Chapter 2
Monetary Policy, Inflation, and Prices

The consumer price index fell by 1.9 percent in 2003, a downward deviation from the inflation target of between 1 and 3 percent, defined as price stability. This followed an upward deviation from the inflation target in 2002, when annual inflation amounted to 6.5 percent. The development of prices was not uniform in the course of the year. Prices rose by 0.8 percent in the first quarter of the year, but subsequently fell by a cumulative rate of 2.7 percent. The fall in prices during the year resulted mainly from the continued appreciation of the NIS against the dollar, and derived partly from the slackness in domestic demand.

The decline in the NIS exchange rate in the course of the year resulted *inter alia* from the major improvement in background conditions from March onwards, namely the publication of the new government's economic program, the US government's approval of loan guarantees for Israel, the rapid and successful outcome of the war in Iraq and the worldwide downtrend in the risk premium required for investment in emerging economies, including Israel. As a result of these developments, uncertainty in the markets decreased considerably, as was reflected by the significant and continued improvement in the majority of indicators that showed a decline in expected inflation. One-year inflation expectations also fell, to within the targeted range of price stability, while nominal and real yields for all terms fell continually, concurrent with a decline in the inflation expectations reflected by longer terms as well.

Against this background, the Bank of Israel began to reduce the interest rate in April and the rate reduction continued until the end of the year. Over the year as a whole, the Bank of Israel cut the interest rate by a cumulative 3.9 percentage points.

1. MAIN DEVELOPMENTS

The consumer price index fell by 1.9 percent in 2003, falling short of the target of 1 to 3 percent inflation defined as price stability. This followed an upward deviation from

the inflation target in 2002, when annual inflation amounted to 6.5 percent. The development of prices was not uniform in the course of the year. Prices rose by 0.8 percent in the first quarter of the year, but subsequently fell by a cumulative rate of 2.7 percent. The fall in prices during the year resulted mainly from the continued appreciation of the NIS against the dollar, and derived partly from the slackness in domestic demand.

The development of the indicators of expected inflation differed notably between the first two months of 2003 and the rest of the year. The first two months of the year were notable for considerable uncertainty in the markets as a result of the anticipated war in Iraq and the lack of certainty regarding the extent of the new government's commitment to restoring fiscal discipline and adhering to the budget deficit targets. Inflation expectations rose during this period and actually cleared the upper limit of the targeted range of price stability, the NIS depreciated, and government bond yields surged. From March onwards, following the publication of the government's economic program, the US government's approval of loan guarantees for Israel and the rapid end of the war in Iraq, the uncertainty in the markets decreased. This was reflected by a decline in inflation expectations for a year ahead to within the targeted range of price stability, the strengthening of the NIS and the continued decline in nominal and real yields, concurrent with a decline in the inflation expectations reflected by longer terms as well.

On the basis of inflation-related assessments and market developments, the Bank of Israel cut the interest rate by a cumulative 3.9 percent in 2003. In January, the rate was cut by 0.2 percentage points and was left unchanged for the rest of the first quarter. The Bank of Israel began to reduce the interest rate in April, a process that was maintained until the end of the year. During the second quarter, the rate was cut increasingly, from 0.2 to 0.4 percentage points. The pace of rate reduction was speeded up in the second half of the year, to between 0.4 and 0.5 percentage points a month. At the end of 2003, the Bank of Israel's interest rate amounted to 5.2 percent as compared to 9.1 percent at the end of 2002.

In order to examine monetary policy in 2003, we will initially review the background economic conditions prevailing during the year. These conditions were affected both by factors unique to the Israeli economy and by worldwide developments.

Three main factors affected the assessment of the risks inherent in the Israeli economy and as a result, market developments in 2003: the rapid and successful outcome of the war in Iraq, which led to a decline in Israel's geopolitical risk; the worldwide downtrend in the premium required for investment in emerging economies, including Israel; and the US government's approval of loan guarantees for Israel, which considerably reduced Israel's debt risk.

Although worldwide economic activity remained at a recession level in 2003, the US economy experienced a rebound in activity, mainly in the second half of the year, which was reflected *inter alia* by a large rise in share prices. The moderate expansion in world trade during the year had a significant impact on Israel's exports. While the recession in the Israeli economy continued against the background of the slow recovery

in worldwide activity and the continued slackness in world demand for high-tech industrial products, activity in Israel stabilized and actually improved to some extent. The serious security and geopolitical situation prevailing for the third consecutive year and the cumulative effects of the slump in activity since 2001 were reflected by the slow pace of recovery in economic activity in Israel.

In the area of fiscal developments, although the budget deficit exceeded its targeted level to an appreciable extent during the year, the economic program announced in March following the formation of a new government called for a cut in government spending in 2003 and a reduction in expenditures during the coming years as well. The program also included major changes in transfer payments and in the pension funds, a temporary cut in public sector wages, and the freezing of employment in the public sector. These measures increased the public's credibility in the government's commitment and ability to reduce the budget deficit and the government debt during the coming years, concurrent with a cut in spending. The fall in long-term real and nominal yields from March onwards, despite the higher than planned budget deficit, showed that as a result of the government's economic program, the public perceived the budget deficit in 2003 as a temporary deficit deriving from the recession in activity.

The development of the exchange rate during 2003 was affected by nonresidents' activity generated by the gap between the interest rate in Israel and interest rates abroad, and by the substantial change in Israel's country risk and the currency risk of the NIS. The NIS appreciated by 6.4 percent against the dollar, although the development of the NIS exchange rate was not uniform in the course of the year. From the beginning of the year and until mid-February, the NIS depreciated by 4 percent due to the rise in fiscal uncertainty and Israel's increased geopolitical risk caused by the anticipated war in Iraq. When the level of uncertainty decreased from mid-February and until the end of the first half, the NIS appreciated sharply against the dollar, by 13 percent, against the background of the large interest-rate differential taking into account the reduction in risk. During the second half of the year, the NIS depreciated by a moderate 2 percent in a mixed trend, as the result of reduced foreign investment in the economy and the increasingly uncertain security situation. The importance of the exchange rate in an open economy with free capital movements is considerable, because of its strong impact on prices. Accordingly, when the exchange rate fell between March and July, prices dropped by 1.8 percent, and during the year as a whole, by 1.9 percent as stated.

2. MONETARY POLICY IN 2003

The principal instrument that the Bank of Israel uses to attain the inflation target is the monetary interest rate that it pays to the commercial banks on their deposits (which are allocated in tenders).[1] This interest rate affects inflation via several channels—aggregate demand, inflation expectations and the exchange rate. The interest rate has a partly

[1] These deposits are not regarded as a fulfillment of the banks' liquidity requirements.

delayed effect on prices, the intensity and timing of which are not always possible to predict. It should also be remembered that external events affect local prices in an open economy.

Since 1992, monetary policy has been subject to the government's inflation targets. From 1992 to 2000, an inflation target was set each year for a single calendar year alone, which encumbered the management of monetary policy and hindered the attainment of the inflation target. In August 2000, the government decided to set inflation targets for the years 2001 and 2002. The decision to set inflation targets for a period of two years made it easier to attain inflation targets by means of monetary policy, since policy is capable of exerting an effect over such periods of time. The government decision of 2000 also called for an inflation target of 1–3 percent a year from 2003 onwards, a range of inflation that was defined as price stability. This target is not a calendar target for a specific period, but a permanent and continuous target. Such a target is intended to strengthen the public's credibility in the persistency of the policy commitment to maintaining price stability, and thereby facilitates the operation of monetary policy. Price stability is an important element in the resumption of economic growth and the full exploitation of the economy's growth potential over time.

The monetary interest rate amounted to 5.2 percent at the end of 2003, following a cumulative reduction of 3.9 percentage points. After cutting the interest rate to a moderate extent in January, the Bank of Israel left the rate unchanged in the first quarter of the year. In the second quarter, the central bank began to lower the interest rate, in a process that lasted for the entire year. The pace of rate reduction increased during the second quarter, from 0.2 percentage points in April to 0.4 percentage points in June. In the second half of the year, the rate reduction was speeded up to 0.4 or 0.5 percentage points a month, making for a cumulative decrease of 2.8 percent during that period (Table 2.1).

In order to examine the monetary policy that the Bank of Israel adopted in 2003 and especially the pace of rate reduction, we need to examine the different indicators of inflation, macroeconomic conditions and the situation in the financial markets, all of which guided policy-makers' decisions. We should also remember that interest-rate decisions are made on the basis of a forward-looking policy, i.e., they take into account future developments in inflation. Past developments are only relevant to the extent that they affect the assessment of future developments. It should be realized that although the actual inflation rate may deviate from the inflation target, a forward-looking monetary policy is capable of ensuring that such deviations are kept to a minimum over time (see Chapter 1).

Monetary policy decisions are largely made on the basis of an examination of expected inflation relative to the inflation target. Generally, when assessments of expected inflation are above the inflation target, the Bank of Israel raises the interest rate in order to adhere to the target, and when the forecasts are lower than the inflation target, it lowers the interest rate. Although the Bank of Israel publishes its decision regarding the interest rate for the coming month, this interest rate is part of an assessed interest-rate course that is intended to bring expected inflation for one and two years

Table 2.1
Nominal and Real Interest Rates, Inflation Expectations, and Price Increases, 1995–2003

	Bank of Israel key interest rate	Nominal monetary interest rate[a]	Inflation expectations[b]	Expected real interest[c]	Real yield to maturity on CPI-indexed bonds[d]	Change in CPI	
	Period averages					During period[e]	Monthly[f]
1995	14.6	15.6	10.6	4.5	4.3	8.1	
1996	15.1	16.3	11.6	4.2	4.4	10.6	
1997	13.6	14.7	9.1	5.1	4.0	7.0	
1998	11.7	12.6	6.2	6.0	5.0	8.6	
1999	12.1	13.0	5.3	7.4	5.3	1.3	
2000	9.3	9.8	2.5	7.2	5.8	0.0	
2001	6.8	7.1	1.9	5.1	4.7	1.4	
2002	6.8	7.3	3.3	3.9	4.7	6.5	
2003	7.5	7.8	2.0	5.8	4.9	–1.9	
2002							
January	3.8	4.0	2.9	1.2	3.0	3.1	13.8
February	3.8	4.0	3.1	0.8	3.0	4.0	9.8
March	4.4	4.6	2.4	2.2	3.9	4.3	6.0
April	4.4	4.6	3.4	1.3	4.2	5.0	20.1
May	4.6	4.9	4.5	0.4	4.2	5.5	12.0
June	6.5	7.3	5.0	2.2	4.6	6.6	16.9
July	9.1	9.7	2.7	6.7	5.6	6.9	8.1
August	9.1	9.6	2.0	7.5	5.6	6.2	–4.3
September	9.1	9.6	3.0	6.5	5.7	6.4	4.5
October	9.1	9.7	4.0	5.5	5.7	6.9	8.0
November	9.1	9.6	3.6	5.8	5.6	6.7	–9.4
December	9.1	9.6	2.8	6.7	5.4	6.5	–3.3
2003							
January	8.9	9.4	2.7	6.5	5.7	5.6	2.3
February	8.9	9.4	3.8	5.4	5.5	5.1	4.8
March	8.9	9.4	3.1	6.1	5.5	4.8	2.4
April	8.7	9.2	1.9	7.2	5.6	3.1	–2.3
May	8.4	8.8	1.4	7.4	5.3	1.6	–5.7
June	8.0	8.4	1.5	6.8	4.9	–0.3	–6.9
July	7.5	7.9	2.5	5.4	4.5	–1.6	–8.0
August	7.0	7.3	1.7	5.4	4.7	–1.1	2.4
September	6.5	6.7	1.5	5.2	4.6	–1.9	–5.8
October	6.1	6.4	1.7	4.7	4.3	–2.6	0.0
November	5.6	5.8	1.1	4.7	4.3	–2.0	–2.4
December	5.2	5.4	0.7	4.6	4.2	–1.9	–2.4

[a] Effective interest; in annual terms.
[b] For the next 12 months.
[c] Nominal interest rate on Bank of Israel auctions *less* inflation expectations.
[d] Averages in all maturities; up to and including 2002–relative gross, and from 2003–gross (see note 4 in this chapter).
[e] Change in monthly data; change over the same month in the previous year.
[f] In annual terms.
SOURCE: Monetary Department, Bank of Israel and Central Bureau of Statistic data.

forward to within the target inflation range. The entire range of indicators is analyzed before each interest-rate decision is made, and the interest-rate course is adjusted on the basis of this analysis.

