THE ECONOMY OF ISRAEL

Stanley Fischer

The Economy of Israel

ABSTRACT

The paper opens with a description of the salient features of the Israeli economy. These consist of a large government sector (the government budget has absorbed more than 80% of GNP in some recent years); high levels of defense spending; a large government budget deficit; a large current account deficit (about 20% of GNP); triple digit inflation; and extensive indexation of both wages and long term financial commitments. A descriptive model of the economy is then presented, which includes the particular asset menu of the Israeli economy, and its properties examined. Finally, the model is used in analyzing aspects of the Israeli inflationary experience. The currency liberalization of 1977, which increased the access of Israelis to foreign assets, shares responsibility for the high rate of inflation. The possibilities of ending the inflation are discussed.

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From 1953 to 1973 real GDP in Israel grew at an annual rate of
nearly 10%; over the next nine years the growth rate was only 3%, as
Table 1 shows.[1] From 1953 to 1973, the average inflation rate (CPI)
was 7.1%; from 1973 to 1979 the inflation rate averaged more than 40%;
and in the last three years the annual inflation rate has been in the
triple digit range.

The aims of this paper are to describe the structure and
performance of the Israeli economy, and to account for the worsening of
its inflation performance over the last decade. We begin with a
description of the current state and structure of the economy.

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Table 1:   Israeli Economic Performance, 1953-1982 (% p.a.)

Period	1953-1973	1973-1979	1979-1982
Growth rate of real GDP	9.9	3.4	2.3
Growth rate of per capita GDP	6.2	1.0	0.3
Inflation rate (CPI)	7.1	44.9	122.7

Source: International Financial Statistics and Bank of Israel Report, 1982.

Table 2: The Allocation of Resources in Israel, 1978-82

(Shares in GNP, %)

Private consumption	Investment	Government consumption	Exports	Imports Civilian	Defense	Net exports
63.9	24.8	37.8	49.3	62.0	9.1	-22.8

The Inflationary Economy.

GNP per capita in Israel at the end of 1981 was about $5500, 45% of the United States level, roughly at the levels of Greece, Singapore, and Ireland.[2] Per capita consumption is also about 45% of the United States level. GNP is around $22 billion.

The Structure of Demand: Table 2 provides a first perspective on some special features of the Israeli economy. The consumption and investment shares in GNP are not out of the ordinary. But government consumption is extremely high; the average for the OECD countries is 17%, with the share even in the case of Sweden being less than 30%. The openness of the economy is shown by the large shares of both exports and imports in GNP, and the balance of trade problem by the magnitude of the import surplus.[3]

The dominant role of government and the magnitude of the government budget deficit are clearly revealed by Table 3, which is based on IMF data. Over the past five years government has on average disposed of more than 70% of GNP and received more than half of GNP in revenues. The budget deficit has averaged more than 20% of GNP. Fiscal year 1982/3 shows the effects of the war in Lebanon, with government expenditures reaching an extraordinary 90% of GNP, and tax revenues exceeding half of GNP as a result of revenue measures imposed in mid-1982. It can be seen that defense spending accounts for most of government consumption. The share of resources being used for defense is understated in the national accounts, in particular because conscripts are paid a below market wage. One estimate is that total resources devoted to defense may be 50% more than the amount estimated in the accounts.[4]

Inflation, the Assets Markets, and Indexation: Figure 1 and Table 4 show CPI inflation rates fourth quarter over fourth quarter. Note in particular that after 1954 the Israeli economy enjoyed a long period of single digit inflation. Even after the 1967 war, the inflation rate remained in single digits until 1973. After the Yom Kippur War there were two years of inflation near 40%, and then a two year decline in the inflation rate in 1976 and 1977. Foreign currency holdings were liberalized at the end of 1977. The inflation rate then increased, but it was only in 1979 that it went above 100%. Since then the inflation rate has remained in a range above 100%.

Indexation of asset returns and wages has been extensive in Israel for over three decades, despite the fact that the inflation rate was reasonably low and stable for most of the fifties and sixties.[5] Israeli residents may hold assets with returns indexed to either the price level or the exchange rate. They have also been entitled since the 1977 liberalization to hold foreign bank accounts and foreign currency, up to specified limits.

Table 5 shows the financial asset holdings of the public, excluding ownership of foreign currency and assets held abroad, for which there are no data. Shekel denominated (nominal) assets account for less than 4% of financial assets.[6] The bulk of the public's financial assets are indexed to the price level, although only a small part of the indexed assets are marketable. Most index bonds are held indirectly through private pension funds, which are obliged to hold the bonds.[7] Note the large increase in the share of equity in financial assets during 1982, reflecting a stock market boom.

The significant point about Table 5 is that there are government

Table 3: The Role of Government

(Shares in GNP, %)

	Government revenue		Government expenditure		Deficit	Defense spending
	Total	Taxes	Total	Current		
1978/9-1982/3	52.9	41.0	73.4	64.7	20.6	25.5
1982/3	63.6	52.0	90.0	78.9	26.4	30.6

Source: IMF. Data are for fiscal years, which start April 1.

Table 4: Inflation Rates, CPI

(% per annum, fourth quarter over fourth quarter)

1967-1973	1973-75	1975-77	1978	1979	1980	1931	1982
10.6	40.0	38.0	49.2	103.4	136.1	104.6	130.4

Table 5: Financial Asset Holdings of the Public,[1] 1981 and 1982

(End of year)[2]

Category	1981 % of financial assets	% of GNP[3]	1982 % of financial assets
1. Nominal	3.6	6.2	3.6
Of which: M1	2.3	4.1	1.6
2. Foreign currency linked	20.2	35.1	14.8
Of which: bank deposits (PATAM)	12.2	21.2	8.9
3. Price index linked	56.4	97.9	48.3
Of which: marketable bonds	6.3	10.9	5.0
savings schemes & time deposits	18.4	31.9	15.7
pension funds & life insurance	31.8	55.1	27.5
4. Equity shares	19.8	34.3	33.3
Of which: bank shares[4]	13.0	22.6	14.3
Total[1]	100.0	100.0	100.0

Notes: [1] Rest of world omitted, for lack of data, as noted in source.

[2] Source: For 1981, based on Table 8-5A, Bank of Israel Report, 1981, (Hebrew edition), p.254; for 1982, based on Table 8-5A in the 1982 Report (Hebrew edition), p.280.

[3] GNP is fourth quarter GNP, IFS data, transformed to annual rate.

[4] Bank shares are noted separately because their stable real rate of return makes them more like index bonds than equity.
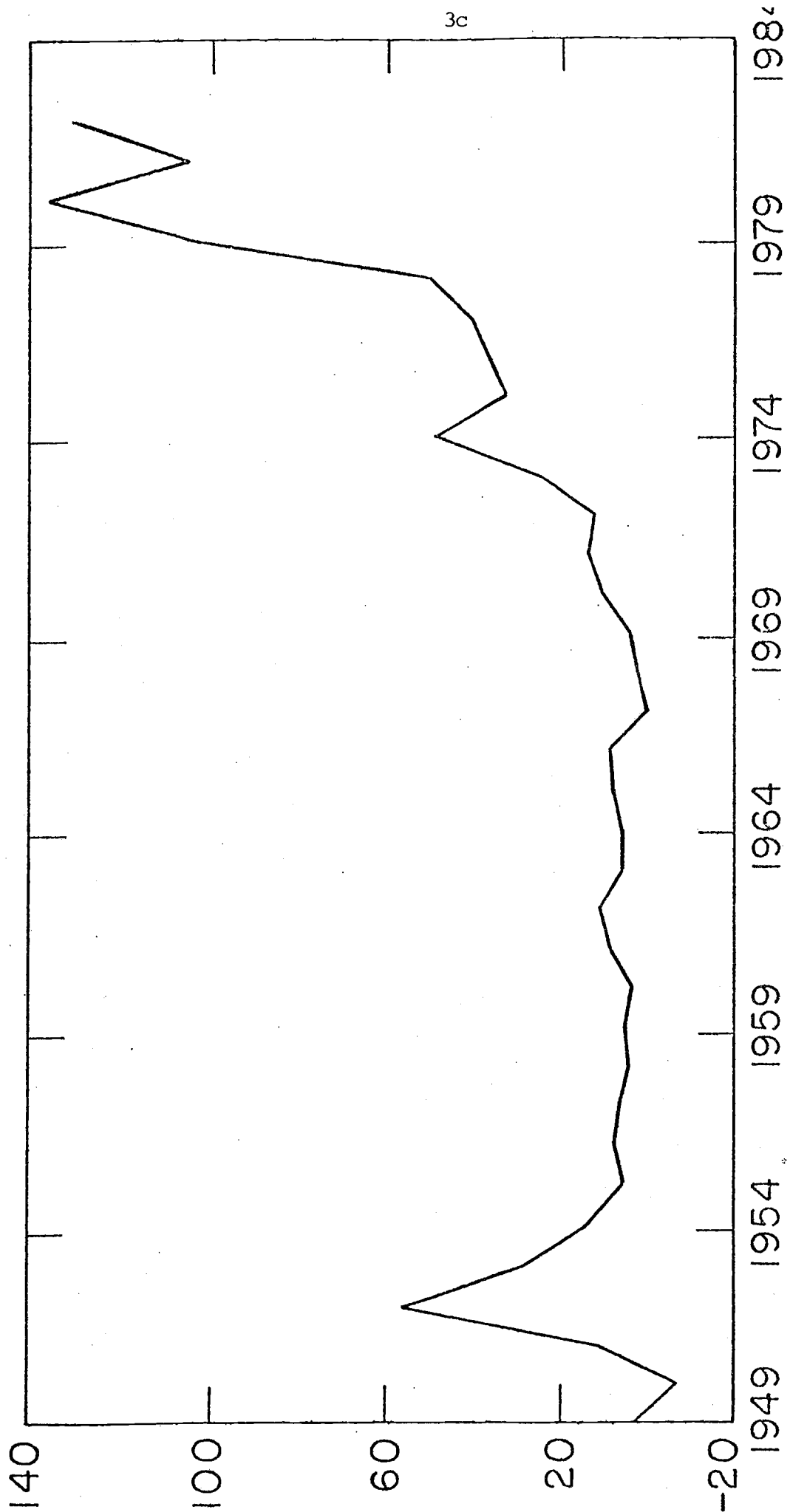
Figure I: CPI inflation, 1949–1982

liabilities corresponding to most of the non-equity financial assets owned by the private sector. The reserve requirement for the banks against foreign currency linked deposits is 90%; and the indexation provided by private institutions is based on their holdings of government indexed liabilities. Thus the government's dominance in the allocation of resources extends to the capital markets; indeed, most private investment is financed with government assistance.

