products	Machinery	Other Manufactures		
Wheat	−0.01	0.62	0.11*	−0.21	−0.02	0.09	0.09	−0.69	0.18	0.53
Other food	−0.04*	−0.17	−2.13*	−0.24	0.22	0.77*	1.45*	−0.20	0.20	0.84
Raw materials	0.01	−0.26	−0.18	−0.91	0.24	0.63	1.05	−0.57	0.95*	0.58
Fuel	0.02	−0.06	0.31	0.44	−0.66	−1.03	−0.33	1.33	1.00*	0.78
Chemical products	0.04*	0.12	0.64*	0.69	−0.60	−0.55	−2.03*	−1.73	1.94*	0.85
Machinery	0.01	0.06	0.58*	0.55	−0.09	−0.98*	−1.18	−1.06	1.39*	0.80
Other manufactures	---	−0.65	−0.12	−0.41	0.53	1.24	−1.56	0.97	0.11	---

Notes: The model was estimated with an intercept term in each equation. An asterisk indicates that the coefficient was significant at the 10 percent level. The R^2 values apply to the ordinary least squares estimates of the unconstrained model.

that a fall in foreign exchange supplies is not reflected in a significant drop in the volume of imported foodstuffs. Rather, the real quantities of other imported commodities are reduced. In addition, of course, reserves may be drawn down and net foreign liabilities increased, but these do not appear explicitly in the current model. It is evident, however, that the decline in the volume of imports accompanying a decline in foreign exchange supplies falls most heavily on industrial raw materials and capital goods. The elasticity of the volume of imports of other manufactures to total import expenditures is found to be quite low (Table 15). This category includes manufactured consumer goods. It appears that Egypt has tried to maintain the real volume of imports of foodstuffs and other consumer goods when foreign exchange supplies fell, and that this has been at the expense of imports of intermediate industrial materials and capital goods. The estimated marginal budget shares for the seven categories of imports are shown below:

Category	μM_i
Wheat	0.03
Other food	0.02
Raw materials	0.12
Fuel	0.14
Chemical products	0.23
Machinery	0.35
Other manufactures	0.11
$\hat{\Sigma}\mu_i$	1.00

The value of 0.03 for wheat is not significantly different from the value of 0.05 found using a model with only two categories of imports, although this model allows for the simultaneous allocation of foreign exchange to reserve adjustments and imports.[38]

A rise in the world price of wheat or other foods reduced the real quantity of imports of both raw materials and other manufactured goods, although apparently not the imports of chemicals and machinery. Both these categories are negatively related to the price of imported food (Table 15), indicating that these results are somewhat sensitive to the specification, although it must be stressed that the hypothesis that these coefficients are zero cannot be rejected.

Reliable estimates of the cross-price elasticities are not easy to obtain. They tend to be sensitive to errors in the data as well as in the specification of the model. However, the estimates of the income elasticities (or marginal budget shares) are more stable and statistically significant. For this reason all empirical estimates of the effects of changes in imported food prices should be treated as indicative only.

A Synthesis

Two important steps have now been completed. First, the effect of fluctuations in industrial imports on output and investment in the industrial sector has been examined. Second, a complete system of import demand equations has been fitted in order to estimate the effect on industrial imports of exogenous changes in food prices and foreign exchange supplies.

Consider the effect of a change in the price of imported food. For simplicity the following notation is used:

V = the real value of industrial output,

M = the real value of imports of industrial goods, and

P_f = the price of imported food.

The elasticity of interest is that which links V and P_f, that is, $(\delta V/V)/(\delta P_f/P_f)$. This elasticity can be written as

$$\eta_{V,P} = \frac{\delta V}{\delta P_f} \cdot \frac{P_f}{V} = \left(\frac{\delta V}{\delta M} \cdot \frac{M}{V}\right)\left(\frac{\delta M}{\delta P_f} \cdot \frac{P_f}{M}\right)$$

$$= \eta_M \cdot \eta_P.$$

The decomposition on the right-hand side allows the formation of estimates of $\eta_{V,P}$. The first term is simply the elasticity of industrial output with respect to imported goods. The second is the cross-price elasticity of imported industrial goods with respect to world food prices. For industrial raw materials the first term is 0.41 (see Table 9). The esti-

[38] Scobie, *Government Policy and Food Imports*, p. 54.

Table 16—Estimation of the effect of imported food prices on industrial output

Elasticity of Industrial Output With Respect to Imports of Raw Materials (η_M)	Elasticity of Imports of Raw Materials With Respect to the Price of Imported Food (η_P)	Elasticity of Industrial Output With Respect to the Price of Imported Food ($\eta_{V.P}$)
0.41	−0.20	−0.08
0.41	−0.30	−0.12
0.41	−0.40	−0.16
0.41	−0.50	−0.20
0.41	−0.60	−0.24

mates of the elasticity of raw material imports with respect to the price of food are given as −0.07 and −0.21 (see Tables 12 and 13). From Table 15 the elasticities of raw material imports with respect to the prices of wheat and other foods are −0.26 and −0.18 respectively. The results in Table 16 summarize the calculations. On the basis of the results, it appears that a 10 percent rise in the price of imported food would result in a drop in the volume of industrial output of 1-2 percent.

In the case of gross fixed investment in industry and manufacturing, the analogous elasticity is examined:

$$\eta_{I.P} = \frac{\delta I}{\delta P_f} \cdot \frac{P_f}{I} = \left(\frac{\delta I}{\delta M} \cdot \frac{M}{I}\right)\left(\frac{\delta M}{\delta P_f} \cdot \frac{P_f}{M_1}\right)$$

$$= \eta_M \cdot \eta_P,$$

where I is investment and M refers to imported capital goods. From Table 9, the elasticity of industrial investment with respect to imports of machinery and transport equipment is 0.90, which is combined with an estimate of the imports of machinery with respect to the price of food of −0.21 from Table 14. This gives a value of −0.19. A 10 percent rise in the world price of food leads to a 2 percent decline in the real level of gross fixed investment in industry.

To this point the effect of exogenous changes in the price of imported food has been considered. The analysis has relied on estimates of cross-price elasticities, the signs and significance of which were erratic. The effects of a change in foreign exchange supplies will now be examined. This depends on estimates of expenditure elasticities whose pattern and statistical significance warrant much stronger conclusions.

