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Macroeconomic Impact of Fiscal Policy in an Open Developing Economy: The Case of the Yemen Arab Republic

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I. Introduction

Fiscal policy in developing countries has been gaining in importance as a tool of development planning and macroeconomic management. This is illustrated by the increasingly important role played by central governments in most developing economies. The expanding role of government is often justified in terms of ensuring the availability of basic needs and services and the development of necessary administrative institutions in the early stages of modernization. From a short-run perspective, fiscal policy has been a key element in the context of efforts by developing countries to pursue financial stabilization programs. In upper credit tranche programs approved by the Fund during the period 1969-78, 77 per cent contained provisions relating to fiscal performance. 2/ Fiscal policy takes on added importance in countries where financial and exchange markets are not sufficiently developed so that conventional tools of monetary and exchange rate management are either absent or lacking in effectiveness.

The purpose of this paper is to examine the relationships between fiscal policy and other macroeconomic variables in a short-run stabilization framework. More specifically, the paper seeks to trace out the impact of changes in the level of government expenditures on the balance of payments, and to a much lesser extent on growth and inflation in the context of a small, open economy.

Of the many macroeconomic effects of fiscal policy in developing countries, the most direct is the impact of fiscal policy on the balance of payments. Although well recognized, this impact is difficult to document. More often than not, it is obscured by the complexities of the economies under study and by the policy actions taken. Nevertheless, there are cases where this relationship can be seen clearly, especially

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1/ Mr. Brillembourg is on the staff of the World Bank. The research for this paper was done while he was in the Research Department of the IMF. The assistance of Messrs. M. El-Erian, S. Ishii, M.J. Moriarty, and Mrs. Youkyong Kwon is gratefully acknowledged.

2/ Beveridge and Kelly (1980).

in economies that are characterized as open, with free exchange and trade systems. One such case is that of the Yemen Arab Republic (Y.A.R.) during the period 1975-81. Chart 1 illustrates this point by relating the bank-financed fiscal deficit (changes in net domestic credit to Government, ΔNDCG) to changes in the country's net foreign assets (ΔNFA, defined so that a negative quantity represents an increase in assets) during this period. 1/

As is clear from Chart 1, the Y.A.R. accumulated reserves during the 1974-78 period when a strong economy and constraints on increases in fiscal expenditure caused government bank deposits to grow. In 1978 the Y.A.R.'s prospects changed. Decreases in foreign transfers from both private and official sources combined with a rapid increase in fiscal expenditures led to rising fiscal deficits and foreign reserve outflows. By 1981 these developments placed the external position of the Y.A.R. in a precarious position and raised some concerns about the sustainability of the balance of payments deficit.

To examine further this relationship, a short-run macroeconomic model was constructed on the basis of available data for the Y.A.R. in the period 1975-80.

The model consists of four interrelated blocks: output and prices, fiscal accounts, monetary accounts, and the balance of payments. It is designed to shed light on the validity of various views concerning the influence of fiscal expansion on the level of output, the rate of inflation, and the balance of payments. In particular, it allows the assessment of a priori hypotheses derived from such diverse views as those of "financial crowding out," "physical crowding out," "offsetting balance of payments deterioration," and "output expansion." 2/ The model

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1/ The close relationship between the two variables is perhaps best seen in the unitary coefficient of the ΔNDCG in the following regression.

$$\Delta NFA = \underset{(-5.33)}{-235.49^{*}} + \underset{(6.82)}{0.94}\ \Delta NDCG$$

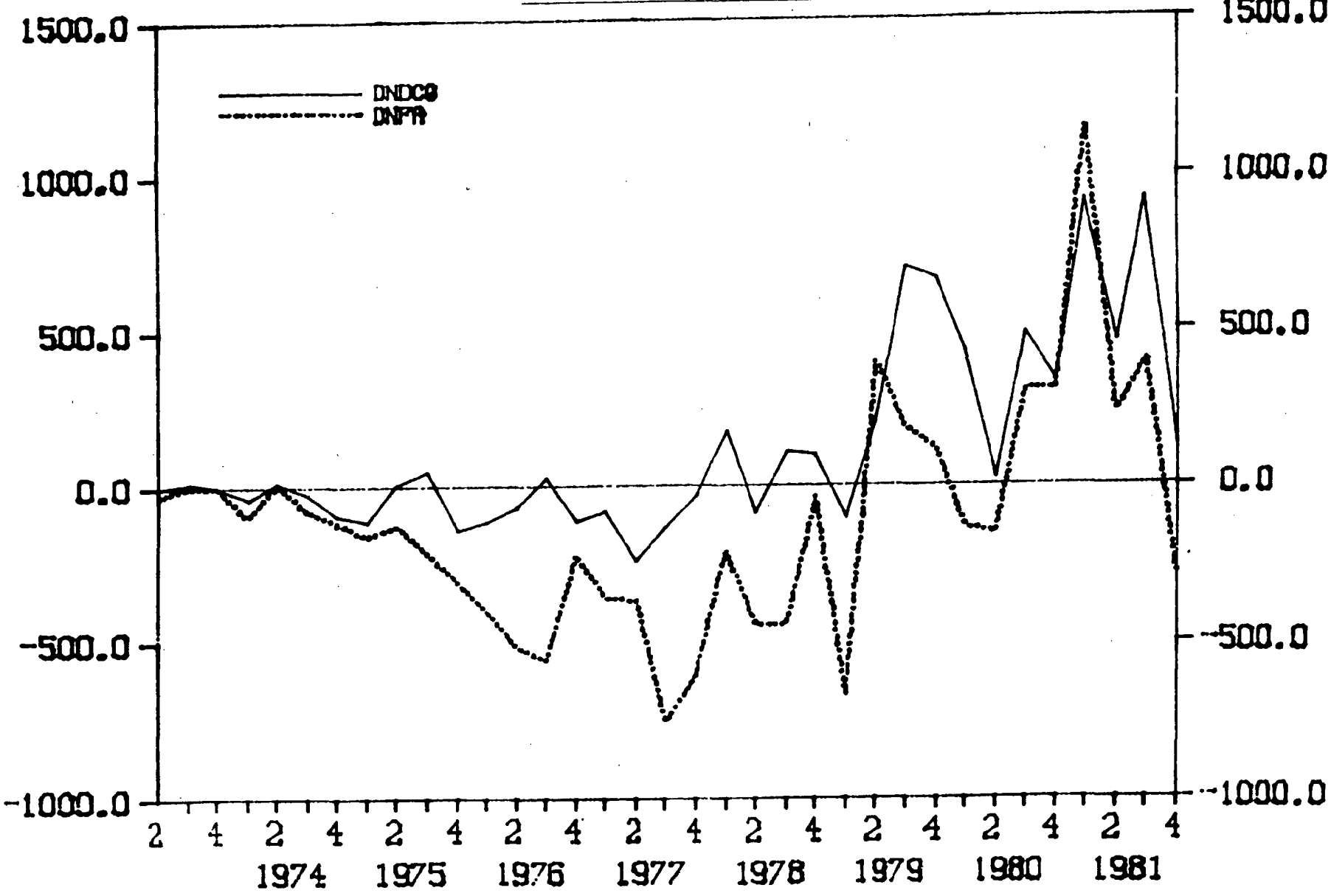
$\bar{R}^2 = 0.57$ D.W. = 1.40

Estimation Period: Q2 1973-Q4 1980.

2/ A useful review of these views, and the resultant issues, is provided in Cook and Jackson (1979). Currie (1981) provides a systematic exposition of the crowding-out hypotheses. Barro (1981) discusses the "output neutrality view." Fetherston and Godley (1981) trace the relationship between fiscal policy and the balance of payments.

Chart 1. Yemen Arab Republic: Movements of Bank-Financed Deficit and Change in Net Foreign Assets, 1974-81

(In millions of Yemen rials)



is estimated using quarterly data and the resultant relationships are used for a series of simulation runs. These lend support to the hypothesis that starting from an initial position of equilibrium and a fixed exchange rate, a fiscal stimulus that increases the wealth of the private sector invokes an adjustment of income to restore the desired wealth-income ratio, with a final equilibrium in which the injections of financial wealth from the fiscal expansion are offset by an equivalent drain on international reserves due to a deterioration in the balance of payments. 1/ The fiscal expansion is shown to have little effect on real output or on the price level.