'Expected inflation' is the result of processing all the relevant information available, and is therefore based on numerous indicators (the main ones are detailed in Section 3 below), including: inflation expectations for different horizons, derived from the capital market and from private forecasters' predictions; the foreign-currency market; fiscal policy; yields in the capital market; the monetary and credit aggregates; and real activity. These indicators are analyzed by means of econometric models developed at the Bank of Israel, and by decision makers using their discretion. Due discretion is necessary because expectations regarding developments in inflation derived from the various indicators reflect different assessments of the future path of the interest rate.

At the end of the first half of 2002, the Bank of Israel raised the interest rate sharply, in three rate hikes during the months May-June, by a cumulative 4.5 percentage points. This resulted from the increased uncertainty in the markets, which was reflected *inter alia* by a large and continued rise in the exchange rate and by an appreciable deviation above the upper limit of the inflation target of the actual pace of inflation and inflation expectations for all terms. In the second half of 2002, following the interest-rate hikes of May-June, the markets were relatively calm but the level of uncertainty remained high. Despite the improvement in certain indicators employed in assessing expected inflation, the trends in these indicators were mixed and highly volatile. As a result, the Bank of Israel decided to leave the interest rate unchanged during that period, at a level of 9.1 percent, in the belief that this rate was necessary in order to attain the target of price stability and to strengthen financial stability.

Towards the end of 2002, most of the relevant indicators stabilized and improved to some extent. Inflation expectations for the term of a year fell to within the targeted long-term range, and the foreign-currency market was calm. Inflation expectations for terms of over a year also fell, although they were still much higher than the upper limit of the target of price stability. Accordingly, the Bank of Israel determined that a start could be made to cutting the interest rate. However, a cautious approach was adopted regarding the extent of rate reduction in view of the major uncertainty over the budget, the political uncertainty caused by the decision to call early elections, and the apprehension over the potential implications for price stability in the economy of war in Iraq. The Bank of Israel therefore cut the interest rate for January by a moderate 0.2 percentage points to 8.9 percent.

In the initial months of 2003 the situation deteriorated again. The NIS began to depreciate and inflation expectations for a year exceeded the upper limit of the inflation target. The background for these developments was the anticipated war in Iraq, which had the effect of increasing Israel's geopolitical risk as reflected *inter alia* by a growth in the risk that world markets attributed to economy.[2] Adding to these developments was the growing apprehension that the budget deficit for 2003 would greatly exceed its targeted level, which was in any case based on an over-estimate of government

[2] See Footnote 8.

revenue. Apart from that, the uncertainty over the post-election government's commitment and ability to revert to a downturn in the deficit led to a rise in yields on all terms of indexed and unindexed government bonds, concurrent with an increase in inflation expectations for the long terms. As a result of these developments, the Bank of Israel left the interest rate unchanged in February and March.

From mid-February, after a new government was formed and in particular, following the publication of the government's economic program, favorable trends developed in the markets. The NIS began to appreciate, long-term interest rates fell from the peak that they had reached at the beginning of the year, and share prices began to rise following the downtrend of the previous two years.

In March and April, the economic and geopolitical uncertainty prevailing during the initial months of the year decreased considerably due to an improvement in background conditions. The improvement resulted from a series of events: the Knesset's approval of the economic program, the US government's approval of loan guarantees for Israel, and the rapid end of the war in Iraq. Concurrent with a worldwide decline in the risk premium required for investment in emerging economies, these factors led to a fall in Israel's risk premium. As a result, the favorable trends that developed in the markets from mid-February intensified: the appreciation of the NIS continued, and the nominal and real interest rates for all terms continued to fall. Inflation expectations began to decline as well, and the expectations for a year reverted to within the limits of the targeted range of price stability. Inflation expectations for longer terms also fell appreciably, although they still exceeded the target. Against this background, in April the Bank of Israel began to reduce the interest rate again, gradually and after examining the markets' response to its rate cuts. Accordingly, the central bank cut the interest rate in April by a moderate 0.2 percentage points. In view of the continued favorable trends in the markets, the rate was cut by 0.3 and 0.4 percentage points in May and June respectively. At the end of the first half of the year, the interest rate amounted to 8.0 percent.

The interest-rate reduction continued during the second half of the year as stated, and the rate was cut by 0.4-0.5 percentage points in each month. The rate reduction was possible due to the continued improvement in all the indicators employed in assessing expected inflation (except for July and August, as will be explained later), and to the large decrease in uncertainty.

The favorable trends in the market weakened to some extent in July and August, partly offsetting the developments in the markets since March. The NIS weakened, inflation expectations for twelve months ahead moved from the lower limit to the center of the inflation target, and nominal and real long-term yields rose concurrent with an increase in inflation expectations for these terms. The changes in the market trends occurred against the background of assessments that the budget deficit for 2003 would significantly exceed the targeted level of 6 percent of GDP, and a decrease in foreign investment in the economy. At the same time, the security situation deteriorated. Nevertheless, as a result of the cumulative decreases in prices, the Bank of Israel estimated that it would be possible to continue reducing the interest rate without harming

price stability during the coming year and two years. Accordingly, the interest rate for August and September was cut by a cumulative one percent.

The favorable trends resumed in September, with the result that nominal and real yields continued to fall until the end of the year and approached the low level of the end of 2001. The foreign-currency market became more stable. The NIS appreciated and the level of uncertainty continued to fall, as reflected by the implied volatility of options' prices.[3] Concurrently, inflation expectations fell to within the lower part of the long-term targeted range of inflation, and at the end of the year were actually below the lower limit. Given these developments and in view of the continued decline in the actual pace of price increase, the Bank of Israel maintained the interest-rate reduction in the last quarter of the year, cutting the rate by a cumulative 1.3 percentage points.

In 2003, inflation fell below the lower limit of the targeted range, after rising above the upper limit in 2002. The deviation can be mainly attributed to the large depreciation of the NIS between March and July, which was reflected by a sharp decrease in the housing price index. This decrease contributed 2 percentage points to the decline in the general index during that period, which fell by a similar rate because other prices remained unchanged.

As early as the beginning of the second half of the year inflation in 2003 was already expected to fall below the lower limit of the long-term target (Figure 2.2). Nonetheless, the Bank of Israel did not step up the pace of its cuts in the interest rate, in order to allow a proper, ongoing examination of the response of the markets. Moreover, since monetary policy acts with a lag, its effect in the short term is limited in any case, so that a faster pace of interest-rate reductions as a means of attaining the inflation target for the year 2003 could have harmed price stability for the coming year and two years and might even have undermined financial stability (see Chapter 1 for more details).

3. INDICATORS OF PRICE DEVELOPMENTS

As previously mentioned, monetary policy is managed in accordance with assessments regarding the expected development of inflation. For as long as expected inflation exceeds the inflation target, the Bank of Israel will tend to raise the interest rate, and *vice versa*. If expected inflation is below the target, the Bank of Israel will tend to reduce the interest rate. Expected inflation is assessed every month by means of a range of indicators and models developed at the Bank itself, which examine the development of prices in response to different scenarios of monetary policy and economic developments. The indicators available do not always point in the same direction; nor is the importance attributed to them in the assessment of inflation necessarily uniform, and may change from time to time in line with the changing economic environment.

[3] NIS-dollar options that the Bank of Israel issues for periods of three and six months. See Chapter 4 for more details.

The development of price indicators was not uniform during 2003. In the first two months of the year, in view of the anticipated war in Iraq, the Knesset elections and the uncertainty over the new government's commitment to restoring fiscal discipline and adhering to the planned budget deficits, most indicators showed a rise in expected inflation and uncertainty in the markets. From March, following the publication of the new government's economic program and its approval by the Knesset, the US government's approval of loan guarantees for Israel, the rapid end to the war in Iraq and the (temporary) resumption of the peace process, the uncertainty in the markets decreased. This was reflected by a substantial and continued improvement in the majority of the indicators of expected inflation (except in July and August).

a. Inflation expectations from the capital market[4]

Inflation expectations derived from the capital market for various terms are an important indicator for assessing expected inflation. These expectations are derived from the difference between the nominal yields and the real yields for the different terms. For the term of a year, the difference is measured between Treasury-bill yields and yields on CPI-indexed bonds (*Galil* and *Sagi*). For longer terms, the difference is taken between yields on unindexed bond (*Shahar*) and yields on CPI-indexed bonds for the relevant terms. It should be remembered that the public's inflation expectations have a direct effect on the present and future development of prices in the economy.

The main advantage of the expectations derived from the capital market is that they are based on asset prices, and thereby reflect the public's investment decisions. The expectations obtained from surveys, on the other hand, are merely assessments, where no loss is incurred if they are wrong. As for the assessments compiled by private forecasters, these parties have a clear interest in avoiding errors in their assessments, but in contrast to the large number of investors in the capital market and the number of participants in the surveys, there are very few (about seven) private forecasters. Two other clear advantages of the expectations derived from the capital market are that they can be calculated on a current basis (on every trading day), and that they can be calculated for a succession of terms (up to nine years) unlike other sources, which provide forecasts only for specific short-term periods.

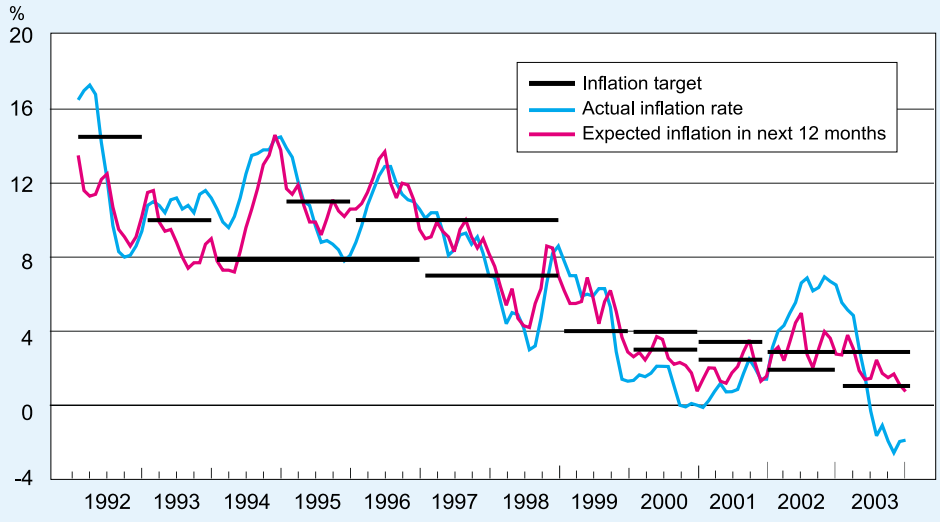
The estimate of inflation expectations derived in this manner also implies an inflation risk premium, which is likely to increase proportionate to the term covered by the expectations, and changes according to the economic environment. In addition, measurement problems arise due to the differing rates of taxation for different investors, and to the low tradability of certain bonds that are included in the calculation of the expectations.