Wage indexation is included as part of the contract negotiated between the Histadrut (trade union organization) and the Manufacturers' Association. These agreements, typically biennial, cover most of the labor force. The frequency and details of cost of living adjustments have varied over the years. Currently the adjustments are made every three months, with compensation for inflation varying with the inflation rate. For instance, if the quarterly inflation rate is less than 20%, there is 80% compensation for inflation; if the inflation rate is more than 30%, compensation is 90%. It is also agreed that there will be negotiations between the Histadrut and the employers if the real wage falls.[8]

The Activities and Financing of Government: The government budget deficit reported in Table 3 for the years 1978-1982 is the total deficit on both internal and external account, as recorded in the IMF data, for fiscal years. Table 6's more detailed budget data for calendar year 1981 present a fuller description of the scope of government activity in the economy.[9]

Note first that government purchases of goods and services, lines (1+12) amount to 44% of GNP. The 44% includes 27% in defense spending, much of that abroad, and close to 6% that is investment spending.[10]

Table 6: Government Budget, 1981

(% of GNP)

I. Domestic

1.	Purchases of goods and services[1]	32.4	
2.	Transfer payments[2]	20.0	
3.	Subsidies	8.3	
4.	Direct subsidization of credit[3]	2.5	
5.	Total domestic expenditure		63.2
6.	Taxes	45.0	
7.	Property and entrepreneuriel income of public sector	3.2	
8.	Total domestic receipts		48.2
9.	Domestic deficit		15.0
10.	Subsidy component of credit[4]	6.6	
11.	Inflationary erosion of money base	0.8	

II. Foreign

12.	Net purchases abroad[5]	11.9	
13.	Foreign income[6]	7.5	
	Of which: U.S. government grants	6.6	
14.	Foreign deficit		4.4
15.	Total deficit		19.4

Source: Bank of Israel Annual Report, 1981 (Hebrew edition),
pp. 101, 104.

Table 6 continued

Notes: [1] Includes domestic defense spending equal to 15% of GNP.

[2] Transfer payments include explicit interest payments: nominal interest on nominal bonds and real portion of interest on indexed bonds.   Interest payments are close to 15% of GNP. Transfers are net of compulsory loan redemptions.

[3] Actual disbursements.

[4] Calculated by Bank of Israel, as difference between nominal interest paid by borrowers and interest that would be paid at real rate of 4%.

[5] This is mainly defense spending.   Note that total government purchases of goods and services, (1+12)=44% of GNP, is well above the 38% recorded as government consumption in Table 1. The difference is accounted for by government investment activities, and by the fact that government consumption in 1981 was 39.1% of GNP.

[6] Transfers to the national institutions, such as the Jewish Agency, equal to 2.1% of GNP, not recorded as foreign income of the government.

Subsidies recorded in line 3 are for the purchase of goods and services.

In addition, the government provides extensive subsidies to borrowers, some recorded in line 4. However, the major subsidization of credit has occurred through the provision of low nominal interest loans; the Bank calculates the subsidy element in such credit during 1981 at nearly 7% of GNP. This amount is noted in Table 6, but not included in any of the budget totals. The provision of low nominal interest rate credit since 1979 has been in the process of being phased out and replaced by indexed loans.[11]

The government finances its activities mostly through taxation. The largest revenue generators are the income tax and value added tax, which in 1981 raised 18.1% and 5.2% of GNP respectively. National insurance payments in 1981 were 7.7% of GNP. There is an impressive array of other taxes. In addition, as Table 6 shows, U.S. government grants provide a substantial proportion of the financing for government spending.

At this point, the logical step is to explain how the deficit of 19.4% of GNP in Table 6 was financed in 1981, through external borrowing, domestic borrowing in the form of both price level and exchange rate linked assets, and the creation of high-powered money. Regrettably data difficulties now become significant. The IMF presents the data contained in Table 7a, for fiscal year 1981/2, which begins April 1. The deficit before foreign grants in that period was nearly 23% of GNP. Foreign grants and loans financed more than half of that amount. Domestic borrowing amounted to 10% of GNP, a large part of that from the Bank of Israel. The difference between entries 7 and 8

Table 7a: Financing of Government Deficit, Fiscal Year 1980

(% of GNP)

1.	Government expenditure and net lending	72.7
2.	Budget revenue	49.7
3.	Foreign grants	7.6
4.	Deficit to be financed	15.3
5.	Net foreign borrowing[1]	5.3
6.	Net domestic bond issues[2]	6.2
7.	Net credit from Bank of Israel	3.8
		15.3
8.	Net impact on base money	6.7

Source: IMF.

[1] Equal to loans of 10% of GNP minus repayments of 4.7% of GNP.

[2] Equal to bond issues of 9.6% of GNP minus repayments of 3.4% of GNP.

in the table is presumably a result in the differences in the timing
with which transactions are recorded by the Treasury and actual
payments. In fiscal year 1981, there was substantial use of Bank of
Israel credit by the Treasury, more than in most earlier years.

Table 7b presents Bank of Israel data on government finance. The
data are much less clean than those of the IMF. The Bank does not
present a comprehensive table on the financing of the government
deficit, concentrating instead on financing of the domestic component
of the deficit, defined as the deficit that arises from the
government's activities in the domestic economy. As can be seen, there
is a significant difference between the estimates of the domestic
deficit in Tables 6 and 7b. Rather than dwell on these difficulties, I
note that it appears that sales of both bonds and foreign exchange, in
approximately equal amounts, provide most of the financing for the
domestic deficit. Nonetheless, the increase in the money base accounts
for the financing of a significant component of government spending--
about 2.5% of GNP.[12] Even though the monetary base in 1981 was under
3.5% of GNP, large amounts of revenue can be raised at high rates of
inflation.[13]

Part B of Table 7b attempts to account for the foreign component
of the deficit. The government sector borrowed heavily abroad, using
the proceeds both to pay for government imports and to sell to domestic
residents. In this account too there remains a sizeable discrepancy,
part of which may result from capital gains on the Bank of Israel's
holdings of foreign reserves. Adding parts A and B of Table 7b, we
find the general outlines confirm those of Table 7a, which applies to
fiscal year 1981. In both Table 7a and 7b it appears that foreign and

Table 7b: Bank of Israel Data on Financing of Government Deficit, 1981

(% of GNP)

A. Domestic deficit and financing.

1.	Domestic deficit from Table 5	15.0
2.	Errors and omissions	4.8
3.	Domestic public sector deficit[1,2]	10.2
4.	Net public sector lending	3.2
		13.4
5.	Sale of foreign exchange to domestic residents	5.9
6.	Sale of debt to private sector[3]	7.5
		13.4

B. Foreign deficit and financing.

7.	Foreign deficit from Table 6	4.4
8.	Public sector foreign borrowings[4]	7.1
9.	Transfers of foreign currency via national institutions	2.1
10.	Increase in reserves	0.6
11.	Line 5	5.9
	Net foreign currency acquisitions (8+9-10-11)	2.7
12.	Errors and omissions (including capital gains on reserves)	1.7
		4.4

Source: Bank of Israel Annual Report, 1981 (Hebrew), p.224.

[1] Described in source as "Liquidity injection stemming from public sector excess demand."

Table 7b continued

[2] Lines 3-6 follow the scheme used by Shiffer (1982), Table 5, p.32. Line 3 in table is line 1 in source (noted above); line 4 is sum of lines 3a and 3b in source.

[3] Calculated as residual.

[4] Calculated from Table 7-1, ibid, p.150, lines 4b and 6b, (in dollars) multiplied by average exchange rate for the year, from IFS data.

domestic borrowing are of the same order of magnitude.

International Trade: Tables 8 and 9 present details of Israel's
international transactions in 1981. The bulk of imports of goods is
accounted for by intermediate products and by oil. A significant share
of exports is accounted for by industrial goods; some of these are
defense-related. The service account is large on both the import and
export side, and is close to being balanced. Note that the balance on
goods and services in 1981 was just less than gross investment. It can
be said--though not accurately--that Israel's investment spending is
financed from abroad.

Table 9 examines the financing of the current account deficit and
details of aid. Unilateral transfers, governmental and private, cover
most of the deficit on net goods and services account. Unilateral
transfers to the government are American government grants. About half
a billion dollars is received by the national institutions, primarily
the Jewish Agency, as a result of donations by world Jewry. Further
unilateral transfers from individuals are made to the private sector.
German reparations continue at a level of close to a half billion
dollars; these restitution payments are made directly to individuals.

Table 9C contains more detail on U.S. government aid. Before the
1973 war, U.S. aid was small. In 1973, emergency military aid
amounting to more than 10% of GNP was provided, and total aid has
remained at approximately that level since then. More than half the
flow of resources from the U.S government in any one year is grants.
The column "Net Loans" is the sum of new loans made within the year,
minus interest and principal payments. This amount is expected to
reach zero in 1983.

Table 8:   Current Account 1981[1]

(% of GNP)

Imports			70.3
Goods		44.5	
(Defense	10.0)		
Capital goods	4.7		
Intermediate goods	28.0		
(Of which oil	9.2)		
Services		25.8	
Exports			49.9
Goods		27.3	
Industrial goods	16.2		
(excl. diamonds)			
Services		22.6	
Balance on goods and services			−20.4
Private transfers (net)			5.0
Official transfers			8.3
Current account			− 7.1

Source: Bank of Israel Report, 1982.

[1] In 1982 the balance on goods and servcies fell to −22.5% of GNP, despite a reduction of 2.6% of GNP in net non-civilian imports.

Table 9: Balance of Payments, 1981

($ billion)

				% of GNP
A. 1. Net goods and services		-4.43	20.4
Private sector	-1.90		
Public	-2.53		
2. Unilateral transfers		2.89	13.3
Private sector	1.09		
Public sector	1.80		
3. Net long and medium term capital			
movements		1.05	
Private sector	- .04		
Public sector	1.08		
4. Net basic balance of payments		- .50	
Private sector	- .86		
Public sector	.36		
B. Unilateral transfers			
Private sector		1.09	
German reparations	.44		
Individuals: immigrants	.23		
others	.27		
Public sector		1.80	
National institutions	.44		
Governmental	1.36		

Table 9 continued

C. <u>U.S. Government Aid</u>. ($ billions)

(1)   (2)   (1)+(2)

	Grants	Loans	Net loans	Total	Direct defense imports	Total aid as % of GNP[1]
1972	.07	.33	.17	.24	.49	1.9
1973	.82	.37	.30	1.02	1.25	11.4
1975	.97	.84	.61	1.58	1.85	13.5
1978	1.05	.93	.49	1.54	1.62	11.9
1980	1.56	1.37	.79	2.35	1.73	12.1
1981	1.42	.93	.26	1.68	2.23	8.1

<u>Source</u>: A <u>Bank of Israel Annual Report</u>, 1981 (Hebrew), pp.150-151.

B <u>Ibid</u>, p.187.

C <u>Ibid</u>, p.191; 1980 English edition, p.212; <u>IFS</u> for exchange rate.

[1] Total aid is evaluated in shekels at official exchange rate and divided by GNP.

U.S. government aid is related to purchases of defense equipment in the U.S. Aid and defense imports are of the same order of magnitude, with defense imports typically slightly in excess of aid.

The exchange rate has since 1977 been on a very dirty float. The Bank of Israel intervenes in the market continuously, and occasionally attempts to stabilize the inflation rate by causing the exchange rate to appreciate.[14] The reform of 1977 liberalized the capital account, permitting free capital flows and also the holding of foreign assets by domestic residents.[15] Subsequently the authorities have intervened to affect capital movements. One intervention took the form of a tax on capital imports, imposed in 1979 when domestic tight monetary policy raised interest rates and caused an undesired (by the authorities) capital inflow.