The outline of the paper is as follows: in Section II we present an overview of the potential effects of fiscal expansion in small, open developing economies. The analysis focuses exclusively on the macroeconomic effects of fiscal expansion. Section III outlines the major relevant characteristics of the Y.A.R. economy, thus laying the foundation for the macroeconomic model described in Section IV. In Section V, the data base and the associated limitations are discussed. In Section VI we estimate the model and in Section VII we provide a number of simulations based on the model.

II. Fiscal Policy in Developing Countries: Some Relevant Observations

In the conventional distinction between fiscal and monetary policy, fiscal policy is defined as changes in government expenditure or tax parameters which do not result in changes in the money supply. This distinction is crucial for many of the theories concerning the relative efficacy of fiscal and monetary policies in affecting output under variant assumptions with respect to the exchange rate system, the extent of sterilization, and the degree of capital mobility. 2/ When considering the effects of fiscal policy in developing economies, however, this distinction is no longer useful. The absence of widespread organized money markets in many of these economies means that the distinction between fiscal and monetary policy becomes blurred. Specifically, the absence of extensive open-market operations imply that fiscal expansions tend to be money financed rather than bond financed. This observation has two important implications for the present analysis. First, the rise in interest rates often associated with bond-financed fiscal expansion may be substituted, in the presence of constant demand for money, by a fall in the real rate of interest, as a result of the domestic credit expansion caused by a money-financed fiscal deficit. Second, arguments of ex ante

1/ A phenomenon predicted by both the fiscalist (or New Cambridge) school and by the monetarists school. The former's analysis relies on the stability of the private sector's net financial surplus whereas the latter's analysis relies on the stability of the demand for money function and the absence of sterilization.

2/ For example, the theory based on the Mundell-Fleming approach whereby the output effect of fiscal policy relative to monetary policy in a small, open economy with a floating (fixed) exchange rate is weak (strong).

and actual "financial crowding" out, whereby wealth effects resulting from the financing of the deficit and from any induced price changes "crowd out" the real effects, have limited relevance in the present context.

These observations mean that the effects of fiscal expansion in a typical developing economy (under a fixed exchange rate) depend more on the structure of the real side of the economy, e.g., the degree of capacity utilization, the interest sensitivity of expenditures and of flows across the exchange, the import propensity, and private sector behavior. Thus, to the extent that there is a fiscal policy-induced crowding out in a small, open developing economy, it is likely to be the result of the existence of real constraints on the expansion of real output. This phenomenon can be associated with an increase in prices and/or ex ante balance of payments deficits. The former results from competitive bidding for limited resources while the latter reflects the increased import flows and the interest-induced capital outflows. The importance of the inflationary pressures relative to the balance of payments pressures is partly determined by the extent of capital mobility and by the efficacy of the international commodity arbitrage mechanism. 1/ In the case of perfect commodity arbitrage (i.e., validity of the "law of one price") and perfect capital mobility, the fiscal expansion will result in a balance of payments deficit with no influence on the price of tradable goods (and therefore limited inflationary influences).

Only through the relaxation of the real constraints can conditions arise under which a fiscal expansion may contribute to increased real output. Such an increase would minimize both the inflationary and the balance of payments pressures. However, the removal of these constraints is difficult and requires the successful implementation of a broad-based development strategy. In the short run the most likely outcome of an increase in the fiscal deficit is likely to be a decline in external reserves. These issues are examined in the macroeconomic model developed and estimated below.

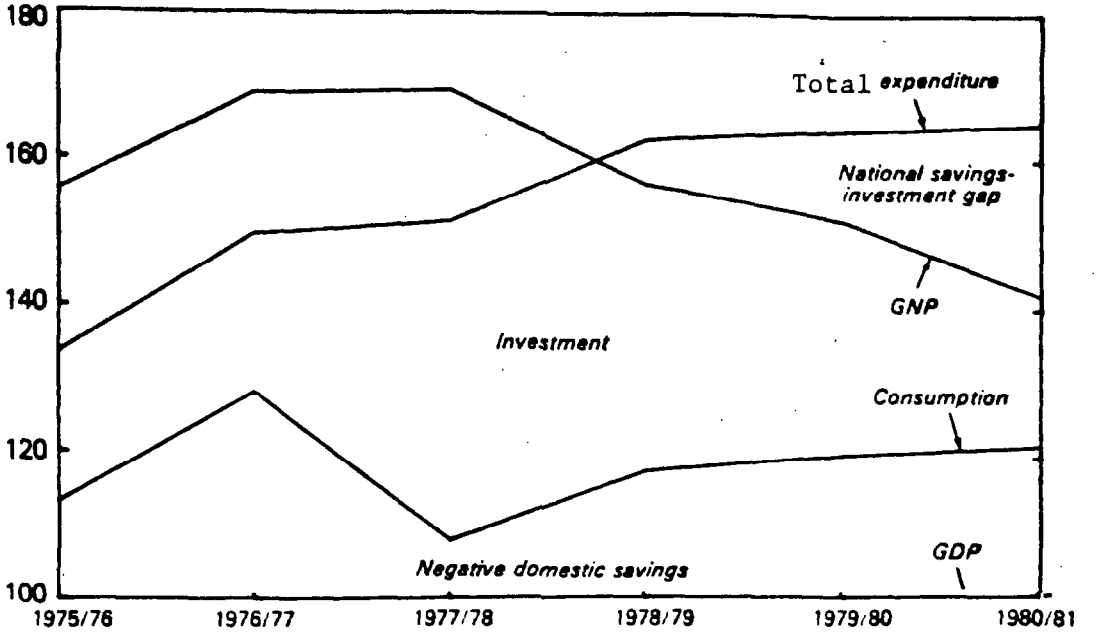
III. Overview of the Y.A.R.'s Economy

The Y.A.R. is a small, open economy characterized by a low level of per capita income, a large reliance on foreign transfers 2/ (Chart 2), an insignificant level of exports relative to imports, and rudimentary financial markets. The economy is "small" insofar as it exerts neither

1/ Other factors include the interest sensitivity of consumption and investment expenditures and the income elasticity of import demand.
2/ Remittances, grants, and loans.

Chart 2. Yemen Arab Republic: Total Expenditure, 1975/76-1980/81

(In per cent of GDP)



Source: Central Planning Organization.

monopoly nor monopsony power in trade. 1/ It is "open" in the sense that it engages in foreign trade and maintains no restrictions on the flow of goods and capital. 2/

The fiscal position in the Y.A.R. began to weaken in 1978/79 when the overall budget deficit rose to 9.2 per cent of GDP, following several years of surpluses or near balance. In 1978/79 revenue growth, which had been highly buoyant throughout the mid-1970s, slowed to 9 per cent, largely because of a stagnation in import duty collections. Expenditure growth, on the other hand, accelerated sharply. Although the fiscal outcome in 1979/80 showed some improvement on both the revenue and expenditure sides the overall deficit remained large and, in the absence of sizable inflows of official transfers, entailed considerable government borrowing from the the banking system. The fiscal outcome in 1981 showed renewed weakness as the overall deficit increased to 17.5 per cent of GDP and the bank-financed deficit to 15.6 per cent.

The financial year 1978/79 3/ also represented a turning point in the external accounts of the Y.A.R. For several years until then, the economy had benefited from large external inflows in the form of workers' remittances and official assistance. Import growth, on the other hand, was restrained primarily by domestic supply and distribution constraints. Consequently, the current account of the balance of payments recorded rising surpluses and net foreign assets increased steadily. By March 1979 gross reserves stood at US$1.6 billion, equivalent to about 15 months of imports. In 1978/79 private remittances declined by 5 per cent while imports rose by 56 per cent, in part because of an unusual increase in defense-related requirements. Although the current account swung to a deficit equivalent to about 6 per cent of GDP, large inflows of official transfers helped maintain the overall balance of payments in surplus. In the following year imports continued to grow strongly while remittances increased only moderately leading to a widening in the current account deficit. Moreover, official transfers dropped sharply from the peak of the preceding year and the overall payments position swung to a small deficit for the first time in many years. The balance of payments situation weakened further in 1980; it registered a current account deficit of US$520 million and an overall deficit of US$39 million. These trends accelerated in 1981 as private remittances declined by 27 per cent and, despite a small drop in imports, the overall payments position recorded a deficit of about US$331 million, equivalent to 12 per cent of GDP. Reserves fell sharply during the period and by the end of 1981 they stood at a level equivalent to seven months of imports.