[4] From 2003, following the income tax reform, estimates of the inflation expectations for all terms derived from the capital market have been based on the untaxed (gross) bond yields instead of on yields after calculation of weighted taxation ('relative gross yield') as was done previously. The change in the calculation of inflation expectations resulted from the implications of the implementation of the income tax reform, and especially from the fact that under the method practiced until 2002 (inclusive), it would no longer be possible to calculate expectations on a regular basis.

Inflation expectations from the capital market for a year

Inflation expectations for a year in 2003 were within the targeted long-term range for most months of the year. During January and February the expectations rose consistently and in February actually exceeded the upper limit of the targeted range, reaching an average of 3.8 percent. The increase largely resulted from the growing uncertainty in the economy and from the depreciation of the NIS during that period. From March onwards, following the favorable developments in background conditions and the appreciation of the NIS, expectations gradually fell despite the cuts in the interest rate, and during the second quarter were in the lower part of the targeted range. Expectations rose to the upper part of the targeted range in July but fell again in August. From August onwards, expectations moved within the lower part of the targeted range, and in December actually fell below the lower limit (Figure 2.1). It should be noted that the inflation expectations at the end of the year were derived from nominal and real levels that were appreciably lower than at the beginning of the year.

Figure 2.1
Inflation Rate: Targets, Expectations, and Actual,[a] 1992–2003

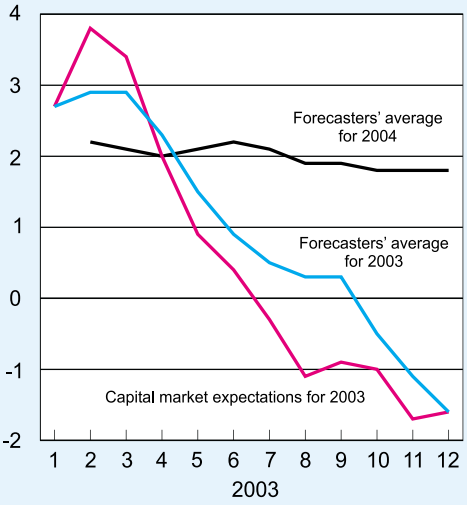


[a] Actual inflation, price rises in previous 12 months. Expected inflation, from capital market.
SOURCE: Based on Central Bureau of Statistics data.

Inflation expectations for longer terms

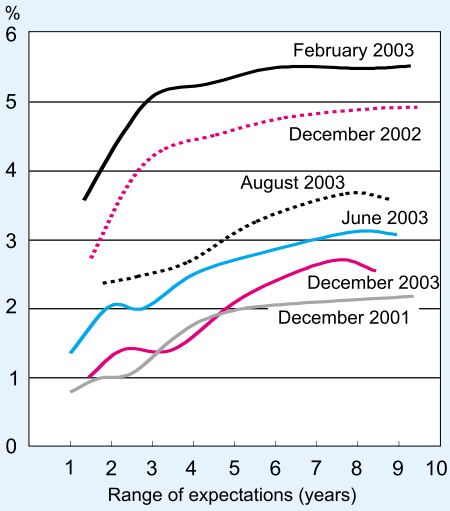
Long-term inflation expectations at the end of 2002 were far above the upper limit of the inflation target. The deviation from the upper limit reflected *inter alia* the increase in inflation risk during 2002, which mainly resulted from growing uncertainty and the

Figure 2.2
Inflation Expectations Derived from Capital Market and Forecasters' Predictions for 2003 and 2004



SOURCE: Based on forecasters' reports.

Figure 2.3
Inflation Expectations Derived from Capital Market (monthly averages)



SOURCE: Monetary Department, Bank of Israel.

reduced credibility of macroeconomic policy. The development of long-term inflation expectations in 2003 was similar to that of the expectations for a year. During the initial months of the year, after declining in November and December 2002, expectations for all terms rose and in February reached an average of 5.5 percent. In March, concurrent with the decline in expectations for a year, expectations for longer terms began to fall as well. The decrease intensified during the second quarter of the year, and in June the expectation curve fell along its entire length to below the upper limit of the inflation target. In July and August, expectations for all terms increased due to assessments that the budget deficit would far exceed its target, the deterioration in the geopolitical and security situation, and the depreciation of the NIS. However, the increase failed to offset the marked decrease during the second quarter. In September, the downturn in expectations for all terms resumed. As at the end of the year, expectations had fallen by an average of 3.0 percent, and the expectation curve along its entire length was within the targeted range of inflation (Table 2.2 and Figures 2.3 and 2.4).

The continued decline in expectations for all terms and their location within the limits of the long-term inflation target at the end of the year, and particularly the decline in expectations for the medium and long terms (which in the second half of 2002 were considerably higher than the upper limit of the target), indicate that uncertainty decreased substantially in 2003. In addition, the credibility of macroeconomic policy as perceived by the public appears to have been largely restored.

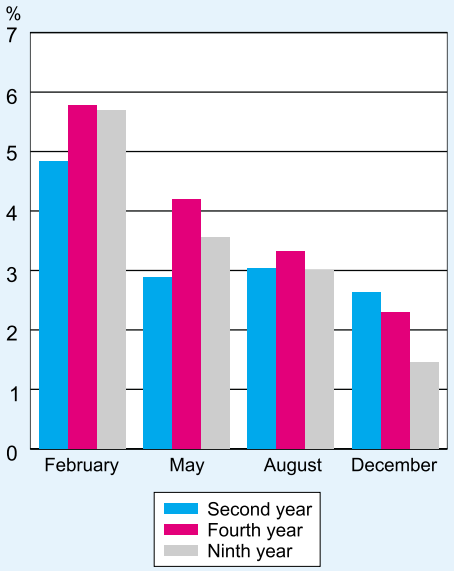
Table 2.2
Indicators of Inflation, 2002–2003

	CPI[a]	Inflation expectations derived from capital market: For coming year[b]	Inflation expectations derived from capital market: For second year	Inflation expectations derived from capital market: 3–9 years	Forecasters' average	NIS/$ exchange rate	Real interest rate[c]	Money supply M1[a]
	(annual change)		*(percent)*		*(monthly averages)*		*(percent)*	*(annual change)*
2002								
January	3.1	2.9	1.7	2.9	2.8	4.54	1.2	23.9
February	4.0	3.1	2.7	2.7	3.0	4.66	0.8	25.9
March	4.3	2.4	3.0	2.4	2.6	4.66	2.2	25.9
April	5.0	3.4	3.2	3.1	2.6	4.81	1.3	21.7
May	5.5	4.5	3.1	3.7	3.4	4.89	0.4	23.2
June	6.6	5.0	4.1	4.5	3.4	4.94	2.2	21.8
July	6.9	2.7	2.6	3.9	2.3	4.72	6.7	14.6
August	6.2	2.0	3.1	3.8	2.0	4.68	7.5	10.8
September	6.4	3.0	3.6	4.8	2.0	4.78	6.5	7.7
October	6.9	4.0	5.0	5.9	2.5	4.80	5.5	5.3
November	6.7	3.6	4.8	5.7	2.4	4.69	5.8	6.3
December	6.5	2.8	4.2	5.3	2.0	4.69	6.7	5.4
2003								
January	5.6	2.7	4.4	5.7	2.5	4.84	6.5	1.1
February	5.1	3.8	4.8	5.9	2.8	4.87	5.4	–1.6
March	4.8	3.1	4.3	5.2	2.5	4.78	6.1	–4.8
April	3.1	1.9	3.5	4.2	1.7	4.62	7.2	–3.4
May	1.6	1.4	2.9	3.6	1.3	4.48	7.4	–3.6
June	–0.3	1.5	2.8	3.4	1.4	4.38	6.8	–6.8
July	–1.6	2.5	2.8	3.6	1.8	4.37	5.4	–2.2
August	–1.1	1.7	3.0	3.9	2.2	4.45	5.4	2.1
September	–1.9	1.5	2.7	3.9	2.5	4.46	5.2	3.4
October	–2.6	1.7	2.5	3.4	2.1	4.45	4.7	7.1
November	–2.0	1.1	2.5	3.2	1.9	4.49	4.7	8.7
December	–1.9	0.7	2.6	2.8	1.6	4.39	4.6	7.6

[a] Annual rate of change, each month compared with same month in previous year.
[b] For next 12 months.
[c] Nominal interest rate on Bank of Israel auctions *less* inflation expectations.
SOURCE: Monetary Department, Bank of Israel and Central Bureau of Statistic data.

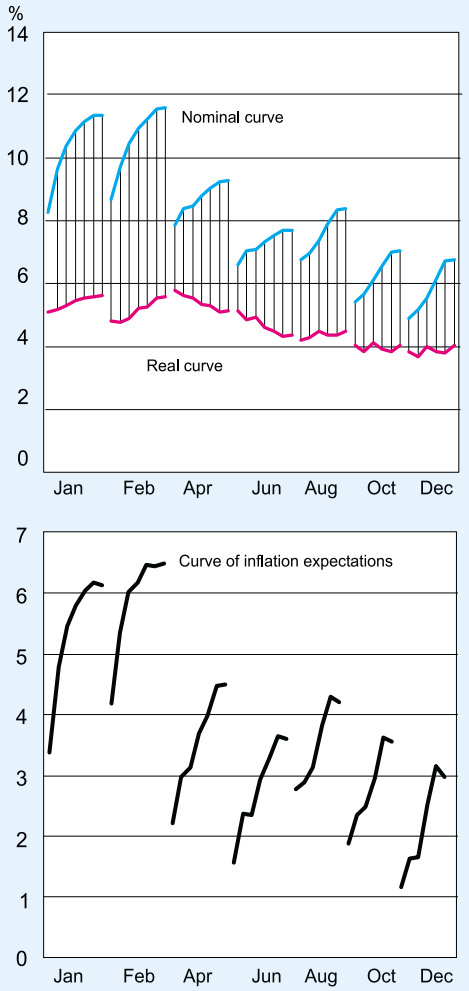
An examination of the composition of inflation expectations for the various terms shows that at the end of 2003, these were derived from nominal and real yields that were lower than at the beginning of the year. Most of the decline in expectations, which lasted from March until the end of the year, resulted from the decrease in

Figure 2.4
Inflation Expectations from Capital Market for Long Terms, 2003



SOURCE: Monetary Department, Bank of Israel.

Figure 2.5
Inflation Expectations Curve, and its Nominal and Real Components, 2003



SOURCE: Monetary Department, Bank of Israel.

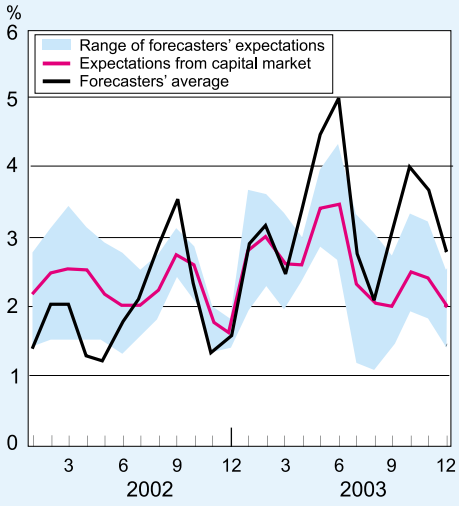
unindexed bond yields. This decrease was larger than the fall in yields on CPI-indexed bonds (Figure 2.5).

b. Private forecasters' assessments

Private forecasters' assessments for 12 months ahead were within the limits of the targeted range of inflation during the year. For most of the year, developments in these assessments were similar to those in the expectations derived from the capital market (Table 2.2 and Figure 2.6). During the first two months of the year, following the deterioration in the financial markets and the growth in uncertainty and concurrent with the rise in expectations derived from the capital market, private forecasters raised their assessments by an average of 2.8 percent in February. Nevertheless, this figure was still within the upper limit of the target. From March onwards, due to the improvement in background conditions, private forecasters lowered their assessments. As a result, their average assessments ranged within the lower part of the long-term inflation target during the second quarter. During the third quarter of the year, private forecasters raised their assessments, as distinct

from the development of expectations from the capital market. This was due to their belief that the pace of inflation would increase following the cumulative decrease in prices until then. In the last quarter of the year, once the assessment that inflation would rise proved to be erroneous and concurrent with the fall in inflation expectations from the capital market, private forecasters' assessments fell back to the lower part of the inflation target.