Monetary Policy: Monetary policy in Israel is constrained by two factors: first, real interest rates on index bonds are inflexible and determined legislatively; and second, political pressures make it difficult to allow the real exchange rate to move freely. Neither constraint is absolute. First, it is only the yield on new bonds that is fixed by legislation, and the Bank of Israel can intervene in the secondary market to attempt to move the yield on bonds. In practice its interventions are directed chiefly to stabilizing the price of bonds. Second, the real exchange rate is sometimes allowed to change.[16]

Given the constraints under which it works, the Bank has not in the recent inflationary period pursued money growth targets. It has pursued credit targets, by limiting the amount of credit banks can provide their customers. Strict credit targets and controls were in

effect in 1979. At that time the targets were partially specified in Israeli currency terms, and partially in foreign currency. This meant the nominal targets adjusted automatically for exchange rate changes. But this was not the major hole in the credit constraint; it was instead the availability of subsidized export credits. Up to the time of the 1979 credit freeze and squeeze, the export credits had not been fully utilized. Once the credit controls came into effect, exporters took the full amount of export credit to which they were entitled, and provided trade credit to their customers. The private sector thus began to find ways around the Bank's credit constraints, as it typically does. Nonetheless, the 1979-80 period of restraint did significantly reduce the balance of payments deficit.

The Governor of the Bank of Israel is described by the law as the government's economic adviser, but there is no evidence that the advice that has been offered--which is typically to get the budget deficit under control--has been taken. The initiative for economic policy is with the Finance Minister, and the Bank has attempted to run a restrictive policy only when the Finance Minister has so desired. This has been infrequently.

The Goals of Policy: Israeli policymakers have generally given first priority to reducing the balance of payments deficit. Concern over inflation has mounted in recent years, but has not been sufficient to induce tough anti-inflationary policies. There were in the 1970's two major episodes of contractionary policy, in 1975-76 and 1979-80, each of which was aimed mainly at the balance of payments deficit, but with the implied effects on the inflation rate clearly being welcome. In both cases there was a significant reduction in the balance of

payments deficit, but less effect on the inflation rate.

The liberalization of foreign exchange holdings in 1977 was followed a year later by the transition to triple digit inflation. The role, if any, of the liberalization in the increase in the inflation rate will be discussed below.

The most ambitious attempt to reduce the payments deficit and the inflation rate was undertaken in 1979 by a newly appointed finance minister, who directed his efforts at reducing the budget deficit, partly through freezing government employment and partly through removing purchase subsidies. At the same time, the Bank of Israel was to constrain credit growth. The policy began to work by increasing unemployment in early 1980, the balance of payments deficit narrowed, but there was no quick impact on the inflation rate. The restrictive policies were extremely unpopular, and with an election expected, the finance minister was replaced by the present minister.

The new minister argued that supply side policies would reduce the inflation rate, and claimed to implement them by reducing import tariffs and increasing subsidies. In the judgment of political observers, the policies were successful at turning around an election that had seemed lost by the government. There has been no subsequent sign that the government is willing or interested in reducing inflation if there is a price--in terms of forgone output--to be paid.

The prolonged period since October 1982 during which the real exchange rate has been appreciating as part of an anti-inflationary policy is unusual in that the balance of payments goal of policy has been sacrificed to the inflation goal. The preference for attempting to stabilize inflation by manipulating the exchange rate without

pursuing other contractionary policies reflects the general unwillingness of policy-makers in the period since 1973 to stabilize the inflation rate by reducing aggregate demand and causing unemployment.

Model

In this section I outline a descriptive model of the Israeli economy based on the post-1977 strucutre of the financial system, that I believe captures the main mechanisms in the operation of the economy. The model is presented both as an attempt to provide a concise description of the economy, and because it is used in Section III to guide the discussion of the causes of the current inflation and possible methods of reducing the inflation rate.

The Structure of the Model.

The Assets Markets: There are four assets: money; domestic price level (CPI) indexed bonds; foreign currency denominated securities; and equity claims to the returns on physical capital. Money is denominated in shekels and pays no interest. In the model we assume all money is a government liability; we thus omit inside shekel-denominated deposits.[17] Index bonds are liabilities of the government. We assume linkage is 100%, although formally some bonds have less than complete linkage.[18] Physical capital (or the equity claims on capital's returns) is assumed to be a perfect portfolio substitute for index bonds.[19]

Israeli residents may hold both foreign securities and domestically issued exchange rate linked securities. In form, the latter are bank liabilities but because the reserve requirement against such deposits is 90%, we treat them as a liability of the government.

The government pays interest on the reserves held against the foreign currency linked securities.

We postulate the following asset market equilibrium conditions:[20]

$$\frac{M_t}{P_t} = L(y_t, R_t^B, R_t^F, V_t); \qquad L_1 > 0, \ L_2 < 0, \ L_3 < 0, \ L_4 > 0 \tag{1}$$

$$\frac{B_t}{P_t} + q_t K_t = K(y_t, R_t^B, R_t^F, V_t); \qquad K_1 < 0, \ K_2 > 0, \ K_3 < 0, \ K_4 > 0 \tag{2}$$

$$\frac{e_t}{P_t}(F_t^d + F_t^f) = J(y_t, R_t^B, R_t^f, V_t); \qquad J_1 \gtrless 0, \ J_2 < 0, \ J_3 > 0, \ J_4 > 0 \tag{3}$$

$$r_t^B = \frac{F_K(K_t, y_t)}{q_t} + \frac{t^q t + 1^{-q} t}{q_t} \ ; \qquad \frac{\partial F_K}{\partial K_t} < 0, \ \frac{\partial F_K}{\partial y_t} > 0 \tag{4}$$

$$V_t = \frac{M_t}{P_t} + \frac{B_t}{P_t} + q_t K_t + \frac{e_t}{P_t}(F_t^f + F_t^d) \tag{5}$$

The appendix lists symbols in the order in which they appear.

Equations (1) through (3) are supply equals demand conditions for the real money stock, real assets (bonds plus capital) and foreign assets respectively. The stock budget constraint ensures that the three equations are linearly dependent. The assets are assumed to be gross substitutes.[21]

An increase in output increases the demand for money for transactions purposes and therefore must, by the stock budget constraint, reduce the demand for at least one of the other assets. Since foreign-currency linked deposits are sometimes used as medium of exchange, we assume that the demand for bonds and capital falls when the level of output rises, while the effect on the demand for foreign currency linked securities of a rise in output is allowed to be either positive or negative. The demand for each asset increases with wealth.

Equation (4) states that the expected real yield on capital is equal to the real yield on index bonds. This condition reflects the assumption that the two assets are perfect portfolio substitutes. The marginal product of capital is assumed to decrease with the capital stock and increase with the level of output.

The Goods Market: There is a single domestically produced good, with aggregate supply function:

$$y_t^s = \phi(p_t, w_t, e_t p_t^f, K_t); \qquad\qquad \phi_1 > 0, \; \phi_2 < 0, \; \phi_3 < 0, \; \phi_4 > 0 \qquad (6)$$

The supply function is homogeneous of degree zero in p, w, and ep^f.

Aggregate demand for domestically produced goods is:

$$y_t^d = \psi(V_t, y_t, \frac{e_t p_t^f}{p_t}, q_t, K_t, G_t, T_t); \quad \psi_1 > 0, \; 1 > \psi_2 > 0, \; \psi_3 > 0, \; \psi_4 > 0, \quad (7)$$

$$\psi_5 > 0, \; \psi_6 > 0, \; \psi_7 < 0.$$

Real exchange rate depreciation increases the demand for domestically produced goods. So does an increase in q, which increases investment demand.[22] For any given q, investment demand increases with the capital stock, so that increases in K increase aggregate demand, given

wealth.[23] Finally, fiscal policy, as measured by government spending

on domestically produced goods and services, and taxes (net of

transfers) affect aggregate demand for domestic goods.

Wage Setting: The rate of increase of the nominal wage is in part

determined by indexation, with past inflation rates determining present

rates of nominal wage increase. In addition, the rate of wage increase

is affected by expectations of inflation and deviations of output from

the full employment level, and by deviations of the real wage from its

equilibrium level.

$$\frac{w_t}{w_{t-1}} = a_1 (\frac{p_{t-1}}{p_{t-2}}) + (1-a_1) (\frac{_{t-1}p_t}{p_{t-1}}) + a_2 (_{t-1}y_t - y_t^*) + a_3 ((\frac{w_{t-1}}{p_{t-1}})^* \tag{8}$$
$$- (\frac{w_{t-1}}{p_{t-1}}))$$

The term following the coefficient a_1 represents the effects of

indexing: actual past inflation affects today's rate of wage increase.

So too does anticipated inflation, to an extent that depends on how

much compensation will occur through indexation. Indexed wage

adjustments in practice take place every three months.

The third term on the right hand side represents the pressure of

demand on the wage. When output is expected to be above the full

employment level, y*, wages rise more rapidly.

When there has been unanticipated inflation in the past, with the

coefficient a_1 less than unity, some catch-up of real wages will occur.

These catch-ups occur mainly at the bargaining over base wages between

the Histadrut (Labor Federation) and the employers. We represent them

in the model by including a term in $((w/p)^* - (w/p))$, the difference between the equilibrium or full employment real wage and the actual real wage. The catch-up term makes it more difficult for accelerating inflation permanently to reduce the real wage. There is accordingly room for real wages to be affected by the dynamics of the inflation process. Because this last term adjusts the wage on the basis of the difference between actual and full employment wages, it does not represent "real wage resistance," a phenomenon which could be added. Equation (8) is of course a Phillips curve.

The Government Budget Constraint: The government purchases goods both at home and abroad, and finances itself by taxation, money issue, domestic security issues, foreign borrowing, and foreign aid. The government budget constraint is:

$$\frac{M_{t+1} - M_t}{P_t} + \frac{B_{t+1}}{P_t} + \frac{e_t}{P_t}(F_{t+}^d - RS_{t+1}) + \frac{e_t}{P_t} FA_t \tag{9}$$

$$= G_t - T_t + \frac{e_t}{P_t} G_t^F + (1 + r_{t-1}^B)\frac{B_t}{P_{t-1}} + \frac{e_t}{P_t}(1 + r_{t-1}^F)(F_t^d - RS_t)$$

The assumption made in (9) on the timing of transactions is that, for example, new indexed debt that will become the initial stock of debt next period (B_{t+1}) is sold in the current period at the current price level. The right hand side includes interest payments on the debt and on foreign borrowing. The fact that the debt is indexed may be seen by noting that the real amount paid on the debt,

$(1 + r_{t-1}^B)\dfrac{B_t}{P_{t-1}}$, is independent of inflation.

The Foreign Sector:

$$NX_t - \frac{e_t G_t^F}{p_t} + \frac{e_t}{p_t}(1 + r_{t-1}^f)(F_t^f + RS_t) + \frac{e_t}{p_t} FA_t \tag{10}$$

$$= \frac{e_t}{p_t}(F_{t+1}^f + RS_{t+1})$$

Net exports of the private sector minus government imports plus interest receipts (in practice these are negative) and aid from abroad are equal to the acquisition of foreign assets by the private and government sectors together. The current account is of course deeply in deficit, which results in the increasing foreign indebtedness of the economy.