1/ This aspect allows us to neglect in the model any second-round feedback effects whereby domestic changes influence economic conditions in the rest of the world which then react on the domestic economy.

2/ The openness of the economy implicitly determines the extent to which the effects of fiscal policy are felt domestically or are leaked via the balance of payments.

3/ Fiscal year ended June 30. As of 1981, the fiscal year was made to coincide with the calendar year; however, to facilitate comparisons references to calendar year 1980 are also made in this paper.

Monetary developments over the past few years reflected the combined effects of the balance of payments and domestic operations of the Government; private sector borrowing remained relatively small throughout. Thus as a result of the recent weakening in the fiscal and balance of payments positions the rate of growth of domestic liquidity slowed considerably, as the expansionary impact of government bank borrowing was countered by the contractionary effects of the decline in reserves. The growth of money and quasi-money dropped from an annual average of 46 per cent in the three years ended in 1978/79 to 12 per cent in the following three years.

IV. A Model of Fiscal Impact

The macroeconomic model used as a basis for the simulation analysis consists of four interrelated blocks--output and prices, the fiscal accounts, the monetary accounts, and the balance of payments. It is a short-run model which focuses on the main macroeconomic relationships within the Y.A.R. economy. Price changes, GDP, and the level of private imports are determined in the output and price block. Growth in the economy essentially depends on the size of the output gap (the deviation of actual GDP from capacity GDP), on recent growth experience, on government spending, and on the tightness in the labor market (measured by the size of the remittance transfers). The price equation incorporates an inflation expectation adjustment mechanism; in addition, price movements are dependent on the gap between domestic and external inflation and on government expenditures. Demand for money and for quasi-money are determined in the monetary block. They are endogenously determined in the model, the former being a function of income, remittance transfers, and expected inflation while the latter is assumed to be a function of interest rate differentials (between international and domestic rates) and changes in income. Taxes are determined in the fiscal block with the fiscal sector consisting of two tax equations which determine taxes on international trade and other domestic taxes; government property income (mostly profit transfers from the banking system) and government expenditures are exogenously determined. Finally, the balance of payments block determines the capital and overall balance of payments account. This block consists of an import function which relates real imports to lagged income and private transfers, and the identity linking the domestic monetary system to changes in foreign assets. The equations used for estimation are presented below, with each block considered separately.

1. Prices, output, and imports

a. Prices

The price equation is based on the notion that the private sector attempts to forecast changes in the price level and that, unless unexpected events shock the economy, it assumes that the actual price level will equal the expected price level. The model identifies two sources

of shocks: one stemming from the foreign sector and another from the domestic sector. If foreign prices increase faster than domestic prices, the actual inflation rate will be higher than expected. If the demand for domestic goods is higher than expected, the resulting supply constraints will cause inflation to accelerate. Because the Government is the largest user of domestic goods and services, increases in government spending are taken to be the main source of unexpected changes in demand for domestic goods and services.

The price equation is therefore specified as

$$(1) \quad \Delta P - \Delta P^e = \alpha_1 + \beta_1 (P^f - P^e_{t-1}) + \gamma_1 \Delta GER_{t-1} \quad \underline{1/}$$

where P = price level

P^e = expected price level, as defined below

P^f = foreign price level

GER = real government expenditure

Expectations about future inflation rates are represented by an exponentially declining average of past inflation rates. Thus:

$$(2) \quad \Delta P^e = (1 - \beta_2) \Sigma \beta_2^i \Delta P_{t-1}$$

The expected price level for the next period is the sum of the logs of the expected inflation and the current price level.

$$(3) \quad P^e = \Delta P^e + P$$

b. <u>Output</u>

Because of the short-term nature of the model, output is determined by its deviation from capacity output. Capacity output is treated as exogenous in this model although, in a longer-run model, it could be treated as depending on capital, labor, and other factors. This model assumes that there are short-run shocks which can make the actual level of real GDP deviate from the capacity level. However, once these shocks are absorbed into the system, output will once again return to its capacity level. The two shocks are changes in private transfers and in government expenditure.

1/ Throughout this paper variables in logarithmic form are denoted by capital letters. A delta (Δ) denotes the change in the variable so prefixed.

The output equation is

(4) $\Delta Y = \alpha_4 + \beta_4 (Y^c - Y_{t-1}) + \gamma_4 \ \Delta YAVG_{t-1} - \delta_4 \Delta TRP + \delta_4 \Delta GERAVG_{t-1}$

where Y = actual output (GDP)

Y^c = capacity output

YAVG = three-quarter average of output

TRP = ten-quarter average of real private transfers

GERAVG = three-quarter average of real government expenditures.

c. Imports

The import equation assumes that real private imports are a function of real income. Since income in the Y.A.R. has two very distinct sources (domestic output and private transfers) which may have different impacts on imports, the effects of these two sources of income are estimated separately and are assumed to operate with a lag of one period.

(5) $IR = \alpha_5 + \beta_5 Y_{t-1} + \gamma_5 TRP_{t-1}$

where IR = real private imports

TRP = real private transfers.

2. Money and quasi-money

a. Money

The demand for money in the Y.A.R. is assumed to have two roles. One is that money is needed to facilitate transactions. The other is that money is used as a store of savings. The model incorporates these two roles by assuming that real money demand depends on output and permanent real transfers. This latter variable is expected to capture changes in the perceived wealth in the Y.A.R. economy not already captured by output. In addition, the real money demand is assumed to be related to changes in expected inflation.

(6) $MD = \alpha_6 + \beta_6 Y + \gamma_6 TRP + \delta_6 \Delta P^e$

where MD = narrow money deflated by the consumer price index.

b. Quasi-money

The model assumes that the ratio of quasi-money to money (Q) changes when the difference between foreign and domestic interest rate changes and when the economy is growing at an unusually rapid rate. The latter factor implies an adjustment lag between savings and income, which is also captured in the lagged ratio Q.

$$(7) \quad Q = \alpha_7 + \beta_7 (i^f - i) + \gamma_7 \Delta YAVG + \delta_7 Q_{t-1}$$

where Q = the ratio of quasi-money to narrow money

i^f = interest rate on London three-month Eurodollar deposits, averaged over the previous two quarters

i = interest rate on domestic three-month deposits.

3. Taxes

The model divides fiscal revenues into three categories: taxes collected on international trade, domestic taxes, and nontax revenue. Taxes on international trade are a function of nominal private imports and lagged taxes. Domestic taxes depend essentially on nominal GDP with a lag. Nontax revenue is exogenous to the model. Thus:

$$(8) \quad TAXI = \alpha_8 + \beta_8 (IR + P^f) + \gamma_8 TAX_{t-1}$$

$$(9) \quad TAXR = \alpha_9 + \beta_9 (Y + P)_{t-2}$$

where TAXI = taxes on international trade

$(IR + P^f)$ = nominal private imports (where IR is private sector real imports and P the unit value)

TAXR = domestic tax revenue

(Y + P) = nominal output.

(10) Deficit = EXP(TAXI) + EXP(TAXR) + nontax revenue - government expenditure.

Equation (10) simply states that government deficit is equal to revenues minus expenditures.

(11) Δdncg = - (deficit + net external borrowing)

Equation (11) states that the change in net domestic credit to Government is equal to the negative of the sum of the fiscal deficit and the change in net foreign credit to Government.

4. Balance of payments

The model is closed by determining the capital account and the overall balance of payments.

a. Changes in net foreign assets

The change in net foreign assets (Δnfa) is determined from the balance sheet identity of the monetary sector.