Figure 2.6
Inflation Expectations for 12 Months Ahead Derived from Capital Market and Forecasters' Expectations for That Period, 2002–2003



SOURCE: Based on forecasters' reports.

It should be realized that private forecasters' assessments of expected inflation are part of a more broad-ranging forecast that includes their assessments regarding the monetary interest rate and the exchange rate, which affect inflation. Accordingly, their assessments of expected inflation should be examined *inter alia* with respect to their forecasts regarding the course of development in the monetary interest rate. As an example, throughout the entire year, when private forecasters' assessments were within the limits of the inflation target, the interest-rate cuts that they forecast for terms of over two months were appreciably lower than the actual rate cuts.

A comparison of forecasters' assessments with the inflation expectations derived from the capital market for a year ahead shows that on average, forecasters' assessments are more stable and that in months when expectations increased to a major extent (January-February and July), the expectations from the capital market were higher than forecasters' assessments. Expectations from the capital market appear to respond to new information and to situations of uncertainty more rapidly and sometimes more intensely. The term of forecasters' assessments, which serves as an additional indicator of uncertainty over inflation, increased during the first half of the year. The increase was concurrent with the increase in the term of the forecasts relating to the exchange rate and matched the uncertainty in the foreign-currency market, which was also reflected by the implied volatility of options and the derivative probability of exchange rate adjustments (see Chapter 4 for details). The term of the forecasts decreased again in the second half of the year.

Private forecasters' assessments for 2004 were stable during the year, and averaged between 1.8 and 2.0 percent, within the long-term ranges of the inflation target. This indicates that the forecasters perceived the fall in prices as temporary, and that in the longer term inflation would converge to the center of the targeted range of price stability (Figure 2.2).

c. Fiscal policy

The budget deficit amounted to 5.6 percent of GDP in 2003, as compared to the year's targeted deficit of 3 percent of GDP. The upward deviation resulted from the fact that government revenue, mainly in the first half of the year, was considerably lower than assumed in the budget plan due to the continued recession. A large budget deficit was accrued in the very first months of the year, and it was clear that the deficit for the year would significantly exceed the target, and that the target would have to be adjusted in order to halt the upturn in the deficit since 2001. Against this background and following the formation of the new government, an economic program was published in March. Under the program, it was decided to slash government spending by NIS 9 billion in 2003 and to trim expenditure in the coming years as well. *Inter alia*, the program included substantial changes in transfer payments and the pension funds,[5] a temporary cut in public sector wages and the freezing of public sector employment levels. Together with structural reforms, principally in the area of pensions, these measures increased the public's credibility in the government's commitment and ability to ensure that the budget would be reduced during the coming years, concurrent with a cut in spending. Moreover, as a result of the economic program, the public perceived the deficit for 2003 as a temporary deficit deriving from the lower than expected tax receipts resulting from recession-level economic activity, and which would decrease under the impact of the program. This supported a fall in real and nominal long-term yields in the course of the year from March onwards.

Towards the end of the first half of the year, as the economic program was implemented, spending did indeed decrease and the budget deficit fell slightly although it remained high. Accordingly, deficit forecasts for 2003 at the time showed that the actual budget deficit would considerably exceed the target of 3 percent of GDP and indicated that it would reach about 6 percent. A new trend on the revenue side developed in the second half of the year and tax receipts increased. The increase derived *inter alia* from an improvement in the economic environment and from a modest growth in activity. The growth in revenue had the effect of reducing the deficit for 2003, which amounted to 5.6 percent of GDP at the end of the year as stated. (If US aid had been received at the end of 2003 as planned, and not been postponed to 2004, the deficit would have been 5 percent of GDP).

The deficit for 2003 in NIS terms amounted to NIS 28 billion compared with a planned deficit of NIS 15 billion in the original budget. The measures that the government employed in financing the deficit were domestic borrowing, overseas borrowing and privatization. Domestic borrowing totaled NIS 23 billion in 2003, and the remaining NIS 5 billion required for financing the deficit were raised abroad. (Privatization revenue during the year was limited and lower than planned.) The US government's approval of loan guarantees for Israel enabled the government to reduce domestic borrowing (Table 2.3). This led to a decrease in Israel's country risk premium,

[5] For more details of the pension fund reform, see Chapter 5 and Box 2 in the Inflation Report for the second half of 2003.

which facilitated overseas borrowing to an amount exceeding that backed by the guarantees, at a relatively low cost.[6]

Table 2.3
Government Borrowing, 2003

(NIS billion)

	Q1	Q2	Q3	Q4	Total annual borrowing
Domestic borrowing					
Total, gross	18.4	15.1	13.6	10.4	57.5
Total repayments	11.0	6.4	11.8	5.9	35.1
Total, net	7.4	8.8	1.8	4.6	22.4
Borrowing abroad					
Total, gross	2.3	5.3	8.0	5.1	10.7
Total repayments	3.8	2.8	4.0	3.4	14.0
Total, net	–1.5	2.5	4.0	1.8	6.7
Total net borrowing, domestic and abroad	5.8	11.3	5.7	6.3	29.1
Deficit (–)/surplus (+)					
Domestic	–5.3	–9.9	–4.0	–7.4	–26.6
Abroad	0.9	0.0	–1.4	–0.6	–1.1
Total	–6.2	–9.8	–2.7	–6.7	–25.5
Sources of absorption (–)/monthly injection (+)[a]	–2.7	3.6	4.9	3.9	9.8
Monthly absorption (–)/injection (+)[b]	–2.1	1.1	2.3	2.8	4.1

[a] Domestic deficit *less* domestic borrowing *less* the deficit abroad *less* borrowing abroad.
[b] Domestic deficit *less* domestic borrowing.
SOURCE: Ministry of Finance and Bank of Israel Monetary Department.

The growth in the budget deficit and the resulting increase in government borrowing during the year, concurrent with the moderate rate of growth in nominal GDP, raised the government debt-GDP ratio for the third consecutive year. At the end of the year, the debt-GDP ratio amounted to the high rate of 105 percent, similar to its level in 1996 (Table 2.4). This came after a consistent downturn in the debt-GDP ratio since the 1985 economic stabilization program (with the exception of a temporary deviation at the end of 1998, which was subsequently offset).

As for fiscal policy objectives in the coming years, when the 2004 budget was submitted the government decided that the deficit target would amount to 4 percent of GDP in 2004, while from 2005 onwards government spending would not exceed the previous year's spending by more than one percent and that the deficit would not exceed the target of 3 percent of GDP. In the long term, implementation of this decision will contribute to a decrease in the debt-GDP ratio, which will make it possible to attain the target of price stability at lower nominal and real interest rates for all terms. A reduction in interest rates is important for encouraging investment and economic activity as a whole, and could thereby help to extricate the economy from the recession.

[6] In June, the government raised $750 million in the USA at an interest rate of 4.73 percent (1.55 percent more than the yield on 10-year US government bonds).

Table 2.4
Total Government Gross Debt, 1996–2003

	1996	1997	1998	1999	2000	2001	2002	2003
a. Reserves at end of period				*NIS billion, current prices*				
1. Internal debt	245.2	268.3	295.1	307.7	305.2	326.2	372.0	389.8
2. External debt	80.6	91.0	112.8	113.0	110.3	119.6	130.2	130.3
Total government debt	325.8	359.3	407.9	420.7	415.4	445.8	502.2	520.1
b. Debt-GDP ratio				*Percentage of GDP*				
1. Internal debt	77	75	75	72	65	69	76	79
2. External debt	25	26	29	26	24	25	27	26
Total government debt	103	101	104	98	89	94	102	105
c. Total government debt by type of indexation				*Percent*				
1. CPI-indexed	65	65	61	60	58	54	53	52
of which: Nontradable debt	37	37	35	35	34	33	32	31
2. Unindexed	7	7	7	9	11	15	18	22
3. Dollar indexed	4	3	4	5	4	4	3	1
4. External debt, foreign-currency denominated	25	25	28	27	27	27	26	25
5. Total	100	100	100	100	100	100	100	100
d. Average term to maturity of government debt				*Years*				
1. Internal debt	6.6	6.5	6.4	6.3	6.2	6.5	6.6	6.6
2. External debt	8.1	7.9	8.0	7.6	7.1	6.9	6.6	8.0
3. Total debt	6.9	6.8	6.8	6.6	6.5	6.6	6.6	6.9

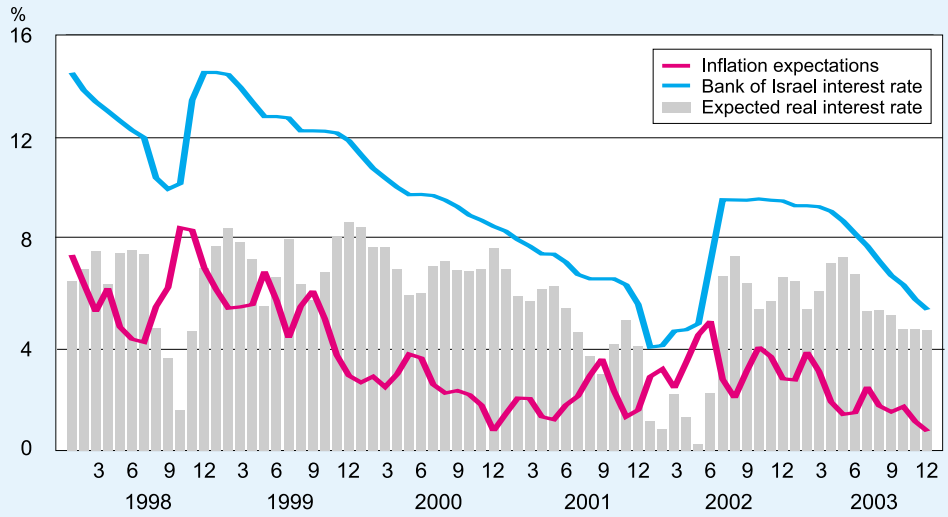
SOURCE: Bank of Israel, and Central Bureau of Statistics data.

d. The expected real interest rate on Bank of Israel sources and the real yield curve

The expected real interest rate on Bank of Israel sources is derived from the difference between the Bank of Israel's headline interest rate (the nominal interest rate) and the inflation expectations for 12 months ahead that are derived from the capital market. This real interest rate is one of the indicators of the intensity of monetary restraint.

Following the interest-rate hikes at the end of the first half of 2002, once inflation expectations fell, the expected real interest rate increased to 7.0 percent in the second half of the year. During the first two months of 2003, the expected real interest rate dropped to an average of 5.4 percent in February due to the rise in inflation expectations at the time. From March, when expectations fell, the expected real interest rate rose again and in May reached an average of 7.4 percent. From June to the end of the year the real interest rate fell mainly because the pace of reduction in the Bank of Israel's interest rate exceeded the decline in inflation expectations. During the second half of 2003, the real interest rate averaged 5.2 percent, similar to the rate in 2002 (Table 2.1, Figure 2.7).

Figure 2.7
Bank of Israel Interest Rate, Inflation Expectations,[a] and Expected Real Interest Rate, 1998–2003



[a] For 12 months ahead, derived from the capital market.
SOURCE: Monetary Department, Bank of Israel.

