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MONETARY POLICY AND INSTITUTIONS IN ISRAEL: PAST, PRESENT, AND FUTURE

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The paper opens with a detailed look at the institutions of monetary policy in Israel, at the goals and limitations of this policy, and at the role of institutions in creating mechanisms which produce automatic accommodation. It goes on to provide a critical evaluation of several issues of great importance for the effective conduct of monetary policy: the exchange rate as a nominal anchor, the high interest rates and high financial spreads, and the pros and cons of targeting financial stocks and interest rates. It concludes with a review of ongoing reforms and makes recommendations for further reforms in the monetary policy-making and regulatory institutions.

Monetary policy in Israel operates through a variety of channels, many of which are only partially under the control of the central bank. This state of affairs evolved over the years because the central bank's traditional role as a guardian of price stability was largely subordinated to such other tasks as the maintenance of full employment and a sufficiently high level of foreign reserves, and the promotion of economic growth. Until 1985 large and persistent budget deficits imposed additional constraints on monetary policy, severely limiting the Bank of Israel's ability to stabilize prices and the balance of payments. The dramatic reduction of the deficit since the 1985 economic stabilization program (ESP) opened the way for a gradual loosening of the government's monopoly of the capital market and increased the need for a more independent monetary policy.

The textbook view of monetary policy is that the central bank controls the money supply, or at least the monetary base, through open-market operations and reserve requirements. The Israeli case is much more complicated, not only because the central bank is not free to fully sterilize the effects of foreign capital flows, but mainly because of numerous unconventional (and at times very specific) instruments of monetary policy.

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In addition, the central bank has to deal with a highly concentrated commercial banking system. This paper takes a detailed look at the monetary institutions in Israel, at their goals and limitations, and at the role of the institutions in the creation of mechanisms that produce automatic monetary accommodation. It also reviews ongoing reforms and evaluates their effects on the accommodative tendencies of monetary policy.

The first part of the paper (Sections 1–4) is mostly descriptive, while Sections 5–8 are concerned mainly with evaluation, analysis, and recommendations. Section 1 describes the goals and limitations of monetary policy during the last decade. Section 2 provides a detailed account of the monetary institutions, including reserve requirements, directed credit, resident deposits, capital-flow policy, credit ceilings, interest-rate policy, and the choice of intermediate targets. The instruments used are classified by the degree of control which the central bank has over them. Section 3 evaluates the accommodative nature of the institutions described in Section 2. Ongoing reform of these institutions and of some of the associated instruments are discussed in Section 4. A major institution of monetary policy is the exchange-rate regime; Section 5 evaluates the pros and cons of using the exchange rate as a nominal anchor, as it has been since the July 1985 stabilization program. Section 6 presents evidence on interest rates in the highly segmented credit market; in particular, it examines the wide interest spread in the unrestricted segment which has aroused considerable public concern. Section 7 compares the attractiveness of interest-rate and financial stock targets. Among the issues dealt with in this section are the effects of the choice of target on the precision of monetary control in the presence of uncertainty, the accommodative effects of a real interest-rate target on government bonds, and its interaction with capital-market indexation. The choice between credit and monetary targets is also discussed. Our recommendations are summarized in the closing section.

1. THE GOALS AND LIMITATIONS OF MONETARY POLICY IN ISRAEL

In the decade following the 1977 foreign-exchange liberalization, monetary policy in Israel was shaped by the desire to achieve a number of not always compatible goals. Although price stability was recognized as an important objective of the central bank, it was by no means the only one.[1] Thus the 1954 law establishing the Bank of Israel, lists additional goals, such as maintaining a high level of production, employment, and investment, and managing the currency, the banking system, and the credit system.

In practice, the institutional framework within which the Bank of Israel operated, as well as the high priority assigned by both the Bank and the government to goals other than price stability, severely limited the capacity of monetary policy to resist inflationary pressures (Gafni *et al.*, 1981).

[1] Previous discussions of Israeli monetary policy appear in Zanbar and Bronfeld (1973), Bronfeld (1977), Kleiman and Ophir (1972), and Patinkin (1972).

The limitations on monetary policy have taken numerous forms. First, until recently, no effective restriction was placed on central bank credit to the government (this was changed in 1986—for details, see Bank of Israel, 1986). Second, in the face of large and persistent budget deficits, monetary policy sought, in a variety of ways, to prevent excessive crowding out of many private-sector activities (Litvin *et al.*, 1988). Third, monetary policy has traditionally been used in Israel as an instrument of external balance. This was implemented in two distinct ways: by the provision of cheap directed credit to exporters and, until the 1985 ESP, by focusing exchange-rate policy on balance-of-payments problems. Thus the sale and purchase of foreign exchange was not used to achieve monetary control (Shiffer, 1982). Fourth, during part of the 1980s, the Bank of Israel tried to reduce the cost of government borrowing in the indexed-bond market by stabilizing the prices of indexed bonds in the secondary market. This created further difficulties for monetary policy and price level control (Fischer, 1982). Fifth, monetary policy also tried to cope with international capital flows through a system of selective controls. At times the policy was geared to preventing real appreciation of the exchange rate caused by short-term capital inflows, while at others it was used to prevent a run on the reserves. Sixth, the fact that the Bank of Israel is responsible for the soundness of the banking system limits the extent to which monetary policy can be restrictive. Seventh, many conventional monetary instruments are not wholly under central bank control. For example, changes in reserve requirements need government approval (see Section 2). Such institutional restrictions have tended to make monetary policy cumbersome and reduce its effectiveness.

In addition, a basic feature of monetary policy in Israel has been that it has not been applied uniformly. Thus, the imposition of credit ceilings was almost immediately followed by the appearance of exempt categories, and banks granting credit to exporters were partly exempt from reserve requirements. Furthermore, the surcharge on foreign capital inflows was imposed on only some types of foreign credit. The lack of uniformity led to segmented markets, with a wide range of interest rates.

In this situation price stability was not a major goal of monetary policy. The little that was done to achieve it consisted of sporadic attempts to reduce aggregate demand pressure, either through quantitative ceilings on part of short-term bank credit, or by using reserve requirements and interest rates as a way of influencing the banking system's liquid reserves.

The three-digit inflation of 1979—which accelerated further in 1984—convinced policy-makers that fundamental reform of both the institutions and the conduct of monetary policy are required if the achievements of the ESP are to be sustained.

2. THE INSTITUTIONAL FRAMEWORK, 1977–87

The assets and liabilities of the central bank, the banking system, and the main financial assets of the non-banking private sector provide a useful basis for understanding the channels of monetary policy in Israel.

Stylized versions of the balance sheets of the central bank and the commercial banking system are displayed in Tables 1 and 2 respectively. Foreign reserves, R, are net of central bank liabilities to foreigners. The credit extended to the government, L_{cg}, is measured net of government deposits with the central bank. Credit to the private sector originates mainly in directed credit to exporters.[2] The loan, L_{cb}, to the commercial banking system represents the discount-window loan. The liabilities side is standard. The banks' deposits, N_L and N_F, with the central bank are considered to be liquid assets which they have to hold against a specified proportion of their liabilities (the reserve requirement). Some of these liquid assets are in foreign currency. Correspondingly, the liability side of the commercial system consists of deposits that are either denominated in or indexed to foreign currency as well as local-currency demand and term deposits.

Table 1
Central Bank's Balance Sheet

ASSETS		LIABILITIES	
Foreign reserves (net)	R	Cash	C
Net government borrowing	L_{cg}	Deposits of banking system	
Loans		Local currency	N_L
To private sector	L_{cp}	Foreign currency	N_F
To banking system	L_{cb}	Equity	E_{cb}

The foreign-currency category includes resident deposits (foreign-currency denominated), and nonresident deposits with the Israeli banking system. For simplicity, we refer to all deposits in D_F as resident deposits. Item D_I consists mainly of medium-term (4 to 5 years) indexed deposits (saving schemes), most of whose proceeds are channelled to the Treasury, which guarantees the indexed return as well as the commercial bank's profit margin; it also raises funds by issuing marketable indexed bonds which are absorbed directly into the portfolios of the nonbanking private sector.[3]

During the period of the study the Bank of Israel used conventional instruments of monetary control such as reserve requirements, as well as less conventional instruments such as credit ceilings. We now turn to a more detailed description of these instruments and their development during the last decade.

[2] For most of the period it was extended through the banking system. In 1988 it was financed almost entirely by the private banks' own sources.

[3] These bonds are indexed to either consumer prices or the price of foreign exchange. The part which ends up in bank portfolios is included in L_{bg}.

Table 2
Balance Sheet of Private Banking System

ASSETS		LIABILITIES	
Cash	C_b		
Deposits with central bank		Deposits	
Local currency	N_L	Local currency	D_L
Foreign currency	N_F	CPI-indexed[b]	D_I
Credit to private sector[a]	L_{bp}	Foreign currency[c]	D_F
Net government borrowing[a]	L_{bg}	Loans from central bank	L_{cb}
Real assets		Equity	E_b

[a] Includes credit out of earmarked deposits.
[b] Includes saving schemes and earmarked deposits.
[c] In foreign currency and indexed to the exchange rate or denominated in foreign currency.

Reserve requirements

During the period reviewed, the Bank of Israel tried to control the volume of financial assets by imposing reserve requirements on bank deposits and at times on bank credit as well. The reserve requirements against various types of local-currency deposits averaged 47 percent in 1977–87, a high figure by western standards.[4] However, banks which participated in financing directed credit to exporters were exempt, thereby reducing both the actual and the required average reserve ratios. The gross and the net requirement (respectively before and after deducting exemptions) and the actual reserve ratio are displayed in Table 3. The table shows that the banking system was chronically below the net reserve requirement, suggesting that the deficiency fines and the interest paid on N_L and N_F were not sufficiently high to deter commercial banks from running substantial reserve deficiencies[5] (see appendix available from author on request).

The ineffectiveness of the fines and interest in maintaining actual reserves near their required level led to wide fluctuations in the actual reserve ratio (Table 3), in response to changing market conditions. The banking multiplier was consequently highly volatile, injecting an element of instability into the money supply and other monetary assets.

[4] The reserve requirement on foreign-currency deposits rose from 80 to 100 percent during the period.

[5] The deficiencies were higher than suggested by the table, since a part of the actual liquid reserve was financed by discount-window loans. A technicality which made it difficult for the Bank of Israel to set the fine on deficiencies at a prohibitive level was the fact that it was not (for most of the period) tax deductible, unlike the interest paid by banks on deposits. As a result, the incentive to raise funds via reserve deficiencies rather than through new deposits varied between banks, depending on their profitability. Since 1982, deficiencies of over 2 percent of required reserves have been automatically converted into discount-window loan, on which the interest was tax deductible, so that the wedge was eliminated.

Table 3
Required and Actual Reserve Ratios on Local-Currency Deposits, 1973–87

(percent)

	Reserve ratio			
	Required			
	Gross (1)	Net (2)	Actual (3)	Deficiency 100[(2)–(3)]/(3) (4)
1973	47.5	41.5	41.2	0.7
1974	52.5	42.5	37.5	13.3
1975	56.0	46.0	35.0	31.4
1976	60.9	50.0	38.2	30.9
1977	57.5	48.8	45.6	7.0
1978	60.4	51.4	44.2	16.2
1979	62.5	47.8	39.2	21.9
1980	50.6	39.0	38.4	1.6
1981	42.7	33.7	30.1	12.0
1982	37.5	30.0	29.2	27.4
1983	40.4	34.7	24.5	41.6
1984	29.8	29.7	22.7	30.8
1985	47.3	46.3	40.2	15.2
1986	39.9	39.9	36.9	8.1
1987	35.1	35.0	32.3	8.3

SOURCE: Bank of Israel, *Annual Report*, various issues.

Resident deposits and their monetary implications

Resident deposits (denominated in foreign currency) were introduced as part of the liberalization of foreign exchange in 1977, as a substitute for the direct holding of foreign exchange and other foreign assets, in order to damp down the effect on the foreign reserves of fluctuations in the demand for foreign-currency denominated assets. Initially, both demand and time resident deposits were allowed. The reserve requirement was at first 90 percent on demand deposits and 80 percent on time deposits. These ratios were gradually raised to 100 percent. The required liquid reserve, which is denominated in local currency and indexed to the price of foreign exchange, is held in the form of deposits with the Bank of Israel.

Until February 1980, residents could transfer funds directly across resident demand accounts and use foreign-currency denominated certified checks, but could not write personal checks in foreign currency. Resident time deposits varied in maturity from one month to one year. Until July 1982, premature withdrawal of funds from these deposits entailed loss of interest but no fine. In August 1985, as part of the stabilization program, the opening of new resident demand deposits was prohibited and the minimum term for new time deposits was raised to one year.

Between 1977 and 1985, as both the mean and variance of inflation rose, the demand for resident deposits increased substantially, their share of total short-term assets held by the nonbanking private sector rising from less than 13 percent in 1977 to almost 50 percent in 1984 and reaching a peak of close to 66 percent in 1985; in 1977–79 alone the share doubled. Correspondingly, the share of unindexed monetary assets (M1 *plus* unindexed time deposits and CDs) decreased, as did the share of tradable indexed bonds, though to a lesser extent (Table 4).

Table 4
Composition of Short-Term Assets Held by Nonfinancial Private Sector, 1977–87

(percent)

	M1	Time deposits and CDs	Resident deposits	Tradable bonds	Total	Total, percent of GNP
1977	24.7	6.5	22.1	46.8	100.0	55.0
1978	22.1	4.9	32.8	40.2	100.0	54.0
1979	14.3	3.3	46.3	16.1	100.0	57.1
1980	11.4	3.6	46.8	38.2	100.0	60.0
1981	10.2	5.3	52.9	31.6	100.0	51.1
1982	9.1	10.9	49.0	31.0	100.0	53.9
1983	6.6	8.9	60.8	23.7	100.0	66.2
1984	5.4	9.4	65.8	19.4	100.0	76.9
1985	7.3	25.2	47.4	20.1	100.0	50.3
1986	12.9	31.8	33.6	21.7	100.0	40.3
1987	14.2	35.7	25.4	24.7	100.0	43.0

SOURCE: Bank of Israel, *Annual Report*, various issues.

As part of the new economic policy introduced in October 1977, there was a 47 percent devaluation. During the next six months, the exchange rate was as near to floating as it has ever been in Israel. The large devaluation triggered a capital inflow and real appreciation. The resident deposits contributed to the real appreciation by attracting some of the demand for foreign exchange. The sizable real appreciation (from the first quarter of 1978) and the increase in the current-account deficit due to it, led to the abandonment of the flexible-rate regime and to other corrective measures.[6] After April 1979 the Bank of Israel shifted to purchasing power parity (PPP) adjustment of the exchange rate. This policy sought to maintain a fairly stable ratio between the nominal exchange rate and the index of domestic prices. As a result, the nominal supply of resident deposits in terms of local currency responded automatically to both internal and external price shocks.