Net exports are a function of aggregate demand and the price of domestic relative to foreign goods:

$$NX_t = g(\frac{e_t p_t^F}{p_t}, y_t^d) \qquad\qquad g_1 > 0, \ g_2 < 0 \tag{11}$$

Factor Supplies: The capital stock is given by:

$$K_{t+1} = (1-\delta)K_t + I(q_t, K_t) \tag{12}$$

Population and effective labor force are taken to be exogeneous, and growing at rate n. This assumption rules out one significant constraint on policymakers: the belief that any prolonged period of unemployment would reduce the rate of immigration and increase emigration.

Short Run Equilibrium

Within each period, beginning of period stocks, M_t, B_t, K_t, F_t^f, F_t^d, and RS_t, are given. The nominal wage, w_t, is predetermined. The interest rate on foreign assets, r_t^f, and the foreign price level, p_t^f, are exogeneous to the Israeli economy. In discussing the determination of short run equilibrium we take expectations (of the price level, relative price of capital, and the exchange rate) as given.

The Assets Markets: Equilibrium in the assets markets can be studied using equation (4) and any two of equations (1) - (3). The aim is to show the asset market equilibrium values of q and e/p conditional on values of the price level and output, along with the stock and expectational variables. We will examine the properties of the functions that express asset market equilibrium conditions:

$$q_t = q(X_t) \tag{13}$$

$$e_t/p_t = h(X_t) \tag{14}$$

$$X_t \equiv [p_t, y_t, M_t, B_t, K_t, F_t, \frac{t^p t+1}{p_t}, \frac{t^e t+1}{e_t}, \frac{t^q t+1}{q_t}, R_t^F] \tag{15}$$

Figure 2 shows equilibrium loci for the money (LL) and bonds (BB) markets. In drawing these loci, the level of output, y, is taken to be constant, as are the other variables in the vector X defined in (15). From equation (4), for given K_t and y_t, F_K is constant, so that q and r^B are, from (4), inversely related given K_t, y_t, and $\frac{t^q t+1}{q_t}$.

The LL locus in Figure 2 is negatively sloped because an increase in q causes an excess demand for real balances through both wealth and

rate of return effects. The excess demand has to be offset by a reduction in e/p, reducing real wealth, to maintain equilibrium. In the bond-capital market, whose equilibrium is shown by the BB locus, an increase in q causes excess supply which is offset by an increase in demand induced through an increase in the real exchange rate. Also shown in Figure 2 is the FF locus (equation (3)), which is positively sloped and steeper than the BB locus. Asset market equilibrium obtains at point E, with corresponding equilibrium values of the price of installed capital (and the real interest rate) and the real exchange rate.

We now show graphically how changes in the price level and the level of output respectively affect the equilibrium values of q and e/p. In Figure 3, an increase in the price level creates an excess demand for real balances, thus shifting the LL curve to the left, to LL'. The increase in the price level creates an excess supply of bonds, shifting BB to the right, to BB'. Clearly, q falls. The effects on the real exchange rate appear ambiguous. However, the real exchange rate must fall, because both a rise in the price level and decline in q create an excess supply of foreign currency denominated assets, which is removed by a fall in the real exchange rate. Thus the new equilibrium at E' shows both q and e/p lower as a result of the rise in the price level.

In Figure 4 we present a similar analysis of the effects of an increase in the level of output. This simultaneously raises the transactions demand for money and the marginal product of capital. For given q, the real interest rate rises. The net effect on the demand for real balances is ambiguous, but we assume it to be positive.
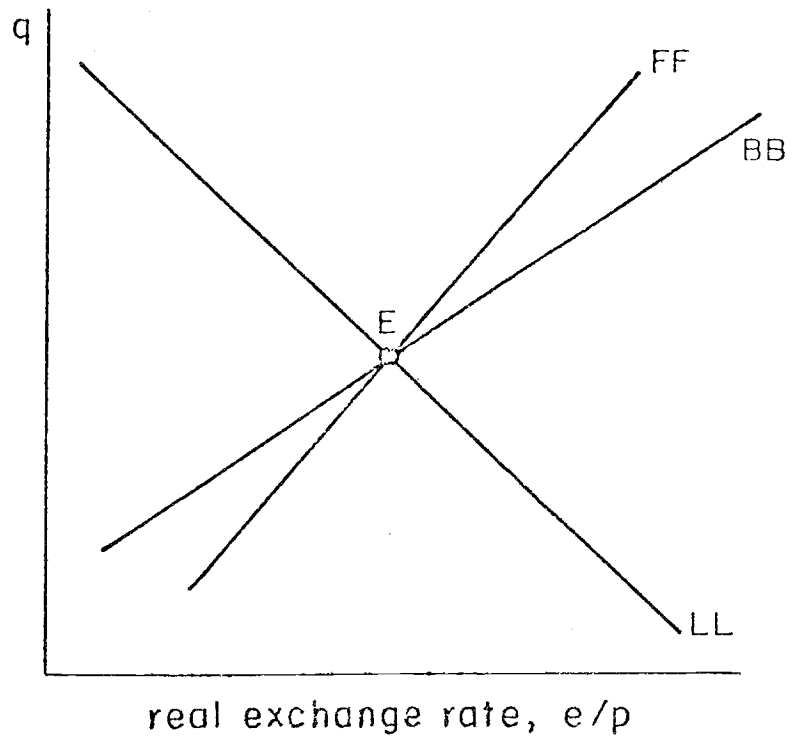
Figure 2: Asset Market Equilibrium.
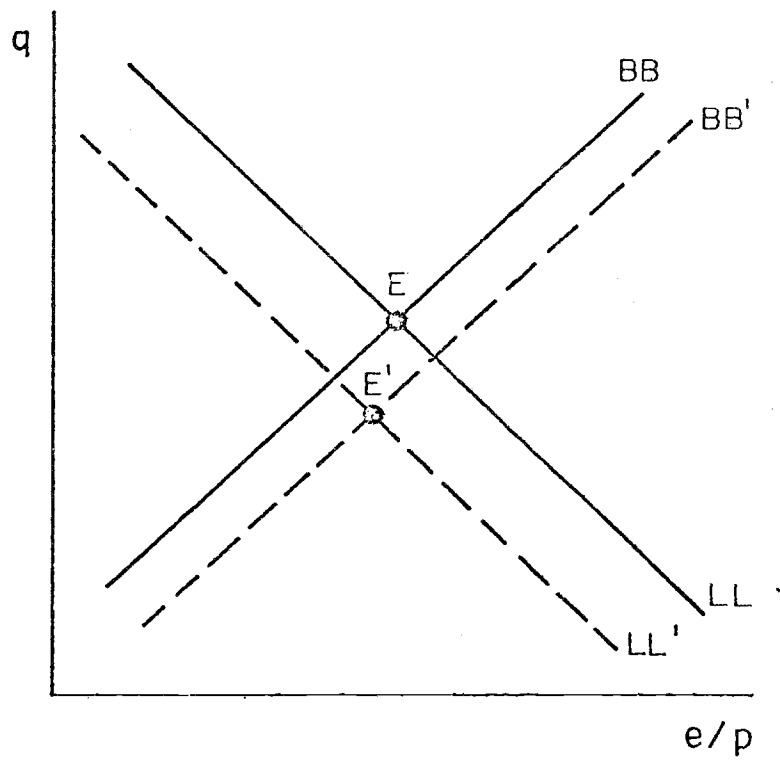
Figure 3: The Effects of an Increase in
the Price Level on Asset
Market Equilibrium.

Accordingly, the LL curve shifts to the left, to LL'.

In the market for foreign currency denominated assets, the increase in output has an uncertain effect on demand through the transactions variable, and reduces demand through the rate of return variable. We assume demand falls, thus shifting the FF curve in Figure 4 to the left, to FF'. The real exchange rate falls. The effect on q is uncertain. The transactions demand related effects tend to cause q to fall[24] while those associated with the increase in the marginal product of capital tend to cause q to rise. We assume the effect is typically positive.

The partial derivatives of the function in (13) and (14), obtained similarly, are:

$$\frac{\partial q}{\partial p} > 0, \; \frac{\partial q}{\partial y} > 0, \; \frac{\partial q}{\partial M} > 0, \; \frac{\partial q}{\partial B} < 0, \; \frac{\partial q}{\partial K} < 0, \; \frac{\partial q}{\partial F} = 0, \; \frac{\partial q}{\partial \frac{{}_t p_{t+1}}{p_t}} > 0 \qquad (17)$$

$$\frac{\partial q}{\partial \frac{{}_t e_{t+1}}{e_t}} < 0 \qquad \frac{\partial q}{\partial \frac{{}_t q_{t+}}{q_t}} > 0, \; \frac{\partial q}{\partial R^f} < 0$$

$$\frac{\partial h}{\partial p} < 0, \; \frac{\partial h}{\partial y} < 0, \; \frac{\partial h}{\partial M} > 0, \; \frac{\partial h}{\partial B} \; ?, \; \frac{\partial h}{\partial F} < 0, \; \frac{\partial h}{\partial \frac{{}_t p_{t+1}}{p_t}} \; ?, \; \frac{\partial h}{\partial \frac{{}_t e_{t+1}}{e_t}} > 0, \qquad (18)$$

$$\frac{\partial h}{\partial \frac{{}_t q_{t+1}}{q_t}} \; ?, \; \frac{\partial h}{\partial R^f} > 0$$
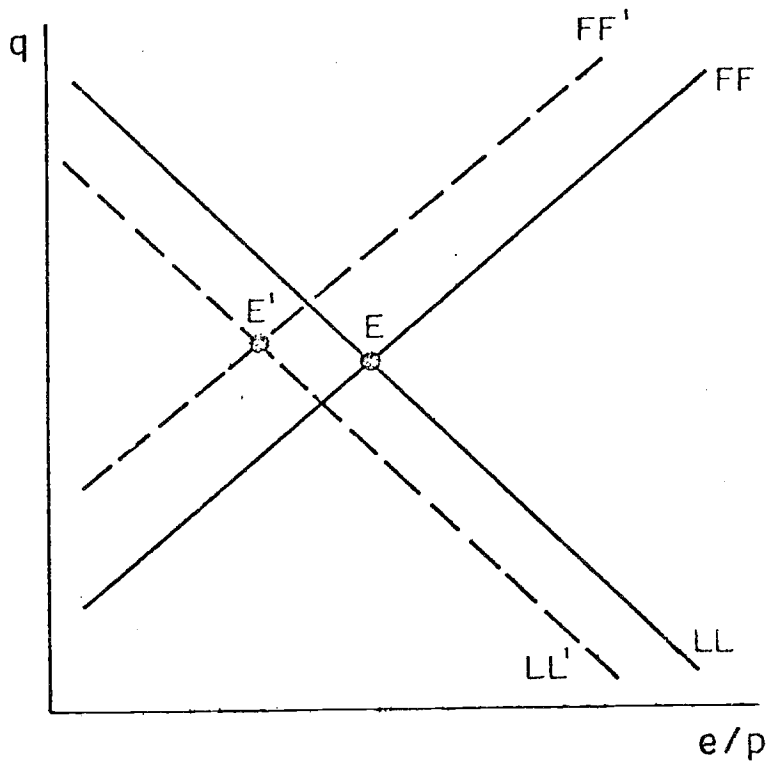
Figure 4 : The Effects of an Increase in
Output on Assets Market
Equilibrium.