As noted earlier, the import expenditure elasticities for food (wheat and other food in Table 15) are much lower than for industrial imports. Thus any decline in foreign exchange availability will disproportionately affect industrial imports. The effect on current output can be gauged from the elasticity

$$\eta_{V.F} = \frac{\delta V}{\delta F} \cdot \frac{F}{V} = \left(\frac{\delta V}{\delta M} \cdot \frac{M}{V}\right)\left(\frac{\delta M}{\delta F} \cdot \frac{F}{M}\right)$$

$$= \eta_M \cdot \eta_F,$$

and the effect on industrial investment can be determined from

$$\eta_{I.F} = \frac{\delta I}{\delta F} \cdot \frac{F}{I} = \left(\frac{\delta I}{\delta M} \cdot \frac{M}{I}\right)\left(\frac{\delta M}{\delta F} \cdot \frac{F}{M}\right)$$

$$= \eta_I \cdot \eta_F.$$

In Table 9 η_M is approximately 0.4 in both cases, and η_f is 0.95 for raw materials and 1.39 for machinery. As a result,

$$\eta_{V.F} = (0.4)(0.95) = 0.38,$$

and

$$\eta_{I.F} = (0.4)(1.39) = 0.56.$$

It is interesting to note that a 10 percent fall in foreign exchange supplies will reduce industrial output by 3.8 percent because the rate of utilization of the existing capital stock falls with the decline in imports of industrial raw materials. However, a 10 percent fall in foreign exchange would result in a 5.6 percent decline in the rate of growth of the capital stock. In other words, when a food subsidy scheme is dependent on imports, priority is given to food in the allocation of foreign exchange. The provision of raw materials for the industrial sector to maintain current output is then accorded priority over the import of capital goods, which are presumably viewed as postponable.

In this study the inelastic demand for food engendered by the food subsidy scheme is associated with fluctuations in output

and investment in the industrial sector. The reader may legitimately inquire if such fluctuations are not offset by an equal and opposite reaction when prices fall or exchange supplies show a transitory rise. Even if the existence of such random movements were fully recognized, there would still be uncertainty about their timing and magnitude and, more importantly, about the government's reaction to them. Such uncertainty would tend to lower incentives for investment in the industrial sector. Furthermore, even if additional capital equipment is imported to compensate for postponed investment, the loss of the services of a greater capital stock cannot be recouped. Neither can the lost output from underutilizing the existing capital stock. Hence, it is likely that the food subsidy scheme has imposed real costs on all nonfarm sectors in Egypt.

5

CONCLUSIONS AND IMPLICATIONS FOR POLICY

The rise in world food prices in 1973 and 1974 contributed to a sharp rise in the cost of subsidies in Egypt. Food policies that insulated consumers from movements in international prices led to large domestic subsidies and an increased allocation of foreign exchange to food imports. But despite the subsequent fall in world prices, real expenditures on food subsidies per capita were twice as high during the years 1979-81 as they were during the "crisis" period of 1973-75. Clearly there has been a significant change in policy toward increasing the level and average of the food subsidy scheme.

A consequence of food subsidies is to make the demand for various foodstuffs much less responsive to prices than it would be without them. Hence, changing the level of subsidy per unit and thus the consumer price will have relatively little effect on total consumption. The strength of this effect varies among commodities, being most marked for wheat (as a result of the extremely low price of bread) and less so for meats. If the Egyptian government were to attempt to reduce expenditures on food imports, it would need to consider the differential effects of changes in per unit subsidies. Although wheat makes up a large share of food imports, a relatively small reduction in imports would result from a rise in the consumer price of wheat—compared with, say, livestock products. A reduction in wheat imports might be more effectively pursued by limiting access to the subsidized commodity.

The full cost of the food subsidies has been met in two ways. The accounts of the central government have included part of the cost through the allocations to the General Authority for Supply Commodities (GASC), whose responsibility it is to arrange the purchase and delivery of imported foodstuffs. The government, through the Foreign Exchange Committee, authorizes the Central Bank to provide the foreign exchange to GASC. The cost in Egyptian pounds incurred by GASC in acquiring imports depends on the exchange rate set for food. This rate (in LE per U.S. dollar) has often been below that for other commodity transactions, and has always been substantially below the own or free exchange rate. As a consequence, the full social opportunity cost of the foreign exchange used in acquiring imported foods has not been reflected in the reported costs of the subsidy.

The rapid rise in the costs to the central government has contributed to the budget deficits. These have been met by both foreign and domestic borrowing. A large part of the domestic borrowing has been in the form of net addition to the stock of domestic credits, through the creation of government liabilities to the Central Bank. The concomitant expansion of the money stock has led to an excess supply of money balances and an excess demand for goods, both foreign and domestic. Furthermore, this excess demand includes claims on foreign goods and services through foreign currency and banks. Eliminating the pressures associated with these imbalances in the money, goods, and foreign currency markets has involved changes in prices and stocks. The rate of domestic inflation has been higher than it would have been without the deficits. The excess demand for foreign currency has driven up its price on the free market. Some of the excess demand was relieved by a decline in the stock of net foreign assets. The exchange market pressure has closely reflected the expansion of the monetary base, which accompanied the rise in budget deficits. Clearly, any policy that reduces the pressure associated with these deficits and their consequences for the monetary base would lessen the inflation rate, the devaluation of the Egyptian pound, and the decline in net foreign assets. Of course, food subsidies are only one item contributing to the deficits, and if compensating cuts in other expenditures were made, the effects on inflation, devaluation, and the balance of payments would be correspondingly reduced.

The political commitment to a system of food subsidies has made it difficult to change the level of food imports from year to year.

If the price of imported food rises, or if the supply of foreign exchange falls, little if any of the adjustment takes place in the allocation for food imports. One of the effects of a food subsidy scheme is to transmit much of the instability in the foreign exchange sector to the import of other goods. It is true that foreign borrowing and the use of reserves can and have contributed to the process of adjustment. However, there are limits to their capacity to absorb the instability; unanticipated swings in other imports have been a crucial mechanism of adjustment.