This episode illustrates the dilemma raised by the introduction of resident deposits in conjunction with a PPP policy by the central bank. On the one hand, by attracting some

[6] In December 1978 a 12 percent surcharge was imposed on the import of capital.

of the demand for foreign assets, these deposits leave more foreign reserves with the Bank of Israel (Ben-Bassat and Marom, 1985). On the other hand, they provide the public with a relatively liquid financial asset whose nominal supply changes automatically with the nominal exchange rate, thus making monetary control more difficult.[7] Given the PPP policy, internal or external price shocks triggered by new wage contracts, a rise in oil prices, or the cancellation of subsidies to domestic producers or consumers led to devaluations which automatically increased the nominal supply of resident deposits.

Table 5
Contribution of Automatic Changes Through Resident Deposits to Annual Changes in M3,[a] 1978–87

	NIS million			Percent of change in M3[b]	
	Automatic changes in resident deposits[c] (1)	Interest paid on M2 (2)	Total change in M3 (3)	(1)+(3) (4)	(2)+(3) (5)
1978	0.5	0.1	3.0	16.6	3.3
1979	3.8	0.2	7.3	52.0	2.7
1980	11.8	0.6	18.3	64.5	3.3
1981	23.5	1.8	36.1	65.0	5.0
1982	57.7	7.4	109.7	53.0	6.7
1983	289.3	33.8	481.7	60.0	7.0
1984	2,175.7	416.3	3,039.6	72.0	13.7
1985	3,408.2	126.0	5,513.4	61.8	2.3
1986	–26.9	613.3	2,114.4	–1.3	29.0
1987	320.6	1,034.8	3,262.0	9.8	31.7

[a] M3 is the sum of currency in circulation, time deposits, CDs, and resident deposits. M2 is M3 *less* resident deposits.

[b] Column (5) was calculated as the sum of monthly interest payments on unindexed local-currency deposits.

[c] Calculated as the sum of weekly automatic changes in resident deposits. The weekly changes are calculated as beginning-of-week balance *times* change in exchange rate during the week.

SOURCE: Research Department of the Bank of Israel.

Table 5 suggests that this automatic response made a major contribution to the growth of liquid assets, as summarized by changes in M3. In each of the years from 1979, when inflation topped three digits, until the ESP, the automatic accommodation of resident deposits accounted for at least 50 percent of the change in M3. By contrast, the contribution to changes in M3 resulting from interest payments on M2 averaged only

[7] The velocity of circulation of resident deposits is substantially below that of local-currency denominated demand deposits. The ratio of these two velocities is similar to that between the velocities of ATS-NOW accounts and demand deposits in the United States.

about 10 percent. In general, it seems that as the devaluation and inflation rates increase, this contribution becomes more important. Particularly noteworthy is its dramatic decrease immediately after the ESP was launched. A general discussion of this and other automatic accommodative mechanisms and of their implications for monetary control and inflation appears in Section 3.

Directed credit

Directed credit to exporters was introduced in the early days of Israel's existence in order to insulate exporters from policy-induced or other fluctuations in the supply of credit. It was a response to Israel's chronic current-account deficit and reflected the desire of

Table 6
Directed Credit as Percent of Total Short-Term Credit, 1977–87[a]

	Total	Local currency	Foreign currency
1977	48.8	16.8	32.0
1978	46.2	11.8	34.4
1979	39.2	8.1	31.1
1980	41.8	7.9	33.9
1981	40.0	7.6	32.4
1982	32.6	7.3	25.3
1983	37.1	6.7	30.4
1984	37.9	3.1	34.8
1985	34.9	0.0	34.9
1986	25.9	0.0	25.3
1987	16.1	0.0	16.1

[a] End-of-year balances.

SOURCE: Bank of Israel, *Annual Report*, various issues.

policy-makers to provide preferential treatment to sectors which could alleviate it. Most directed credit goes to exporters and almost all of it is short term (Attiyah and Leef, 1981). The machinery of directed credit is operated by the Bank of Israel through the banking system. Many of the decisions regarding the volume of credit and its cost are made by joint committees of the Ministry of Finance, the Ministry of Industry and Trade, and the Bank of Israel. This structure implies that an important segment of monetary policy is only partly under the direct control of the central bank, even though it is responsible for the allocation of directed credit—a remarkable situation in view of the fact that during the period under consideration, total short-term credit was often the main intermediate target of monetary policy. Since directed credit on average accounted for over one third of total short-term credit (Table 6), aggregate monetary policy had to reach its intermediate target by operating only with the remaining two thirds. This obviously

made interest rates in the unrestricted segment of the short-term credit market more sensitive to changes in the target. From time to time, the Bank of Israel also used whatever influence it had to subordinate some of the institutional details of directed credit to general (as opposed to sectoral) monetary considerations.

Over 85 percent of directed credit is allocated through four funds—the Export Production Fund, the Imports-for-Exports Fund, the Export Shipments Fund, and the Diamond Fund. The first two are intended to finance production. The Export Shipments Fund enables exporters to extend short-term credit to their customers, and the Diamond Fund provides interim financing for uncut diamonds and deliveries. Until 1984 directed credit was in both foreign and local currency. Since 1985 it has nearly all been in foreign currency (Table 6). Until the early 1980s it was financed from three sources: discounting at the Bank of Israel, exemptions from reserve requirements, and the commercial banks' own sources. The proportion of each source was a policy variable normally left to the discretion of the Bank of Israel. Directed credit was extended at subsidy rates, with a larger subsidy component in the local-currency portion. The subsidy component of both types of credit was gradually reduced, as was the proportion financed by discounting bills at the central bank. This trend has been particularly marked since 1982. It is related to the fact that since 1985 practically all directed credit has been in foreign currency and financed exclusively from the commercial banks' own sources—mostly nonresident deposits and external sources (see appendix available from author on request).

Capital-flow policy[8]

During the period investigated, the public was generally prevented from borrowing and lending freely abroad by a set of complicated rules. These applied both to foreign loans extended by the local banking system and to credit from foreign sources.

Capital flows were governed by three major, often conflicting, policies: (a) the imposition of limitations on most forms of credit from abroad in order to prevent 'excessive' monetary accommodation; this policy was stressed in 1979–82; (b) the relaxation of controls on long-term capital inflows; this became the emphasis of policy after the end of 1982, when concern about foreign-reserve shortages developed; (c) the use of capital controls to extend the average maturity of the country's external debt.

In spite of the quantitative restrictions, fines, and taxes imposed on capital inflows, the economy became more exposed to foreign credit inflows. Thus during the 1980s there was a marked increase in foreign residents' deposits with banks in Israel, gross foreign claims on the local banking system, and foreign claims on the nonbanking private sector (Table 7).

Casual evidence also suggests that by international standards the Israeli private sector is quite exposed to foreign lending. This can be seen from the international comparison in

[8] This section draws on an unpublished paper by Ozer (1988).

Table 7
Indicators of Private-Sector Exposure to Foreign Lending, 1970–86[a]

(percent of GNP)

	Nonresident deposits	Foreign claims on domestic banks	Foreign claims on nonfinancial sector
1970	6.1	7.9	7.3
1971	8.7	16.1	9.9
1972	9.6	19.0	10.8
1973	10.2	20.3	10.3
1974	8.9	18.6	8.0
1975	10.7	24.3	9.6
1976	10.9	24.1	10.0
1977	11.1	14.5	9.0
1978	17.6	40.2	11.3
1979	19.2	40.6	13.9
1980	20.0	40.1	12.4
1981	22.1	44.2	12.3
1982	27.2	51.8	13.0
1983	25.7	45.6	13.6
1984	27.3	47.8	15.1
1985	31.4	50.4	17.1
1986	28.3	43.0	14.8

[a] End-of-year balances.

SOURCE: Bank of Israel, Supervisor of Banks, *Israel's Banking System*, various issues; and Central Bureau of Statistics, *Statistical Abstract of Israel 1987*, No. 38.

Table 8, which shows that Israel ranks very high in both long-term private and short-term debt.[9]

In spite of the quite high and increasing exposure, since 1982 there has been a deliberate attempt to lengthen the average maturity of the private foreign debt, by relaxing restrictions on long-term capital inflows while simultaneously tightening restrictions on short-term capital movements. Thus, while on average the proportion of short-term foreign credit was over 60 percent in 1977–82, it had fallen to 45 percent by the end of 1985.

The authorities have apparently been willing to tolerate the expansionary effects of long-term capital inflows because long-term loans are considered a more stable source for financing the balance-of-payments deficit. In other words, the policy-maker is prepared to accept a larger balance-of-payments deficit provided it is financed by long-term loans.[10] This is because measures intended to deal with underlying imbalances such as

[9] There is no sectoral breakdown of short-term debt, which is, however, likely to be concentrated in the private sector in most countries.

[10] Nonresident deposits, which have averaged over $5 billion, have not been viewed as a stable source of finance by the regulator because their average maturity is less than one year. Regulations stipulate

Table 8
Indicators of Private-Sector Exposure to Foreign Capital, Selected Countries, Average 1980–86

(percent of GNP)

	Long-term private debt	Short-term debt	Total
Argentina	0.13	0.15	0.28
Brazil	0.11	0.08	0.19
Chile	0.27	0.11	0.38
Costa Rica	0.11	0.18	0.29
Greece	0.06	0.10	0.14
Israel	0.15	0.16	0.31
Mexico	0.07	0.08	0.15
Peru	0.09	0.11	0.20
Portugal	0.04	0.15	0.19
Uruguay	0.16	0.01	0.17
Venezuela	0.10	0.27	0.37
Canada[a]			0.36

[a] Ratio of net external assets other than gold to GNP.
SOURCE: *World Debt Tables.*

large devaluations or drastic subsidy cuts were adopted only after serious balance-of-payments deterioration and heavy losses of foreign reserves (Liviatan and Piterman, 1986). The capital-flow policy that emerged was the result of introducing universal restrictions, and then following up with exemptions. The result is a wide variety of interest rates and types of credit.

Table 9 groups foreign credit into three main categories. Group A consists of short-term credit which has generally been exempt from either administrative restrictions or fines and taxes. It consists mostly of trade credit, directed credit, and other short-term bank credit not subject to the ceilings or fines imposed on short-term foreign-currency credit. The interest paid on these types of credit is fairly close to the rates prevailing in the international money markets for similar terms. Group B includes mostly long-term credit from earmarked deposits with commercial banks in Israel and long-term credit obtained directly from sources abroad. Until 1982 this type of credit was subject to a variety of restrictions and fines which are reflected in its high interest rate.[11] Since August 1982 there have been no restrictions on credit from abroad provided it is extended for at least 30 months. Group C consists of short-term bank credit subject to ceilings imposed by the Bank of Israel. After April 1979 a surcharge initially set at 12 percent was gradually reduced to 1 percent, and eventually eliminated altogether.

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that no more than one third of these deposits, which have been exceptionally stable, can be lent locally.

[11] Before August 1982 recipients of long-term credit from abroad were required to make a local-currency deposit of 20–30 percent (depending on the term) of the loan, which carried a negative real rate of interest.

Table 9
Foreign Credit, by Category, 1978-86[a]

	Exempt from ceilings Group A	Out of earmarked deposits[b] Group B	Subject to ceilings Group C	Total
Credit				
$ million				
1978	2,358	1,776	918	5,052
1979	3,351	2,311	993	6,655
1980	3,868	2,466	983	7,317
1981	4,138	2,314	701	7,153
1982	3,638	3,735	646	8,019
1983	3,130	4,694	463	8,287
1984	3,373	4,786	415	8,574
1985	3,534	4,910	380	8,824
1986	3,411	5,253	474	9,138
Percent				
1978	47	35	18	100
1979	49	35	16	100
1980	53	34	13	100
1981	58	32	10	100
1982	45	47	8	100
1983	38	57	5	100
1984	39	56	5	100
1985	40	56	4	100
1986	37	60	3	100
Interest rate (percent p.a.)				
1978	8.7	8.9	8.7	
1979	11.9	22.0	27.3	
1980	14.0	26.8	30.5	
1981	16.8	25.9	34.5	
1982	13.1	16.6	26.8	
1983	9.5	9.5	21.7	
1984	10.7	10.7	29.7	
1985	8.3	8.3	33.8	
1986	6.9	6.9	35.8	

[a] See text for explanation of categories.
[b] Includes direct credit lines.
SOURCE: Ozer (1988).

Short-term bank credit as an intermediate target

At various times between 1977 and 1986 the Bank of Israel imposed ceilings on some categories of short-term credit; there were ceilings in effect during February 1976–April 1977, October 1977–January 1978, and April 1979–November 1982. Directed credit in local and foreign currency as well as a large part of other foreign-currency credit was exempt. As a result, the stabilization of total short-term credit was achieved by relying more on non-exempt credit, which came to less than a third of total short-term credit (see Table 10). At the beginning of the period there were separate ceilings on credit in local and foreign currency, but unutilized foreign-currency funds could be used to stretch the ceilings on local currency. Since March 1981 this has no longer been possible. Credit over the ceiling drew nondeductible fines of up to 70 percent of the excess, but in spite of this the ceilings were not always observed. High inflation and devaluation made it necessary to revise the local-currency ceilings frequently, and this was done on the basis of expected inflation at intervals of two and a half months, on average. When actual inflation was higher than expected there was a further adjustment of the ceiling (see appendix available from author on request).

It might be asked why the Bank of Israel decided to use credit as an intermediate target rather than some of the more conventional monetary aggregates that appear on the liability side of the banking system's balance sheet (see Tables 1 and 2). There appear to have been three reasons for this choice. First, a credit target seems more appropriate for controlling speculative runs on domestic financial assets following periodic increases in the expected rate of devaluation.[12] During such episodes the public tries to reduce its local-currency deposits and borrow more in order to purchase foreign-currency denominated assets. Stabilization of monetary aggregates at such times means that high-powered money and other local-currency deposits are increased precisely when the public is trying to get rid of them. This policy response reinforces expectations of devaluation, speeding up the flight from local currency. By contrast, stabilization of credit limits the demand for foreign-currency denominated assets by raising domestic interest rates. The conclusion is that whenever expectations of devaluation build up, it is more effective to stabilize credit in order to protect the reserves and slow down the inflationary process. Second, credit was considered more controllable than bank deposits, simply because the banks themselves have greater control over it. Third, the Bank of Israel has greater discretion over credit ceilings than over reserve requirements (see below).

[12] Such episodes normally occur under a fixed exchange rate, but they may also occur under a crawling peg if the exchange rate is not allowed to float completely freely. See Section 7 for a more detailed analysis.

Table 10
Currency Composition of Short-Term Credit Subject to Ceiling, 1979–86
(percent of total short-term credit)

	Total	Local currency	Foreign currency
1979	32.0	15.4	16.6
1980	21.3	10.2	11.1
1981	26.9	9.2	17.7
1982	25.6	13.4	12.2
1983	–	–	10.0
1984	–	–	8.9
1985	–	–	7.0
1986	–	–	6.0

SOURCE: Bank of Israel, *Annual Report*, various issues, and Supervisor of Banks, *Israel's Banking System*, various issues.

Interest-rate policy

From time to time the Bank of Israel tried to smooth certain interest rates, namely the rate on the discount-window loan, which is extended to banks with liquidity deficiencies, the rate on Treasury bills,[13] and the real yield to maturity on long-term government bonds in the secondary market.