(12) $\Delta nfa = \Delta liquidity - \Delta ndcp - \Delta ndcg$

The change in liquidity is equal to the change in money plus quasi-money. The change in net domestic credit to the private sector (Δndcp) is exogenous to the model. The change in net domestic credit to Government (Δndcg) was determined in (11), above.

b. Net errors and omissions

In this model, exports, net services, and transfers are exogenous. The first two are small enough to be ignored. The third variable, transfers, depends on variables which are outside the scope of this short-run model. Thus, having determined private imports above, the current account is also determined. The capital account is exogenous since it only contains official capital transfers. This leaves only net errors and omissions (neo) to be determined. In the Y.A.R. this variable captures private capital flows as well. It is determined by the balance of payments identity.

(13) neo = nfa - bopexog + imports

where bopexog = exports + net services + private and official transfers + official capital inflows.

V. Data Base

The data base used for the estimation of the model was constructed on the basis of data provided by the Central Bank of Yemen and the Central Planning Organization (CPO). The majority of the time-series data was used to estimate the macroeconomic model without any adjustments; however, some data were either manipulated or redefined. For example, because of the unavailability of quarterly GDP data these were interpolated by assigning appropriate weights to successive annual GDP observations. In this quarterly interpolation from annual observations, the time path of GDP was assumed to be smooth. Price time-series data provided by the CPO showed a decline in the consumer price index in 1979 while international price levels rose sharply. For an economy which is highly dependent on

international trade, the decline in the price index seemed unreaslistic. 1/ Thus, the consumer price index was adjusted to show an upward trend in 1979. In view of a persistent discrepancy between the fiscal accounts and the monetary data concerning the budget deficit, the budget expenditure figures were built up by adding together the deficit (as measured by financing data) and the revenues. This procedure essentially consolidates the discrepancy into the expenditure data. Thus, the discrepancy was essentially considered unrecorded budgetary expenditures. Finally, because of the changing structure of the economy and the limitations of the data, especially in the earlier periods, the model was estimated using quarterly data over the period 1977-I to 1981-III (unless otherwise noted).

VI. Estimation of Model

The model was estimated using ordinary least squares routines of the Research Analysis Language (RAL) program on the Fund's mainframe computer and was simulated using the VisiCalc program on an Apple II micro-computer. The estimated equations below are identical to those discussed above except for the addition of certain dummy variables to take account of seasonal variations. The figures in parentheses below the estimated parameters are the corresponding t-statistics. An asterisk (*) denotes that the parameter is significant at the 5 per cent level. The R^2 refers to the R^2 adjusted for degrees of freedom. The D.W. refers to the Durbin-Watson statistic.

$$(1)\quad \Delta P - \Delta P^e = \underset{(2.21)}{0.099^*} + \underset{(2.31)}{0.310^*}\,(P^f - P^e_{t-1})$$

$$+ \underset{(1.36)}{0.015}\ GER_{t-1} - \underset{(1.19)}{0.014}\ SD3$$

$$\bar{R}^2 = 0.39 \qquad D.W. = 1.40$$

$$(4)\quad \Delta Y = \underset{(4.41)}{-0.026^*} + \underset{(7.05)}{1.13^*}\,(Y^c - Y_{t-1}) + \underset{(6.37)}{1.36^*}\ \Delta YAVG_{t-1}$$

$$\underset{(4.73)}{-0.045^*}\ \Delta TRP + \underset{(2.37)}{0.015^*}\ \Delta GERAVG_{t-1}$$

$$\bar{R}^2 = 0.80 \qquad D.W. = 1.64$$

1/ Estimation of the effects of international price level changes in the Y.A.R.'s consumer price index yielded: YARP = 37.920 + 0.978Q where YARP denotes the Y.A.R.'s price level, Q denotes an index of imported inflation with $Q = \Sigma\alpha_i P_i ER_i$, α_i denoting import weights, P_i the unit export value for country i and ER_i the bilateral exchange rate between country i and the Y.A.R.

(5) $$IR = -9.14^* + 1.80^* Y_{t-1} + 0.40^* TRP_{t-1} - 0.157^* D$$
$$(2.51) \quad (3.79) \quad (4.97) \quad (7.27)$$

$\overline{R}^2 = 0.92$ D.W. = 2.898

(6) $$MD = -1.81^* + 1.00^* Y + 0.42^* TRP - 1.46^* \Delta P^e$$
$$(3.03) \quad (14.3) \quad (11.8) \quad (3.22)$$

$R^2 = 0.98$ D.W. = 2.50

(7) $$Q = -1.26^* + 0.83\ (i^f - i) + 11.53^*\ YAVG + 0.35\ Q_{t-1}$$
$$(3.78) \quad (1.54) \quad (2.68) \quad (1.92)$$

$\overline{R}^2 = 0.59$ D.W. = 1.02

(8) $$TAXI = 2.18^* + 0.29^* (IR + P^f) - 0.067\ SD3 + 0.29^*\ TAXI_{t-1}$$
$$(4.96) \quad (4.18) \quad (1.76) \quad (2.56)$$

$\overline{R}^2 = 0.84$ D.W. = 1.79

(9) $$TAXR = -6.97^* + 1.48^* (Y + P)_{t-2} + 0.39^*\ SD1,2$$
$$(5.79) \quad (9.56) \quad (4.51)$$

$\overline{R}^2 = 0.86$ D.W. = 1.76

The price determination equation (1) shows the poorest fit of all of the estimated equations. In large part, this is due to the unreliability of the price index. Nevertheless, the estimation shows that the domestic price index is significantly affected by foreign prices. The estimation results also show that increases in real government expenditures have minor inflationary consequences. For each 10 per cent increase in government expenditures, the inflation rate is increased by 0.15 percentage points. This increase, however, is not significantly different from zero. In order to correct for seasonal variations, a seasonal dummy, which takes on the value of one in the third quarter of the year and zero elsewhere, was added to the estimated equation.

The exponential weight β used in the formation of inflationary expectations in equation (2) was estimated to be 0.67. This parameter was found to maximize the fit of the money demand equation after searching over the range of zero to one. This estimate implies that the current inflation rate has a weight of one third and those of previous quarters have the remainder. In other words, one year after the inflation reached a new level, the expected inflation will reflect 80 per cent of this change in inflation.

Equation (4) states that real GDP growth depends on the deviation of lagged output from capacity output. 1/ If capacity is underutilized in the previous quarter, output will tend to return to its capacity level. In addition, a high rate of growth over the preceding three quarters also tends to have a positive effect on current growth rates. 2/ Growth is also affected by an increase in the permanent real private transfers, which are defined as the simple average of real private transfers over the past ten quarters. A priori, one could have expected an increase in private transfers to either stimulate or dampen growth. On the one hand, it could stimulate growth because it could induce expectations of increased future growth in demand. On the other hand, it could dampen growth because of the delayed effects of the implied labor shortage caused by the emigration of workers which accounts for the increased remittances. In addition, the increased inflow of remittances, by stimulating import demand and possibly dampening work incentives, could be associated with a decline in the growth of GDP. The estimation results show that either or both of the latter effects tend to dominate. As expected, an increase in the average growth of real government expenditure has a stimulating, if small, effect on growth.

In the import demand, equation (5), the estimated parameters were found to vary substantially over time, and the estimation period was shortened to begin in 1979-III to better reflect recent structural relationships. The output elasticity is high, but not unusually so for a developing country. The transfer elasticity is also high. More specifically, private transfers account for about one third of total income during this period. Thus, if the income elasticity was equal to one, the corresponding transfer elasticity would be about one third. Following this line of reasoning, the income elasticity implied by the estimated coefficient on private transfers is about 1.33.

The results of the estimation of the money demand, equation (6), show that the output elasticity is equal to one. They also show that 40 per cent of an increase in permanent private transfers is added to real cash balances. There is also a strong inverse relationship between inflation and real money demand.

Equation (7) determines the ratio of quasi-money to money and suggests that an increase in the differential between foreign and domestic interest rates causes an increase in quasi-money. This coefficient, however, is not significantly different from zero. A rapid growth of output over three quarters, however, does have a significant, positive

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1/ Because of lack of data, the estimation period was shortened to end in 1980-IV.