These other imports largely comprise industrial raw materials and capital goods. This study shows a clear pattern in the marginal propensity to import from the total foreign exchange budget. Any decline in the supply of foreign exchange is met first by postponing the import of capital goods, then by reductions in raw materials, and finally, and only in a minor way, by a reduction in the quantity of imported food. Food consumption is maintained at the expense of output and employment in the nonfarm sector and of growth in the capital stock. This transmission of instability to capacity utilization and industrial growth is a hidden cost of a food subsidy scheme that depends heavily on imported foods. Neither the existence nor the size of this cost have received much attention. National and international policies that reduce instability in the cost of importing foods or that offer improved mechanisms for adjustment would lessen the impact on industrial output, employment, and investment.

APPENDIX 1: EXCHANGE RATE REGIMES

Prior to World War II there were no controls on foreign exchange. At the outbreak of the war all Egyptian foreign exchange earnings were placed in the London sterling pool. Thus, as a result of allied military expenditures, Egypt ended the war with substantial sterling reserves. However, the country's capital stock was depleted; inventories of raw materials, parts, and food were exhausted; and soil fertility had declined. Consequently, in 1947 imports were desperately needed, but foreign exchange reserves were high.

Britain, however, was not prepared to make the sterling reserves available in hard currencies, nor could she supply the imports Egypt needed. The ensuing negotiations about convertibility finally led to Egypt's withdrawal from the sterling bloc in late 1947. The lack of hard currency caused Egypt to adopt a number of policies concerning foreign exchange.

Egypt instituted a system of triangular trade whereby dollar goods were paid for with sterling reserves through a third party, who accepted payment at 20-25 percent below the official par value, which at the time was $4.13 = LE 1. This dollar premium (or pound discount) applied especially to imports from hard currency areas. It is important to note that wheat, which could not be supplied by Britain, was imported from outside the sterling bloc at the discounted rate. In the model a value of $3.00 = LE 1 is used for these imports in 1948.[39] The nonfood rate is a weighted average of this rate, which applied to about 40 percent of total trade, and the par value, which is used for trade within the sterling bloc. Hence the value used for 1948 is $3.68 = 0.4 (3.00) + 0.6 (4.13).

Toward the end of 1949 sterling was devalued and the pound followed. However, the use of premiums under the triangular trade system was tantamount to a devaluation of the pound. This phenomenon is observed repeatedly in the last three decades of Egyptian exchange rate policy. Although there have been official rates, they have been supplemented with a series of other controls and impediments to the movement of goods and capital, effectively devaluing (or at times appreciating) the pound in relation to official or par values. In order to distinguish the "real" official rates—those at which transactions actually took place—from the "nominal" official rates, it is necessary to review the evolution of exchange rate policies.

By the end of 1949 Egypt had devalued to $2.87 = LE 1, and had discontinued the triangular trade arrangements, at the insistence of Britain. However, an alternative mechanism known as the export account was introduced. Egyptian importers could pay for hard currency goods from soft currency countries with Egyptian pounds in nonresident's "export accounts." These pounds were freely traded in third markets, having been acquired by those buying Egyptian exports. The discounts below par of the export pound have been used for the food exchange rate for the years 1950-55. The nonfood rate is based on the average depreciation of the pound.[40]

After the Korean War boom, the Egyptian pound strengthened somewhat. Exchange controls were liberalized but were soon replaced when cotton prices fell. From 1953-55 an import entitlement scheme was operated in which the rights to import were freely traded, again at a discount to the official rate. From 1957 to 1962 a complex system of discounts and premiums were instituted, which were subject to frequent change. These premiums were set by the Central Bank rather than determined by the market, and the changes were largely determined by movement in world cotton prices.[41] Following Hansen and Nashashibi, the average depreciation for imports (food) and exports (nonfood) implied by the pre-

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[39] Bent Hansen and Karim Nashashibi, *Foreign Trade Regimes and Economic Development: Egypt* (New York: National Bureau of Economic Research, 1975), p. 30.

[40] Ibid., p. 34.

[41] M. Girgis, *Industrialization and Trade Patterns in Egypt*, Kieler Studien No. 143, Institut für Weltwirtschaft an der Universitat Kiel (Tübingen: J. C. B. Mohr, 1977), p. 86.

miums are used for the years 1957-62.[42] Thus the official devaluation to $2.30 = LE 1 in May 1962 had little direct impact as it had already been incorporated by the previous system of taxes and subsidies. With the nationalization of trade in 1961 and the devaluation in 1962, there was an effort to return to unified official rates. From then until 1973 the allocation of foreign exchange was carried out through a foreign exchange budget, and transactions were made at official prices. The alternative free market for the pound no longer received official sanction. It is fairly clear that the official rates were overvalued, because the black market was consistently below the par values.

The return to a unified system of official rates was a condition of the loan that Egypt negotiated with the International Monetary Fund in May 1962. A unified rate of $2.30 = LE 1 was applied to all transactions except Suez Canal dues and salaries of missions abroad. Moreover, to avoid the windfall to oil exporters, an export surcharge of 20 percent was applied to absorb the extra proceeds of oil exports denoted in pounds.

Following the 1967 war, increasing balance-of-payments pressure led to the application of multiple official rates in May 1968 in an attempt to achieve external balance and to control the foreign exchange smuggling that had emerged as the unified rate became increasingly overvalued. An incentive rate was created to attract remittances and in 1971 it was extended to include tourist receipts. In 1968 remittances were LE 10 million out of total current transactions of LE 352 million, giving an effective rate of $0.97(2.30) + 0.03[2.30(1 - 0.33)] = 2.28$. This fell to $0.85(2.30) + 0.15[2.30(1 - 0.33)] = 2.19$ in 1971, and to 1.90 when the premium was raised from 33 to 50 percent in May 1972. By this time remittances and tourism were 35 percent of total current receipts.

The period from 1968-73 saw the evolution of the own exchange market and represented a turning point in exchange rate policy. Prior to this, all foreign trade was nationalized, the exchange rate was unified, and an administrative system of foreign exchange budgeting prevailed. However, the system of incentives (or premiums) used during this period was in effect based on a variable levy, which kept constant the price in pounds of foreign currencies despite movements in their prices on world markets. The system was devised in the late 1960s when the fixed exchange rate system was still operating. But after the floating of major currencies in 1971 the Egyptian incentive system led to endless arbitrage possibilities. For example, the Central Bank was committed to acquire devalued sterling paying a fixed value in Egyptian pounds. That there was an inflow of sterling comes as no surprise.