Another indicator of the extent of monetary restraint is the slope of the real yield curve. Real yields for both short and long terms are affected by a range of real indicators.[7] In addition, short-term yields are affected, more than long-term yields, by the Bank of Israel's interest rate, in other words by monetary policy, while long-term yields are more affected by fiscal policy.

During the initial months of the year, real yields for the medium and long terms increased due to the growth in uncertainty, and the slope of the yield curve became steeply positive. From March to July, long-term yields fell heavily as a result of the improvement in the markets—especially the positive impact of the publication of the economic program, which was indicative of the government's commitment to restoring fiscal discipline and reducing expenditure, and due to the US government's approval of loan guarantees for Israel, which reduced Israel's debt risk. During the same period, short-term yields rose, mainly because of the decline in inflation expectations. The slope of the yield curve thereby became steeply negative, reflecting a relatively high level of risk. During July and August, when short-term yields fell in line with the cuts in the interest rate, the negative slope of the yield curve flattened out, indicating that the extent of monetary restraint had increased. From September to the end of the year, yields on all terms continued to fall and the curve averaged 4.2 percent, lower than at the end of 2001 prior to the two percentage point cut in the Bank of Israel's interest rate.

[7] Demographic movements, the returns on tangible capital, real interest rates abroad and the risk premium.

e. The foreign-currency market, capital movements and import prices

The exchange rate is affected by the difference between the yield on local assets and the yield on foreign assets, long-term capital movements, local factors and by events exogenous to the economy. In an open economy with unrestricted capital movements, the sensitivity of the exchange rate to yield gaps is considerable, and this impacts prices as well. A growth in the yield gap increases the relative feasibility of holding local assets and attracts capital imports to the economy, a development reflected by an appreciation of the NIS and *vice versa*. Demand and supply for foreign currency are also affected by the perception of the risk inherent in the economy. A change in the exchange rate affects prices via the prices of tradable goods and services. The development of import and export prices serves as a potential indicator of decreases in tradables prices (for more details, see below).

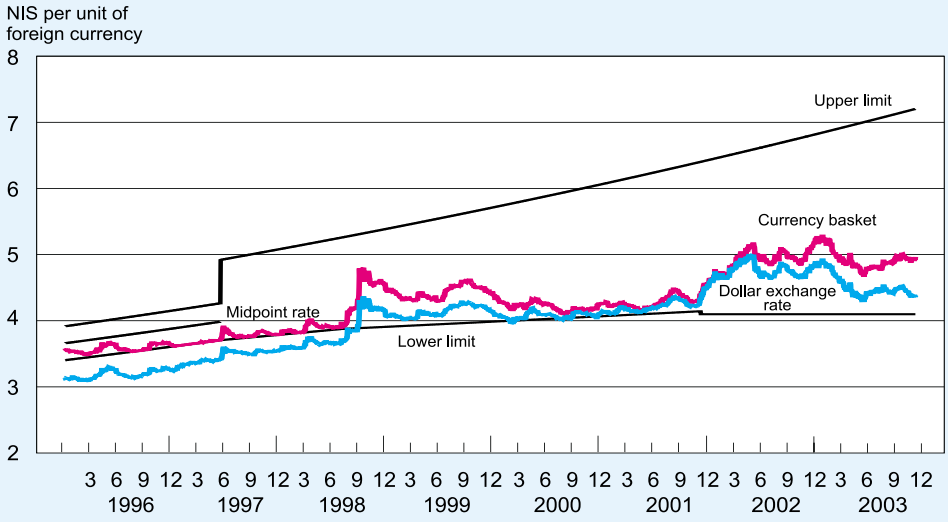
The NIS appreciated by 6.4 percent against the dollar and by 0.5 percent against the currency basket during 2003. However, the development of the NIS exchange rate was not uniform in the course of the year (Figure 2.8), in which three main periods can be discerned: (1) from the beginning of the year and until the middle of February, the NIS depreciated by 4 percent against the dollar and by 5 percent against the currency basket; (2) from the middle of February and until the end of the first half of the year, when background conditions improved, the NIS surged by 13 percent against the dollar and by 12 percent against the currency basket, despite the cuts in the interest rate; (3) during the second half of the year, the trend in the exchange rate was mixed, and the NIS depreciated by 2 percent against the dollar and by 6 percent against the currency basket.

The development of the exchange rate in 2003 was affected by both local and worldwide factors, which were reflected by a substantial change in the assessment of the risk inherent in the Israeli economy and in the NIS 's currency risk, as well as by the decrease in the gap between the NIS interest rate and overseas interest rates. Foreign investors' activity in the economy played a key role in the development of the exchange rate during the year. The majority of capital movements in 2003, which changed the trend in the exchange rate, derived from foreign residents' short-term futures transactions (for details, see the 2003 Annual Report of the Foreign Exchange Activity Department).

From the beginning of the year to the middle of February, the NIS depreciated against the dollar by 4 percent as stated. This was due to the increased uncertainty in the markets, which resulted from the upcoming Knesset elections, apprehension regarding the budget deficit (whose large size became apparent at the very beginning of the year), and the anticipated war in Iraq.

In mid-February, the factors behind uncertainty prevailing at the beginning of the year became more positive. The elections were over, and the new government compiled an economic program that called for a major cut in the budget for 2003 and the coming years, which helped to restored investors' confidence in the economy. In the geopolitical and security-related area, negotiations with the Palestinians resumed in an optimistic climate. Two other important factors were the US government's approval of loan

Figure 2.8
Exchange Rate Against the Currency Basket and the Dollar, 1996–2003



SOURCE: Foreign Exchange Activity Department, Bank of Israel.

guarantees for Israel, which reduced Israel's debt risk, and the rapid end of the war in Iraq, which contributed greatly to reducing Israel's geopolitical risk. These factors led to a decrease in the assessment of the risk inherent in the foreign-currency market, and were reflected by a decline in the implied volatility of NIS-dollar option prices (see Chapter 4 for details).

An indicator of these risks is the premium required for investment in Israel Government bonds that are traded abroad (CDS;[8] for details, see the 2003 annual Report of the Foreign Currency Department). Since October 2002, except for the initial months of 2003, the risk premium has fallen steeply and continuously. As a result of the decrease in this premium and in line with the worldwide trend of increased investment in emerging economies, principally those with a high interest rate, foreign residents began to purchase substantial amounts of NIS for the purpose of buying NIS assets. This activity, which increased the supply of foreign currency, led to appreciation of the NIS in the first half of the year. While Israeli residents purchased foreign currency at the same time, their activity did not have a dominant impact in the market.

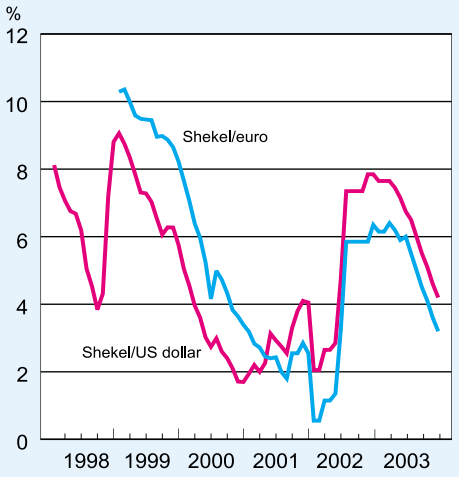
The NIS depreciated to a moderate extent during the second half of the year due to reduced foreign investment in the emerging markets, including short-term investment in Israel, the increasingly uncertain security situation, and to expectations that the budget deficit would significantly exceed its targeted level. However, the assessment of the risk inherent in the foreign-currency market continued to decline, as apparent from the decrease in the implied volatility of the prices of the NIS-dollar options that the Bank of Israel issues from 9 percent to 6 percent, and from the distribution of the future

[8] Credit Default Swaps—financial instruments that make it possible to transfer credit risk exposure in a transaction to the issuer: In return for a premium, the buyer purchases from the seller insurance against the event of non-payment by the issuer of the security.

exchange rate derived from options traded in the stock market, according to which the probability of large exchange rate adjustments in that period was very low.

The gap between the NIS interest rate and foreign-currency interest rates, principally the dollar interest rate, contracted appreciably in 2003 after expanding greatly in 2002. During the first half of 2003, as a result of the interest-rate cuts in Israel and the unchanged level of the interest rate in the USA, the gap between the NIS interest rate and the dollar interest rate decreased from 7.8 to 6.7 percentage points. The gap continued to contract in the second half of the year due to the increased pace of rate cuts in Israel and the moderate reduction in interest rate in the USA. By the end of the year, the rate gap had fallen to 4.2 percentage points (Figure 2.9).

Figure 2.9
Overnight-Interest-Rate Gap between Israel, the USA and Europe,[a] 1998–2003



[a] As of 12.5.2001, *The Economist* stopped publishing the overnight interest rates, and from that date the representative interest is the weekly Libor rate.
SOURCE: *The Economist, Globes,* and Bank of Israel.

The exchange rate affects prices via the prices of tradable goods and services. Since the proportion of imports and exports to product and uses in the Israeli economy is very high (84 percent and 58 percent respectively) and considering that many goods and services are close substitutes for import and export goods, import and export prices can have a substantial effect on local prices. Import and export prices are affected by two factors—the exchange rate and the worldwide development of prices. Accordingly, we will define an index of 'tradables prices' as a multiple of the NIS exchange rate against the dollar by the average dollar prices of import and export goods. A high degree of correlation does indeed exist between the rate of increase in tradables prices and rate of increase in local prices.

Tradables prices rose by one percent in 2003 following a large 12 percent increase in 2002. The moderate rise in tradables prices derived from a dollar increase in import and export prices that was offset by the decline in the exchange rate (Table 2.5). As for the development of the tradables price index during the year, in the first quarter the index rose sharply, by 23 percent in annual terms as the result of a large increase in import and export prices, which was accompanied by a depreciation of the NIS. But the index fell in the second and third quarters (mainly in the second quarter) due to the appreciation of the NIS, while import and export prices on average remained unchanged. In the fourth quarter of the year the index rose by 10 percent due to the concurrent increase in import and export prices.

As in 2002, when the large increase in prices resulted from the large increase in the prices of tradable goods, in 2003 tradables prices again affected local prices. During

Table 2.5
The Exchange Rate, Import and Export Prices, and Consumer Prices, 1996–2003

	Basket rate	Dollar rate	Export prices[a]	Import prices[a]	Prices of tradables[b]	CPI
	Change from previous period, annual averages					
1996	3.5	5.9	–1.2	–1.8	4.3	11.3
1997	4.3	8.2	–2.9	–5.1	3.9	9.0
1998	9.6	10.2	–3.2	–6.2	5.0	5.4
1999	8.3	8.9	–1.6	–2.3	6.9	5.2
2000	–4.7	–1.5	–2.3	2.4	–1.5	1.1
2001	1.4	3.1	–1.9	–2.1	1.0	1.1
2002	14.1	12.6	–0.7	–0.2	12.2	5.7
2003	1.1	–4.1	3.4	7.2	1.0	0.7
	Change from previous period, last quarter					
1996	4.0	6.3	–1.6	–3.6	3.5	10.9
1997	4.7	8.7	–3.7	–4.9	4.0	8.1
1998	20.9	19.0	–2.7	–5.8	13.9	7.8
1999	–1.7	0.7	–0.4	0.4	0.7	1.9
2000	–7.8	–3.1	–2.7	–0.7	–4.7	0.0
2001	4.2	4.3	–3.5	–3.5	0.7	1.6
2002	13.9	10.5	1.7	5.3	18.1	6.7
2003	–0.6	–6.0	2.7	7.3	–1.3	–2.1
	Change from previous period, annual terms					
2001						
I	7.5	3.5	–3.9	–0.4	1.3	–2.6
II	–4.1	2.3	–5.1	–3.6	–2.2	5.6
III	10.3	8.3	0.4	0.8	9.0	4.0
IV	3.7	3.1	–4.8	–10.5	–4.8	–0.4
2002						
I	31.0	35.8	–2.9	–6.1	29.7	6.2
II	32.7	25.1	3.8	12.4	35.1	13.5
III	–4.2	–12.5	4.2	13.0	–6.2	7.0
IV	1.9	0.6	0.8	2.4	2.2	0.5
2003						
I	18.0	8.7	12.3	14.3	23.2	0.2
II	–20.9	–25.7	–4.3	0.8	–27.0	–1.8
III	–6.0	–4.9	–1.2	3.1	–3.9	–5.0
IV	11.4	1.5	4.9	11.6	9.9	–1.9

[a] In dollars.
[b] Average prices of imports and exports *multiplied by* the exchange rate of the dollar.
SOURCE: Bank of Israel and Central Bureau of Statistic data.