By manipulating the rate charged on the discount-window loan, the Bank of Israel's policy-makers hoped to influence lending rates on unrestricted credit. By stabilizing the rate on Treasury bills they hoped to influence borrowing rates on, for example, time deposits and CDs.[14] As a result, changes in the demand for credit induced immediate changes in the utilization of the discount-window loan by commercial banks—weakening the central bank's control over the level of unrestricted credit.[15] Similarly, pegging the rate on Treasury bills allowed the quantity to be determined by demand. This preoccupation with interest rates has since been relaxed, as the focus of regulation shifted from interest rates to financial stocks.[16]

When it intervened in the indexed-bond market, the Bank of Israel's aim was usually to prevent large—particularly downward—fluctuations in their prices, a policy that was more prominent before 1983. In 1977–82 the ratio of internal debt to GNP increased from

[13] This is a short-term liability sold by the Bank of Israel to the public and traded on the Tel-Aviv Stock Exchange.

[14] Other long-term rates, such as the rates on savings deposits and new issues of government bonds, are set by the Ministry of Finance and are therefore not discussed here.

[15] This policy is particularly problematic during periods of expected devaluation, when the demand for domestic credit at a given price may increase quite substantially because of the higher return expected from foreign assets.

[16] An extensive analysis of the discount-window loan, including more recent changes in its aims and structure, appears in Offenbacher's paper elsewhere in this issue.

96 to 123 percent, although the yield to maturity on seasoned CPI-indexed government bonds averaged 2.3 percent with relatively little variation (Table 11).

Table 11
Internal Debt and Yield to Maturity of Indexed Government Bonds, 1977–87

	Internal debt (percent of GNP)	Yield to maturity (percent)
1977	95.9	1.96
1978	106.6	2.29
1979	117.5	2.67
1980	118.1	2.53
1981	119.2	2.52
1982	123.3	1.81
1983	117.6	2.86
1984	126.3	3.51
1985	136.0	4.80
1986	124.8	4.60
1987	109.0	3.57

SOURCE: Bank of Israel, *Annual Report*, various issues.

Comparison of government bonds with other financial assets reveals that the monthly real holding-period yield on the bonds was much less variable than that of shares, particularly until 1983, supporting the view that the policy was effective in keeping the real rate on seasoned government bonds low and within a narrow range.

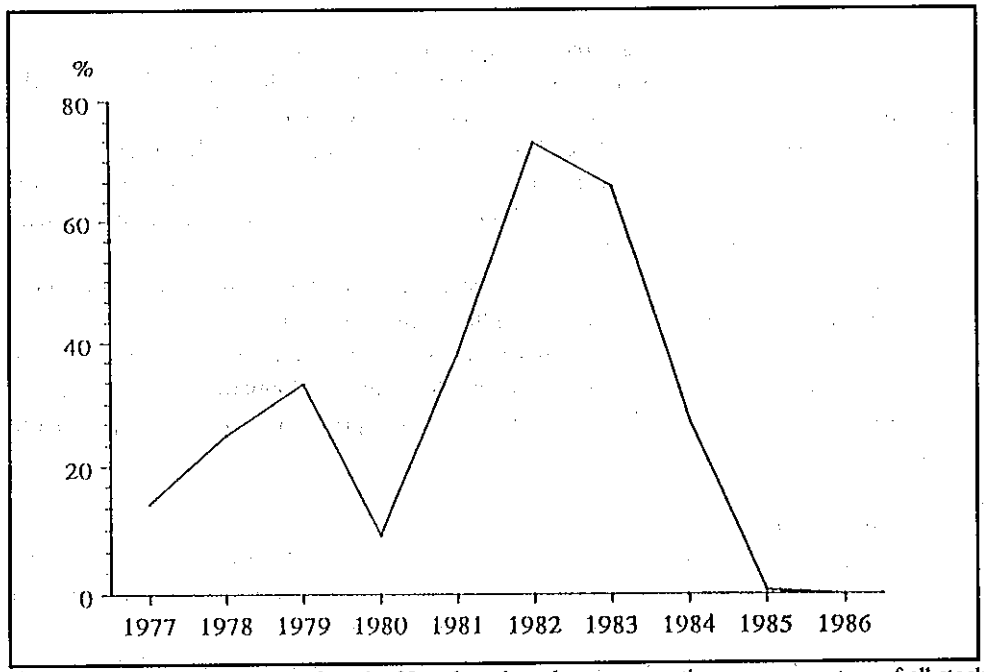
The real yield on government bonds was stabilized in order to reduce the cost of borrowing to the government. This policy obviously weakened the Bank of Israel's control over the monetary base and related monetary stocks. Any decrease in the demand for government bonds led, through the price support policy, to a concomitant increase in the monetary base, creating an automatic inverse link between the demand for bonds and high-powered money. Figure 1 shows the scale of the Bank of Israel's intervention on the stock exchange during the period under review: there is a local maximum (about 18 percent) in 1979, and a global maximum in 1982, when it exceeded 35 percent.[17] Intervention in the bond market declined gradually after that, ceasing altogether in 1985.[18]

[17] Since the internal offsetting of demand and supply are not included, these figures overestimate the extent of intervention, though they probably provide an accurate picture of the direction of change over the years.

[18] Note that there was a concurrent increase in the yield to maturity of seasoned government bonds (Table 11).

Interestingly enough, the policy of stabilizing the prices of government bonds gathered momentum and reached a peak concurrently with the commercial banks' share-price support. Apparently, the monetary authority felt that if it did not, at least to some extent, match the banks, the cost of government borrowing would have become intolerably high. The fact that intervention by the Bank of Israel declined sharply—and eventually stopped—after the manipulation of bank shares was discontinued at the end of 1983 is consistent with this view. Causality also ran in the opposite direction. The stabilization of bond prices by the Bank of Israel reduced the mutual funds' cost of stabilizing the price of mutual-fund shares since they could always unload large quantities of government bonds at fairly steady prices. Thus, by holding bond prices steady, the Bank of Israel facilitated the stabilization of share prices by the commercial banks (which manage the mutual funds in Israel).

Figure 1
Bank of Israel Intervention on the Stock Exchange, 1977–86[a]



[a] Calculated as half the sum of Bank of Israel stock exchange transactions as a percentage of all stock exchange transactions.

SOURCE: Bank of Israel, *Annual Report*, various issues.

Central bank control over the instruments of monetary policy

As is clear from the preceding discussion, monetary policy in Israel is implemented through a wide variety of instruments, some largely at the discretion of the central bank, others only partly controlled by it, and some which are entirely outside the scope of central bank decision-making. Even where control is largely retained by the Bank of Israel, the Bank is constrained by having to conduct monetary policy in accordance with the government's general economic policy, and by the need to consult an advisory board consisting of representatives of the banking system, industry, agriculture, commerce, and the general public. In what follows, we provide a rough classification of instruments by the amount of control the Bank of Israel has over them.

Instruments controlled mainly by the Bank of Israel

1. The schedule of interest rates on the discount-window loan.
2. The amount of the discount-window loan which the Bank of Israel offers the banks at weekly auctions.
3. The schedule of interest rates paid to banks on their liquid reserves.
4. Open-market operations with long-term indexed (CPI or dollar) securities—here the central bank is constrained by not having enough securities in its portfolio.
5. The volume of Treasury bills and the interest rates on them—the government is required by law to sell all the securities it issues to the Bank of Israel, which is then free to use them as it sees fit; the main constraint on large-scale open-market operations with this instrument is the thinness of the market.
6. Exemptions from credit ceilings and reserve requirements—these are at the Bank of Israel's discretion, after consultation with the Ministry of Finance.
7. The proportion of directed credit financed by rediscounting, exemptions from reserve requirements, and banks' own sources (while this mechanism was in effect).
8. Some discretion in deciding which earmarked deposits are to be exempted from reserve requirements.

Instruments influenced partly by the Bank of Israel

1. Exchange-rate policy is mainly but not exclusively the preserve of the government—daily operations in the foreign-currency market are left to the Bank of Israel, but long-term policy is decided mostly by the government.
2. Reserve requirements on local- and foreign-currency deposits other than savings schemes—changes in reserve requirements are initiated by the Bank of Israel but must obtain government approval; the Bank may, however, change them at its discretion within a range of 5 percent; changes in the interest rates on liquidity deficits also need government approval.
3. Local- and foreign-currency credit ceilings—the central bank imposes ceilings, but the formula for setting and revising them must be approved by the government.
4. Interest rates may be limited by the Ministry of Finance or the Bank of Israel when

they appear to be excessive. At present there is a limit of 11 percent on CPI-indexed loans.

5. Quantitative restrictions on foreign-exchange holdings—exemptions from such restrictions can be granted by the Bank but the Ministry of Finance is usually consulted.

6. Eligibility for directed credit—the Ministry of Industry and Trade plays an important part in determining eligibility criteria.

7. The surcharge on capital imports—the 3 percent surcharge was introduced by the Ministry of Finance at the recommendation of the Bank of Israel, and approved by the Knesset Finance Committee. The surcharge may be changed within a 2 percent band at the Bank's discretion.

Instruments outside the Bank of Israel's control

1. The volume, yield, and time profile of new issues of government bonds—debt management policy is largely the domain of the Ministry of Finance.

2. Interest rates and reserve requirements on long-term savings schemes.

3. The breadth of the market in which open-market operations can be conducted is indirectly determined by the Ministry of Finance through the proportion of tradable bonds it decides to allow as coverage for savings deposits, provident and pension funds, and insurance companies.

4. The surcharges on imports of services (15 percent) and the purchase of foreign exchange (1 percent) are imposed by the Ministry of Finance.

3. AUTOMATIC ACCOMMODATIVE MONETARY INSTITUTIONS

The points raised in the preceding section indicate that there are several automatic monetary accommodation mechanisms. These include: (a) the automatic adjustment of resident deposits and the volume of directed credit to changes in the exchange rate; (b) the link between the monetary base and shocks to the demand for bonds caused by attempts to stabilize the yield to maturity; (c) the link between the volume of the discount-window loan and the demand for credit due to an inflexible (nominal) rate on the loan.[19] The extent of accommodation differs, however, being highest for the resident deposits and decreasing as one goes down the list. This is because the Bank of Israel is obliged by law to adjust the local-currency value of resident deposits in line with the exchange rate. It is not bound to maintain a strict relationship between the volume of directed credit and the exchange rate, since it may change the amount of credit per dollar or other parameters governing the relationship. The degree of automatic accommodation deriving from the stabilization of bond yields is still lower, since the Bank is free to vary the extent of its intervention and has, in fact, abandoned this technique since 1985. A

[19] The widespread indexation of government bonds provides another powerful channel of accommodation, but the conditions are determined by the fiscal authority (the Ministry of Finance) rather than the Bank of Israel.

Table 12
Indicators of Fiscal and Balance-of-Payments Constraints on Monetary Policy, 1977–87

(percent of GNP)

	Budget deficit[a]	Internal public debt	Goods and services account[a,b]	Net external debt[c]	Monetary base
1977	–14.7	95.9	–14.5	60.9	9.0
1978	–18.9	106.6	–19.7	67.6	9.0
1979	–11.8	117.5	–18.6	61.8	7.3
1980	–15.7	118.1	–8.8	56.1	4.9
1981	–16.1	119.2	–7.7	60.7	3.5
1982	–13.4	123.3	–13.9	67.5	2.8
1983	–7.9	117.6	–15.4	71.1	2.6
1984	–19.3	126.3	–8.5	83.2	2.4
1985	–1.8	136.0	–6.4	87.7	1.9
1986	3.7	124.8	–10.9	72.3	4.4
1987	–0.6	109.0	–11.2	61.0	6.4

[a] Minus sign indicates deficit.
[b] Excludes direct defense imports.
[c] GNP converted to dollars at average official exchange rate.
SOURCE: Bank of Israel, *Annual Report*, various issues, and Research Department of the Bank of Israel.

similar consideration applies to the discount-window loan (the Bank of Israel recently began holding discount-window auctions).

The last two mechanisms are particularly destabilizing when expectations of devaluation are strong or when, for one reason or another, there are doubts regarding the government's ability or willingness to repay its debt. At such times individuals and firms attempt to get out of indexed government bonds and borrow more local currency in order to buy foreign and foreign-currency denominated assets. In the absence of an active interest-rate policy, these changes in demand increase both the yield on bonds and the cost of unrestricted credit, limiting and eventually eliminating the decline in the demand for local-currency bonds and credit. If, however, the central bank stabilizes bond yields and the cost of credit (through a fixed rate on the discount-window loan) interest rates do not rise. Instead, the monetary base and local-currency denominated deposits expand, fuelling inflation and providing a further incentive to substitute foreign currency for domestic assets. Recognition of this destabilizing potential probably contributed to the abandonment of the bond-yield stabilization in 1985, the gradual shift from a fixed to a variable interest rate on the discount-window loan, and the reduction of the reserve ratio on resident deposits.[20]

[20] Since 1985 opening new resident time deposits has been prohibited, and the liquidity of resident deposits has therefore declined.

The monetary base in Israel is usually small in comparison with such variables as the budget deficit, the total debt, and the current-account deficit. This is largely the consequence of massive past deficits, which were above 10 percent of GNP for most of the last decade. Such huge deficits created a powerful incentive for accommodation, in turn generating inflation (see Section 7). A rough idea of the relative size of the base can be obtained from Table 12. As can be seen, during most of the period the monetary base was very small compared with the budget deficit, the internal public debt, the current-account deficit, and the external debt (although admittedly this is partly due to past inflation and to fears that it might recur). Thus, only a large proportional change in the base can offset budget deficits—the present limited scope of the base is largely due to past deficits and the existence of accommodative mechanisms.

Table 13
Unemployment Rates in Israel and Selected Developed Countries, 1973–86

(percent)

	Israel	Seven major industrial countries[a]	Other OECD[b]	Total OECD[c]
1973	2.6	3.3	4.4	3.5
1974	3.0	3.7	4.6	5.1
1975	3.1	3.7	4.6	3.9
1976	3.6	5.4	4.9	5.3
1977	3.9	5.3	5.8	5.4
1978	3.4	5.0	6.5	5.3
1979	2.9	4.9	7.0	5.3
1980	4.8	5.6	8.8	6.2
1981	5.1	6.4	9.8	7.0
1982	5.0	7.8	10.9	8.4
1983	4.5	8.1	12.0	8.5
1984	5.9	7.5	12.6	8.5
1985	6.8	7.4	12.7	8.4
1986	7.1	7.8	12.2	9.3

[a] Canada, France, West Germany, Italy, Japan, United Kingdom, United States.

[b] Belgium, Denmark, Finland, Greece, Iceland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey.

[c] Average for OECD, Australia, and New Zealand.

SOURCE: OECD, *Economic Outlook* (December 1987), and Central Bureau of Statistics, *Statistical Abstract of Israel 1987*, No. 38.

Why have successive Israeli governments developed and maintained such powerful accommodative institutions at the risk of intensifying the inflationary consequences of price shocks? We believe that there are two main reasons for this. The first is the deep-seated aversion of practically all Israeli governments to even short periods of

unemployment. Since automatic accommodation reduces the risk of unemployment directly and since extensive deficit financing is used to combat inflation and itself generates automatic accommodation, it is easy to see why successive governments have been wedded to these powerful tools. Some evidence of the success of loose fiscal and monetary policies in sustaining a high level of employment appears in Table 13, which provides an international comparison of unemployment rates. It can be seen that Israel's unemployment rate is consistently, and at times substantially, lower than elsewhere.