In 1973 a new economic policy was formulated, paying more attention to foreign trade and investment and placing greater reliance on market-determined prices. On September 1, 1973 the parallel exchange market was created and the official rate set at $2.56 = LE 1, and $1.70 for the incentive or (official) parallel rate. The parallel rate, which was confined to certain categories of private imports, receipts from tourism, and remittances, applied to no more than 20 percent of all transactions in late 1973. The parallel rate was devalued in three steps, declining to $1.43 by December 1976. The coverage rose steadily so that by 1978 almost all convertible currency transactions were included.[43] Alternative estimates were derived from the sample averages of all effective rates.[44] For the years 1974-79 these were (in U.S. $ per LE), 2.45, 2.36, 2.28, 2.16, 1.99, and 1.43.

On January 1, 1979 a further devaluation took place in a move to reestablish a unified exchange rate. The official rate ($2.56 = LE 1) and the parallel rate were merged at $1.43 = LE 1. This rate was to apply to all official private and public transactions. Food imports, which had been maintained at the of-

[42] Hansen and Nashashibi, *Foreign Trade Regimes*, pp. 60-63.

[43] Khalid Ikram, *Egypt: Economic Management in a Period of Transition* (Baltimore: Johns Hopkins University Press, 1980), p. 353.

[44] World Bank, unpublished data.

ficial rate, were finally moved to the unified or parallel rate.[45]

In addition tc the official markets, the free or own exchange market has persisted. It has provided a mechanism for the residual suppliers and demanders to establish a market clearing rate for foreign exchange. This pool has drawn its supplies from remittances and tourism, and it provides exchange for private importers. Consequently, periods of unified rates—to which Egyptian policy repeatedly has tried to return—refer only to official unification. Even that was abandoned in August 1981 when a devaluation was announced. The official rate continued at $1.43 = LE 1 and applied to the Central Bank pool.

The pool draws its supplies from cotton and oil exports, Suez Canal dues, and the Sumed pipeline. From this pool, foreign exchange is drawn for public-sector imports (including basic food commodities for the subsidy scheme). All other exports, together with some remittances and tourism, enter the Central Bank pool at the parallel or incentive rate of $1.19 =LE 1. This rate was introduced partly as an attempt to capture more of the flows of remittances and tourist spending.

Three categories of imports are established under this rate: food, raw materials and intermediate goods, and other imports. At least one month prior 25, 40, and 100 percent of the value of the letter of credit in Egyptian pounds must be deposited with a commercial bank. The Central Bank provides foreign exchange at the official rate for the first two categories to match the prior deposits. The remainder must be acquired on the own (or black) market. The complete series of all three exchange rates (the black market and the official rates for food and nonfood) are given in Table 17. Figure 10 shows the evolution of the unadjusted official rates and the black market rate under the different regimes that prevailed during 1947-81.

[45] In some years explicit adjustment was made for this by the creation of a Price Adjustment Fund to allow for the additional direct costs to the treasury of moving food imports to a lower exchange rate. It has not been possible to obtain a complete or consistent series of these adjustments. Korayem notes that in 1978 and 1979, LE 168 and LE 470 were adjustments for devaluation of the food pound (Karima Korayem, "The Impact of the Elimination of Food Subsidy On the Cost of Living of the Urban Population in Egypt," paper presented to the International Labour Organisation, Income Distribution and International Employment Policies Branch, Geneva, May 1980, p. 6). Of the latter amount, LE 421 referred to the General Authority for Supply Commodities. Alderman, von Braun, and Sakr, in *Egypt's Food Subsidy and Rationing System*, present the following Ministry of Finance data: 1977, LE 228; 1978, LE 190; and 1979, LE 140; whereas Ikram uses LE 124 for 1977 (Ikram, *Egypt: Economic Management*, p. 336).

Table 17—Exchange rates, international price indexes for food and nonfood, and the consumer price index, 1947-81

Year	Exchange Rate			Price Index		
	Black Market	Official		International		Consumer Price Index
		Food	Nonfood	Food	Nonfood	
	US$/LE					
1947	2.50	4.13	4.13	58	40	50.2
1948	2.70	3.00	3.68	63	43	50.7
1949	2.40	2.87	2.87	56	42	50.2
1950	2.39	3.38	2.85	62	37	53.2
1951	2.22	2.50	2.83	67	44	57.7
1952	2.28	2.53	2.85	66	45	57.6
1953	2.38	2.61	2.84	66	43	53.6
1954	2.60	2.67	2.86	38	42	51.4
1955	2.41	2.61	2.86	39	42	57.2
1956	2.09	2.70	2.70	40	44	52.5
1957	1.64	2.50	2.50	40	45	54.6
1958	1.68	2.41	2.47	33	44	54.7
1959	1.85	2.50	2.73	33	43	54.8
1960	1.96	2.58	2.64	31	44	55.0
1961	1.45	2.30	2.35	32	44	55.4
1962	1.24	2.18	2.24	41	44	53.8
1963	1.25	2.30	2.30	54	45	54.2
1964	1.20	2.30	2.30	65	45	56.1
1965	1.15	2.30	2.30	54	46	64.5
1966	1.10	2.30	2.30	42	42	70.3
1967	1.30	2.30	2.30	40	47	70.8
1968	1.20	2.30	2.28	35	47	69.8
1969	1.09	2.30	2.28	42	48	72.1
1970	1.10	2.30	2.28	61	52	74.9
1971	1.15	2.30	2.19	37	55	77.2
1972	1.31	2.30	1.90	47	60	78.8
1973	1.54	2.56	2.26	52	72	82.2
1974	1.44	2.56	2.34	105	89	91.1
1975	1.42	2.56	2.11	100	100	100.0
1976	1.35	2.56	2.09	103	101	110.3
1977	1.43	2.56	1.59	112	109	124.3
1978	1.34	2.56	1.43	127	124	138.1
1979	1.33	1.43	1.43	97	142	151.8
1980	1.31	1.43	1.43	105	161	183.1
1981	1.00	1.43	1.19	106	175	222.0

Sources and notes: The base used is 1975 = 100.