Although a change in the stock of bonds has an uncertain effect on the real exchange rate that clears the assets markets ($\frac{\partial h}{\partial B}$ is of uncertain sign), an open market purchase (increasing M while reducing B) increases e/p. In other words, expansionary monetary policy causes the exchange rate to depreciate. A swap of domestic for foreign currency denominated bonds, increasing B while reducing F, reduces q and increases e/p. This open market operation corresponds to sterilized intervention in the foreign exchange market.

Under the assumption that bonds and capital are perfect portfolio substitutes, an open market swap of bonds for capital can have real effects only if the return on capital differs depending on whether it is held by the government or the private sector. For instance, if the government buys capital and takes it out of production, the marginal product of capital rises. As a result, q rises but the effects on the real exchange rate are uncertain.

Goods Market Equilibrium: Equilibrium obtains in the goods market when the output of domestic goods, y_t^s from (6), is equal to the demand for those goods, y_t^d from (7). In Figure 5 we show aggregate supply and demand curves in (p,y) space.[25]

The curves shown in Figure 5 have the conventional slopes. However, in the case of aggregate supply, there are countervailing effects. The slope of the aggregate supply curve is:

$$\frac{dp}{dy}\bigg|_{AS} = \frac{1 - \phi_3 h_2}{\phi_1 + \phi_3 \frac{\partial e}{\partial p}} \tag{19}$$

With both ϕ_3 and h_2 negative, the numerator need not be positive. The

ambiguity arises because an increase in output increases the transactions demand for money, thereby causing a currency appreciation through the assets markets, and a reduction in production costs. We assume this effect is not large enough to cause the AS curve to be negatively sloped.

On the aggregate demand side, all the channels through which an increase in the price level affect aggregate demand operate in the same direction: an increase in the price level reduces aggregate demand. We assume that an increase in output creates an excess supply of goods, despite some ambiguities arising from asset market effects of an increase in output.[26]

The intersection of the aggregate demand and supply curves determines the price level and domestic output. Given expectations, the foreign interest rate, and the stock variables, the joint equilibrium of the assets and goods markets determines the price level (p) and output (y), the exchange rate (e), the relative price of installed capital (q), and the real interest rate (r^B).

The exchange rate is accordingly determined by the interaction of the goods and assets markets, without direct reference to the external sector. But of course expectations of future exchange rates and the levels of stocks of foreign assets affect the current exchange rate, so that there is no useful sense in which it can be said that the exchange rate is determined uniquely in the assets markets, or that it is not influenced by the current account.

Comparative Statics.

We now examine the effects of changes in asset stocks, fiscal variables, and expectations on the equilibrium price and output levels.

We start by considering the impact effects of an increase in the money stock, holding expectations constant.

An Increase in the Money Stock: An increase in the money stock increases both q and e/p in the assets markets. The goods market effects are shown in Figure 5. The depreciated real exchange rate and the rise in q both increase aggregate demand, shifting the AD curve to AD'. The higher exchange rate shifts the AS curve to AS'. The price level and level of output both increase.[27]

One source of the short run non-neutrality of money is the fact that the nominal wage is pre-determined. But there is a second source of non-neutrality, which has so far been concealed by concentrating on the goods and assets markets. The government budget constraint implies that a money stock increase has to be accompanied by some other policy change.[28] For instance, the change could be an increase in government spending, or cut in taxes. In this case, output and prices would rise by more than would result purely from the increase in the money stock.

An Open Market Purchase: An open market purchase of bonds has the same qualitative effects as are shown in Figure 5. Both q and e/p rise in the assets markets, shifting the aggregate demand and supply curves as shown. Both output and the price level rise.

In discussing such an operation, we assume that expectations of inflation, of the rate of change of the exchange rate, and of the rate of change of q, do not change. But given the change in the composition of the government debt, expectations will adjust. These effects are discussed below.

The Effects of an Anticipated Depreciation: An anticipated depreciation of the exchange rate makes foreign exchange denominated
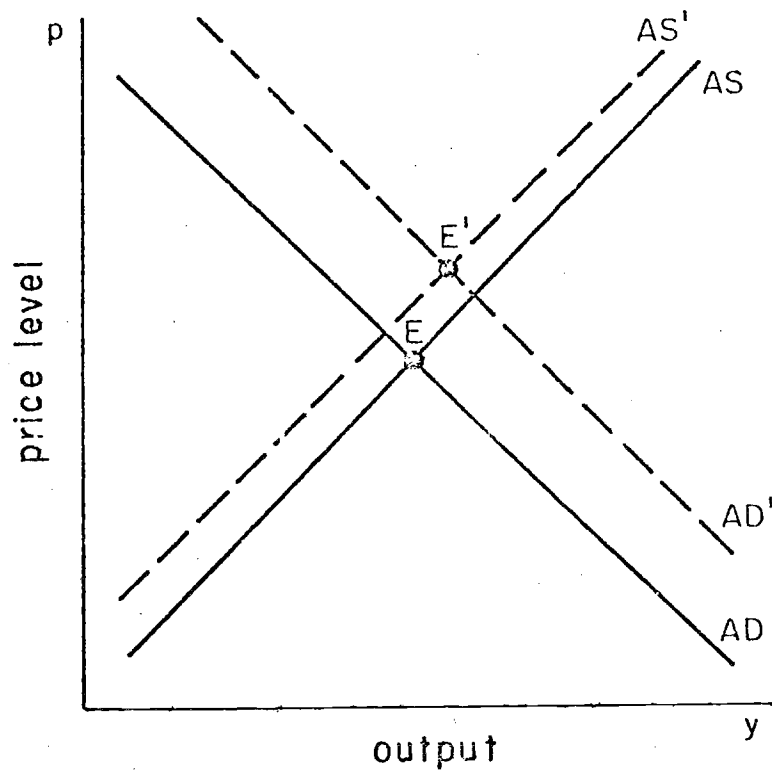
Figure 5 : Goods Market Equilibrium, and
the Effects of an Increase in
the Money Stock.

securities more attractive relative to domestic, and tends to reduce q

and increase e/p in the assets markets. Investment demand falls while

the demand for Israeli exports rises. The net effect on aggregate

demand is therefore uncertain. If the export effect dominates, both

the price level and output rise.

The Effects of an Incrase in the Wage Rate: An increase in the

wage rate shifts the aggregate supply curve up and to the right,

raising the price level and reducing output. The relative price of

installed capital, q, probably falls, while the effects on the real

exchange rate are uncertain.

Currency Liberalization: The modelling of the currency

liberalization in the current model requires some care. Foreign

currency denominated securities were traded before the liberalization,

but there was no free access to foreign capital markets. Foreign

exchange purchased through this market was typically at a premium over

the official rate. Modelling the operation of such a system would

require the introduction of a new variable, representing the premium

for foreign-currency linked securities over the official exchange

rate.[29]

We do not explicitly model the pre-existing structure of the

capital markets. Rather, we view the currency liberalization as an

increase in the yield available in the capital markets on foreign-

currency denominated securities. The effects of such a change are

already implied by (17) and (18): in the capital markets there is an

increase in the real exchange rate (a depreciation) and a fall in q.

The effects on aggregate demand are thus uncertain, since the fall in q

reduces demand while the depreciation increases it. The depreciation

in addition shifts up the aggregate supply curve.

The above discussion assumes that asset stocks and expectations remain unchanged. In the model with which we are working, it is entirely possible in the short run and ignoring expectations, for both the exchange rate and q to be kept at desired levels through open market operations. It would have been possible through open market swaps of foreign exchange denominated assets for money and bonds for the government to maintain both q and e/p at their pre-liberalization levels. Had this been done, there would later have been budgetary implications resulting from the substitution of interest-bearing assets for money in the portfolios of the public that would have increased the inflation rate. Moving over to the goods markets, the only effects of the liberalization in the current period would have been a result of changed expectations about future budget deficits or values of q.

The liberalization thus need not have created any major short-run disturbances to the economy except--and this is a major exception-- through expectations. But the liberalization as carried out did affect the goods markets directly. The liberalization was accompanied by the removal of tariffs and export subsidies and by a 50% devaluation that was intended to maintain the effective exchange rate fixed. Assuming the effective exchange rate unchanged, the supply curve would not have shifted as a result of the devaluation. But because there were pre-existing foreign currency denominated assets, the 50% devaluation had a large wealth effect, shifting up the aggregate demand curve and causing the price level to rise. There was thus an immediate expansionary effect from the liberalization-cum-devaluation.

In addition, and not less important, the liberalization by causing

a shift into foreign currency denominated securities from domestic money reduced the domestic currency denominated money base and thus required higher rates of inflation to produce the same amount of revenue from seigniorage.

The External Sector: The trade account is completely determined within each period by the level of output and the real exchange rate. The service account is predetermined. An open market purchase that causes a depreciation and expansion of output has ambiguous effects on the trade account: the real depreciation tends to increase net exports while the rise in domestic income tends to decrease net exports.

A fiscal expansion (not studied above) unambiguously increases the current account deficit.

Long Run Constraints: Suppose the economy is in a steady state, with given ratios of real balances to bonds and government issued foreign currency liabilities. These ratios can be assumed to be determined by monetary policy:

$$b = \lambda_1 m \tag{20}$$

$$f^d = \lambda_2 m \tag{21}$$

where $b \equiv \dfrac{B}{pN}$, $m \equiv \dfrac{M}{pN}$, $f^d \equiv \dfrac{eF^d}{pN}$.

Lower case letters without time subscripts are steady state real values of the equivalent upper case symbols.

Substituting into equations (9) and (10), we obtain the steady state government budget and balance of payments constraints:

$$m(\pi+n(1+\pi)) + b(1+\pi)(n-r^B) + (f^d-rs)[(1+\pi^f)(n-rr^f)] + fa \tag{22}$$

$$= g - \tau + g^f$$

where τ is per capita real government revenue from taxes net of transfers.[30]

The balance of payments constraint is:

$$fa + nx = g^f + (f^f + rs)(1 + \pi^f)(n - rr^f) \tag{23}$$

The crucial point about these constraints—and a well-known one—is that the amount of seigniorage and the possibility of issuing other assets to finance a budget deficit (in (22)) depends significantly on the growth rate of the economy. In a rapidly growing economy, the government can finance a budget deficit through the printing of money without creating inflation. When the growth rate is lower, it takes a higher inflation rate, if indeed the budget deficit can be financed at all.[31]

Similarly, the relationship between the growth rate of output and the real interest rate is an important determinant of whether a deficit in either the government's account or the foreign trade sector can be financed through borrowing against bonds or foreign exchange. If growth is rapid—as it was in Israel up to 1972—there is no difficulty in having large budget deficits financed by households wanting to acquire assets that will maintain the asset to income ratio constant. But when growth is slow and the interest rate above the growth rate, borrowing generates ever increasing burdens on the budget over time.