The second reason for the existence of accommodative institutions is related to Israel's chronic balance-of-payments deficits and the policy-maker's concern over this and the level of foreign reserves. By providing a substitute for foreign exchange, resident deposits satisfy the public's desire for foreign assets with few repercussions on the country's reserves. To the extent that it encourages exports without increasing imports by the same amount, directed credit reduces the current-account deficit. Thus, Israeli monetary policy-makers are willing to tolerate accommodative institutions, with the associated price-level instabilities, in order to protect the country's long-run reserve position.

4. REFORM OF THE MONETARY POLICY MECHANISM

The strategy of monetary policy until the 1985 ESP may be summarized as setting interest rates and permitting quantities to be determined by the market, and in some cases (such as credit) controlling quantities as well. A notable feature of this system is the large number of interest rates facing different borrowers. In addition to differences between short- and long-term rates, there are substantial variations in the cost of credit to different short-term borrowers. This multiplicity of rates has two drawbacks—it results in misallocation of capital, and it places the burden of monetary policy on quite small segments of the credit market, causing widespread fluctuations.[21] This problem is compounded by the fact that cyclical monetary policy has to counteract not only the original exogenous shocks, but also the automatic accommodative mechanisms discussed in the previous section. This intensifies interest-rate fluctuations in the unrestricted segment, inducing public pressure on the central bank to loosen monetary policy when they become high.

The success of the ESP, and in particular the drastic—and so far sustained—reduction of the budget deficit, give some hope that monetary policy and institutions will in future be more effective in resisting inflationary pressures than they have been in the past. Some changes have already occurred and there are signs that others are on the way, suggesting a trend towards greater freedom and flexibility of the central bank. The symptoms of this trend are (a) legislation which, since fiscal year 1988/89, does not

[21] Between 1978 and 1986 the *ex-post* real rate on unrestricted short-term credit fluctuated from a minimum of –11 percent to a maximum of 177.3 percent. (See also Table 3 of Cukierman, 1988).

permit direct government borrowing from the Bank of Israel;[22] (b) the discontinuation of bond-price stabilization; (c) the financing of practically all directed credit on international capital markets, with borrowers being charged accordingly.

Another development is the gradual shift from interest rates and ceilings to the control of stocks as the main instruments of monetary policy. There is also a process of rate unification at the short end of the credit market, whose symptoms are: (a) the restructuring of the discount-window loan, including auctioning some of it (see Offenbacher's paper in this issue); (b) the sale of short-term unindexed government securities at auction rather than at preset prices; (c) the gradual reduction of reserve requirements. Since August 1985 reserve requirements on demand deposits have been reduced from 60 to 33 percent. Similar reductions were made for time deposits. One by-product of liberalization is an increase in the proportion of the Treasury's indexed obligations traded in the secondary market. This change enhances the Bank of Israel's ability to conduct open-market operations without causing unacceptable fluctuations in the yield to maturity on these traded bonds.

Not all the changes have been successful. A notable example is the attempt to gradually replace ceilings on credit from abroad by a surcharge on capital imports, which was to be applied to almost all types of foreign credit. After lengthy deliberations by the Knesset Finance Committee, a 3 percent surcharge was imposed, but applied to a much narrower base than originally intended. This was clearly a regression to the old practices which led to a wide range of interest rates.

Another problem is that much of the Bank of Israel's credit to the government (L_{cg} in Table 1) is not tradable so that the Bank's ability to sell government securities on the market is restricted simply because it does not have enough of them. There has been some progress here—the Ministry of Finance agreed to issue up to NIS 3 billion worth of short-term unindexed government bills.[23] Continuation of this process and the Bank of Israel's increased ability to use indexed bonds will enable it to conduct open-market operations in a more conventional manner than hitherto.

Whether these trends will persist and develop into a full-scale mechanism for the control of stocks instead of interest rates (see Section 7), depends to a large extent on the government's ability to keep the budget balanced. If the deficit returns to anywhere near its pre-1985 level, the liberalization of the capital market and the associated shift to stocks in the conduct of monetary policy are likely to suffer serious setbacks.

[22] Within the fiscal year, the law allows the government to take a temporary loan from the central bank. This loan cannot exceed 1.6 percent of the annual budget, may be extended for 30 days twice during the year, and must be repaid by the end of it. The government is not prohibited from converting its foreign-currency earnings into local currency.

[23] There is still a serious legal problem in using short-term bills for the purpose of open-market operations. The purchase of these bills from the public by the Bank of Israel counts as an increase in credit from the central bank to the government and may therefore conflict with the legislation limiting such credit.

5. THE EXCHANGE RATE AS A NOMINAL ANCHOR—PROS AND CONS

With the introduction of the stabilization program in July 1985, Israel returned to an adjustable peg after almost ten years of experimentation with a managed float. Between July 1985 and April 1988 there was only one devaluation.[24] This prolonged period with a fixed rate resulted from the policy-maker's desire to provide a credible and generally-accepted anchor for nominal magnitudes in Israel. In spite of its remarkable success in bringing inflation down quickly and at relatively low real cost, the stabilization program did not bring inflation down to the level maintained by Israel's major trading partners.[25] As a result, since 1986 use of the exchange rate as a nominal anchor has produced real appreciation, causing a gradual increase in the current-account deficit and triggering heated debate about whether to devalue more frequently in order to maintain the real exchange rate. This section provides a systematic discussion of the case for and against this instrument.

Dynamic inconsistency and the case for an adjustable peg

Israeli labor is highly unionized. As a result, wage rates are determined by collective bargaining in both the public and private sectors. Most wage agreements are for two years and provide for less than full indexation.[26] In drawing up agreements unions and employers must therefore predict the price level in order to evaluate the real content of the basic nominal wage for which they contract. Their prediction depends on their perceptions of what government policy is likely to be. These perceptions, in turn, depend on their understanding of the policy-maker's attitudes to alternative objectives such as price stability, balance-of-payments targets, employment, and the promotion of economic growth. With rational expectations and no uncertainty, these perceptions coincide with the policy-maker's actual behavior once the contract has been signed.

The fact that decisions about monetary policy, and the exchange rate in particular, are made after wage agreements have been concluded creates dynamic problems leading to suboptimally high inflation.[27] The problem is widespread and may arise as a result of the interaction between unions and monetary policy-makers whenever the latter are concerned with one or more of high employment, low real interest rates, and keeping

[24] It was pegged to the dollar until 1986 and to a five-currency basket thereafter. During the first period the depreciation of the dollar maintained the real exchange rate with respect to non-dollar currencies in spite of the peg and domestic price increases.

[25] Detailed discussions of the Israeli stabilization program and of the two years following it appear in Cukierman (1988) and Bruno and Piterman (1988).

[26] During the 1970s and the early 1980s wage indexation usually provided between 80 and 90 percent of the compensation needed to keep the real wage constant (O. Liviatan, 1982).

[27] This problem, which was first pointed out by Kydland and Prescott (1977), led to the development of an extensive literature on interaction between policy-makers and the public. Partial surveys are given in Cukierman (1986) and Rogoff (1987).

down the balance-of-payments deficit. Credible commitment to an exchange-rate path or a nominal stock removes the inefficiency by eliminating expectations of devaluation, thus making it possible to attain the same real equilibrium without inflation. The nature of the problem and the contribution of a credibly pegged exchange rate to its solution are illustrated briefly in the appendix, which considers the interaction between a union and a monetary policy-maker whose objectives include only price stability and a low current-account deficit.[28]

The discussion in the appendix assumes that there is no uncertainty, so that the union's rational prediction of inflation coincides with the perfect-foresight prediction. If there is uncertainty, the union's forecast will usually be wrong. When the union overestimates the rate of inflation (thereby raising real wages and increasing unemployment and the balance-of-payments deficit), monetary policy-makers will be tempted to devalue in order to offset the increase in the deficit. Furthermore, in practice, a fixed exchange rate entails not an indefinite commitment to its current value but one that is at least implicitly contingent on economic developments. It is also usually probabilistic in the sense that, given the realization of a particular contingency, the probability that the peg will be adjusted is neither zero nor unity. Under Israel's exchange-rate regime, the probability that the peg will be maintained is a decreasing function of the balance-of-payments deficit. Since the unions understand this, their wage claims tend to be an increasing function of the balance-of-payments deficit. Thus, an overestimate by unions of future inflation may eventually trigger devaluation and transform the overestimate into a self-fulfilling prophecy.

Does this mean that an adjustable peg that is not precommitted with unity probability is useless as a nominal anchor? Not necessarily. However, its effectiveness obviously diminishes the smaller the probability that the current peg is maintained or, equivalently, the larger the measure of the set of contingencies over which it is adjusted. The probability may be taken as a measure of the seriousness with which the authorities intend to maintain the exchange rate. In general, the more serious they are, the more credible is the commitment and the smaller the rate of increase in wages. Thus, although an adjustable peg does not involve an absolute commitment to the current exchange rate, the determination with which it is maintained affects the wage agreements between unions and employers. A weak commitment that induces higher wage increases triggers more frequent and larger devaluations, while a strong commitment induces mild wage adjustments, enabling the policy-maker to lengthen the intervals between devaluations and to devalue by less. To demonstrate their seriousness, the authorities must abstain from frequent use of the exchange rate in order to attain balance-of-payments targets, resorting instead to other means, such as fiscal policy. When the fiscal policy stance implies large balance-of-payments deficits, the commitment to the current peg is less credible. Hence an important ingredient of the effective functioning of an adjustable peg as a nominal anchor is a fiscal policy geared to keeping the deficit low.

[28] This example is drawn from Section 3 of Cukierman and Liviatan (1990).

Since the strength of the policy-maker's commitment to the current peg is private information, economic agents make use of a variety of signals in order to gauge it. The government is a major employer, and public-services wage settlements are regarded by other economic agents as indicating how firmly the policy-maker is resolved to adhere to the current peg. This is probably why finance ministers have resisted substantial changes in public services wages since the ESP.

When private employers resist union wage demands they incur costs associated with labor unrest, strikes, and prolonged negotiations. If they and the unions believe that the policy-maker will be quick to satisfy wage claims through devaluation and monetary accommodation, the unions' demands will be higher and employers will agree to them more easily. On the other hand, if they believe that the policy-maker will be slow to satisfy the wage claims, employers will be more cautious and the unions less demanding. Thus, even if wage claims are eventually satisfied by devaluation, the interval between devaluations and the policy-maker's desire to keep the adjustments small are important determinants of the long-run rate of inflation.

The nature of the nominal anchor[29]

In the long run and under perfect certainty the exchange rate can be maintained only if the stock of money is adjusted appropriately, so that it makes no difference whether using the exchange rate or a monetary (or credit) aggregate serves as the nominal anchor. This is one of the basic messages of the monetary approach to the balance of payments.

This equivalence disappears, however, as soon as it is recognized that in a small open economy such as Israel the relationship between the price level and the exchange rate is stronger and more immediate than that between the price level and monetary aggregates.[30] As the preceding subsection showed, in order to neutralize the excessive inflation resulting from dynamic inconsistency problems, the path of the price level must be preset in a credible manner. In the short and medium run the planned path is attained with greater precision with an exchange-rate target than with a monetary one. With two-year agreements, unions and employers care mostly about the tightness of the price-level path in the short and medium runs. It is likely therefore that they would consider a prior commitment to an the exchange-rate target as more credible. In addition, the commitment to an exchange-rate target is verifiable on a daily basis, and is observed by most economic agents more frequently than are monetary aggregates.

Of particular importance is the fact that in the presence of financial innovations and related structural or other changes in the demand for financial assets, maintenance of

[29] A complementary discussion of this question in the context of disinflation appears in Fischer (1986).

[30] This conclusion is based on vector autoregressions between rates of change of narrowly-defined money, prices, and the exchange rate (see Helpman and Leiderman, 1987, and Leiderman and Razin, 1986). One of the reasons for the close connection between the price level and the exchange rate is the high import component of domestic output.

price stability does not necessarily imply that the money supply has to adhere to a Friedman-type rule. For example, when the parameters of the demand function for narrowly-defined money change, the nominal supply of money must also be adjusted in order to maintain a stable price level. Thus, maintaining price stability via monetary targets requires a contingent monetary rule. Since the monetary authority normally has better information about the contingencies than the public, this creates a moral hazard problem. This is because the monetary authority can pump up the money supply in order to achieve balance-of-payments or employment targets and claim that it is acting in accordance with a contingent rule that makes the supply of money conditional on structural shifts in the demand for money. Since the public has no way of verifying this claim, it is (rightly) suspicious of contingent money-supply rules, particularly when prices are rising.[31] By contrast, a pegged exchange-rate system, in which the money supply is adjusted so as to maintain the peg, is more credible, since fulfilment of the government's commitment is readily verifiable. Verifying a contingent monetary rule becomes even more complicated when it is recognized (see Section 7 below) that the price level depends on the nominal supply of several types of financial assets and the structure of demand for them. At present, maintaining price stability by means of a monetary rule requires the rule to be contingent not only on the parameters of money demand, but also on the parameters of the demand for other financial assets.

This suggests that an exchange-rate anchor is preferable to a money-stock anchor so long as the relevant nominal stocks are adjusted to sustain the pegged exchange rate in the long run. Once an exchange-rate anchor is in place, however, the monetary authority may be tempted to increase the money supply in order to reduce interest rates. So long as the peg is maintained, such a policy may succeed in reducing real interest rates without substantial price increases, but it may eventually force adjustment of the peg and diminish its effectiveness as a nominal anchor. Hence both exchange-rate and monetary targets may be necessary to anchor the price level. Pegging the exchange rate provides a tight short-run commitment to the price level, while monetary or credit targets ensure its long-run stability. The recent legislation preventing direct sale of government obligations to the Bank of Israel is therefore a step in the right direction. It cannot by itself ensure a stable long-run price level, however, as the Bank can still expand the money supply by open-market operations and in other ways. Given sufficient public pressure, the Bank may be tempted to do so in order to depress interest rates.

The case against using the exchange rate as a nominal anchor

Several criticisms of the adjustable peg can be made, the most obvious being that the exchange rate cannot be used as an instrument of external balance. When the nominal

[31] Canzoneri (1985) suggests a stochastic trigger strategy designed to alleviate this problem. However, implementing this strategy requires a degree of coordination among private economic agents that is largely lacking.

exchange rate is maintained in spite of rising domestic prices and wages, the real exchange rate appreciates, reducing the profitability of exports and increasing the balance-of-payments deficit. In these circumstances devaluation could be employed in order to prevent the latter. Obviously, the same result could be achieved by appropriate choice of fiscal instruments. But these instruments are not always set with external balance as a primary target. In addition, adjustment of the exchange rate usually brings quick (albeit temporary) changes in relative prices, whereas fiscal measures may take longer to bring about the desired change in relative prices.

When the domestic rate of inflation diverges persistently from the world rate (as has been the case in Israel since the beginning of 1986), the exchange rate must sooner or later be adjusted. Since this is understood by economic agents, the expectation of devaluation triggers intertemporal substitution effects, decreases savings, and aggravates the current balance-of-payments deficit. Since these effects are reversed after devaluation, total saving over the entire period between adjustments will not necessarily be lower than under a managed float of the type in effect before the ESP.