For 1947-48, the international food price index is linked to the U.S. f.o.b. export price of wheat (U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1951* [Washington, D.C.: Government Printing Office, 1952], p. 293). For 1949-61 the values are the price paid for wheat by Egypt (Grant M. Scobie, *Government Policy and Food Imports: The Case of Wheat in Egypt*, Research Report 29 [Washington, D.C.: International Food Policy Research Institute, 1981], p. 72). For 1980-81, the index is linked to the United States f.o.b. Gulf ports export price of hard winter wheat, ordinary protein (U.S. Department of Agriculture, Foreign Agricultural Service, *Foreign Agricultural Trade of the United States* [Washington, D.C.: USDA, November/December 1981], p. 66). The food price index for 1962-79 was constructed as the weighted average unit price paid by Egypt for 18 commodities, using data for values (v_i) and quantities (q_i) taken from United Nations, Department of International Economic and Social Affairs, Statistical Office, *Commodity Trade Statistics* (New York: UN, various years), and forming the index $p = \exp [\pi a_i (v_i/q_i)]$. The commodities (with their SITC codes in parentheses) were: meat: fresh, chilled, and frozen (011); meat: tinned n.e.s. or prepared (013); milk and cream (022); butter (023); cheese and curd (024); fish: fresh and simply preserved (031); fish: tinned and prepared (032); wheat: unmilled (041); maize: unmilled (044); wheat: meal or flour (046); fruit: fresh, and nuts: fresh and dry (051); vegetables: fresh and simply preserved (054); sugar and honey (061); coffee (071); tea and maté (074); animal feedstuffs (081); tobacco: unmanufactured (121); tobacco: manufactured (122). The weights (α_i) were the share of each group in total food imports.

The index of international nonfood prices is the unit value of exports of industrialized countries (Grant M. Scobie, *Government Policy and Food Imports*, p. 67). For 1947-48, these values are linked to the U.S. wholesale price index for total manufactures (U.S. Department of Commerce, *Business Sta-*

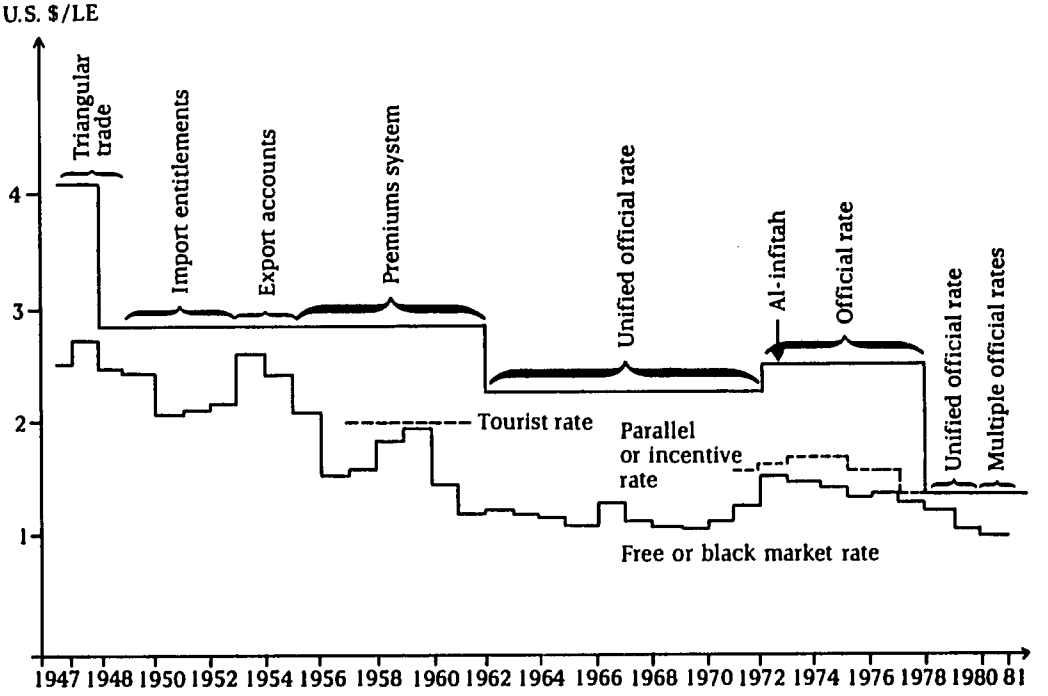
Table 17—Continued

tistics, 20th Biennial Edition (Washington, D.C.: Government Printing Office, May 1976), p. 228. For 1980-81, the price index of industrial commodities of the United States is used (U.S. Department of Commerce, *Survey of Current Business* [Washington, D.C.: Government Printing Office, December 1981], p. S.6).

The figures for the consumer price index for 1949-79 are from Grant M. Scobie, *Government Policy and Food Imports*, p. 67. For 1957-58 the index is linked to those given by D.C. Mead, *Growth and Structural Change in the Egyptian Economy* (Homewood, Ill.: R.D. Irwin, 1967), p. 400. For 1980-81 the values are from the International Monetary Fund, *International Financial Statistics* 34 (Washington, D.C.: IMF, November 1981). The 1981 value was estimated by converting the rate from January to May to an annual equivalent.

The black market rates are from *Pick's Currency Yearbook* (New York: Pick Publishing Corp., various years). For 1980 and 1981, they are from *Pick's World Currency Report*, various issues (New York: Pick Publishing Corp., various years). See Appendix I for discussion of the official exchange rates.

Figure 10—Exchange rates, 1947-81



APPENDIX 2: SUPPLEMENTARY TABLES

Table 18—Net imports of basic grains, 1949-80

Year	Wheat and Wheat Flour	Rice	Maize	Total Cereals	Pulses
			(1,000 metric tons)		
1949	434	−344	145	225	4
1950	546	−178	165	531	5
1951	1,082	−314	18	811	6
1952	894	16	43	914	5
1953	550	−1	9	578	4
1954	66	−49	−1	15	4
1955	5	−186	...	−181	36
1956	677	−215	85	552	45
1957	840	−296	75	653	43
1958	1,177	−360	59	878	16
1959	1,380	−23	106	1,510	7
1960	1,288	−280	50	1,069	25
1961	1,560	−154	101	1,111	−18
1962	1,568	−144	262	1,684	−14
1963	2,104	−380	177	1,894	−39
1964	1,888	−527	424	1,774	−49
1965	2,077	−330	136	1,883	−70
1966	2,274	−347	164	2,065	5
1967	2,687	−435	200	2,440	19
1968	2,285	−570	132	1,847	24
1969	1,659	772	43	786	19
1970	1,233	−654	73	651	20
1971	2,410	−515	39	1,933	10
1972	1,686	−456	88	1,319	33
1973	1,805	−298	67	1,574	8
1974	3,208	−136	388	3,740	17
1975	3,694	−104	418	4,110	151
1976	3,888	−211	459	4,135	131
1977	4,344	−223	590	4,713	66
1978	5,120	−145	731	5,817	65
1979	4,906	−125	494	5,275	91
1980	5,443	−47	944	6,340	105

Sources: The data for 1949-78 are from Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, various years. The data for 1979-80 are from the Office of the U.S. Agricultural Attaché, Cairo.