2/ This term can also be viewed as a proxy for investment. In the simple accelerator models, investment is considered to be a function of the acceleration of output in the previous quarters. Here, investment is assumed to depend on the difference between the average growth in the last three quarters and trend growth.

impact on quasi-money, perhaps reflecting the demand for higher savings prior to new investment. These changes, however, take some time because they work through a partial adjustment mechanism as evidenced by the lagged dependent variables (Q_{t-1}).

The equation determining taxes on international trade (8) is a partial adjustment model, and the coefficient of nominal imports is the short-run elasticity. The corresponding long-run elasticity is equal to one so that an increase of imports causes an equal increase in taxes collected in international trade over the long run. The partial adjustment coefficient, given by the coefficient of lagged taxes, indicates that about 80 per cent of the potential increase in taxes is collected a year after an increase in the level of imports. Domestic taxes have a somewhat more buoyant elasticity. Here, an increase in nominal output increases domestic taxes more than proportionally.

VII. Simulation of the Model

The purpose of this section is to describe how the model simulates the impact of changes in government expenditure and in private transfers. In order to see these impacts more clearly, various simulations are performed under artificial conditions. These simulations consist of changing one of two exogenous variables at a time and tracing the impact of this change on the rest of the model. In order to guarantee that extraneous disturbances are not affecting the results, the simulations are performed with the economy in an initial stationary equilibrium. 1/

Four simulations are performed. First, government expenditure is increased temporarily by 10 per cent for one quarter and then decreased back to its previous level. Second, government expenditure is increased permanently. Third, private transfers are increased temporarily and, fourth, permanently. For each of these four simulations, all other exogenous variables are maintained constant.

Before going on to describe the results of these simulations, it is useful to go through the model describing how the variables interact with one another. Because the model has the useful property of being recursive, the shocks to the model can be traced through as if they were occurring in sequence, although, in fact, the impact of the shock occurs simultaneously on all the variables in the model.

The first impact of an increase in government expenditure is on the price level as the additional government demand for goods creates pressure on domestic goods prices. This increased demand also induces increased output but less so, because the increase in prices decreases the real value of new government expenditure. These changes in the price level and in output also affect the other macroeconomic variables

1/ In this context, this means that the economy is not growing and all stocks are constant.

by increasing both imports and the demand for liquidity. The additional imports mean that additional international taxes are collected. Although revenues respond to increased expenditure, the latter causes a fiscal deficit which must be financed by domestic and foreign borrowing. The change in net foreign assets is then determined by subtracting the domestic credit expansion from the changes in demand for liquidity. The domestic credit expansion is determined by the domestic borrowing requirement of the fiscal authorities and by the policy-determined amount of net domestic credit to the private sector. Finally, "net errors and omissions" is equal to the difference between the current and the overall account of the balance of payments, adjusting for official capital movements.

The impact of an increase in private transfers follows a similar path. It first affects income. Unlike an increase in government expenditure, increases in private transfers directly increase both imports and the demand for money, but not inflation. The change in imports then increases tax revenue and decreases the government deficit. These effects combine to increase net foreign assets. The increase in transfers, however, generates an excess supply of money and this excess is eliminated through capital outflows.

1. Changes in government expenditure

In order to gain further understanding of the impact of an increase in government expenditure, two simulations are performed. First, a temporary (one quarter) and then a permanent increase in government expenditure are simulated. For these simulations artificial data are used and the starting point for the simulation is taken to be 1980-I. 1/

Changes in government expenditure have a direct impact on three variables: prices, output, and the fiscal deficit. The simulation results show that the impact on prices and output is empirically too small to make a substantial difference. Rather, the main lesson drawn from the model is that an increase in expenditures causes a fiscal deficit which is associated with a depletion of net foreign assets. This conclusion remains the same whether or not the increase is temporary or permanent.

Chart 3 illustrates the impact of a permanent 10 per cent increase in government expenditure on prices and output. Two important features of the simulation are that (1) the impact on prices and output is very small and (2) the impact causes cyclical fluctuations in these variables. The former is due to the empirical estimation results and the characteristics of the Y.A.R. economy while the latter is due to the structure of

1/ To get the starting point of the simulation, the following procedure was performed. Taking as an initial period 1980-IV, the model was simulated until all variables reached an equilibrium level, adapting both government revenues and exports so that in equilibrium there would be neither a fiscal deficit nor a balance of payments disequilibrium. Given these equilibrium levels, a shock is introduced and the model simulated.

the estimated equation. For both income and prices, the variables fluctuate about the level of exogenously determined variables. Shocks to the system can cause temporary deviations from these levels but eventually these deviations converge toward equilibrium.

A temporary change in government expenditure has a similar impact, though somewhat shorter lived, on prices and output. Since these two variables are not affected much, the other behavioral equations in the model are also left relatively unaffected.

The main impact of an increase in government expenditure is felt through the financing of the fiscal budget. To the extent that this is financed through the Central Bank, this creates a potential liquidity expansion. Because the demand for money is predetermined by other variables and there is free convertibility of the currency, this potential increase never takes place. Rather what does take place is a capital outflow matched by a decrease in net foreign assets. This capital outflow is a consequence of the private sector's desire to get rid of excess cash balances caused by the increased government expenditure. These conclusions hold as long as the increased government expenditure is used to purchase domestic goods and services. To the extent that it is used to purchase government imports, then the amount of excess money demand and its corresponding capital outflows are correspondingly diminished.

Charts 4 and 5 show the impact of a 10 per cent increase in government expenditure. Chart 4 shows the impact of a temporary increase in government expenditure of YRls 155 million per quarter. Chart 5 shows the impact of a permanent increase of the same magnitude. In both cases, the initial reaction of the economy is to have a capital outflow and a decrease in net foreign assets equal to the fiscal deficit which is domestically financed. Because of the impact of government expenditure on income and prices, there are some minor disturbances which affect the economy for the next four years. The increases in both income and prices raise the demand for both liquidity and imports in the quarter following the shock. This attracts foreign reserves and capital inflows. By the third quarter, however, the cyclical adjustment begins to reassert itself and the reserve flows are reversed. If the increase in government expenditure is permanent then these fluctuations take place around a trend outflow of reserves equal to the fiscal deficit.

One can analyze this economic behavior in various ways. One of the most fruitful is to consolidate the Central Bank balance sheet with that of the fiscal authority. 1/ If this is done, one can consider the foreign reserves of the Central Bank as foreign deposits of the fiscal authorities. These deposits are then drawn down to finance the new fiscal expenditure. One may postulate that the private sector reaction to this change in government policy may run as follows. Government expenditure substitutes

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1/ This assumes that monetary policy is a passive reflection of fiscal policy, not an unrealistic assumption in many developing countries.

Chart 3. Yemen Arab Republic: Impact of a Permanent 10 Per Cent Increase in Government Expenditure on Prices and Output, 1979-85

(As per cent of initial level)