Be that as it may, the fluctuations on current and capital balance-of-payments account are greater with an adjustable peg than with a managed float: capital flows out before a devaluation and flows in immediately after it, when foreign borrowing is temporarily attractive. These wider fluctuations require the monetary authority to hold larger reserves, making monetary control more difficult for the central bank. In particular, expectations of devaluation are likely to trigger large capital outflows and force devaluation even when the central bank does not want to devalue.[32] Such capital outflows can be prevented by restrictions on the export of capital, and in Israel such restrictions are in force. They are not foolproof, however, and it is not clear that it would be desirable to tighten them even if it were possible to do so.

The major cost of an adjustable peg is perhaps the fact that free movement of capital is likely to be sacrificed to monetary and price stability. Allocative efficiency requires that all firms and individuals should be allowed to borrow on international capital markets.[33] Under a temporarily fixed exchange rate, and with no restrictions on capital flows, the capital account, foreign reserves, and monetary base are liable to be dominated by speculative swings related to the expected timing of the next devaluation. Before an expected devaluation, funds will flow overseas and loans to foreigners will be repaid, jeopardizing the reserves and circumscribing the central bank's ability to choose the timing of devaluation. The associated shrinking of the monetary base and increased demand for domestic credit will push domestic interest rates up.[34] After devaluation, economic agents borrow abroad and repatriate previously-exported funds in order to invest in domestic securities. These inflows, and the associated increase in the monetary

[32] Krugman (1979), Obstfeld (1986), and others present models of balance-of-payments crisis based on the principle that individuals arbitrage away profit opportunities.

[33] Galyam *et al.* (1986) and Galyam and Shiffer (1987) recommend the eventual lifting of restrictions on capital imports.

[34] We assume that domestic and foreign financial capital are imperfect substitutes.

base, reduce domestic interest rates and create upward pressure on prices. Without additional intervention, and with a sufficient amount of foreign exchange reserves, the inflows and outflows of capital, as well as their effects on the monetary base, cancel out. Hence, if the central bank keeps net domestic credit (NDC) constant, neither the price level nor interest rates should, on average, be seriously affected.

Given Israeli policy-making institutions, however, NDC will probably be kept constant when capital flows in and increased when capital flows out, in order to prevent domestic interest rates from rising. Such a policy response transforms basically neutral swings in the monetary base into a systematic tendency to increase it. Restrictions on capital flows divorcing domestic from foreign interest rates may prevent this inflationary policy response by eliminating the swings in interest rates before and after devaluation. However, the cost of such restrictions is that domestic investors are shielded from the trade-offs that confront the economy in international capital markets. In contrast with a floating exchange rate, there is no need to use controls in order to counteract the policy-maker's inflationary bias, since domestic interest rates do not fluctuate under an adjustable peg as they do in the absence of controls. The conclusion is that under an adjustable peg concern about long-run price stability may prevent the monetary authority from eventually giving all domestic borrowers equal access to international capital markets. In any event, it is unlikely that serious consideration will be given to a floating-rate system in the foreseeable future.[35] The discussion in the rest of the paper is therefore based on the assumption that monetary policy will be constrained by the use of the exchange rate as a nominal anchor. The fact that Israel went through its worst inflationary phase when it was on a managed float (1975–85) is not inconsistent with the view that the exchange rate is an important element in the battery of measures designed to anchor the price level.

6. INTEREST RATES AND FINANCIAL STRUCTURE

During the last few years, and particularly since the ESP, a great deal of public concern has been voiced about the high cost of credit. This concern raises two questions: are interest rates indeed high by economic criteria, and if so, why? This section takes a look at the role of segmentation and the banking system in determining the average level and structure of interest rates. We begin by reviewing the institutional and policy-induced causes of segmentation, and present data on interest rates. An important conclusion suggested by this discussion is that lending rates in the unrestricted segment are quite high compared with any reasonable estimate of the return to capital. We next provide a general discussion of the reasons for the high cost of credit in this market segment. Finally, we present data on the high spread in the unrestricted credit market, using an

[35] Possible ways of maintaining free capital markets and long-run price stability are discussed in Section 8.

oligopolistic banking model to identify possible reasons for it. The model, as well as other evidence, indicates that the highly concentrated nature of the Israeli banking industry, restrictions on banking fees, and the high reserve requirements play an important role.

The structure of interest rates

Table 14 presents data on *ex post* real interest rates by market segment together with indicators of the relative importance of the segments in 1986. In that year there were relatively few inflationary surprises, so that the structure of *ex post* real rates in the table is a reasonably good proxy for the structure of the *ex ante* real rates.

The average real rate on total short-term bank credit was 6.6 percent. But this average conceals very substantial differences. In particular, the real rate on unrestricted short-term banking credit—which represents about three quarters of the total—reached 15.2 percent, while the figure for directed credit to exporters (about one quarter of the total) was −11.6 percent. There are also substantial variations within the unrestricted aggregate. Foreign-currency credit was substantially cheaper than local-currency credit, with −11.6 percent for the portion that is exempt from ceilings. This very low rate reflects the fact that borrowers in this segment were in effect allowed to borrow on international capital markets (this also applies to directed foreign-currency credit). The real cost of unrestricted local-currency credit is substantially higher, with the highest cost (31.1 percent) for credit lines and overdrafts (28.1 percent of the total), and the lowest (11.5 percent) in CPI-indexed credit. Note that the rate on other unindexed local-currency credit, which consists mostly of term loans, is almost 10 percent below the very high real rate on credit lines. The possible reasons for this difference are discussed below.

Are the interest rates shown in Table 14 high? One way of answering this question is to compare them with the long-run return to capital. Calculations made by Bregman (1986) indicate that the total return to capital in industry averaged 19 percent between 1973 and 1980,[36] and that it was less than 20 percent in over half the seventeen industries he investigated. The lowest rate was 12.5 percent. Hence, an average real rate of 6.6 percent on total short-term bank credit does not seem excessive. When account is taken of the fact that long- and medium-term credit is substantially cheaper, and that its volume is more than one and a half times the volume of short-term credit (Table 14), the average for total credit may even seem low. Nevertheless, the rate on short-term local-currency credit (61.4 percent of short-term bank credit) seems rather high. In particular, the rate on credit lines and overdrafts is much higher than any reasonable estimate of the marginal productivity of capital even in some of the most successful industries. Since the degree of access to the credit market is not distributed evenly across borrowers, this

[36] It was only 17.1 percent between 1965 and 1972. The total return to capital is defined as the ratio of non-labor income to the value of total productive assets.

Table 14
Real *Ex Post* Interest Rates, by Type of Credit, 1986

(percent)

	Interest rate	Percent of short-term bank credit
Short-term bank credit		
Unrestricted credit	**15.2**	**74.7**
In local currency		
Credit lines, overdraft facilities[a]	31.1	28.1
Other unindexed[a]	21.7	19.1
CPI-indexed	11.6	14.2
In foreign currency		
Subject to ceiling	9.4	13.3
Exempt from ceiling	–11.6	
Directed credit	**–11.6**	**25.3**
In local currency	–3.0	0.0
In foreign currency	–11.6	25.3
Total short-term credit	**6.6**	**100.0**
Medium- and long-term credit		
Mortgages	0.5	
Industrial development loans	1.6	
Total medium- and long-term credit		**178.5**

[a] Calculated on the assumption that the same interest rate applies to credit lines and overdrafts.
SOURCE: Adapted from Bank of Israel, *Annual Report 1986*.

means that different entrepreneurs face different costs of capital, so that the marginal productivity of capital is not equal across firms.

In addition, the high cost of unrestricted local-currency credit may jeopardize long-run price stability by creating pressure on the central bank to resort to monetary expansion. In particular, since most other types of credit[37] are shielded from the effects of monetary policy, the brunt of monetary restraint is borne mainly by this segment. This makes it politically difficult for the central bank to implement restrictive policies.

The high cost of unrestricted credit

An important long-run factor affecting the level of interest rates is the huge size of the public debt.[38] In order to persuade the public to hold such a large proportion of its savings in the form of government debt, the government has to pay non-negligible real

[37] Such as directed credit, ceiling-exempt credit in foreign currency, and most long- and medium-term credit.

[38] In 1987 the debt/GNP ratio was 146 percent, or 110 percent for the domestic debt alone.

rates, which normally fluctuate between 4 and 6 percent. This huge demand for savings tends to crowd out the supply of funds to other borrowers and raise the level of interest rates in the markets to which they have access. The fiscal and monetary authorities have shielded some borrowers from these high rates by giving them access to limited quantities of cheaper types of credit. Thus, exporters are allowed to borrow limited quantities at Libor + 2 percent, while some mortgagors and industrial borrowers also obtain credit at low rates.[39] However, borrowers who do not have access to these credit lines depend on the unrestricted segment of the market, in which the scarcity of funds due to the large government debt is allowed to affect interest rates. The relatively high return on the safe government debt sets a lower limit for the cost of funds. Other causes of this high cost are related to the market structure of the banking system and the Bank of Israel's policy on reserve requirements and certain banking fees.

The Israeli banking industry is highly concentrated, with the three largest banks accounting for 90 percent of the industry's combined balance sheet. Together with the fact that the industry does not face foreign competition, this tends to increase lending rates. This does not mean that the banks do not compete with each other in order to maintain their market share and defend their profits, but the equilibrium reached under these circumstances leads to higher lending rates than would prevail if the number of banks were greater.

The Bank of Israel requires the banking system to hold reserves well above the level needed to ensure the liquidity of the system (in 1977–86 it averaged 47 percent). To enforce these reserve ratios the central bank pays interest on required reserves and obliges banks to borrow from it at a higher rate (the discount-window rate) to cover reserve deficiencies. In consequence, the cost of funds to banks becomes a function of the interest rate on excess reserves as well as of that charged on the discount-window loan. The model presented below implies that when these rates are increased, the equilibrium lending rate rises too. Hence, when the interest on required reserves and the discount-window loan is kept high for reasons of general monetary policy, lending rates in the unrestricted credit market are higher too. This is one aspect of the tradeoff between long-run price stability and the promotion of economic growth through low interest rates. In the Israeli case, restrictive monetary policies designed to maintain price stability affect a relatively narrow segment of the credit market, making its interest rates particularly high.

Another factor tending to increase interest rates in the unrestricted credit market is the substantial weight of open credit lines or overdraft facilities whose utilization is determined by the customers (up to a ceiling).[40] In fact, the ceiling can be exceeded on payment of a penal interest rate. In consequence, banks do not know in advance how large their loan portfolio will be and whether or not they will need to tap the discount-

[39] In 1986 the real interest rate to these borrowers was less than 2 percent, and exporters paid a real rate of –11.6 percent (Table 14).

[40] In 1986 almost 46 percent of unindexed unrestricted local-currency credit was in the form of lines of credit and overdraft facilities (calculated from Table 14).

window loan. This tends to make interest rates on overdrafts higher for two reasons. First, the interest rate on the discount-window loan is an increasing step function of each bank's utilization. Hence, even if it is not indebted to the Bank of Israel, the individual bank takes into consideration the fact that it may have to resort to the discount window, perhaps even when the marginal rate is substantial. To cover itself, the bank charges overdraft borrowers higher rates. Second, if it is also risk-averse, it charges a premium for the uncertainty that it has to absorb. Both factors tend to make the interest rate higher on overdrafts than on unrestricted term loans. The evidence suggests that this is in fact so. The conclusion is that some of the high cost of unrestricted credit is due to the large proportion of lending through overdrafts and credit lines.

Since the type of loan is endogenous, at least in the long run, the reasons for the high proportion of overdraft credit must be examined. One reason is that high reserve requirements have induced banks to find ways of keeping their liquid reserves to a minimum. By lending through overdrafts rather than term loans, their reserve requirements are a function of the actual utilization of the line rather than of the ceiling. In addition, the customer pays only for the credit actually taken up. Thus, by channelling funds through overdrafts, banks provide flexibility to their clients and decrease their reserve requirements. The greater their reserve ratio, the stronger their motive for following this course of action. The upshot is that high reserve requirements are conducive to high interest rates, both directly and through the greater proportion of overdraft credit which they encourage.

The high banking spread

Table 15 summarizes the behavior of the spread between the short-term borrowing and lending rates in the unrestricted segment of the Israeli credit market and in the United States in 1971–87. The Israeli spread is substantially and consistently above its American counterpart.[41] A major structural difference between the Israeli and American banking systems is that the latter is much less concentrated and more open to foreign competition. This comparison is consistent with the view that there is a positive association between the spread and the banking industry's degree of concentration.

We turn next to the question of whether there are theoretical grounds for this relationship. To simplify the analysis, we have restricted it to linear demand for credit, linear supply of deposits, and a market structure in which all firms face identical demand and supply schedules. In addition, we assume that the interest paid on surplus reserves is equal to that charged by the central bank on the discount-window loan and that each bank can use as much of the loan as it wishes. There are b banking firms in the industry. The (real) demand for credit facing firm i is

[41] When the term-credit rate is used instead of the overdraft rate the spread narrows in Israel, but still remains substantially higher than in the U.S.

Table 15
Banking Spread—Israel and the United States, 1971–87

	Israel[a]	United States[b]
1971	7.3	0.73
1972	7.1	0.58
1973	7.3	–0.39
1974	7.0	0.56
1975	11.4	1.42
1976	12.1	1.58
1977	14.0	1.24
1978	16.8	0.86
1979	9.3	1.45
1980	29.9	2.20
1981	39.1	2.96
1982	22.8	2.51
1983	16.0	1.70
1984	61.0	1.67
1985	85.7	1.88
1986	34.0	1.83
1987	35.2	–

[a] Difference between interest rate on credit lines and the rate on CDs or short-term deposits, whichever is the higher.

[b] Difference between short-term prime rate charged by banks and the rate on one-month CDs.

SOURCE: Israel: Ablin (1988), Table 1. United States: *IFS Yearbook 1987*, p. 699; and *Federal Reserve Bulletin, Annual Statistics 1975–79*.

(1) $$f_i(\cdot) = \left(\frac{F}{b}\right) - \left(\frac{f_0}{b}\right) r_{di} + f \sum_{\substack{j=1 \\ j \neq i}}^{b} (r_{dj} - r_{di}) ,$$

where F, f_0, and f are positive constants and r_{di} is the implicit real lending rate of firm i,

(2) $$r_{di} = n_{di} - \pi \qquad \forall\ i.$$

Here, n_{dj} is the nominal borrowing rate set by firm j and π is the rate of inflation expected by the public. Equation (1) states that the demand for credit facing firm i is a decreasing function of the real cost of its credit and an increasing function of the difference between the real cost of credit to each of the other firms in the industry and the real cost of credit to firm i. These differences, which capture interbank competition, are summarized by the last term on the RHS of equation (1). The constant F is a shift factor in the demand for

in the demand for credit. It summarizes all effects on this demand other than those acting through changes in the banks' lending rates or in the expected rate of inflation.[42]

This specification has two attractive features. First, it implies that the amount of credit sales that firm i loses when it raises its lending rate (while all other firms keep theirs constant) increases with the number of firms in the industry. Second, summing over all banks, it implies that the demand for credit facing the entire industry is

$$F - f_0(\bar{n}_d - \pi) = F - f_0\bar{r}_d, \tag{3}$$

where $\bar{n}_d$ is the average nominal lending rate for the industry.