Notes: Prior to 1955 pulses included only dry beans. Cereals include wheat and wheat flour, rice, maize, oats, rye, and barley, except for 1979-80, when oats, rye, and barley are excluded.

Table 19—Net imports of foodstuffs, 1949-80

Year	Meat	Butter	Cheese	Sugar	Tea
	(1,000 metric tons)	(metric tons)		(1,000 metric tons)	
1949	3	...	3	40	16
1950	5	...	4	140	16
1951	4	...	5	2	16
1952	4	...	5	127	16
1953	4	...	4	53	20
1954	4	...	3	25	16
1955	3	...	3	2	17
1956	2	...	2	1	14
1957	6	...	1	40	16
1958	11	...	3	42	23
1959	3	...	2	28	19
1960	5	...	1	22	20
1961	11	16	1,285	65	23
1962	5	15	610	114	26
1963	5	53	4,375	41	23
1964	7	38	971	37	26
1965	13	1,677	2,224	35	29
1966	27	−5	464	226	29
1967	6	−1	979	166	32
1968	6	0	801	45	15
1969	2	−1	1,111	14	25
1970	2	0	2,526	9	30
1971	6	300	3,738	96	11
1972	11	346	713	16	14
1973	12	11	727	26	9
1974	12	4,087	1,476	70	14
1975	6	2,097	3,379	121	23
1976	11	23,564	8,856	130	25
1977	36	14,222	6,337	205	26
1978	55	27,173	12,179	293	31
1979	86	37,500	15,067	251	n.a.
1980	129	n.a.	n.a.	460	n.a.

Sources: All data are from the Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, various years. Data for 1979-80 are from the Office of the U.S. Agricultural Attaché, Cairo.

Notes: (...) indicates negligible quantities; n.a. means not available.

Table 20—Government expenditures, revenues, and financing, 1947-81

Year	Government Expenditures		Government Revenues	Government Deficits	Deficit Financing	
	Subsidies	Total			Foreign	Domestic
			(LE million)			
1947	6	79	103	+24	−19	−5
1948	4	97	99	+2	7	−5
1949	7	148	144	−4	−2	2
1950	8	191	159	−32	34	−2
1951	7	208	250	+42	−50	8
1952	13	225	194	−31	−4	35
1953	17	207	199	−8	8	0
1954	7	224	206	−18	26	−8
1955	5	266	220	−46	3	43
1956	4	338	268	−70	32	38
1957	6	357	266	−91	82	9
1958	2	293	334	−41	−40	−1
1959	8	377	403	−26	−47	21
1960	12	398	445	+47	−111	64
1961	9	700	540	−160	124	36
1962	17	780	728	−52	9	43
1963	46	710	458	−252	28	226
1964	32	896	527	−369	−83	287
1965	35	906	598	−308	−81	227
1966	35	1,022	660	−362	−67	295
1967	46	971	753	−218	57	161
1968	41	894	643	−251	24	227
1969	33	880	675	−205	−13	218
1970	24	956	750	−206	−15	221
1971	42	1,063	869	−194	0	194
1972	42	1,218	903	−315	18	297
1973	136	1,404	1,018	−534	51	483
1974	410	1,961	1,184	−813	119	694
1975	622	2,628	1,524	−1,388	210	1,178
1976	434	2,977	2,015	−1,265	488	777
1977	650	3,769	2,755	−1,270	414	860
1978	900	5,013	3,306	−2,077	705	1,372
1979	1,370	6,789	4,165	−2,624	481	1,647
1980	1,446	7,768	5,476	−2,293	853	1,417
1981	1,861	10,250	7,350	−2,901	714	2,187

Sources and notes: For government expenditures on subsidies, see Table 22. Total government expenditures for 1947-57 are from D.C. Mead, *Growth and Structural Change in the Egyptian Economy* (Homewood, Ill.: R. D. Irwin, 1967), pp. 381-401, and include the ordinary and annexed budgets. For 1958-60, see G. Kardouche, *The U.A.R. in Development: A Study in Expansionary Finance* (New York: Praeger Publishers, 1967), p. 20. For 1961-62, see F.R. Faridi, *Fiscal Policy and Economic Development of the Arab Republic of Egypt: 1952-1968* (Aligarh, India: Aligarh Muslim University Press, 1976), p. 89. Data for 1963-78 are from Khalid Ikram, *Egypt: Economic Management in a Period of Transition* (Baltimore: Johns Hopkins University Press, 1980), pp. 408-409. 1979 data were supplied by the U.S. Agency for International Development, Cairo. 1980 and 1981 are from the Ministry of Finance, Cairo. 1980 is estimated as the actual for January-June 1980, plus one half of the preliminary actual for 1980/81. 1981 is calculated as one half of the preliminary actual for 1980-81 plus one half of the 1981-82 budgeted revenue. The same sources and procedures were used for government revenues. The financing of the government deficit was estimated for 1947-62 by taking the change in the claims of the Central Bank on the government as the domestic financing, and the difference as foreign financing. For 1963-78, see Ikram, *Economic Management*, pp. 408-409. The data for 1979-81 were supplied by the Ministry of Finance, Cairo.