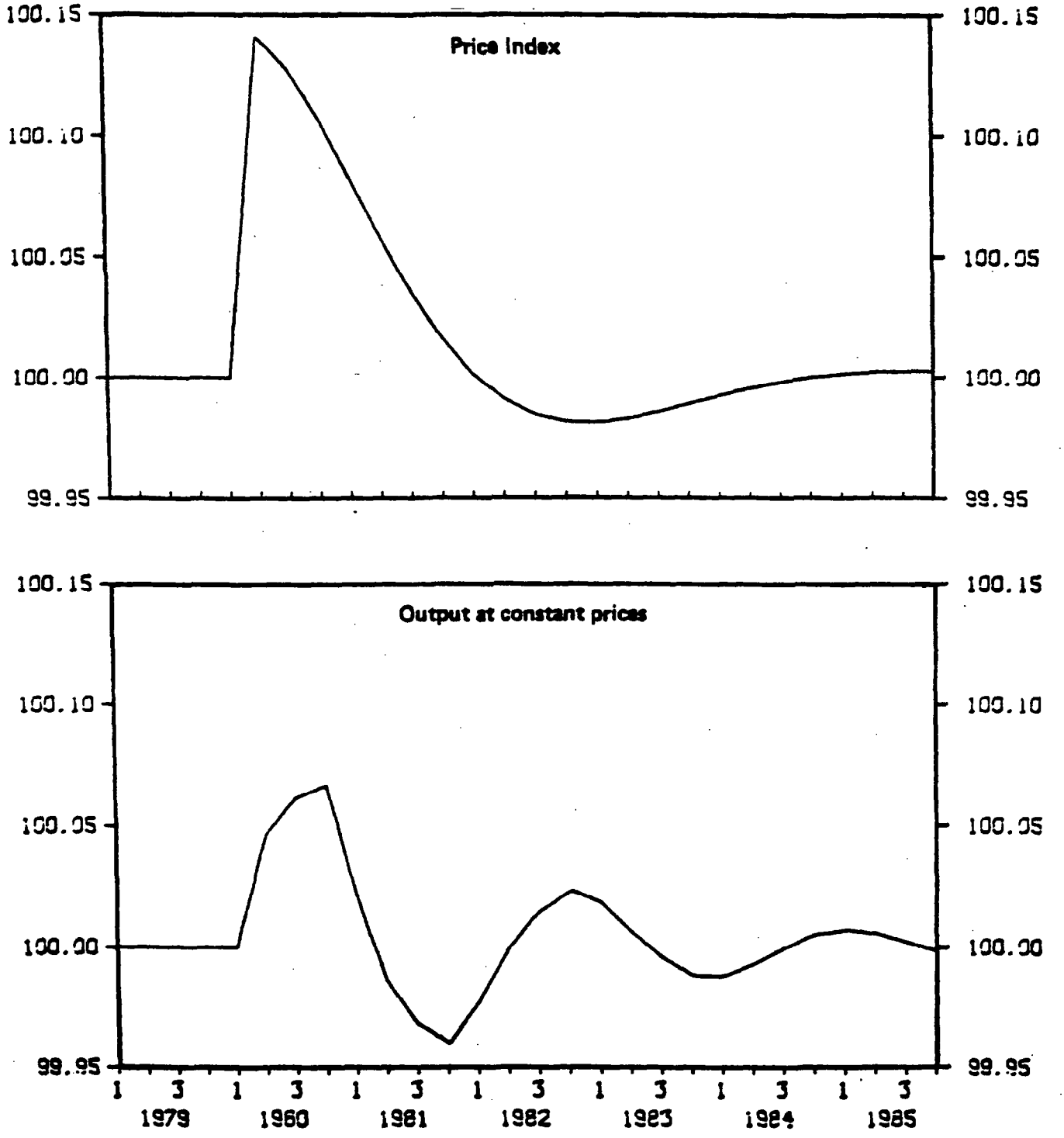


Chart 4. Yemen Arab Republic: Simulation of a Temporary Increase in Government Expenditure of YRls 155 million, 1979-85

(In millions of Yemen rials)

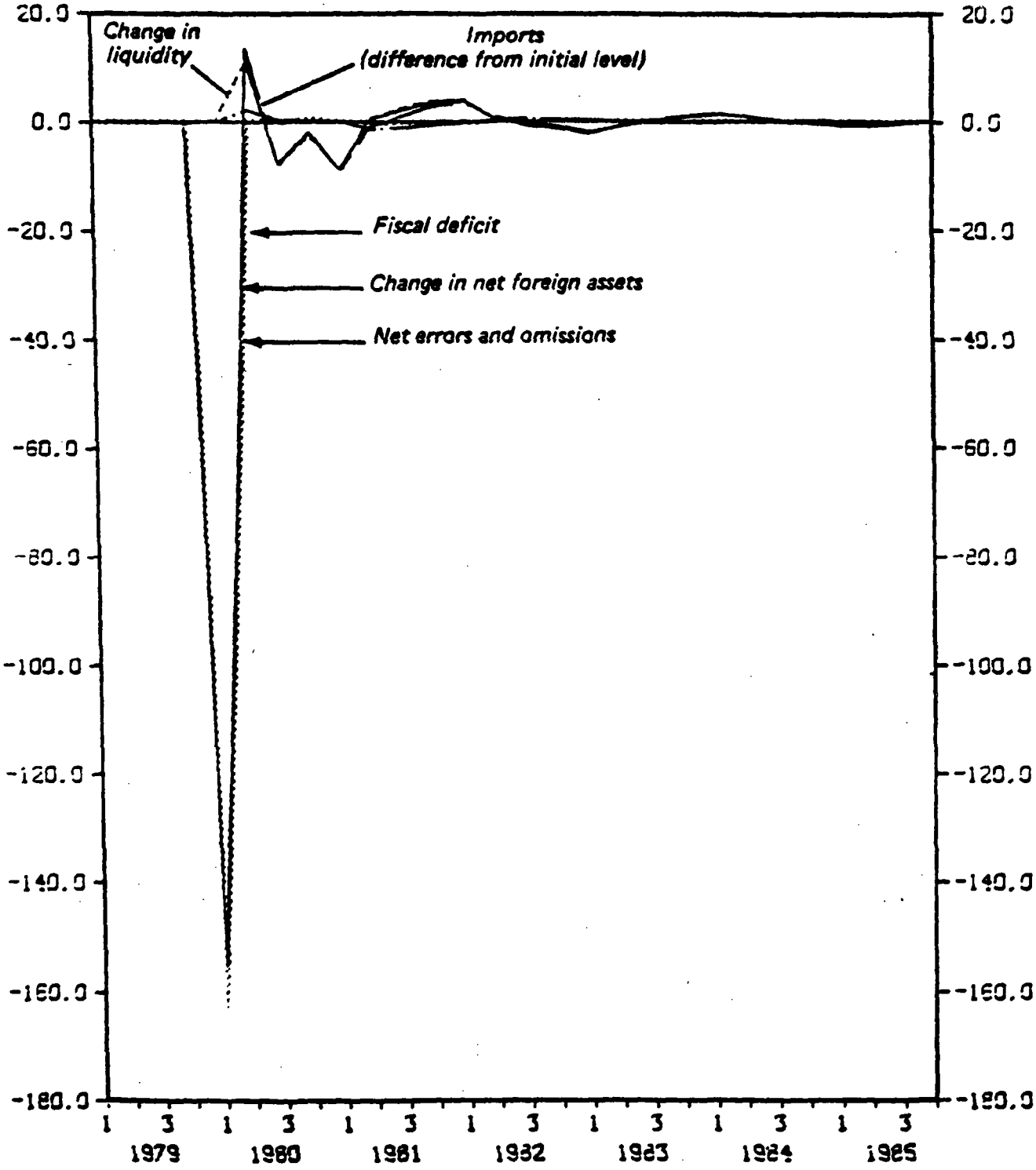
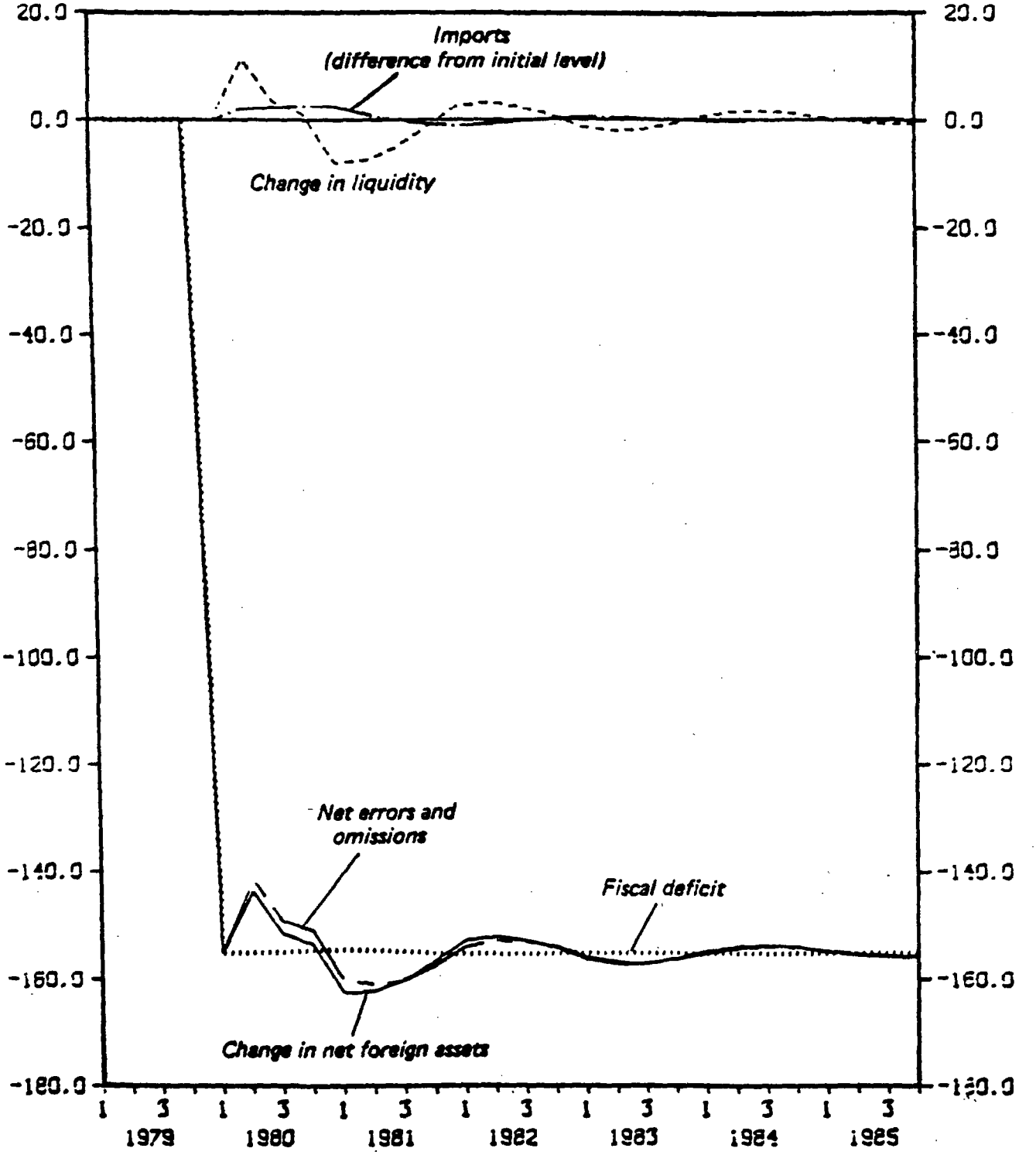