Similarly, the specification of the (real) supply of deposits facing bank i is

$$g_i(\cdot) = \frac{G}{b} + \frac{g_0}{b} + g\sum_{\substack{j=1 \\ j\neq i}}^{b}(r_{cj} - r_{ci}), \tag{4}$$

where the coefficients g_0 and g are positive, changes in G reflect changes in the supply of deposits which are unrelated to changes in either borrowing rates or inflationary expectations, and n_{ci} is given by

$$r_{ci} = n_{ci} - \pi \qquad \forall\ i, \tag{5}$$

where n_{ci} and r_{ci} are respectively the nominal and implicit real rates of bank i. Equation (4) states that the supply of deposits to bank i is an increasing function of the bank's real borrowing rate and a decreasing function of the difference between the real borrowing rates of each of the other banks and that of bank i.[43] As with the credit-demand functions, this specification implies that when a bank lowers its borrowing rate while others do not, the more banks there are in the industry, the greater the volume of deposits it loses. In addition, the total supply of deposits to the banking industry is

$$G + g_0(\bar{n}_c - \pi) = G + g_0\bar{r}_c, \tag{6}$$

where $\bar{n}_c$ is the mean borrowing rate for the industry. Let ρ be the required reserve ratio and n_m the (nominal) rate paid on surplus reserves and charged on the discount-window loan. The required reserves of bank i are $\rho g_i(\cdot)$, and its actual reserves are $g_i(\cdot) - f_i(\cdot)$.[44]

[42] We have restricted the analysis to the range of real rates at which the demand of each of the banks summed in (1) is non-negative. This does not involve loss of generality, since in equilibrium all demand will be positive.

[43] Here, too, we have restricted the analysis to the range of real rates for which the supply of each bank summed in (4) is non-negative. For reasons stated in the preceding note, this restriction implies no loss of generality.

[44] Use has been made here of the fact that on the bank's balance sheet actual reserves are equal to

The surplus of required over actual reserves which has to be financed by resorting to the discount-window is therefore

$$f_i(\cdot) - (1-\rho)g_i(\cdot). \tag{7}$$

Bank i's profits are equal to interest income from loans *less* interest expenditure on deposits and the discount-window loan. Using (7), the bank's profit function is

$$f_i(n_{di}-\pi) - g_i(n_{ci}-\pi) - [f_i(\cdot) - (1-\rho)g_i(\cdot)](n_m-\pi)\,. \tag{8}$$

The individual bank takes the discount-window rate, the expected rate of inflation, and the borrowing and lending rates of other banks as given, and chooses its own borrowing and lending rates so as to maximize profit (8). Substituting the explicit forms of $f_i(\cdot)$ and $g_i(\cdot)$ from (1) and (4) into (8), and differentiating with respect to n_{di} and n_{ci}, we obtain the following first-order conditions for an internal maximum:

$$\frac{F - f_0(n_{di}-\pi)}{b} + f\sum_{\substack{j=1\\ j\neq i}}^{b}(n_{dj}-n_{di}) - \left[\frac{f_0}{b} + (b-1)f\right](n_{di}-n_m) = 0$$

(9)

$$-\left[\frac{G - g_0(n_{ci}-\pi)}{b} - g\sum_{\substack{j=1\\ j\neq i}}^{b}(n_{oj}-n_{ci})\right]\left[\frac{g_0}{b} + (b-1)g\right][(1-\rho)(n_m-\pi) - (n_{ci}-\pi)] = 0.$$

Since all banks face the identical demand for credit and the identical supply of deposits, they all choose the same borrowing and lending rates at equilibrium. Using this assumption in equations (9) and rearranging, we get

$$n_{di} = \frac{F + [f_0 + b(b-1)f](n_m-\pi)}{2f_0 + b(b-1)f} + \pi = n_d \quad \forall\ i, \tag{10a}$$

$$n_{ci} = \frac{G + [g_0 + b(b-1)g](n_m-\pi) - G}{2g_0 + b(b-1)g} + \pi = n_c \quad \forall\ i\,. \tag{10b}$$

Equations (10) yield the (Nash) equilibrium values of the borrowing and lending rates chosen by each bank. Since the equilibrium is symmetrical, all banks choose the same rates.

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deposits *less* loans.

It is useful to first determine the form of the equilibrium when the number of banking firms is very large (perfect competition). In that case $b \to \infty$ and equations (10) reduce to

$$n_d = n_m$$

(11a)

$$n_c = (1 - \rho)(n_m - \pi) + \pi,$$

which implies that under perfect competition the spread is[45]

(11b) $$s = n_d - n_c = \rho(n_m - \pi).$$

Using (11a) in (3) and (6) we obtain the equilibrium demand for credit and the supply of deposits facing the banking system under competition as

$$F - f_0(n_m - \pi) = F - f_0 r_m$$

(12)

$$G - g_0(1 - \rho)(n_m - \pi) = G - g_0(1 - \rho) r_m .$$

We shall assume that, given inflationary expectations, the monetary authority always sets the discount-window loan rate at a level which makes the total demand for credit and the total supply of deposits under competition positive so that the two expressions in (12) are positive.

We now go on to look at the effects, summarized in Proposition 1, of market concentration in the banking industry on the average lending rate, borrowing rate, and spread:

> *Proposition 1:* Other things being equal, and provided the discount-window loan rate is set at a level that does not annihilate the loan and the deposit markets (under competition):
> a. The lending rate, n_d, increases when the number of banks, b, goes down;
> b. The borrowing rate, n_c, decreases when the number of banks, c, goes down;
> c. The spread, s, goes up as the number of banks goes down.[46]

Since inflationary expectations are given, the proposition also implies that the smaller the number of banks, the higher the real lending rate and the lower the real borrowing rate. Another implication of Proposition 1 is that for any finite b

[45] Equation (11b) also implies that all banks have zero profits.

[46] Statement (a) is proved by differentiating equation (10a) with respect to b and noting that the sign of the derivative is opposite to that of $F - f_0 r_m$, which is positive. Statement (b) is demonstrated by differentiating equation (10b) with respect to b and noting that the sign of the derivative is the same as that of $G - g_0(1 - \rho) r_m$, which is positive. Statement (c) is a direct consequence of statements (a) and (b).

(13) $$s = n_d - n_c = r_d - r_c > \rho r_m,$$

which is the spread under perfect competition. Hence the profits of the representative banking firm in an oligopolistic banking system are positive for any finite number of banks.

Proposition 1, together with the fact that Israel and the United States have different spreads, provides a strong indication that at least part of the substantially higher Israeli spread is due to the greater degree of concentration of the Israeli banking system. But the model points to additional factors, summarized in Proposition 2:

> *Proposition 2:* Under the conditions of Proposition 1
> a. Both the lending and the borrowing rates are higher, the higher the discount-window rate, n_m.
> b. The borrowing rate is lower and the spread higher, the higher the reserve requirement, ρ.[47]

Thus the lending rate, although not necessarily the spread, can be lowered by reducing the discount-window rate. The spread can also be narrowed by lowering the reserve requirement, but an initial decline can be achieved by raising the borrowing rate without altering the lending rate.

Since several factors combine to produce the high spread and lending rate, it is important to evaluate the net contribution to this state of affairs made by the high degree of concentration of Israeli banking. Although such an evaluation is beyond the scope of this paper, there are other indicators consistent with the view that the market power of Israeli banks is substantial. First, there is the fact that almost 54 percent of the total financial income of banks is from local-currency operations, while local-currency deposits account for only 6.6 percent of total bank deposits (see Gheva, *et al.*, 1992). Since the overlap between local-currency transactions and the unrestricted credit market is large, this is consistent with the view that banks impose higher spreads on the local-currency market, where they enjoy natural protection, and take lower spreads in those foreign-currency segments, where they are more open to foreign competition. Comparison of rates of foreign-currency segments which differ in their exposure to foreign competition supports this view.[48] Furthermore, banks are allowed to lend 60 percent of nonresident deposits to the rest of the world. In fact, they choose to lend much less than this ceiling on foreign markets, using the difference in order to lend on the more protected local market.

Finally, monthly data on the spread in the unrestricted local-currency credit market suggests that it went down quite substantially following the ESP, once inflationary

[47] The proof follows immediately from inspection of equations (10).

[48] Thus, the spread in overseas offices of Israeli banks is similar to its international counterpart (Supervisor of Banks, *Israel's Banking System: Annual Survey*, various issues).

expectations had completed their downward adjustment at the beginning of 1986.[49] Cukierman and Hercowitz (1989) have shown that when the financial intermediation structure has market power, theoretical considerations imply that there should be a positive association between expected inflation and the spread.[50] However, even in a perfectly competitive banking system a reduction in the *ex ante* real rate on the discount-window loan should reduce the spread, as implied by equation (11b). Since the stabilization program there has been a sharp decrease in both inflationary expectations and the real discount-window rate. More precise calculations show that the second factor is responsible for about 70 percent of the huge decline in the unrestricted market spread between 1985 and 1986. This is consistent with the view that the remaining 30 percent is due to the decrease in expected inflation and the market power of the banking industry.

7. THE MONETARY POLICY TARGET: INTEREST RATE OR FINANCIAL STOCK?

As noted in Section 4, general monetary strategy until the 1985 stabilization program was to set interest rates and let quantities be determined by the market, and in some cases to control quantities as well. During the last few years, and particularly since the ESP, there has been a gradual shift from interest rate to stock targets, as evidenced by (a) selling Treasury bills at auction rather than at a preset price; (b) discontinuing bond-price stabilization; (c) introducing the discount-window auction at market rates; (d) enacting legislation that sets a ceiling on the amount the government may borrow from the Bank of Israel; (e) financing practically all directed credit on international capital markets, with borrowers charged accordingly; (f) singling out net domestic credit (NDC) as a long-run indicator for monetary policy.

This section reviews the advantages and disadvantages of the shift from interest rates to financial stocks, taking into consideration some features which are specific to Israel's financial structure, such as indexation in the capital market and the oligopolistic structure of the banking industry. An attempt is also made to evaluate the political feasibility of switching exclusively to control of stocks.

If the nominal interest rate on the discount-window loan is a target, its real rate of interest is uncertain. We begin by evaluating the relative efficiency of a fixed rate and a fixed quantitative target for the loan in achieving tight control of bank deposits and credit. The main result is that if inflationary expectations are the major source of uncertainty, auctioning preset quantities of the discount-window loan provides better control of both deposits and unrestricted credit. We go on to demonstrate the destabilizing effects on the rate of inflation of attempts to stabilize the real interest rate on indexed government bonds in the presence of budget deficits. The main conclusion is

[49] This statement is based on data on the spread in Gheva *et al.* (1992) and on data on actual and expected inflation in Cukierman (1988, Table 4).

[50] Intuitively, when inflationary expectations rise, the demand for financial intermediation services rises too, thereby increasing the financial sector's market power.

that quantitative targets eliminate these instabilities. But, even with quantitative targets, precise control of the price level requires knowledge of the elasticities of demand of the financial assets traded in the Israeli capital market. The results are then used to compare interest-rate and financial-stock targets, concluding in favor of the latter. Finally, we discuss the merits of alternative quantitative stock targets, focusing on a comparison of monetary and NDC targets.

The discount-window loan—preset interest rate versus auction

Until 1987 the Bank of Israel set the nominal rate on the discount-window loan, allowing banks to borrow as much as they liked at this rate. The Bank then introduced an auction of limited quantities of the loan. Here we use the oligopolistic banking model of Section 6 to determine whether a shift from a system with a preset rate to one in which the entire loan is auctioned off improves the central bank's control over banking credit and deposits.

It appears that with a preset rate, changes in inflationary expectations which are unforeseen by the central bank cause excessive fluctuations in credit and deposits. Intuitively, the process is as follows. An increase in inflationary expectations reduces the implicit real rate at the discount-window. Commercial banks respond by lowering the real rates on both credit and deposits. As a result credit expands, deposits shrink, and the banks resort more heavily to the discount-window loan. If a preset quantity of the loan is auctioned instead, an increase in expectations raises the nominal discount-window rate, which offsets the decrease in the implicit real discount-window rate and damps down at least some of the fluctuations in credit and deposits. In order to check this intuitive interpretation, we focus on the case in which the only uncertainty faced by the central bank concerns inflationary expectations. Substituting (10a) into (3) and (10b) into (6) and rearranging we obtain

$$L = K_L[F - (n_m - \pi)]$$

(14)

$$D = K_D[G - (1 - \rho)(n_m - \pi)],$$

where L and D are the equilibrium demand for credit and the equilibrium supply of deposits respectively; the composite parameters K_L and D_D represent parameters whose specific form is of no consequence.[51] Since the central bank is uncertain only about inflationary expectations, the variance of credit and deposits that it faces when n_m is fixed (indicated by superscript r) is [from (14)]

[51] Both K_L and K_D depend on b and are positive. In addition K_L depends on f_0 and f, and K_D depends on g_0 and g.

$$V_L^r = K_L^2 V(\pi)$$

(15)

$$V_D^r = K_D^2 V(\pi).$$

Here $V(\pi)$ is the central bank's mean forecast error of expectations.

Consider next the case in which the central bank sets the discount-window loan at quantity M and auctions it. In this case n_m is determined by the condition that, given π, the demand for the loan equals its fixed supply M:

(16) $$M = F - f_0(n_d - \pi) - (1 - \rho)[G - g_0(n_c - \pi)].$$

For given n_m, the equilibrium relationship between n_d and n_c, on the one hand, and n_m, on the other, is given by equations (10). Substituting these equations into (16) and solving for n_m, we obtain

(17) $$n_m = A_F F - A_G a + \pi,$$

where A_F and A_G are positive composite parameters representing the parameters of the underlying supply and demand functions, the reserve requirement, and the number of banks. Substituting (17) into equations (14), it is easily seen that

(18) $$V_L^a = V_D^a = 0,$$

where superscript a denotes auction. The major result to emerge from this analysis can be summarized as follows:

> *Proposition 3:* When the central bank is uncertain only about inflationary expectations, auctioning the entire discount-window loan reduces the variability of deposits and unrestricted banking credit to zero.

A qualification is in order: when there are additional sources of uncertainty about the supply of deposits and the demand for credit, this result may no longer hold. This would be so if F and G were stochastic, for example. In this case an auction system would transmit some of the uncertainty from F to deposits and some of the uncertainty from G to credit. Although the analysis could be extended to handle this more general case, it is omitted for reasons of brevity.[52] In any case, if $V(\pi)$ is large in relation to the variances of F and G, an auction system would probably provide more precise control of deposits and credit, even in the general case.

[52] The model can also be used to investigate the effects of the multiple-rate discount-window loan system, under which there is an interest-rate schedule with the discount-window loan rate as an increasing function of the extent to which it is taken up by each bank. This analysis, too, is omitted for reasons of brevity.

A real interest-rate target and price stability

In line with the shift away from control of interest rates, price support of government indexed bonds (the prevailing policy until 1982) was discontinued (Section 2). The interaction of this policy with capital market indexation increased the inflationary consequences of bond-financed budget deficits and monetary expansion (see also Shiffer, 1986). We analyse the effects of a policy of this kind, and of replacing it by nominal stock targets, by means of a full employment model with two assets.[53] The new regime, in which stocks are targeted, is analyzed first.