2003, the fall in tradables prices contributed to a decrease in the prices of local goods. This phenomenon highlights the effect of an appreciation of the NIS in bringing down the consumer price index.

f. The monetary and credit aggregates

The monetary and credit aggregates and their composition are additional indicators employed in the assessment of expected inflation (Table 2.6). In a regime of inflation targets where the nominal anchor is the inflation target and the monetary policy instrument for obtaining the target is the interest rate, the development of the monetary aggregates plays a smaller role than in regimes where the policy instrument is a monetary aggregate, because the size of the aggregates is determined by the public's demand: the supply of money at any point in time adapts itself to demand, so that a supply surplus cannot arise. But since in certain situations the development of the monetary and credit aggregates could fulfill the important function of warning of the possibility of a crisis situation, these aggregates must be monitored. Thus, a large and continued deviation of the aggregates greater than that derived from economic models,[9] without any reasonable explanation, could be indicative of demand instability and/or the undermining of the macroeconomic relationships guiding interest-rate policy. A change in the composition of the aggregates may point to a change in expected inflation. For example, an increase in the proportion of long-term deposits could indicate a decline in expected inflation.

The *M1 money supply* expanded by 8 percent in 2003, although its development was not uniform in the course of the year: M1 contracted by 0.3 percent during the first half and expanded by 8.0 percent in the second half. The growth in the money supply during the second half of the year can be perceived as a response to the Bank of Israel's cumulative reduction in the interest rate. While the rate of growth in cash component during recent years outstripped that of the demand deposit component, in 2003 the cash component increased by 6.2 percent while the demand deposit component expanded by 9.2 percent. In addition, the development of the two components differed between the two halves of the year. During the first half, when the Bank of Israel's interest rate was still high despite the cuts made in that period, the cash component expanded by 1.2 percent but the demand deposit component contracted by 2 percent. In the second half, following the cumulative reduction in the interest rate, both components increased, by 5 percent and 11 percent respectively.

The *M2* aggregate includes the *M1* money supply and other unindexed local-currency deposits. This aggregate increased by a moderate 2.5 percent in 2003 after contracting by 4.9 percent in 2002 and expanding by 17 percent in 2001. As stated, the rate of increase in the aggregate has slowed considerably since December 2001, initially as a result of the large interest-rate cut at the end of 2001 and the upturn in inflation in 2002, and subsequently due to the abolition of the tax advantage of unindexed local-currency deposits and the consecutive interest-rate cuts in 2003.

[9] An estimate of demand for the monetary aggregates is determined according to the development of real activity, the price level and relative yields. An actual significant deviation of a monetary aggregate from the level derived from the demand equation could indicate the possibility of financial instability and/or the development of a financial bubble.

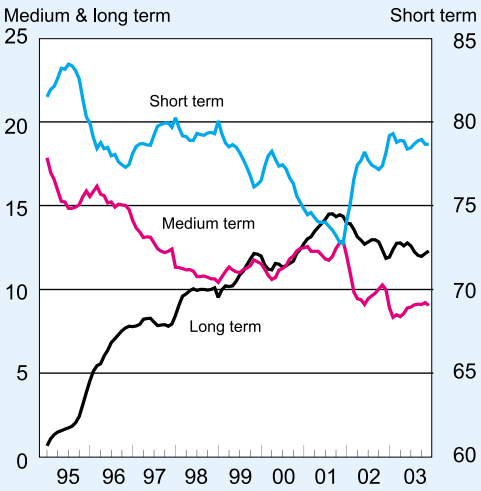
Table 2.6
Rates of Change in the Monetary Aggregates, 1996–2003

	Total credit to public C3	CPI-indexed credit to public	Unindexed NIS credit C1	Credit in and indexed to foreign currency		Monetary aggregates		Monetary base	Change in nominal GDP[c]	CPI
				In $ terms	In NIS terms	M1[a]	M2[b]			
1996	19.5	22.8	13.4	20.0	26.0	6.7	32.2	19.8	16.8	10.6
1997	17.3	17.1	10.1	14.1	23.1	13.9	24.1	16.4	12.4	7.0
1998	19.2	14.8	20.3	5.5	24.6	11.7	19.1	26.1	10.4	8.6
1999	12.7	10.7	15.1	13.2	13.6	14.3	28.3	15.4	9.3	1.3
2000	10.1	2.9	28.9	9.8	6.8	7.5	19.2	11.5	9.0	0.0
2001	8.7	6.7	11.1	6.7	11.8	15.4	17.0	16.1	1.3	1.4
2002	9.7	6.2	5.5	7.0	17.4	4.9	–4.9	4.3	3.4	6.5
2003	–2.7	–5.6	3.1	1.8	–4.7	7.6	2.5	6.3	0.6	–1.9
2000										
I	3.5	–2.0	54.2	4.0	–13.5	–11.2	15.1	1.1		–4.8
II	16.0	7.4	15.7	2.3	13.2	16.3	10.1	9.0		6.6
III	11.1	7.7	26.3	5.9	–0.9	12.1	24.4	8.9		–3.3
IV	10.1	–1.3	22.5	28.1	33.6	15.3	28.0	29.0		1.9
2001										
I	7.7	–1.2	18.9	9.5	18.7	12.2	22.4	17.2		–1.9
II	10.9	13.6	10.2	5.8	5.6	14.0	16.2	12.6		6.6
III	13.3	11.9	4.5	14.3	32.9	34.1	18.3	30.1		3.6
IV	2.5	3.4	11.3	–1.8	–6.0	3.5	11.4	5.7		–2.3
2002										
I	15.1	7.4	–3.2	6.4	50.7	58.8	–21.7	26.1		9.8
II	19.2	11.2	7.9	10.0	38.3	0.0	–1.1	8.0		16.3
III	2.8	8.3	6.3	7.7	–5.9	–18.1	9.0	–11.8		2.6
IV	0.2	–2.0	11.7	3.8	–3.1	–7.0	–3.3	–1.6		–1.8
2001										
I	0.3	–3.3	–4.5	2.1	9.9	7.9	–0.1	18.9		3.2
II	–9.4	–5.6	17.4	–3.5	–32.1	–8.4	–2.9	–11.5		–5.0
III	0.0	–6.2	–6.5	2.6	11.0	24.1	9.8	13.5		–3.9
IV	–1.2	–7.2	7.6	6.4	–0.3	9.5	3.6	7.0		–1.6

[a] M1: cash and demand deposits.
[b] M2: M1 *plus* NIS term deposits *plus* long-term NIS deposits.
[c] During the year.
SOURCE: Bank of Israel and Central Bureau of Statistics data.

These changes were reflected in the composition of the aggregate. In 1999-2001 the M2 money supply was notable for long-term deposits, while the aggregate became more liquid in the first half of 2002 due to the large decrease in the nominal interest rate concurrent with a rise in the inflation rate. The trend towards increased liquidity continued in 2003 as a result of the cuts in the Bank of Israel's interest rate in the course of the year and the tax reform, which reduced the investment feasibility of unindexed local-currency deposits relative to the previous periods. This trend was apparent from the increase in the proportion of short-term deposits (up to three months)

Figure 2.10
Term Composition of M2, 1995–2003 (percent)



SOURCE: Monetary Department, Bank of Israel.

to 78.7 percent at the end of the year, as compared to 72.7 percent in December 2001 (Figure 2.10). The increase in the proportion of short-term deposits came at the expense of the proportion of medium-term deposits, which fell. The proportion of long-term deposits remained practically unchanged.

Total credit to the public (*C3*) contracted by 2.7 percent in 2003 after expanding by an average of 9.2 percent during the previous two years (Table 2.6). Since the decrease occurred despite the fall in the nominal and real interest rates, it mainly derived from a drop in demand for credit that resulted from the continued recession. However, the decrease in the aggregate may also have resulted from the increase in credit risk, which had the effect of reducing supply.

The volume of unindexed credit (C1) grew by 3.1 percent in 2003 compared with 5.5 percent in 2002. The rate of increase in CPI-indexed credit was negative, at minus 5.6 percent compared with an average growth of 6.5 percent during the previous two years.

The weights of the different types of credit changed little. The weight of unindexed credit to total credit rose slightly, from 28.0 percent at the end of 2002 to 29.7 percent. The weight of CPI-indexed credit fell slightly, from 38.8 percent to 37.7 percent, and the weight of foreign-currency-denominated and indexed credit (including direct credit from abroad) dropped from 33.2 percent to 32.6 percent.

g. Real activity

Real activity stabilized in 2003 at the low level that it reached after two years of slowdown, and actually improved to some extent in the second half of the year. The stabilization was reflected *inter alia* by a moderate increase in GDP (1.3 percent), business sector GDP and exports. However, these developments were accompanied by continued slackness in domestic demand and by a fall in per capita GDP. Private consumption per capita, which dropped by 2 percent in 2002, remained unchanged in 2003, and gross domestic investment continued to fall.

If it is on the demand side, recession-level real activity reduces the pressure on prices and thereby moderates an increase in prices. The recession-level economic activity in 2003 did indeed contribute to a decrease in prices, and supported a series of relatively large cuts in the interest rate, mainly in the second half of the year.

Table 2.7
Nominal Labor Cost per Unit of GDP, Unemployment Rate, and Prices, 1995–2003

	Wage per employee post		Business-sector product	Nominal labor cost per unit of business-sector product[a]	CPI	Unemployment rate
	Business sector	Public sector				
	Average annual change over previous year					
1995	10.7	16.0	8.5	9.4	10.0	6.8
1996	12.9	13.4	6.5	11.6	11.3	6.6
1997	12.8	8.9	3.3	11.6	9.0	7.6
1998	8.5	5.8	3.7	5.3	5.4	8.6
1999	9.1	5.4	2.4	8.6	5.2	9.0
2000	7.8	6.5	9.8	1.6	1.1	8.8
2001	4.4	3.8	–2.6	7.2	1.1	9.3
2002	–1.4	1.1	–2.8	1.1	5.7	10.3
2003	–1.7	–3.1	1.8	–4.4	0.7	10.7
	Change compared with previous period, in annual terms					
2001						
I	5.8	5.6	–6.2	8.9	–2.6	8.5
II	0.3	55.1	–5.0	11.1	5.6	8.8
III	–2.8	–10.1	7.4	–8.7	4.0	9.6
IV	10.3	8.6	5.8	6.8	1.3	
2002						
I	–3.6	16.3	–6.9	1.9	6.2	10.4
II	6.8	17.0	12.2	–1.6	13.5	10.3
III	–10.3	–1.0	7.6	–9.7	7.0	10.4
IV	–1.2	–20.7	–6.9	–0.4	0.5	10.2
2003						
I	–0.7	2.1	–6.9	–1.7	0.2	10.8
II	–4.7	–8.8	6.7	–7.4	–1.8	10.6
III	5.0	24.1	26.0	–11.0	–5.0	10.7
IV	–0.7	–16.5	–20.7	16.2	–1.9	10.9

[a] Wages per employee post *less* real business-sector product per labor unit.
SOURCE: Monetary Department, Bank of Israel and Central Bureau of Statistic data.