Table 21—Composition of the monetary base and money supply, 1947-81

Year	Net Foreign Assets	Domestic Credit	Central Bank Claims on		Money Supply		Government Deposits at Central Bank
			Government	Private Sector	M1	M2	
			(LE million)				
1947	357	142	63	79	318	337	25
1948	346	150	58	92	350	274	53
1949	336	179	60	119	348	373	79
1950	339	197	58	139	364	389	66
1951	332	195	66	129	361	418	43
1952	264	179	101	78	362	405	16
1953	255	175	101	74	347	395	18
1954	242	195	93	102	340	399	19
1955	208	240	136	104	340	406	26
1956	169	343	168	175	397	456	24
1957	117	397	177	220	398	453	19
1958	96	423	176	247	385	455	32
1959	68	494	197	297	390	475	30
1960	53	570	261	309	405	485	29
1961	27	634	297	337	455	541	5
1962	−30	740	344	396	443	578	12
1963	−29	892	465	427	516	689	22
1964	−44	1,002	548	454	621	801	28
1965	−56	1,077	616	461	655	852	18
1966	−102	1,165	729	440	684	865	19
1967	−128	1,258	811	447	707	916	14
1968	−131	1,326	843	483	722	945	10
1969	−140	1,390	871	519	746	999	12
1970	−180	1,498	975	523	783	1,053	14
1971	−263	1,652	1,103	549	846	1,084	18
1972	−341	1,774	1,221	553	989	1,084	18
1973	−149	1,930	1,405	531	1,205	1,536	20
1974	−192	2,474	2,474	1,685	789	1,503	34
1975	−973	3,727	2,634	1,093	1,863	2,430	38
1976	−922	4,278	2,952	1,326	2,239	3,061	40
1977	−654	5,019	3,277	1,742	2,943	4,103	47
1978	2,110	7,892	5,866	2,026	3,553	5,212	101
1979	−2,140	1,889	7,236	2,653	4,354	6,844	692
1980	−1,653	12,148	8,093	4,055	4,859	9,017	1,230
1981	−1,112	13,199	7,999	5,208	5,467	10,500	1,171

Sources and notes: Net foreign assets for 1947-51 are from D.C. Mead, *Growth and Structural Change in the Egyptian Economy* (Homewood, Ill.: R. D. Irwin, 1967), p. 369. For 1952-73, see International Monetary Fund, *International Financial Statistics Yearbook* 32 (Washington, D.C.: IMF, 1979), pp. 168-169. For 1974-81, see International Monetary Fund, *International Financial Statistics* 34 (Washington, D.C.: IMF, November 1981), pp. 140-141. The 1981 figure refers to the second quarter. Domestic credit, claims on the government by the Central Bank, narrow (M1) and broad (M2) money supplies, and government deposits at the Central Bank are all from the same sources. Claims on the private sector are the difference between total domestic credit and government liabilities to the Central Bank. M1 is the net currency circulation outside the banks plus private demand deposits. M2 is M1 plus time, savings, and foreign currency deposits of the nonbank public.

Table 22—Government expenditures on subsidies, 1947-81

Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
						(LE million)				
1947	6									6
1948	4									4
1949	7									7
1950	4	13								8
1951	6		8							7
1952	9		18							13
1953	20	15	16							17
1954	8		6							7
1955	5	9	2							5
1956	6		2							4
1957	8		3							6
1958			2							2
1959			8							8
1960		15	9							12
1961			9							9
1962			17							17
1963		54	37	...						46
1964			32	...						32
1965			35	...						35
1966			35	...						35
1967			46	...						46
1968			41	1						41
1969			33	...						33
1970			24	...						24
1971			42	3		3				42
1972			42	11		11				42
1973			136	...		89	131			136
1974			393	410	410	410	428			410
1975			459	622	622	622	580			622
1976			404	434	434	434	458			434
1977			313	650	650	650	496	650		650
1978				710	900	900	681	900		900
1979					1,370	1,370	1,288	1,370	1,230	1,370
1980						640			640	1,446
1981										1,861
1980/81						1,563		1,960	1,611	

Sources and notes: In Column (1) the 1947 figure refers to food subsidies only; the remaining years are for all subsidies. See D. C. Mead, *Growth and Structural Change in the Egyptian Economy* (Homewood, Ill.: R. D. Irwin, 1967), p. 381 and p. 385, Table VI-E4.

Column (2), interest and price subsidies, is taken from Bent Hansen and G. A. Marzouk, *Development and Economic Policy in the U.A.R. (Egypt)* (Amsterdam: North Holland Publishing Co., 1965), p. 250.

The subsidy expenditures in Column (3) are from F. Shalaby, "A Report on Wheat Consumption in Egypt," Program Economist's Office, U.S. Agency for International Development, Cairo, December 1978. (Mimeographed.)

The subsidy expenditures in Column (4) are from Khalid Ikram, *Egypt: Economic Management in a Period of Transition* (Baltimore: Johns Hopkins University Press, 1980), pp. 408-409. (...) indicates negligible amounts.

The consumer subsidies in Column (5) are from unpublished data provided by the World Bank.

Column (6) presents data on total subsidies from Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr, *Egypt's Food Subsidy and Rationing System: A Description*, Research Report 34 (Washington, D.C.: International Food Policy Research Institute, 1982), p. 14. The figure for 1980 refers to January through June and the 1980/81 figure is the budgeted expenditure.

Column (7) presents cost-of-living subsidies from Karima Korayem, "The Impact of the Elimination of Food Subsidy on the Cost of Living of the Urban Population in Egypt," a paper presented to the International Labour Organisation, Income Distribution and International Employment Policies Branch, Geneva, May 1980. The 1979 figure is an estimate.

Column (8) presents subsidy data from the U.S. Agency for International Development, Cairo, Table 12. The 1980/81 figure is an estimate.

The data in Column (9) were supplied by the Ministry of Finance, Cairo. The 1979 figure is actual, and the figure for 1980 is actual for January-June. The one for 1980/81 is the budgeted expenditure.

Table 22—Continued

The data series in Column (10) was constructed for use in the present study. Data for 1947-48 come from Column (1); 1949-62 figures are averages of Columns (1), (2), and (3); data for 1963-73 are taken from Column (3); the 1974 and 1975 figures are from Columns (4), (5), and (6); the 1976-79 figures are from Columns (5) and (6); the 1980 figure is 640 + 0.5 (1,611); and the figure for 1981 is 0.5 (1,611 + 2,000) (1,611/1,563).

The figures for 1980 and 1981 are estimated by converting to a calendar-year basis and in 1981 by allowing for the same margin of underbudgeting as reported in the previous year by the Ministry of Finance.