Let the two assets be money and government bonds, whose real demand functions are

$$\hat{L}\left(r, \frac{M}{P}, \frac{B}{P} - \pi\right) \tag{19a}$$

$$\hat{b}\left(r, \frac{M}{P}, \frac{B}{P} - \pi\right) \tag{19b}$$

Here, r, P, π, M, and B are the real rate on bonds, the price level, expected inflation, the nominal supply of money, and the nominal supply of government bonds respectively.[54] Aggregate demand for goods is given by

$$\hat{E}\left(Y, r, \frac{M}{P}, \frac{B}{P} - \pi\right), \tag{19c}$$

where Y is the (exogenous) full-employment level of output. Given inflationary expectations, π, and output, Y, the general equilibrium of the economy is determined by

$$L\left(r, \frac{M}{P}, \frac{B}{P}\right) = \frac{M}{P} \tag{20a}$$

$$E\left(r, \frac{M}{P}, \frac{B}{P}\right) = Y \tag{20b}$$

$$b\left(r, \frac{M}{P}, \frac{B}{P}\right) = \frac{B}{P}, \tag{20c}$$

where Y and π are subsumed into the functions L, E, and b. From the balance-sheet constraint, only one of the two stock equilibrium conditions in equations (20a) and (20c) is independent. We need therefore consider only the first two conditions in equations

[53] We abstract from uncertainty since the argument is independent of whether or not there is uncertainty.

[54] This specification assumes that the nominal interest rate on money is set at zero.

(20). Equations (20a) and (20b) determine the real interest rate on bonds, r, and the price level, P, for given nominal stocks M and B. We make the standard assumptions on the partial derivatives of L and E with respect to their arguments,[55]

$$L_r < 0, \quad 1 > L_m \geq 0, \quad L_b \geq 0$$
$$E_r < 0, \quad E_m \geq 0, \quad E_b \geq 0. \tag{21}$$

Total differentiation of equations (20a) with (20b) with respect to a non-recurring simultaneous change in M and B, yields

$$\frac{dP}{P} = \frac{s_m a_m \frac{dM}{M} + s_b a_b \frac{dB}{B}}{s_m a_m + s_b a_b}, \tag{22}$$

where s_i $(i = m, b)$ is the share of asset i in the public's portfolio and

$$a_m = L_r E_m + E_r(1 - L_m)$$
$$a_b = L_r E_b - E_r L_b. \tag{23}$$

The message of equation (22) is that the price level is affected by changes in the quantity of money as well as by changes in the (nominal) stock of bonds. When the nominal quantities of these two assets increase by equal amounts, the price level increases by the same amount. If a_b is negative, dP/P is a weighted average, with positive weights, of the proportional changes in M and B.

Consider now the case in which government bonds are indexed to the price level and let γ be the degree of indexation. Then the change in B which is due to the price increase in equation (22) in conjunction with indexation is

$$dB^I = \gamma \frac{dP}{P} B. \tag{24}$$

The total change in the nominal supply of bonds is

$$dB = dB^I + dB^*, \tag{25}$$

where dB^* represents the increase in the nominal supply of bonds deriving from the government's attempt to increase the real supply. Substituting equations (24) and (25) in equation (22) and rearranging, we obtain

[55] If some individuals are bequest constrained, E_b may be positive even in a neo-Ricardian framework of the Barro type (Cukierman and Meltzer, 1989).

$$\frac{dP}{P} = \frac{s_m a_m \frac{dM}{M} + s_b a_b \frac{dB}{B^*}}{s_m a_m + (1-\gamma) s_b a_b}. \tag{26}$$

Equation (26) implies that indexation amplifies the effect on the price level of changes in M or in the autonomous component of B.

We turn next to the inflationary consequences of a fixed real interest-rate target in the presence of budget deficits. From equations (20a) and (20b)

$$dr \equiv \frac{-[L_b E_m + (1-L_m)E_b]}{s_m a_m + s_b a_b} s_m b \left(\frac{dB}{B} - \frac{dM}{M}\right) = K\left(\frac{dB}{B} - \frac{dM}{M}\right). \tag{27}$$

If the strict neo-Ricardian hypothesis ($L_b = E_b = 0$) holds, or if $E_b = 0$ and there is no real-balance effect ($E_m = 0$), the real rate r is not affected by either bond issues or monetary policy. In all other cases dr is positive or negative according as the increase in the nominal quantity of bonds is greater or smaller than the increase in nominal money balances.[56] We shall assume that it is greater.

If the Treasury increases the supply of government bonds, the real interest rate on them increases. If the central bank is committed to maintaining r at its original level, it has to expand the money supply by an amount equal to the nominal expansion in the supply of government bonds. This creates an automatic link between new bond issues and the money supply. Hence, if there is a budget deficit and new bonds are issued, the central bank's interest-rate policy transforms the deficit into monetary expansion.

Consider now the effect of the real rate target in the presence of capital market indexation. With indexation

$$\frac{dB}{B} = \gamma \frac{dP}{P} + \frac{dB^*}{B}. \tag{28}$$

Substituting equation (25) into (27) and imposing $dr = 0$ the interest-rate policy implies

$$\frac{dM}{M} = \gamma \frac{dP}{P} + \frac{dB^*}{B}. \tag{29}$$

Thus, in the presence of indexation, an interest-rate target implies that the money supply also responds to the price level. Substituting equation (29) into (26) and rearranging, we get

[56] This statement relies on equation (21) and assumes $ab < 0$.

$$\frac{dP}{P} = \frac{1}{1-\gamma}\frac{dB^*}{B}. \tag{30}$$

Equation (30) implies that in the presence of an interest-rate target, a higher degree of indexation causes a bond-financed deficit to have a stronger effect on the price level.[57] In particular, when $\gamma \to 1$, this effect tends to infinity.

The frequent focus of past monetary policy in Israel on the stabilization of real interest rates in the presence of large budget deficits created a built-in inflationary bias. This bias was particularly severe because of the relatively large value of γ that characterizes the capital market (Shiffer, 1986). The discontinuation of this policy, and its replacement by what may eventually become a pure stock target, eliminates the bias by breaking the link between budget deficits and monetary expansion.[58] However, if large budget deficits recur, the temptation to restore a real interest-rate target in order to temporarily reduce the cost of borrowing to the government may prove irresistible. The upshot is that long-run price stability can be reinforced by both fiscal moderation and strict adherence to monetary targets.

The choice of stock target and the price level

If policy shifts to control of stocks and abandons the interest rate as a target altogether, it is necessary to determine which financial stocks have to be controlled—and by how much—in order to maintain stable prices or moderate inflation in the long run.

A full answer requires an understanding of the relationship between the price level and the supply of different financial stocks. These include, *inter alia*, narrowly-defined money, time deposits, resident deposits, and indexed bonds. In general, a change in the nominal stock of each asset has some effect on the price level. For some assets this effect is so small that it may be disregarded for practical purposes. For others, the effect on the price level of a unit increase in the nominal stock depends on the characteristics of the demand function.

In order to determine which assets are likely to exert a stronger long-run effect on the price level, a multi-asset framework of the Tobin type is required (Tobin, 1969). According to this approach, there is no single most appropriate definition of money, the price level being affected by the nominal quantities of several financial assets. Control of the aggregate stock of these assets does not lead to full control of the price level, however, since each of the component stocks has a different effect. Although a complete analysis of these effects requires a detailed model of Israel's financial structure, the two-asset model presented above suffices to illustrate the kind of considerations involved. As

[57] Had we allowed inflationary expectations in equations (19) to be rational, this effect would have been even stronger. Individuals would reduce their demand for money in anticipation of the inflationary effect of the bond-financed deficit, causing an additional upward adjustment in the price level.

[58] With a stock target, however, the real cost of borrowing to government is more variable.

can be seen from equation (22) [or, when there is indexation in the capital market, from (26)], the rate of inflation is a weighted average of the rates of change of the nominal stock of money and bonds. The weights depend upon the elasticity of aggregate demand and the demand for money, with respect to the arguments of these functions. In particular, the greater $|E_r|, E_m, L_b, s_b$, and the smaller L_m, the greater, *ceteris paribus*, is the effect of a 1 percent increase in M or P compared with a 1 percent increase in B. Note that if the strict neo-Ricardian hypothesis holds, $E_b = L_b = 0$ and government bonds do not affect the price level, so that the elasticity of dP/P with respect to dM/M is unity. Otherwise it is smaller than unity.

The main lesson from this example is that different assets affect the price level to a different extent. It is therefore not sufficient to control M1, M2, or M3 in order to control P. The nominal stocks of the component assets must be controlled in order to maintain effective control over P. The example also suggests some of the factors determining the relative effects of the nominal supply of different assets.

The example also suggests that we need to know more about the demand functions for various financial assets in order to effectively control the price level even under strict quantity targets.

Monetary versus interest-rate targets.

The preceding discussion indicates that maintaining a fixed nominal rate on the discount-window loan and a fixed real rate on indexed government bonds has destabilizing effects on deposits, credit, and the price level. The first effect is due to uncertainty about the public's inflationary expectations. The second occurs also in the absence of uncertainty, when deficits are financed by bonds and the central bank is committed to preventing the real rate from rising. The first destabilizing effect could be eliminated by indexing the discount-window loan.[59] However, it is likely that in this case banks would also index some of their short-term assets and liabilities, thereby increasing the overall degree of capital-market indexation. This would increase the inflationary impact of a real interest-rate target in the presence of budget deficits, as implied by the discussion of the interest-rate target. Such a change in structure may not be desirable if there are doubts about the fiscal authority's ability to balance the budget. It therefore seems preferable to achieve precise control of deposits and loans by auctioning the discount-window loan rather than indexing it (see also Bank of Israel 1982).

Interest-rate targets also make it more difficult to sustain the adjustable peg regime which has been in effect since the ESP. Pegging some interest rates creates mechanisms which either lead to loss of reserves or increase the domestic price level, both of which make it less likely that policy-makers will be able to maintain the existing parity. With a

[59] Under current arrangements, the nominal discount-window loan rate is an increasing step function of the extent to which it is utilized. This arrangement gives more precise control than a preset nominal rate, but less precise control than full indexation of the loan.

preset nominal interest-rate on the discount-window loan, for example, an increase in expected devaluation increases the demand for credit and therefore utilization of the discount-window.[60] Using the additional credit for domestic purposes pushes domestic prices up, and reduces the long-run sustainability of the fixed parity. If it is used to buy foreign goods or securities there is a drain on reserves which, if large enough, may also jeopardize the fixed parity. The conclusion is that it is easier and safer to maintain a fixed exchange rate with quantitative targets than with interest-rate targets.

The main arguments for retaining some form of interest-rate targeting seem to be that, first, sharp increases in interest may not be politically viable; and second, high interest may, under some circumstances, jeopardize the stability of the banking system. These considerations are particularly relevant when the brunt of monetary policy is borne by a narrow segment of the credit market. But this is an argument for the desegmentation of the credit market rather than for an interest-rate rule. In fact, one of the indirect benefits of desegmentation may be that it will make it easier for policy-makers to adopt—and adhere to—quantitative stock targets. Thus, the long-run benefits of these targets outweigh their cost.

Alternative stock targets[61]

In the past the Bank of Israel adopted net domestic credit (NDC) as an important monetary indicator, as advocated by Bruno and Piterman (1988). The traditional closed-economy view is that some liabilities of the banking system should be targeted.[62] In an open economy, however, where the central bank stabilizes the exchange rate, the monetary base—and therefore the quantity of deposits—is endogenous. This is because the central bank must supply and demand foreign exchange for local currency as dictated by the need to maintain the fixed peg. But it is still possible to target deposits by sterilizing the monetary effects of the fixed peg on the targeted monetary aggregate. This can be done by changing the composition of domestic credit in a way that offsets the effects of reserve fluctuations on the desired monetary aggregate, something which requires a sufficiently large capacity to perform open-market operations. It is doubtful whether under existing institutional arrangements the Bank of Israel possesses this capacity. By contrast, the NDC target does not require it, since the central bank is not required to counteract the effects of changes in foreign reserves on monetary aggregates. The relationship between NDC and the more traditional monetary targets can be illustrated by consolidating the balance sheets of the central bank and the banking system (Tables 1 and 2) The result appears in Table 16. As can be seen,

[60] This is also true, although to a lesser extent, with a nominal schedule.

[61] This subsection draws on Galyam and Shiffer (1987), Galyam *et al.* (1986), Meridor (1987), Piterman and Sokoler (1988), and Yariv (1987).

[62] These could be the monetary base or some other monetary aggregate such as M1, M2, or M3. M1 includes cash *plus* the liquid reserves of commercial banks. M2 is equal to M1 *plus* time deposits and CDs in local currency. M3 is equal to M2 *plus* resident deposits.

$$R + L = C_p + D + \bar{E}, \tag{31}$$

where $\bar{E} = E_{cb} + E_b$ (real assets) and is assumed to be constant,[63] and C_p is the amount of cash held by the nonbanking public. The identity in equation (31) states that any change in reserves, R, or domestic credit, L, has to be matched by a corresponding change in the sum of cash and deposits, $D + C_p$. The basic difference between a monetary and a credit target can be illustrated by considering the case in which the credit target is L and the monetary target is $D + C_p$. Targeting $D + C_p$ implies that whenever the foreign reserves change, the central bank changes L in the opposite direction so as to keep $R + L$, and therefore the target, $D + C_p$, unchanged. This implies that L must be reduced when reserves rise, and increased when they decline. On the other hand, targeting L implies that the specie-flow mechanism is allowed to operate. An increase (decrease) in reserves is allowed to increase the domestic monetary aggregate. More generally, the credit target could consist of only a subset of the assets in L, and the monetary target only a subset of the liabilities in $D + C_p$. In addition, it is possible to target only some of the liabilities of the central bank, such as the monetary base—as advocated by

Table 16
Consolidated Balance Sheet of the Banking System and the Central Bank

ASSETS	LIABILITIES
R	$C - C_b$
$L = L_{cg} + L_{cp} + L_{bp} + L_{bg}$	$D = D_L + D_F + D_I$
Real assets	$E_{cb} + E_b$

monetarists. The ranking of alternative types of stock target generally depends on the origin and nature (transitory or permanent) of shocks, on the priorities given to ultimate targets such as price stability, balance-of-payments equilibrium, and full employment, and on the structure of monetary institutions. An in-depth analysis of the effect of these factors on the relative desirability of NDC and a monetary target is beyond the scope of this paper.[64] The following discussion is meant merely to suggest the sort of consideration which may be important in comparisons of this kind.

Assume that the ultimate targets are price stability and full employment, and that an increase in real interest rates is associated with a decrease in employment. Consider first the case in which there is a loss in reserves because of a transitory positive shock in the import surplus. If $D + C_p$ is held constant there will be no pressure (in either direction)

[63] This is an approximation based on the assumption that the changes in these items are small compared with the remaining monetary items.