Inflationary Issues.

In this section we briefly analyze issues of general interest that arise from the Israeli inflationary experience.

The Inflation Tax.

Table 10 presents data on the amount of revenue obtained by the Israeli government through the creation of high powered money. The

Table 10: Money Base and Seigniorage

	$\frac{H}{GNP}$ (%)	Real GNP growth (% p.a.)	Inflation rate (CPI)	$\frac{\Delta H}{GNP}$(%)
1955-59	12.7	10.3	5.3	2.1
1960-64	13.0	9.5	6.1	2.1
1965-69	13.0	8.5	4.3	1.3
1970-74	15.4	8.4	17.6	3.5
1975-76	11.0	2.3	35.4	2.6
1977-78	9.9	3.3	42.3	1.4
1979-80	4.7	3.3	103.0	1.8
1981	4.0	2.5	116.6	2.1

Source: IFS data.

Table 11: Estimated Inflation Tax on Monetary Base and Credit Subsidy

	(1) Monetary base (billions of 1982 shekels)	(2) Tax rate	(3) Tax As % of GNP	(4) Credit subsidy[1] due to inflation (% of GNP)	(3)-(4) Total Inflation tax
1976	49.0	.29	2.6	9.8	-7.0
1979	35.4	.66	3.4	11.3	-7.8
1981	17.7	.76	1.7	5.1	-3.3

[1] Calculated as difference between real interest paid and amount that would be paid at real rate of 4% on long term credit. For details on calculation of subsidy on short-term credit, see source.

Source: Bank of Israel Annual Report, 1982 (Hebrew edition), p.244.

period during which seigniorage revenue was at a maximum was 1970-1974,
when the economy was growing fast (at least into 1973), and when the
inflation rate was, by later standards, low. The ratio of high powered
money to income was during that period at about 12%, roughly the ratio
that was maintained from 1955 until the implementation of the
liberalization in 1977. Table 10 shows a sharp reduction in the ratio
of monetary base to income—which is the base of the inflation tax—
starting in 1979. This shift followed the liberalization with a lag.
The lag is probably a reflection of the fact that it took time until
foreign currency deposits began to be used as means of payment, thereby
producing the shift out of domestic currency.

Is it possible that the current amount of seigniorage—about 2% of
GNP—could be obtained at a lower inflation rate? In other words, is
the economy on the slippery side of the Laffer curve? That obviously
depends on the inflation elasticity of the demand for the monetary
base. If the ratio of base to income returned to 10%, then an
inflation of about 17% (plus 3% for growth) would generate revenue
equal to 2% of GNP.

There are two ways of producing such a shift. First, it could
happen if the inflation rate were reduced in the current post-
liberalization institutional setting. That would require a very large
elasticity of the monetary base with respect to inflation—an
elasticity that is not at all visible in the data in Table 10 for the
pre-reform years.

Second, such a shift could be induced by undoing the currency
liberalization. The demand function for high powered money could be
shifted by policy measures, such as that recently implemented that

imposes a tax on the purchase of foreign currency. Even so, because
financial sophistication has increased rapidly since 1977, it is
doubtful that the system would return to a base to income ratio of 10%,
nearly double the current U.S. ratio.

Thus a reduction in the inflation rate would have to be
accompanied by a reduced reliance on seigniorage by the government.

Is the Inflation Tax Negative? It is often asserted that the
inflation tax in Israel is negative. Table 11 shows the calculation:
the tax on the holdings of monetary base is more than offset for the
private sector by the fall in the value of its nominal liabilities to
the government. The point made by the table is that a marginal 1% of
inflation increases private sector wealth. The effect was at a maximum
in 1979 and is gradually becoming less important as the government
stops providing non-indexed loans to the private sector.

Table 11 shows that the real balance effect would be negative in
Israel. That is, if economic agents regard their liabilities to the
government as liabilities, then their wealth would increase when the
price level increases. It does not necessarily follow that an increase
in the money stock would produce negative revenue for the government.[32]
An increase of one shekel in the money stock would in the first
instance provide one shekel's worth of resources to the government.
The subsequent negative effects, summarized in Table 11, would have to
be deducted from the initial positive effect. But it does appear from
the table that the effect through subsidized credit is so large—or was
so large until recently—that an increase in the money stock would have
reduced the present discounted value of government revenue.

This of course brings to the fore the basic question about the

Israeli inflation: why does the government persist in policies that produce such high rates of inflation? With nothing obviously gained by continuing inflation, why not stop it? We return to this question below.

The Balance of Payments and the Foreign Debt.

The balance of payments has been the major preoccupation of Israeli policymakers for the past three decades. Figure 6 and Table 12 show net exports for the period since 1950.[33] The foreign deficit has been in the range of 20% of GNP for most of the period, with a sharp increase taking place following the Yom Kippur War and associated oil shock.

As noted by Karni(1979), there are two standard arguments for the case that the large import surplus is undesirable. The first is that the accompanying accumulation of foreign debt places an undue burden on future generations. The second is that the magnitude of the deficit and the need to rely on external financing, some of it in the form of grants, makes for excessive vulnerability to outside pressure, economic and political.

Table 13 presents data on the extent of the external debt. The gross debt passed the $20 billion mark in the third quarter of 1982. The net debt at the end of 1982 was equal to 63% of GNP or 1.4 times the value of exports. With a real interest rate of 5%, the annual interest cost of the debt would be above 3.0% of GNP. This would be a manageable amount in steady state. But the ratio of the net foreign debt to GNP is growing because of the size of current account deficits financed through borrowing. By the end of 1982 net debt service amounted to nearly 25% of exports and more than 10% of GNP.

Table 12: Foreign Trade

	Exports	Imports	IM-X	Real exchange rate[1]
	GNP	GNP	GNP	
1950-53	6.0	27.2	21.2	100
1954-67	17.6	37.7	20.1	216.7
1968-73	30.6	53.5	22.9	266.5
1974-77	37.2	66.9	29.7	232.8
1978-81	48.7	70.6	21.9	246.8
1982	44.7	67.0	22.3	254.7

[1]Calculated as ratio $\frac{ep^*}{p}$ where e is $ exchange rate, p* is U.S. price level (GNP deflator) and p is Israeli price level (GDP deflator). There was extensive licensing of imports in the period to 1954.

Table 13: Israel's External Debt

(End of period)

$ billion

	1975	1979	1981	1982
1. Gross external debt	10.2	16.4	24.2	25.2
2. Net external debt	6.7	11.1	13.1	13.7
3. Net debt as % of GNP	57.1	66.4	63.1	62.9
4. Net debt as % of exports	175.6	151.5	118.2	140.7

Source: IMF.

Is the accumulation of the debt desirable, or at least better than the alternatives?[34] Note first that part of the import surplus of the last eight years has been associated with defense imports. Figure 6 includes data on defense imports, which show that most of the significant increase in the import surplus in the mid-70's was defense related (the rest was oil). Borrowing would be optimal if the current defense burden were transitory. But if the current rate of defense spending were to continue, it would become necessary to curtail borrowing.[35]

The concern over vulnerability to foreign pressure resulting from the import surplus and the magnitude of the foreign debt is a real one. It is also a very old concern. (See Halevi and Klinov-Malul (1968)). Such pressures have been brought to bear in the past, though the abrupt cut-off of aid that has been the primary fear of policymakers has not happened. If it were to happen, the access of the Israeli government and private sector to international capital markets would be curtailed; there would be major disruption to the economy and a reduction in the standard of living.

At least for this reason, successive Israeli governments have sought to bring about a reduction of the import surplus.[36] The level of exports has risen rapidly relative to GNP, as Figure 6 and Table 12 show. The economy succeeded in moving resources into the export sector through a variety of incentives, including subsidized export credits, and recently, exchange rate insurance. Although the level of imports has risen along with exports, and the basic 20% of GNP import surplus remains, the private sector import surplus has been reduced—defense imports have risen as a share of GNP.

exports / GDP

net imports / GDP
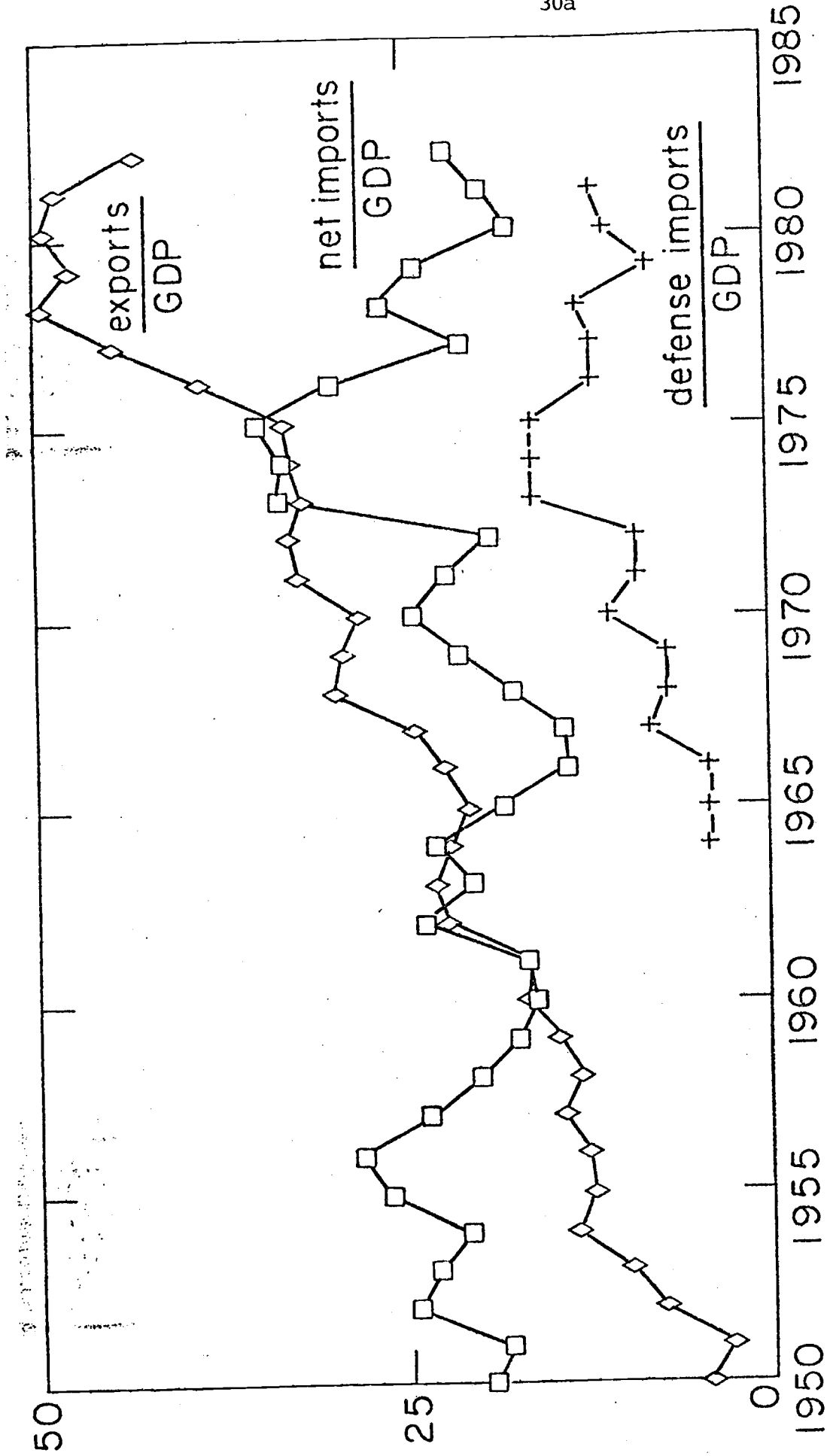
defense imports / GDP

Figure 6 : Foreign Trade, 1950-1981

The Israeli government has three times undertaken major
restrictive policies to reduce the balance of payments deficit. The
first period was 1965-67, which shows in Figure 6 as having the lowest
import surplus of the entire period. After the 1973 war, there was
again a period in which taxes were raised and the balance of payments
deficit was reduced. The latter episode took place against a
background of high inflation. So did the attempted 1979-80 program to
reduce the payments deficit through restrictive fiscal and credit
policy. In each case there was a reduction in the payments deficit, at
the cost of higher unemployment. The conclusion, especially after the
painful 1965-67 episode, was that it was preferable to attempt to
improve the balance of payments gradually, except in extreme
circumstances like those after 1973 when the import surplus moved close
to 40% of GNP.