Chart 5. Yemen Arab Republic: Simulation of a Permanent Increase in Government Expenditure of YRls 155 million, 1979-85

(In millions of Yemen rials)



for private sector expenditure so that aggregate spending remains essentially unaffected. The private sector then takes the money saved by having reduced its own expenditures and invests it abroad. One can easily explain the reasoning behind the private sector reaction with a simple illustrative example. If the private sector is already doing its best in identifying and investing in all profitable activities found in the Y.A.R., or alternatively if supply constraints limit investment opportunities, 1/ then when the Government invests in a profitable project, it effectively displaces the private sector investment. As all other investment opportunities, given the real constraints in the economy, are already being exploited by either the private sector or the Government, the displaced investor has no other recourse than to seek expenditure opportunities abroad. 2/

The above postulate is valid only as long as the switching between government and private sector investment does not affect capacity output. Such an assumption is perfectly reasonable in a short-term model. For longer-term models, one must be able to determine if switching between public and private sector expenditure has an effect on capacity output. If the effect is positive then, over time, income will grow at a rate faster than the simulated rate thereby improving the balance of payments and inducing a capital inflow. If the effect is negative then the simulations given in Charts 4 and 5 will be unduly optimistic.

To conclude, it may be the case in the Y.A.R., and perhaps in other open-developing economies, that in the short run increased government expenditure causes a substitution for private sector expenditure. The increased government spending is ultimately financed by a decrease in foreign reserves while the private sector takes the incremental saving and invests it abroad. Whether or not this money is reinvested domestically over time depends on the impact of the government expenditure on capacity output. Because of its short-term nature, the model presented here does not incorporate these longer-run effects.

2. Impact of increased private transfers

The main impact of an increase in private transfers in this model is to cause an increase in the demand for liquidity and for imports. The effect of this impact over time depends on whether or not the increase in private transfers is temporary or permanent. Charts 6 and 7 show the impact of a 10 per cent increase in private transfers (the equivalent of YRls 100 million per quarter). Chart 6 shows the impact of a temporary increase while Chart 7 shows the impact of a permanent increase.

1/ As may be the case in the Y.A.R. as a result of the significant labor migration to neighboring oil exporting countries.

2/ In the case of the Y.A.R., the leakage of excess demand was accelerated by the rapid rise of domestic production costs relative to its unit import value and by the effective appreciation of the currency in the latter part of the period.

The immediate impact of an increase in private transfers is to increase the demand for liquidity. Of the additional YRls 100 million received, about YRls 25 million is absorbed by the banking system in the form of new demand for liquid assets. The remaining YRls 75 million is deposited abroad in the form of capital outflows. In the next quarter most of the capital outflow is repatriated as imports, the equivalent of about YRls 60 million. The increased imports have the additional benefit of increasing taxes collected on international trade and, consequently, of inducing a fiscal surplus. If the increase in private transfers were a temporary increase then most of the effects would disappear after about two quarters. Because of the way permanent transfers are calculated in the model, there is a loss of reserves ten quarters after the initial increase.

The simulation illustrates that when the increase in transfers is viewed as permanent, the economy mobilizes its resources to adapt to the new level. In this case, imports remain at their new level, financed directly by the new level of private transfers. The capital account shows neither an outflow nor an inflow. The overall balance, however, shows a surplus for the next ten quarters, as the increased international reserves are required to satisfy the growth in the demand for liquidity. Because the increased imports mean more tax revenue, there is a constant fiscal surplus which, in the long run, is equal to the increase in net foreign assets. Once the economy stabilizes, the YRls 100 million in increased transfers is distributed as follows: YRls 60 million is spent on imports, YRls 35 million is kept abroad, and YRls 5 million flows in increased international reserves.

Again, as in the analysis of impact of government expenditure, it must be emphasized that the model is a short-term model which does not incorporate a feedback between the increased level of imports and capacity output. If, as in the case in many developing countries, a considerable portion of these imports represents capital equipment, then it can be expected that capacity output would increase at a faster rate than simulated as the new capital goods are put into production.

VIII. Conclusion

Theoretical considerations suggest that a fiscal expansion can lead to one or a combination of the following: inflationary pressures, real output growth, or deterioration in the balance of payments. The outcome was shown to be a function of the conditions prevailing in the economy. These considerations were assessed empirically using a short-term macroeconomic model tracing the effects of fiscal expansion in the context of a small, open economy. The model was specified to capture the general features of such an economy as well as features peculiar to the Y.A.R.'s economy. A number of simulations, based on the model, were presented. These differed in their assumptions regarding two important variables: budget expenditure and the inflow of private remittances--the former being the key policy variable under consideration while the latter is the most important element in the Y.A.R.'s balance of payments.