[64] A more detailed analysis in the context of an open-economy Keynesian model appears in Piterman and Sokoler, 1988.

on the price level or interest rates, and therefore none on employment.[65] On the other hand, if L is held constant, $D + C_p$ will increase, pushing the price level down and interest rates up, and therefore putting downward pressure on employment. Hence, if the initial combination of price level and employment was satisfactory, the monetary target $D + C_p$ is preferable to the credit target L, since it maintains the ultimate targets at their pre-shock level. Had the transitory shock in the import surplus been negative, reserves would have risen. With a monetary target, a negative transitory shock to the import surplus would have increased reserves without affecting the initial position; but with a credit target it would have increased D + C_p and pushed up prices. It follows that a monetary target is preferable in the face of transitory shocks to the balance-of-payments current account.

Consider next the case in which there is a transitory shock to the relative demand for the monetary aggregate D and foreign exchange. With the $D + C_p$ target in effect, L will be adjusted to keep the supply of $D + C_p$ constant.[66] Since the demand for D has changed, this policy implies that interest rates (and therefore employment), or the price level, or both, will have to change. There are no pressures on the price level or interest rates with the L target, since maintaining it does not require any change in the supply of D. It follows that when shocks originate in the demand for D a credit target is preferable. This leads to the following tentative proposition:[67]

> *Proposition 4:* In the presence of transitory shocks to
> (a) the supply of $D + C_p$, a monetary target is more likely to insulate the ultimate targets from their effects; or
> (b) the demand for $D + C_p$, a credit target is more likely to insulate the ultimate targets from their effects.

After a devaluation there are usually large capital inflows, generating downward pressure on interest rates and upward pressure on prices, and therefore on the real exchange rate. In this situation a $D + C_p$ target is better, since it means sterilization of the capital inflows.

The NDC indicator currently used by the Bank of Israel consists of total bank credit to the government and the private sector, net of all bank liabilities not included in M3. The

[65] We have assumed that the level of the foreign reserves is sufficiently high to sustain the consequent loss of reserves without a change of parity.

[66] The real-life events behind this schematic representation are a desired portfolio shift out of domestic financial assets and into foreign currency, or vice versa. The first kind of shift occurs when expectations of an imminent devaluation—or new taxes on domestic financial assets—increase. The opposite shift normally occurs after a devaluation, when the probability of an immediate devaluation is negligible, and when domestic interest rates are higher than those abroad. In that case the public borrows abroad in order to invest in domestic assets, D.

[67] The proposition is based on the assumption that the bank multiplier is unity. When it is greater than unity there are additional effects deriving from the fact that the supply of money fluctuates more than the demand for it. It also depends to some extent on the assumption that there is only one asset besides the monetary aggregate.

balance-sheet constraint of the consolidated banking system implies that this is equivalent to targeting M3 net of foreign reserves. Whether this is the most appropriate credit target for achieving effective control of the price level depends on the type of considerations outlined earlier. In particular, at a constant level of reserves this credit target reduces to M3. Hence, given the reserves, its appropriateness can be evaluated only when more detailed information about the demand functions for the components of M3 (and other financial assets) becomes available.

8. PROPOSED REFORMS AND UNRESOLVED PROBLEMS

In this section we propose changes in the institutions and conduct of monetary policy designed to achieve a stable price level and a more efficient capital market, including a smaller spread between borrowing and lending rates.

Fiscal discipline and responsible monetary policy

Monetary policy does not and cannot operate in isolation; the fiscal environment within which it is carried out is of particular importance. The best safeguards against automatic monetary accommodation will fail to withstand the pressure of fiscal deficits, as happened before the 1985 stabilization program. Given this experience, we believe that it is important to restrict public deficits by law to a specified percentage of GNP.[68] The restriction should take into consideration the sustainable deficit in the balance of payments (see, for example, Sokoler *et al.*, 1984). If the limitation of public deficits is institutionalized, repeated government announcements that it is committed to preserving the achievements of the stabilization program will become considerably more credible. We believe that such restriction is politically feasible—the law prohibiting the government from borrowing directly from the central bank is a move in this direction. Nevertheless this law does not go far enough, because the government retains the option of financing the domestic budget deficit from foreign grants or borrowing abroad. Reliance on such funds to finance domestic deficits generates monetary expansion which is not easily sterilized, because of the Bank of Israel's limited capacity to conduct open-market operations.

Alternatively, or in addition, the Bank of Israel's ability to sterilize the monetary results of fiscal actions via open-market operations should be extended. If and when the reforms needed to ensure adequate sterilization (see below) are implemented, the ceiling on deficits may be raised.[69]

[68] The law should take emergencies, such as wars, into account.

[69] However, as stressed by Liviatan and Piterman (1986), trying to remain firm on the monetary front alone in order to reduce current inflation to world levels may prove too costly in terms of unemployment. The interaction between policy decisions and unions in the presence of overlapping

Debt management and the flow of information

A ceiling on budget deficits does not prevent the government from borrowing domestically in excess of its deficit needs. During 1987, in fact, the Treasury issued long-term bonds in excess of these needs, in anticipation of a future increase in outlays. The timing was probably motivated by the belief that if all the bonds had been sold at once interest rates would have risen by more than they did. In any event, this policy crowded out private borrowers from the long-term bond market. As a result, private demand for short-term bank credit increased, inducing commercial banks to step up recourse to the discount-window loan. The final result was monetary expansion and the replacement of long-term credit to private borrowers by short-term credit from the central bank (Piterman, 1988).

This episode illustrates two weaknesses of the existing fiscal-monetary institutional structure. First, an increase in domestic borrowing by the Treasury produces some automatic monetary accommodation. Second, it shortens the maturity structure of private debt and, under certain conditions, pushes a larger proportion of private borrowers into the more expensive segment of the credit market. The solution to this problem seems to lie mainly in fiscal policy. Less reliance by the Treasury on the bond market would prevent both the monetary accommodation and the crowding out of private borrowers. In the long run, the real domestic interest rate is an increasing function of the domestic public debt, gradually reducing the latter being a precondition for more reasonable interest rates. Budget surpluses should therefore be used to retire public debt whenever possible. When it is not, the Treasury should at least inform the Bank of Israel in advance of its intentions. The Bank could then temporarily move up the entire discount-window loan schedule in order to prevent excessive accommodation, or remain passive if the prevention of crowding out is considered more important than long-run price stability.

Central bank independence and desegmentation of the capital market

Israel's money supply is subject to large shocks emanating from the government, the public, and the rest of the world. In order to maintain long-run price stability, the central bank must be able to counteract these shocks, and to do so rapidly. For this purpose, it must have adequate instruments which can be put to work without a protracted legislative process. In addition, the burden of monetary policy should not be concentrated on narrow segments of the economy, something that is apt to make monetary policy ineffective, produce strong political opposition to necessary restrictive steps, and lead to misallocation of capital. We therefore recommend:

1. Lifting the institutional barriers that produce segmentation of the capital market. In

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contracts exacerbates the problem (Cukierman, 1988).

particular, discontinuing the Bank of Israel's involvement in export promotion through directed credit, allowing investors such as provident and pension funds greater flexibility in portfolio selection, and granting unrestricted access to international capital markets to additional categories of borrowers.

2. Allowing the Bank of Israel to conduct open-market operations at both the long and short end of the bond market by transforming sufficient amounts of the existing non-tradable long-term government debt to the Bank into tradable debt. Desegmentation and enhanced open-market capacity of the Bank of Israel constitute a package because in the absence of segmentation the Bank would be able to use open-market operations more aggressively, the effect on interest rates being spread over a wider market. Furthermore, if the private sector has easier access to foreign capital markets, the Bank must be able to counteract larger monetary shocks.

3. Giving the Bank of Israel full discretion to change reserve requirements, including those on savings schemes. Such changes are at present only partly under the Bank's control and require a long approval procedure. As a result, the Bank is unable to respond vigorously and quickly enough to exogenous disturbances. It tends, therefore, to use instruments over which it has greater control but which are less appropriate for the task in hand.

4. Leaving the imposition and removal of credit ceilings to the full discretion of the central bank; such ceilings should be used sparingly, but when they are imposed they should apply to a wide base. Furthermore, they should be applied at the aggregate rather than the individual level.

The choice of intermediate target

Long-run price stability and a stable exchange rate are more likely to be achieved when financial stocks rather than an interest rate are targeted. The current tendency to de-emphasize interest rates and focus on stocks is, therefore, to be encouraged. More analysis and empirical evidence is needed, however, in order to make definite recommendations about the financial stock (or stocks) to be used as an intermediate target (or targets). In particular, the discussion of the preceding section indicates that we need to know more about the structure of demand for various types of financial asset.

Capital flow policy and the choice of exchange-rate regime

Economic efficiency requires all investors to be permitted to borrow freely on international capital markets, as has been forcefully advocated by Galyam *et al.* (1986) and Galyam and Shiffer (1987). A flexible exchange-rate system, in conjunction with correctly-set and strictly adhered-to financial stock targets, can improve access without endangering price stability. At this stage, the Bank of Israel is not equipped to adhere to

such targets, nor does it know which is the appropriate financial stock target. In addition, many of the powerful accommodative institutions are intact, and it is unlikely that they will be removed in the near future. Under these circumstances, and in view of the inflationary consequences of the 1977 liberalization, a full-scale shift to a flexible exchange-rate regime appears to be a risky undertaking.[70]

The adjustable peg regime should, therefore, be viewed as a second choice, to be used as long as the accommodative institutions are in place, there is no commitment to a stock target, and the necessary instruments are lacking. The reforms suggested above (particularly the last two) should be introduced before a fully flexible exchange-rate regime and the associated free capital flows can be given serious consideration. The rest of the discussion is conducted on the assumption that the adjustable peg will be maintained for the foreseeable future.[71]

Monetary control under an adjustable peg does not necessarily imply abandoning equal access to foreign capital markets. Destabilizing capital flows can be neutralized, even under equal access, either by sterilization operations—provided our recommendations are implemented—or by imposing a surcharge on capital inflows. The first seems preferable for several reasons: first, it does not oblige the central bank to guess expectations in order to set the tax on capital inflows; second, it is consistent with our general recommendation to concentrate on stocks as intermediate targets; third, a capital surcharge which was recently tried failed to function effectively both because the Bank was not given sufficient flexibility in adjusting it, and because many types of credit (e.g. directed credit) were exempt. This episode suggests that desegmentation is important not only *per se*, but also in order to provide a broad base for future policy measures.

Monetary control may at times require a positive differential between (real) domestic and foreign interest rates. With equal access, however, more investors will be faced by the true social cost of capital. In the absence of sufficient marketable government securities for open-market operations, or in the face of unexpected changes in capital inflows, the monetary authority must possess an instrument of last resort.

Structural reform of the banking system and domestic interest rates

The discussion in Section 6 suggests that the marked concentration of the banking industry is largely responsible for the high lending rate and wide spread in the unrestricted credit market. An increase in the number of banks is likely to decrease the spread by lowering the lending rate and raising the borrowing rate. The model in Section

[70] More work is needed to elucidate the reasons for the positive correlation between flexibility of the exchange rate and the rate of inflation in Israel. There is little doubt, however, that this correlation has existed for the last twenty years.

[71] We have also assumed that foreign reserves are sufficient to maintain the existing exchange-rate regime.

6 implies that these effects are likely to be strongest when the number of banks or banking groups is very small, as it is in Israel.

In addition, for a given number of banks, greater competition from alternative sources of credit can also reduce the high cost of unrestricted bank credit. This can be done by making Israeli borrowers more accessible to foreign lenders and by encouraging the development of local markets, such as a commercial-paper market, which would compete with the banks.

As regards the first approach, we feel that if the current quantitative restrictions on lending and borrowing from abroad are not replaced by open-market operations, they should at least be rationalized and relaxed. For example, it is not clear why long-term borrowing from abroad was restricted to those who could obtain credit at the Eurodollar + 1 percent interest rate. The development of a local commercial-paper market will also work in the same direction (by reducing placement costs such as the need to prepare a prospectus). In terms of the model in Section 6, these changes will depress F and G, leading [through equations (10)] to a decline in lending rates and an increase in borrowing rates.

The deregulation of fees and commissions and the gradual reduction of reserve requirements may also help to narrow the large banking spread.

APPENDIX

DYNAMIC INCONSISTENCY AND THE BALANCE OF PAYMENTS

There is only one union which has the power to determine the real wage rate, and its preferred rate is above what could be obtained in a competitive labor market. Although the union does not set the real wage, when each contract is signed it sets the nominal wage. This is based on the union's (rational) expectation of the price level and the real wage aimed at. Since the latter is above the competitive wage there is excess supply of labor. Hence, given the agreed nominal wage, an increase in the price level stimulates employment by reducing the real wage. This creates a positive relationship between the price level and output during the period of the contract. Since the marginal propensity to absorb current output is smaller than unity, resources are released for exports and for reducing the current-account deficit.[72] In other words, once the union has committed itself to a nominal wage, the policy-maker faces a temporary tradeoff between inflation and the current-account deficit.

Under a managed float of the type that existed before the 1985 stabilization program,

[72] This effect may be reinforced by a decline in consumption triggered by the decline in the real value of monetary assets due to the increase in the price level.

the monetary authority was able to set the exchange rate after the nominal wage had been agreed upon. In a small, open economy this determines the price level, provided that domestic monetary aggregates are adjusted so as to back up the exchange rate chosen by the (monetary) policy-maker. Since the latter dislikes both inflation and a current-account deficit, he picks a (usually positive and finite) rate of devaluation—and hence a rate of inflation—which minimizes their combined cost. In doing so, he takes the agreed nominal wage as well as the size of the government's budget and tax revenue (which are set by the fiscal authority) as given. Provided the marginal cost to the policy-maker of inflation or a balance-of-payments deficit (or both) increases, the rate of devaluation chosen will increase with the rise in the balance-of-payments deficit implied by the policies of the fiscal authority.

The union knows the monetary authority's objective function as well as the magnitude of the variables chosen by the fiscal authority. It can therefore calculate the rate of inflation which will be induced by the monetary authority during the period of the contract. Given this (rational) forecast, it sets the nominal wage at a level which achieves its preferred real wage. As a result, the authority's attempt to improve the balance of payments by stimulating output through devaluation fails, since the union manages to obtain the real wage it desires. Moreover, since the union sets the nominal wage on the basis of rationally expected inflation, the policy-maker has to inflate at this rate solely in order to prevent the balance of payments from deteriorating. Thus, the ultimate equilibrium is characterized by positive inflation and inability on the part of the monetary authority to improve the balance of payments.

This equilibrium is inefficient,[73] since the balance-of-payments position could have been achieved without inflation if the government had been committed to an exchange rate through a credible pegging policy. If there is a credible peg the union rationally expects no inflation and has no reason to ask for nominal wage increases, provided that the current nominal wage is from the outset at the level which produces the real wage desired by the union.

The foregoing example makes a strong case for indefinite pegging of the exchange rate in order to provide a nominal anchor, and for achieving balance-of-payments targets by fiscal means. This conclusion is reinforced when other reasons for inflation, such as the employment motive[74] and the low-interest rate motive, are taken into consideration, since they reinforce the tendency to excessive inflation.

[73] It is also dynamically inconsistent, since the monetary authority has no incentive to devalue before the wage contract is signed.

[74] The dynamic inconsistency of monetary policy in the presence of several unions and an employment motive on the part of the policy-maker are discussed in Cukierman (1988).

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