It has generally been believed that to achieve its eventual aim of
a substantially reduced current account deficit, the government will
have to produce a continuing slow real devaluation. Whether a real
devaluation is needed, though, depends on relative productivity trends
in Israel and abroad. It appears from Table 12 that the government has
had some success in achieving a real devaluation over the years,
although the data should be treated with extreme caution; in any event,
the success of the policy can also be gauged by its effects on the
volume of exports and the import surplus. Taking defense imports into
account, this aspect of policy has been successful.

The 1982-83 policy that attempts to stabilize the inflation rate
by causing a real appreciation has, however, sharply increased the
balance of payments deficit and foreign borrowing. This policy is

undoing the reduction in the external deficit that was painfully achieved during the past decade. With an external deficit in excess of $4 billion per year, projected by some estimates to rise further in 1983, the prospects for a rising and ultimately unsustainable external debt burden become high. For this reason the current policy will be reversed.

Inflation and Other Trends in the Israeli Economy.

The economy described in the first part of this paper is very different from the Israeli economy in, say, 1960. In that year government expenditure was less than 30% of GNP, the government budget deficit (IFS definition), was 4% of GNP the CPI was 2% higher than in the previous year; only the import surplus, at 18% of GNP, was at a modern level. It was the import surplus that was the main cause of the restrictive fiscal and monetary policies that produced the 1966-67 recession, which as we have seen in Figure 6 did improve the current account. The question is, what happened after 1960?

Table 14 presents summary data for the behavior of the major macroeconomic variables over subperiods since 1958, and Figure 7 shows some of the same variables graphically. The period up to 1967 looks tranquil from today's perspective. Growth was rapid, inflation low, and government spending and the budget deficit low. After the 1967 war there was an apparently permanent jump in the level of government spending, due largely but not entirely to higher defense spending. For the next four years the economy grew rapidly, absorbing labor from the administered territories and immigration. (Bruno, 1983). The increase in the labor force permitted rapid growth without pressure on the real wage. By 1973 the pressure of demand began to affect the inflation
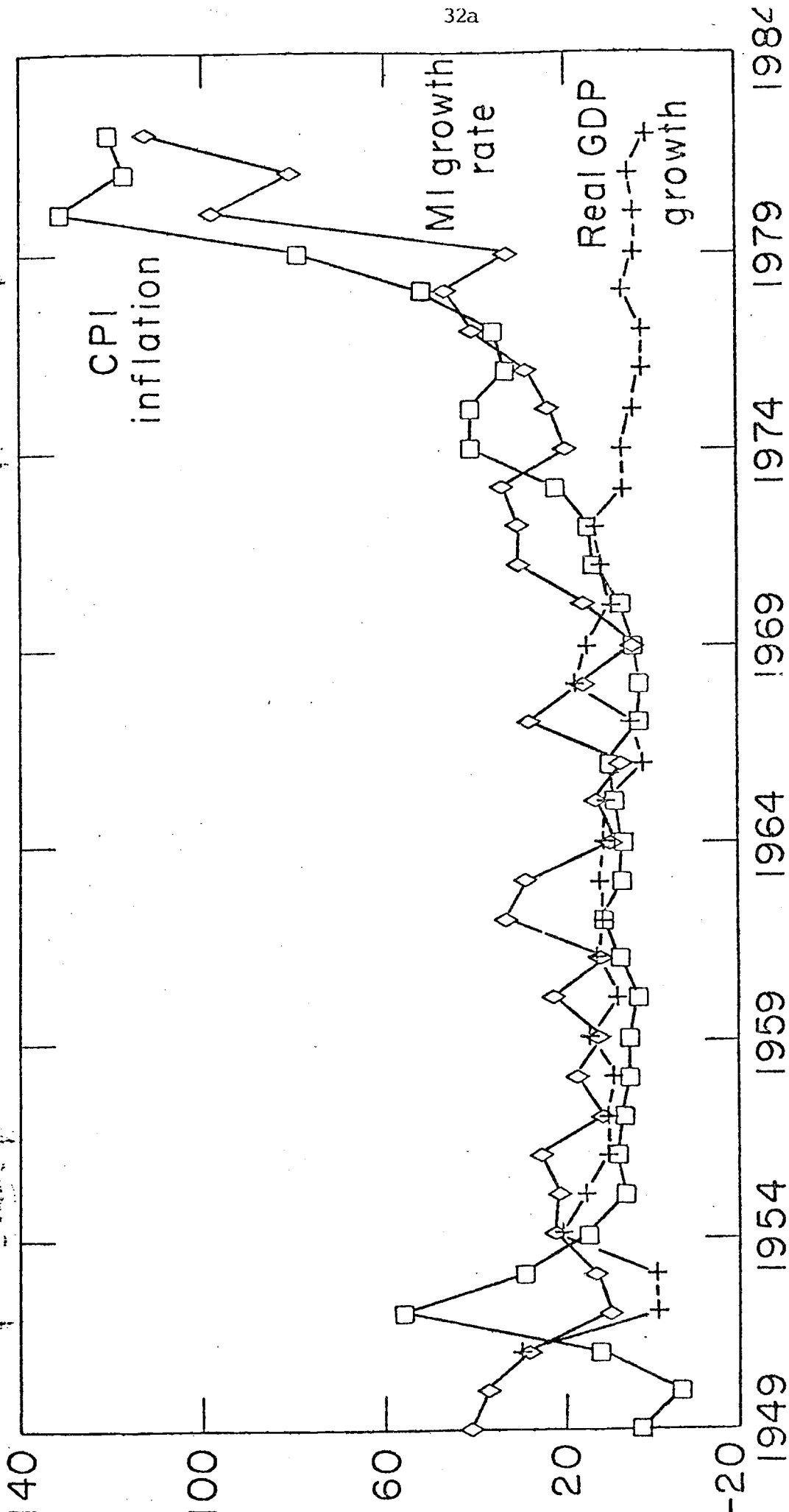
Figure 7: Money Growth, Inflation and Output, 1949-1982

Table 14: Major Macroeconomic Variables, 1958-1981

	m1	p	y	$\dfrac{GE}{GNP}$	$\dfrac{GR}{GNP}$	$\dfrac{DEF}{GNP}$	$\dfrac{GD}{GNP}$
1958-67	16.1	5.4	8.5	32.2[1]	28.0	4.2	10.6
1968-72	17.1	8.0	11.1	47.1	32.2	14.9	21.8
1973-77	27.4	35.9	2.7	64.2	42.5	21.7	30.0
1978-81[2]	60.8	95.6	1.8	61.3	45.3	16.0	25.2

Source: IFS for columns 1 to 6; Bank of Israel Annual Report, 1981

(Hebrew), p.85, last column; also Patinkin (1970), p.69.

lower case letters indicate growth rate

M1 is M1

p is CPI

y is real GDP

GE is government expenditure

GR is government revenue

DEF is government deficit (IMF definition)

GD is defense expenditure

[1] Data are ratios of fiscal year (starting April 1) government variables
to calendar year GNP.

[2] Columns 4 through 6 in this row are for 1978-80.

rate, which reached 20% even before the Yom Kippur War.

Then in 1973 the oil and war shocks struck. Defense spending jumped by nearly 10% of GNP once again. The supply shock both reduced the growth rate of output and caused a rapid rise in the inflation rate in 1974. In that year the government made a deal with the Histadrut to forgo one round of indexation of wages, which made it possible to reduce the real wage and appeared to start the inflation rate back down towards the 20% level from which it had come in 1972. Taxes were raised and credit restricted to reduce the balance of payments deficit and inflation. From 1973 to 1977, GNP grew slowly. Productivity growth was negative in each of the years 1975-1977. The balance of payments deficit did fall.

The high levels of government (especially defense) spending and money growth continued. The inflation rate came down from its 1974 level, but appeared to stabilize at about 30% just as it currently appears to be stable at a higher rate. The government was taking about 3% of GNP in seigniorage, less than it had taken in the three years before 1973. But as shown above, with the low real growth rate, a higher inflation rate was necessary to produce the same amount of seigniorage. Recall at this point that the real interest rate was kept fixed, so that any amount of the deficit that could not be covered through bond sales at the existing interest rate automatically fed into either an increase in the stock of high powered money, or the foreign deficit. Indexation made the inflation tolerable, and there was no willingness to pay the price in terms of unemployment to reduce the inflation rate significantly.

Then came the liberalization of 1977. As noted above, the

liberalization was accompanied by a devaluation that produced a wealth effect in the goods market, thereby raising the price level and thus in the short run the inflation rate. With a lag, the liberalization also produced a shift in the demand for shekel denominated currency. The initial reaction was to move largely from index bonds to foreign currency linked deposits, thus not yet shifting the demand for local currency denominated money. It was only gradually that it was understood that the foreign currency balances could be used to make transactions, and the demand for shekel denominated assets therefore shifted. Accordingly we see in Figure 7 that it is only in 1979 that there is a large increase in the inflation rate, accompanied by a fall in the growth rate of the money stock. Subsequently there is again a reasonably close correspondence between the inflation rate and the growth of M1.

Because the jump in the inflation rate came at a time when the growth rate of M1 was not high, there has been a tendency in Israel to describe the inflation as being caused by a "bubble", meaning that it is due to unexplained sources rather than monetary pressures. But given the shift in the demand for shekel denominated assets, the inflation rate would at some point have had to exceed the growth rate of money.