Table 23—GNP, population, and foreign trade, 1947-81

Year	GNP at Market Prices	Population	Exports of Goods and Services	Imports of Goods and Services	Food Imports	Foreign Exchange Reserves
	(LE million)	(million)		(LE million)		
1947	578	19.02	197	131	11.8	353
1948	718	19.36	195	199	35.2	323
1949	905	19.89	215	207	34.1	345
1950	978	20.46	267	279	44.0	346
1951	944	20.94	292	307	58.9	339
1952	916	21.44	249	272	61.7	254
1953	950	21.94	215	223	53.7	245
1954	1,048	22.56	1,222	219	26.5	250
1955	1,110	22.99	227	261	25.6	220
1956	1,129	23.53	219	252	33.2	190
1957	1,198	24.09	237	268	49.1	163
1958	1,303	24.66	250	270	49.9	149
1959	1,437	25.24	265	301	52.6	107
1960	1,379	25.92	302	325	48.0	93
1961	1,461	20.58	256	309	52.5	71
1962	1,513	27.26	247	265	73.8	97
1963	1,679	27.95	364	487	110.9	94
1964	1,881	28.66	374	497	117.8	97
1965	2,199	29.39	403	513	107.9	84
1966	2,381	30.14	430	506	123.8	68
1967	2,459	30.91	375	500	134.8	85
1968	2,497	31.69	352	459	91.9	78
1969	2,652	32.50	387	519	72.5	70
1970	2,927	33.33	432	633	72.6	70
1971	3,080	34.08	449	660	118.3	79
1972	3,403	34.84	468	690	111.9	57
1973	3,634	35.62	563	786	113.1	194
1974	4,085	36.42	932	1,464	409.1	248
1975	4,738	37.23	1,035	2,004	555.6	229
1976	6,409	37.87	1,782	2,449	431.3	212
1977	8,643	38.79	2,202	2,986	440.9	309
1978	10,765	39.82	3,139	3,965	686.4	378
1979	13,260	40.98	5,666	6,761	708.0	503
1980	16,922	41.99	6,550	7,033	1,811.2	1,765
1981	21,760	43.17	7,627	8,169	3,108.4	1,205

Sources and notes: The GNP figures at market prices for 1947-48 are from D.C. Mead, *Growth and Structural Change in the Egyptian Economy* (Homewood, Ill.: R. D. Irwin, 1967), p. 272. For 1949-79 see Grant M. Scobie, *Government Policy and Food Imports: The Case of Wheat in Egypt*, Research Report 29 (Washington, D.C.: International Food Policy Research Institute, 1981), p. 67. The 1980 and 1981 figures were estimated on the basis of 6 percent real growth.

Population data for 1949-77 are from International Monetary Fund, *International Financial Statistics Yearbook* 32 (Washington, D.C.: IMF, 1979). For 1947, see Robert Mabro, *The Egyptian Economy: 1952-1972* (Oxford: Clarendon Press, 1974), p. 26. The 1948 figure was estimated assuming a growth rate of 1.79 percent. The figures for 1978-80 were taken from International Monetary Fund, *International Financial Statistics* 34 (Washington, D.C.: IMF, November 1981): p. 143. The 1981 figure was estimated assuming a growth rate of 2.8 percent.

Table 23—Continued

Exports and imports of goods and services for 1947 are from Mead, *Growth and Structural Change*, Appendix Table V-C-1. Figures for 1948-64 are based on International Monetary Fund, *International Financial Statistics*, various issues. For 1965-79, unpublished data from the World Bank was used. The 1980-81 figures were provided by the U.S. Agency for International Development Mission, Cairo.

Food imports for 1947-52 are from Mead, *Growth and Structural Change*, Appendix Table V-A-3. For 1953-61, see J.D. Coppock, *Foreign Trade of the Middle East: Instability and Growth: 1946-1962* (Beirut: Economic Research Institute, American Research Institute, and American University, 1966), p. 27. The 1962-67 figures are from Karim Nashashibi, appendix in L.E. Preston, *Trade Patterns in the Middle East* (Washington, D.C.: American Enterprise Institute, 1970), p. 84. 1968 and 1970 figures are from Bent Hansen and Karim Nashashibi, *Foreign Trade Regimes and Economic Development: Egypt* (New York: National Bureau of Economic Research, 1975), p. 21. 1969 and 1971-73 figures are from United Nations Department of International Economic and Social Affairs, Statistical Office, "Commodity Trade Statistics Tape," New York, various years, and are converted to LE million at official exchange rates. For 1974-79 see Central Agency for Public Mobilization and Statistics, *Statistical Yearbook of the Arab Republic of Egypt* (Cairo: CAPMAS, July 1980), p. 235. The figures for 1980-81 were estimates provided by the U.S. Agency for International Development Mission, Cairo.

The values of foreign exchange reserves including gold valued at market prices for 1947 and 1948 are from Hansen and Nashashibi, *Foreign Trade Regimes*, p. 27. For 1949-79 see Scobie, *Government Policy and Food Imports*, Tables 12 and 21. For 1980 and 1981 see International Monetary Fund, *International Financial Statistics* 34, p. 469. The value for 1981 refers to the value in July 1981. Gold prices, at London market prices, are from International Monetary Fund, *International Financial Statistics* 35 (Washington, D.C.: IMF, February 1982), p. 54.

Table 24—Industrial output, investment, and imports, 1956-79

Year	Real Value of Industrial Output in GDP	Real Value of Gross Fixed Investment in Industry and Manufacturing	Real Value of Imports of			
			Raw Materials	Basic Manufactured Goods	Machinery and Transport Equipment	Total Industrial Imports
			(LE million)			
1956	292	70	34	100	102	280
1957	309	80	40	84	64	249
1958	349	109	45	84	118	323
1959	396	114	37	79	126	302
1960	436	155	43	95	127	325
1961	465	114	52	95	148	341
1962	531	184	66	111	175	418
1963	574	233	98	118	227	547
1964	627	222	82	127	244	549
1965	603	220	85	143	207	552
1966	604	172	74	117	174	455
1967	649	214	64	94	147	368
1968	681	262	51	81	151	353
1969	639	263	56	83	140	365
1970	672	269	75	102	175	436
1971	703	218	73	111	176	449
1972	810	256	73	108	143	415
1973	809	325	43	81	124	324
1974	758	443	79	134	187	543
1975	843	409	103	236	315	857
1976	922	559	93	259	455	951
1977	1,051	704	165	294	599	1,236
1978	1,366	779	136	356	782	1,475
1979	1,211	892	118	390	640	1,315

Sources: The basic data are almost all from the National Bank of Egypt, *Economic Bulletin* (Cairo: National Bank of Egypt, various years), supplemented with unpublished data provided by the World Bank.

Notes: The domestic variables are deflated by the consumer price index and the import values by the international index of inflation (see Table 17).

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