Developments in real activity during 2003 were affected by the relatively slow rebound in world trade concurrent with the continued slump in world demand for high-tech products, whose proportion in Israel's exports is high, by the serious security situation (for the third consecutive year), and by the cumulative effects of the recession that had lasted since 2001.

One manifestation of the continued recession is the rise in the unemployment rate and appreciably slower rate of increase in nominal and real wages during recent years. The unemployment rate continued to rise in 2003, to 10.7 percent, concurrent with a 2.3 percent decrease in real wages per employee post (FTE) in the business sector. The

development of wages, or more accurately, the nominal cost of labor per (real) unit of GDP can provide an indication of the extent of the pressure from the labor market on prices in the present and the future. An increase in labor cost implies an increase in the expenditures of firms, which try to compensate themselves by raising prices. In 2002, the rate of increase in nominal labor cost per unit of GDP slowed considerably, which may have supported the decline in the inflation rate in 2003 (Table 2.7). Unit labor cost fell significantly in 2003 compared with 2002. In itself, this development could reduce the pressure on prices and possibly even bring down prices in 2004.

h. Econometric models

Concurrent with a judgmental examination of the indicators, the Bank of Israel uses macro-econometric models that it has developed in order to assess expected inflation. These models express the complex relationships between the economic variables and the pass-through mechanisms, and thereby make it possible to examine different economic scenarios and obtain forecasts of the development of expected inflation from these scenarios. The models also make it possible to assess the interest-rate course necessary for attaining the inflation target under different scenarios. However, the models operate in a 'mechanistic' and rigid manner, and are not necessarily suited to the entire range of economic situations and developments, especially when structural changes are occurring in the economy.

In the first quarter of the year, despite the deterioration in the financial markets and increased uncertainty over inflation, the models showed that the level of the interest rate at the time matched the level required for attaining the inflation target one and two years forward. In the second quarter, the models indicated that it would be possible to begin reducing the interest rate gradually. From April to the end of the year, due to the continued improvement in the markets and the unexpected appreciation of the NIS, the models showed that it would be possible to reduce the monetary interest rate faster than they had indicated at the beginning of the year, and the downward course of the interest rate was updated accordingly from month to month.

4. PRICES

a. Price developments

The consumer price index fell by 1.9 percent in 2003. Contributing to the decline in the index was the housing item, which brought the index down by 1.5 percentage points (Table 2.8 and Figure 2.11). The consumer price index excluding the housing item fell by a more moderate 0.5 percent. The development of prices in 2003 was not uniform in the course of the year. In the first quarter, prices rose by 0.8 percent. During the rest of the year, prices fell in most months, and decreased by an overall 2.7 percent. Detailed below are selected price indicators.

Figure 2.11
Development of CPI Items in 2003

SOURCE: Based on Central Bureau of Statistics data.

The housing price index fell by 6.7 percent in 2003 after rising by 5.2 and 8.2 percent in 2001 and 2002 respectively. A decrease of this magnitude in the housing index was unprecedented. Under the current measurement method (in use since January 1999), the index of owner-occupied housing prices is calculated on the basis of apartment rents rather than apartment prices used in the previous method. The relationship between the exchange rate of the NIS against the dollar and the housing price index has strengthened during recent years. This would suggest that in the short run, the impact of exchange rate adjustments on apartment rental fees is greater than their impact on apartment prices. At the beginning of 2003, when the Family Expenditure Survey was updated, the weight of the housing item in the consumer price index was increased from 20.7 percent to 23.2 percent, thereby strengthening the impact of exchange rate adjustments on the housing price index and on the consumer price index as a result. For example, in 2002 the NIS depreciated by 9.8 percent against the dollar and the housing component rose to 8.2 percent, while in 2003 the exchange rate of the NIS against the dollar and the housing component fell by 6.4 and 6.7 percent respectively.

The index of clothing and footwear prices fell by 4.0 percent in 2003, contributing 0.1 of a percentage point to the reduction in the overall CPI. The change in the clothing and footwear index was not uniform throughout the year. During the spring and autumn months, seasonal price increases were recorded at monthly rates of 3 to 8 percent, while in the remaining months of the year prices fell by monthly rates of 4 to 7 percent. The decrease in the clothing and footwear index during 2003 followed a cumulative 13.3 percent decrease in this index during the years 1999 to 2002. The decrease in the prices of clothing and footwear appears to have been affected by the low prices of items imported from the Far East.

The wholesale price index of industrial production rose by 2.9 percent in 2003 following an increase of 5.6 percent in 2002. The wholesale price index reflects the change in the prices of goods that are sold directly from the manufacturers. Although the basket of goods included in the index differs from that included in the consumer price index, during the years 1999 to 2002 they developed at a similar pace. But the development of the two indices during 2003 differed considerably (Table 2.8). Nearly

Table 2.8
Price Developments, 1990–2003

	CPI	Fruit & vegetables	Food	Housing	Apartment maintenance	Clothing & shoes	Education, culture & entertainment	Health	Transport & communication	Core index[a]	Index of controlled & supervised products	Wholesale price index of industrial production[b]
Year-end, percentage annual change												
1990	17.6	4.9	12.7	31.6	19.5	4.3	12.0	17.5	20.1	15.4	19.9	12.6
1991	18.0	14.3	13.0	28.1	12.5	12.8	15.9	19.6	19.1	13.7	18.6	14.6
1992	9.4	14.2	8.9	5.4	8.4	6.6	12.9	20.6	10.6	9.3	12.9	9.1
1993	11.2	–1.2	8.3	23.7	5.3	4.3	11.8	7.4	9.2	7.9	10.0	7.2
1994	14.5	56.1	8.7	23.6	10.4	7.7	10.0	15.8	10.1	9.3	10.9	9.7
1995	8.1	–24.6	9.3	13.6	9.8	6.0	9.0	8.3	8.1	9.2	8.5	10.0
1996	10.6	4.9	11.2	13.2	10.9	5.2	9.8	14.0	10.6	10.2	12.0	6.3
1997	7.0	7.6	8.4	7.5	7.7	–4.4	8.6	9.2	6.6	7.8	6.7	6.5
1998	8.6	11.0	8.6	8.8	8.5	6.7	8.4	9.2	7.1	8.8	6.9	9.3
1999	1.3	6.5	2.9	–0.9	3.1	–4.0	3.3	4.9	0.8	2.4	2.0	1.1
2000	0.0	–5.9	3.3	–2.4	3.1	–0.1	–1.4	3.2	1.1	0.6	2.9	0.8
2001	1.4	6.9	1.1	5.2	0.9	–5.7	–0.3	6.0	–5.0	0.2	1.5	0.5
2002	6.5	–1.2	4.9	8.2	10.7	–3.5	3.5	5.7	9.3	6.9	7.3	5.6
2003	–1.9	4.2	0.3	–6.7	0.0	–4.0	–0.5	–0.4	–0.6	–0.3	–0.6	2.9
Percentage monthly change												
2003												
January	0.2	–1.1	–0.4	0.7	0.6	–6.3	0.1	–0.2	1.8	0.4	0.6	0.2
February	0.4	3.1	–0.2	0.7	1.1	–5.3	0.4	0.0	0.4	0.2	0.7	0.7
March	0.2	4.4	0.4	–0.5	0.8	–4.0	–0.2	0.3	0.8	0.4	0.4	0.6
April	–0.2	4.4	0.7	–2.4	–0.8	4.3	0.3	0.4	1.0	0.5	–0.3	1.2
May	–0.5	7.3	–0.3	–2.4	–0.8	3.8	0.0	0.1	–1.4	–0.5	–0.5	–0.4
June	–0.6	–3.4	0.2	–2.7	–1.0	7.3	–0.1	0.2	0.2	0.0	–0.4	–0.5
July	–0.7	–6.5	0.1	–0.6	–0.4	–5.9	0.1	–0.2	0.0	–0.1	–0.3	–0.5
August	0.2	–1.4	–0.1	1.4	–0.5	–5.1	0.4	–0.1	0.2	0.1	–0.1	–0.2
September	–0.5	–0.2	0.0	0.5	–0.2	–4.2	–0.3	–0.3	–1.5	–0.3	–1.2	0.5
October	0.0	3.3	0.0	–0.2	0.1	3.2	–0.3	–0.5	–0.1	–0.4	0.1	1.0
November	–0.2	0.1	–0.2	–0.3	0.8	3.9	–0.4	–0.1	–1.5	–0.5	0.4	0.4
December	–0.2	–1.1	0.1	–1.0	0.4	5.9	–0.5	0.0	–0.3	–0.2	0.1	–0.1

[a] The CPI excluding housing, fruit and vegetables, clothing and shoes, and price-controlled products.
[b] Excluding fuel.
SOURCE: Central Bureau of Statistics data.

all of the principal components of the wholesale price index rose. The increase derived mainly from the rise in world prices for raw materials, and partly from a large increase in the food component whose weight in the index is very large (20 percent).

The variability of the consumer price index: One reflection of price stability is a relatively low variability in the rate of change in the consumer price index. This variability has two aspects: the inter-month volatility of the index (that is, its variability over time) and the inter-month variability of the components of the index.

Inter-month standard deviation: The standard deviation in the consumer price index fell to 4.0 percent in 2003 compared with 8.5 percent in 2002. This followed an average standard deviation of 5.2 percent during the years 1999-2001 (for a long-term analysis, see Box 2.1).

Standard deviation of the index components: The standard deviation of the index components amounted to 1.9 percent in 2003, similar to the rate in 2002, despite the decrease in prices. During the last decade, the decline in inflation was accompanied by a very moderate decrease in the standard deviation of the index components. During the years 1999 to 2003, the standard deviation amounted to 1.8 percent, compared with 2.0 percent from 1992 to 1998. This was despite the large decline in average inflation during those years, from 10.1 percent to 1.6 percent.

5. SOURCES OF CHANGE IN THE MONETARY BASE, AND MONETARY POLICY INSTRUMENTS

Every month, the Bank of Israel announces the interest rate that it is prepared to pay to the banks for their deposits with it. The public's demand for the monetary base is derived from this interest rate, and the Bank of Israel supplies it via the instruments available to it. A change in the monetary base can derive from three sources: government injections, private sector conversions of foreign currency and the Bank of Israel injection. Given the first two sources, the Bank of Israel determines the volume of its injection/absorption that will supply the amount of monetary base required at the rate of interest that it has determined.

The Bank of Israel has not intervened in foreign-currency trading since the middle of 1997, except for a few days at the beginning of 1998. From that time therefore, the 'foreign-currency conversions in the dealing room' item has not contributed to a change in the monetary base. The monetary base expanded by NIS 3.6 billion in 2003 due to an NIS 2.1 billion injection from the government and national institutions and a Bank of Israel injection of NIS 1.4 billion (Table 2.9).