But why then has the inflation rate not come down subsequently? There has not been a reduction in the growth rate of the nominal aggregates since the inflation rate broke through the triple digit range by the end of 1979. At one level this failure to reduce the growth rate of nominal money may be attributed to the need for revenue from seigniorage. But because during this period government revenue

from inflation was probably negative in the sense defined at the beginning of this section (see Table 10), the inflation has also to be blamed on a set of operating procedures (a constant real interest rate, reasonably constant real wages, exchange rate targets) that made the rate of growth of money endogeneous. From this viewpoint, the continued rapid inflation can be blamed rather on the government's failure to reduce its budget deficit. The large government deficit ensures that after all other sources of financing of the deficit have been tapped (foreign and domestic borrowing), the residual is financed by the printing of money.

Along with the higher inflation since 1973, the Israeli economy has also experienced much slower growth than before. Part of the decline in the growth rate is a result of slower accumulation of factors of production (Bruno, 1983) and part a result of a fall in productivity growth. The heavy pressure of defense and government spending has resulted in a reduction in investment spending, and the labor force has been growing slowly. But productivity growth has fallen more rapidly in Israel than in other countries. The reason for this is not clear, though doubtless some blame attaches to the high inflation that has moved resources into the financial sector.[37]

Stabilization Policy: The model presented above indicated that there is nothing particularly mysterious about the operation of either monetary or fiscal policy in a heavily indexed economy like the Israeli one, with its unusual menu of assets. Restrictive monetary or fiscal policy will reduce the price level or inflation rate. But they will also reduce the level of output.

The indexation formulae for wages do not provide instant price

flexibility. There is a lag in the adjustment of wages, which means that the real wage would be high during the course of a disinflation. The one way out of this dilemma is an agreement with the Histadrut on a wage and macro-policy package. Such an agreement was successfully reached with the government in 1974, when it was necessary to have a real devaluation and labor was persuaded to forgo indexation temporarily. In the absence of such an agreement, it will take the pressure of unemployment to drive down the rate of wage increase and thus the rate of price increase. Israeli governments have not since the sixties shown evidence that they are willing to have prolonged unemployment. The choice is thus between a package, and attempts to disinflate gradually. In either case, the government would have to reduce its domestic deficit, to be sure that it would not end up again relying on money printing to finance the deficit.

The government has experimented with the alternative of trying to reduce the inflation rate by keeping the prices of commodities or the exchange rate stable. Such policies have not worked. Fixing of the exchange rate for a period during which domestic inflation is continuing only ensures that a big correction has to take place later. Similarly, the attempt to use subsidies to stabilize some nominal prices leads to large increases in the budget deficit, and eventually to the lifting of the subsidies and more inflationary pressure.

There is one final question. The inflation rate is not a major issue in Israel. It is talked about, but there is no groundswell of public insistence that the rate be reduced. Indexation of pensions, long term savings, and wages, cover most of the difficulties that would face an unsophisticated economic agent living in an economy with a high

and variable rate of inflation. The question is: why disinflate? Israeli policymakers frequently assert that unemployment that would be needed to disinflate successfully cannot be justified in Israel. The 1965-67 recession during which unemployment reached double digits and there was net emigration has burned as deep a concern about unemployment in the memory of policymakers and the public as the Great Depression did in the United States.

The arguments for undergoing the pain of disinflation have not been established. It has frequently been asserted that the low growth of the seventies in Israel is a result of the high and variable inflation, which draws resources into non-productive activities like banking, and which distorts the price mechanism. But the productivity slowdown is a worldwide phenomenon, which has taken place in low inflation as well as high inflation countries. A convincing demonstration that it is indeed the inflation that is responsible for low growth would make the case for disinflation.

Footnotes

[1] Unless otherwise noted, data are from International Financial Statistics or the IFS tape.

[2] Kravis, Heston and Summers (1978) present estimates of Israeli per capita GDP adjusted for purchasing power differences that are around 60% of the United States level for the years 1970, 1973, and 1974. The exchange rate mediated comparison for those three years ranged from 40% to 60%.

[3] A similar table is presented in Shiffer (1982); his data differ slightly from those in Table 1, apparently as a result of data revisions.

[4] Berglas (1983).

[5] For accounts of Israeli indexation see Brenner and Patinkin (1977) and Kleiman (1977).

[6] In 1982 the banks were encouraged to offer high nominal interest rate time deposit accounts to increase the demand for nominal assets. At the same time, the tax treatment of nominal interest was adjusted to ensure only real interest was taxed. Accordingly the share of non-M1 nominal assets rose from 1.3% to 2% of financial assets. In April 1983 a 1% tax was imposed on the turnover of foreign currency linked assets, also with the aim of increasing the demand for shekel denominated assets.

[7] Total net wealth of the non-financial private sector for the end of 1981 was estimated by the Bank of Israel to be a little above 4 times GNP (Bank of Israel Annual Report, 1981, Hebrew edition, p.257): the housing stock and value of plant and equipment account for most of the excess of net wealth over financial wealth as recorded in Table 5.

[8] The less than 100% compensation for inflation was introduced on the grounds that nominal wages should not be adjusted in response to external shocks. The lack of full indexation has led to continuing attempts by labor to restore real wages in mid-contract, and thus to increased labor strife. Some Israeli economists now argue that wage indexation should be complete, frequent, and put in place as soon as possible following each change in prices--on the grounds both that this would minimize labor trouble and that it would help the disinflation process.

[9] I am indebted to Zvi Auerbach for his assistance in compiling Table 6 and to Zalman Shiffer for advice on Table 7.

[10] The Bank of Israel data differ in several respects from those of the IMF, which are based on Treasury calculations. The two sets of data are difficult to reconcile, in part because Bank data are typically for calendar years and Treasury data for fiscal years. The underlying sources of the difficulties appear to be the use by the Bank of a cash basis for expenditures and receipts as compared with a less clear set of Treasury conventions on the timing of expenditures and receipts; and a wider definition of the government sector by the Bank.

[11] The estimate for 1982 is 5.1% of GNP; the peak, in 1979, was 11.3% of GNP.

[12] The wide definition of the base is used in Table 7b. Continuing the discussion from footnote 10, it is believed that the errors and omissions recorded in line 2 of Table 7b, which is based on monetary data as opposed to the budgetary data that underlie Table 5, result from: the difference between accrual (Table 6) and cash (Table 7b) accounting; from the treatment of interest; and perhaps from the

treatment of government support of housing investment. The difference is unusually large in 1981.

[13] During 1981, the change in the money base amounted to 2.4% of GNP (calculated from Bank of Israel Report, 1981 (Hebrew) p.251). However, since Bank of Israel profits are included in government revenue, this item is not shown separately in Table 7b.

[14] It has been engaged in such an exercise since October 1982, with the result that the real exchange rate has appreciated over 30%, with no visible effect on the inflation rate. A large devaluation is expected as of the time of writing (July 1983).

[15] For a description and evaluation of the reform, see Sussman (1979).

[16] See Fischer (1981) for a discussion of monetary policy in Israel.

[17] In 1973 the ratio of monetary base to M1 was 93%; at the end of 1981 the ratio was 78%. The ratio of reserve money to GNP (expressed at an annual rate) was 3.2% in the fourth quarter of 1981. The equivalent ratio for the United States was 5.5% in 1982.

[18] A bond with return that is 80% index linked can, at high rates of inflation, be viewed as a fully linked bond paying real interest at a rate equal to 80% of the stated real rate.

[19] Given that the Israeli tax system is more inflation proof than the U.S. system this assumption is more appropriate for Israel than it would be for the U.S. There were nonetheless until 1981-2 major inflation-related distortions in the Israeli tax system.

[20] The asset menu and equilibrium conditions in this model are similar to those in the valuable paper by Fraenkel (1979).

[21] An alternative formulation would have the real returns on each asset, measured in CPI units, in the demand functions. The present formulation is a specialized version of that form.

[22] It has been suggested that because government intervention in the investment process is so pervasive, it might be preferable to treat investment as exogenous.

[23] This argument is based on an adjustment (of capital) cost function of the form $K.C(I/K)$ where I is the rate of investment.

[24] This can be seen more clearly by adding the BB curve to the figure.

[25] These curves embody the assumption of asset market clearing, since the functions q( ) and h( ), (13) and (14), are used to substitute for q and e/p wherever they appear in (6) and (7).

[26] These ambiguities arise only because an increase in output is assumed to increase q, thereby increasing demand both through a wealth effect and by raising investment. However, as noted in the discussion of Figure 4, this effect is assumed to be small.

[27] The graphical analysis raises the possibility that the supply side exchange rate effect could lead to a fall in output when the money stock rises. This possibility can be ruled out by noting that if the price level were to rise in the same proportion as the money stock, with output at its original level, the assets markets would be in equilibrium, the demand for goods would be at its original level, but supply would exceed demand.

[28] In a more detailed model, an M1 money stock increase could result from a change in reserve requirements that would not necessarily affect the government budget.

[29] Such a variable would perform for foreign currency linked securities a role almost identical to that of q for capital: the value of the stock of such assets (the left hand side of the market clearing equation) would reflect the premium; the interest component of the return would be reduced because of the higher cost of the asset; and expectations of changes in ;the premium would affect the expected return on the asset.

[30] The presence of the $(1+\pi)$ and $(1+\pi^f)$ terms with b and (f^d-rs) respectively is a result of the assumption that the initial stock of bonds in period t is sold at the end of period t-1.

[31] See Melnick and Sokoler (forthcoming) for calcualtions of the effects of reductions in the growth rate of the economy on the inflation rate when inflation is used to generate government revenue.

[32] This issued is discussed in Fischer and Frenkel (1981) and in an MIT B.S. thesis by David Lebow (1983).

[33] The balance of payments problem is discussed by Halevi and Klinov-Nalul (1968), Michaely (1975). and Karni (1979).

[34] Edi Karni points out that much of external borrowing during the seventies was at negative real rates.

[35] Defense imports overstate the defense burden on the balance of payments, since it is doubtful Israel would be exporting arms if it were not for the defense burden of the past.

[36] Michaely (1974) describes the methods used to affect the balance of trade and payments. He also calculates effective real exchange rates, which show little change over the period 1955-71.

[37] This point has been emphasized by Jacob Frenkel.

Appendix: Symbols

M_t — shekel denominated money stock.

p_t — CPI price level

y_t — real output

R_t^B — expected nominal return on index bonds

R_t^F — expected nominal return on foreign currency linked bonds (in dometic currency)

V_t — real wealth

$\dfrac{B_t}{p_t}$ — real stock of index bonds

q_t — relative price of installed capital

K_t — physical capital stock

e_t — exchange rate

F_t^f — holdings by domestic residents of foreign-issued foreign currency bonds (measured in foreign currency)

F_t^d — holdings by domestic residents of domestically issued foreign currency bonds (measured in foreign currency)

r_t^B — real yield on index bonds

F_K — marginal product of capital

w_t — wage rate

G_t — domestic government purchase of goods and services

T_t — net taxes

RS_t — reserves

FA_t — foreign aid, (measured in foreign currency)

G_t^F — government purchases abroad (measured in foreign currency)

r_t^f nominal interest rate on foreign currency bonds (measured in
foreign currency)

NX_t net exports

π domestic inflation rate

π^f foreign inflation rate

rr^f real interest rate on foreign currency bonds (measured in domestic
goods)

rs per capita reserves (measured in real terms)

fa per capita foreign aid (measured in real terms)

g^f per capita government purchases abroad (measured in real terms)

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