Chart 6. Yemen Arab Republic: Simulation of a Temporary Increase in Private Transfers of YRls 100 million, 1979-85

(In millions of Yemen rials)

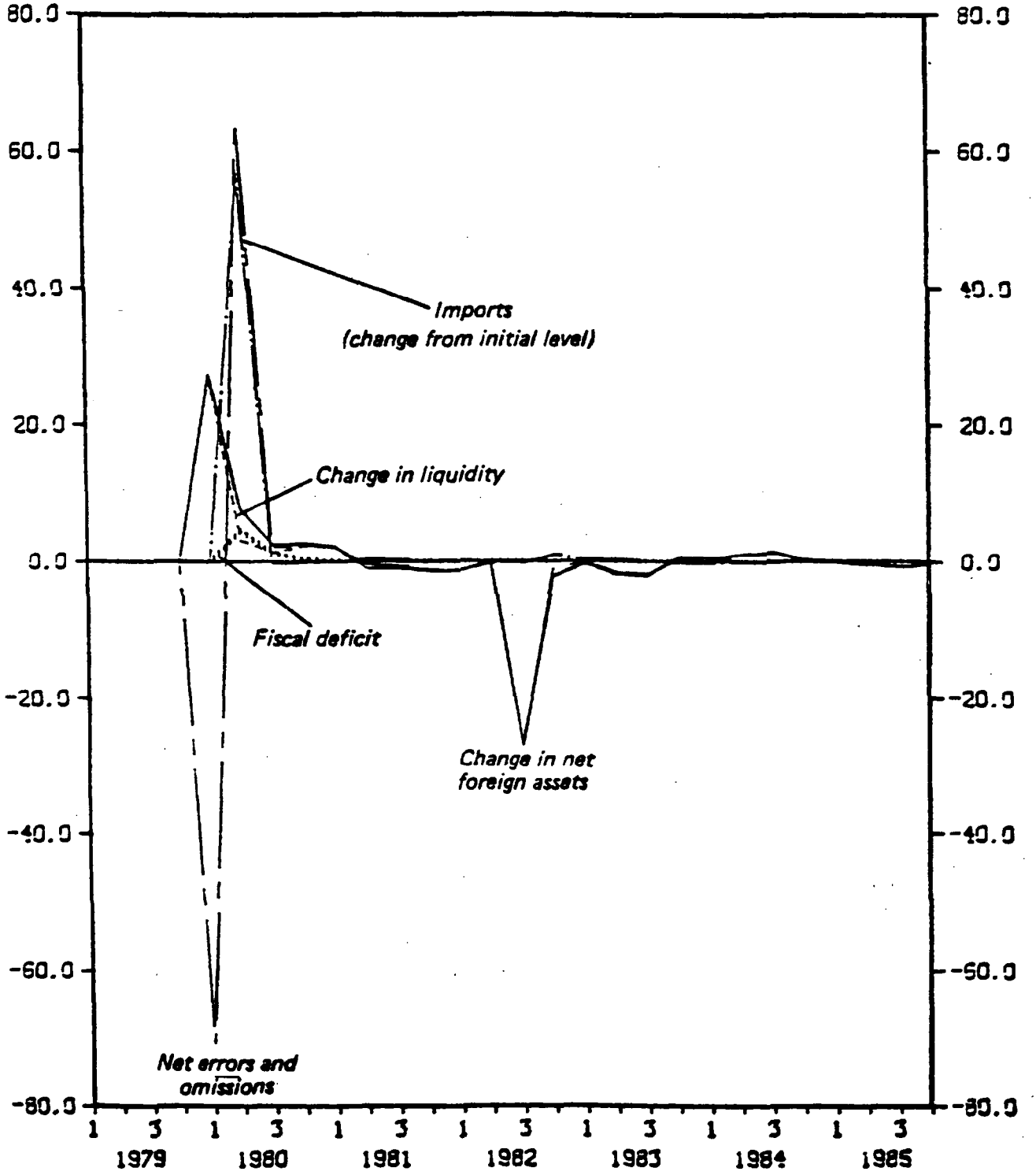
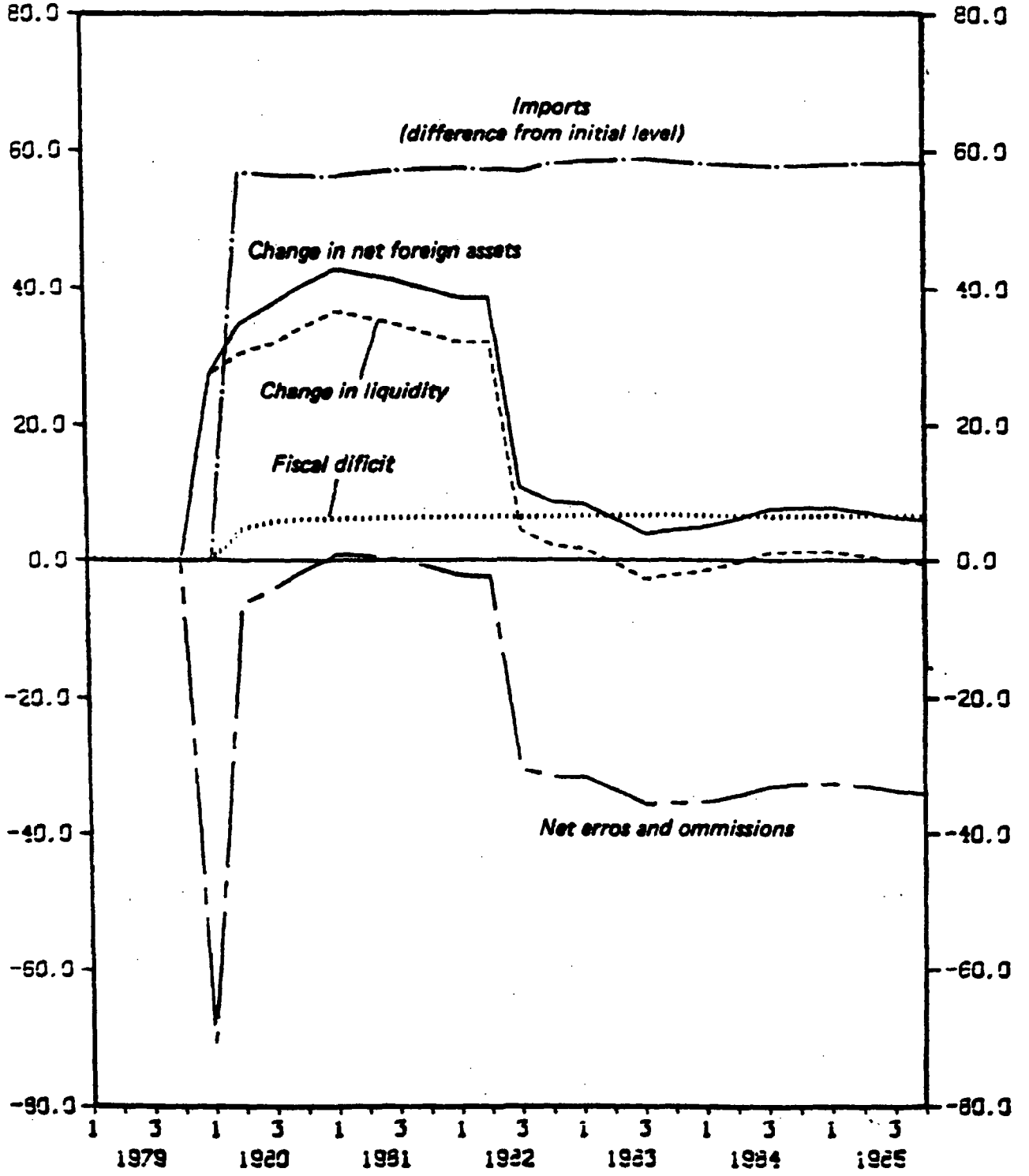


Chart 7. Yemen Arab Republic: Simulation of a Permanent Increase in Private Transfers of YRls 100 million, 1979-85

(In millions of Yemen rials)



The results of these simulations suggest that in an open and free economy such as the Y.A.R.'s, fiscal expansion results in a deterioration in the balance of payments, with little output and price effects. The lack of significant growth or inflation effects is due in part to the absence of a strong production base and to the capacity constraints which operated on the economy during the period under study. These factors resulted in a leakage abroad of the excess demand. The resultant short-term costs of the deterioration in the balance of payments may be offset by the possible beneficial effects of government expenditure on production capacity, basic needs, productivity levels, and the composition of output. These effects, however, are of a longer-term nature and in the context of an open, developing economy, unless rapid progress is made to resolve capacity constraints and increase productivity, the impact of expansionary fiscal policy is likely to translate more into balance of payments deficits than in higher growth rates.

Developments in the Y.A.R. since the end of the period covered by the model tend to provide further confirmation of the model's results. The fiscal deficit has widened considerably, with the government bank borrowing to finance the deficit rising even more sharply. As our analysis would indicate, the most visible impact has been on the balance of payments. The fall in reserves has accelerated while the effects on growth and inflation have been negligible.

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