The Bank of Israel uses various monetary instruments in order to inject or absorb money—auctions for the banks' term deposits with it, short-term debt certificates (Treasury bills), swap transactions and monetary loan quotas. Until 2001, the principal

Table 2.9
Sources of Change in the Monetary Base, 1996–2003

	1996	1997	1998	1999	2000	2001	2002	2003	2003 I	2003 II	2003 III	2003 IV
1. Monetary injection, govt. + Jewish Agency	7,005	1,889	1,901	4,067	–2,729	–2,611	–6,065	3,480	–1,920	754	1,669	2,977
of which: Government	6,096	939	781	3,139	–3,493	–4,341	–7,634	1,969	–2,186	337	1,305	2,513
2. Conversions of foreign currency	5,753	22,817	1,041	237	286	–723	–1,748	–1,358	–230	–265	–370	–493
of which: Dealing room	6,451	23,324	1,746	0	0	0	0					
3. Total (1+2)	12,758	24,706	2,942	4,304	–2,443	–3,334	–7,813	2,122	–2,150	489	1,299	2,484
4. Monetary injection by Bank of Israel	–8,958	–21,036	–2,700	–381	2,754	7,697	9,251	1,448	3,452	–1,518	–1,003	517
of which: Monetary loan	–3,052	470	–631	–12	–3	21	68	–236	–73	–5	–5	–153
Treasury bills	–1,912	–1,059	–2,794	–1,843	–4,855	–4,866	–8,566	–9,387	–2,330	–2,395	–3,967	–695
Swaps–5,146	–917	1,111	–892	–20	145	–252	–573	379	–196	603	–113	85
Banks' term deposits	–5,000	–27,500	–7,500	–8,700	–1,800	5,500	10,500	2,243	4,500	–1,000	1,500	–757
Interest[a]	276	3,420	4,957	5,825	4,492	3,411	2,679	2,772	889	765	622	496
5. Change in monetary base	3,801	3,670	242	3,927	311	4,363	1,437	3,568	1,303	–1,029	292	3,002

[a] Excluding Treasury bills.
SOURCE: Bank of Israel.

instrument used in the management of the current liquidity system took the form of auctions for the banks' term deposits at the Bank of Israel. This situation changed at the end of 2001, when as part of the structural changes in the financial markets it was decided to remove the Treasury bill ceiling that was anchored in the law until then. Although the issue of Treasury bills to the public serves as a monetary instrument that is similar in its effect to the banks' deposits at the Bank of Israel, while Treasury bills are traded in the stock market after being issued and are open to investment by the general public, deposits at the Bank of Israel are permitted only to the banks and are not tradable. The removal of the Treasury bill ceiling makes it possible to increase issues of Treasury bills at the expense of deposits at the Bank of Israel, with the result that the public can also benefit from this monetary instrument. The expansion of issues increases the tradability of Treasury bills in the stock market, enhances the operation of the secondary market, and thereby helps to create the infrastructure that is essential for the development of the money market.

Following the removal of the Treasury bill ceiling, the Bank of Israel increased its issues of Treasury bills to the public and reduced the banks' deposits with it (Table 2.10). The balance of Treasury bills rose from NIS 42.6 billion at the end of 2002 to NIS 57.7 billion at the end of 2003. Concurrently, the balance of deposits from the banks at the Bank of Israel fell from NIS 33.5 billion at the end of 2002 to NIS 25.6 billion at the end of 2003. The banks' deposits at the Bank of Israel are for a period of a day and a week (Table 2.11).

Table 2.10
Monetary Instruments,[a] December 2002–December 2003

(monthly averages, NIS million)

	Total deposits	Deposit		Treasury bills total	*of which:* held by banks	Total deposits *plus* Treasury bills
		Daily	Weekly			
December 2002	33,484	13,484	20,000	42,589	5,020	76,073
2003						
January	34,144	13,241	20,903	43,437	3,298	77,581
February	35,096	13,846	21,250	44,413	2,456	79,509
March	32,437	12,437	20,000	46,666	1,627	78,103
April	31,566	12,966	18,600	45,703	1,893	77,269
May	30,400	12,077	18,323	46,957	2,063	77,357
June	29,487	11,420	18,067	48,663	2,895	78,150
July	29,866	11,866	18,000	49,874	3,208	79,740
August	28,296	10,457	17,839	51,259	2,907	79,555
September	29,996	11,529	18,467	52,434	3,175	82,430
October	32,758	10,693	22,065	53,924	3,659	86,682
November	27,449	10,082	17,367	56,037	5,321	83,486
December	25,637	9,960	15,677	57,746	6,816	83,383

[a] Unindexed resident time deposits (*Pazak*) *plus* Treasury bills.
SOURCE: Monetary Department, Bank of Israel.

Table 2.11
Monetary Deposits, 2001–2003

(total system, quarterly average)

	Utilization of auction deposits				Cost of auction deposits		
	Daily	Weekly	Monthly[a]	Total	Daily	Weekly	Monthly
	NIS million				*percent*		
2001							
IV	9,585	11,873	24,000	45,422	6.20	6.24	6.46
2002							
I	8,589	9,178	19,600	37,367	4.20	4.20	4.20
II	8,608	7,011	15,385	31,004	5.60	5.54	5.33
III	12,913	19,130	1,542	32,043	9.65	9.63	7.57
IV	12,663	20,000	–	32,663	9.64	9.62	–
2003							
I	13,152	20,700	–	33,852	9.45	9.40	–
II	12,153	18,330	–	30,483	8.81	8.78	–
III	11,282	18,098	–	29,380	7.30	7.30	–
IV	10,247	18,380	–	28,627	5.99	5.87	–

[a] The monthly auction was stopped on 16 July 2002.
SOURCE: Monetary Department, Bank of Israel.

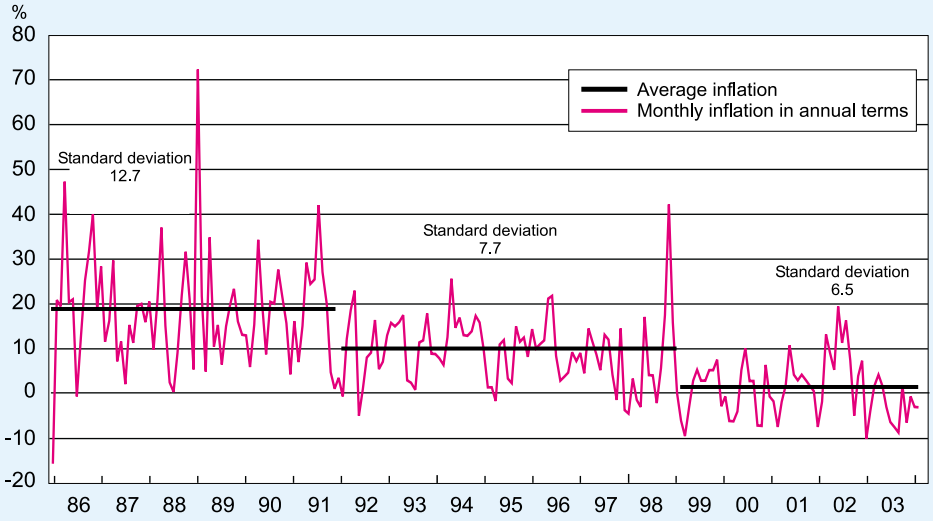
Box 2.1
Inter-Month Standard Deviation at Different Inflation Rates in Israel and Selected Developed and Developing Countries

One of the phenomena characteristic of high inflation is the associated uncertainty, which is reflected *inter alia* by the inter-month standard deviation of the rate of increase in the price index.

The decline in inflation in Israel during the last decade was accompanied by a decrease in the standard deviation of the monthly rate of changes in prices. During recent years however, the level of the latter remained high relative to average inflation and the level prevailing in other countries with similar rates of inflation to Israel (Figures 2.12 and 2.13).

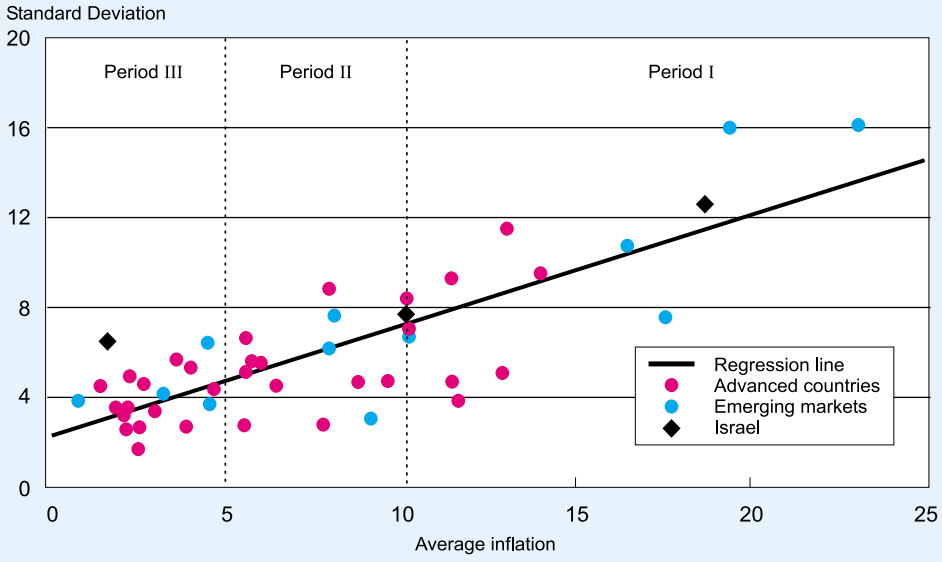
The passage of time between the 1985 economic stabilization program and the present can be divided into three main periods with respect to the development of inflation. In the first period, from January 1986 to December 1991, the inflation rate averaged 18.7 percent and its standard deviation was 12.7 percent. In the second period, from January 1992 to December 1998, the inflation rate fell considerably, to 10.1 percent, and its standard deviation dropped to 7.7 percent. In the third period, from January 1999 to December 2003, inflation continued to slow and averaged 1.6 percent, but its standard deviation remained high at 6.5 percent (Table 2.12 and Figure 2.12).

Figure 2.12
Monthly Inflation in Israel, 1986–2003 (in annual terms)



SOURCE: Based on Central Bureau of Statistics data and Bank of Israel.

Figure 2.13
The Scatter of Inflation Rates and Standard Deviations in Selected Countries[a]



[a] For definitions of the periods see Table 2.12
SOURCE: Based on IMF data.

Table 2.12
Standard Deviations of Rates of Inflation in Selected Countries[a]

	Period I Inflation 10–20 percent			Period II Inflation 5–10 percent			Period III Inflation 0–5 percent		
	Average inflation	Standard deviation	Coefficient of variation	Average inflation	Standard deviation	Coefficient of variation	Average inflation	Standard deviation	Coefficient of variation
Israel	**18.7**	**12.7**	**0.7**	**10.1**	**7.7**	**0.8**	**1.7**	**6.5**	**3.8**
Italy	12.9	5.1	0.4	5.5	2.8	0.5	2.5	1.7	0.7
Portugal	23.1	16.1	0.7	10.2	6.7	0.7	3.2	4.2	1.3
UK	13.0	11.5	0.9	5.6	6.6	1.2	2.6	4.6	1.8
US	8.8	4.7	0.5	3.8	2.7	0.7	2.5	2.7	1.1
Mexico	17.6	7.6	0.4	9.1	3.1	0.3	4.5	3.7	0.8
Sweden	11.5	9.3	0.8	7.9	8.8	1.1	1.4	4.5	3.2
Poland	16.5	10.7	0.6	7.9	6.2	0.8	0.8	3.9	4.9
Denmark	10.2	7.1	0.7	3.6	5.7	1.6	2.2	3.5	1.6
Belgium	11.5	4.7	0.4	6.4	4.5	0.7	2.1	3.2	1.5
Canada	9.6	4.7	0.5	4.6	4.4	1.0	1.8	3.6	2.0
France	11.6	3.8	0.3	7.8	2.8	0.4	2.1	2.6	1.2
Korea	19.4	16.0	0.8	8.1	7.6	0.9	4.5	6.4	1.4
Norway	10.2	8.4	0.8	5.7	5.6	1.0	2.2	4.9	2.2
Ireland	–	–	–	6.0	5.5	0.9	4.0	5.3	1.3
Spain	14.0	9.5	0.7	5.6	5.1	0.9	2.9	3.4	1.2
Average	13.9	8.8	0.6	6.7	5.4	0.8	2.6	4.0	1.9

Definitions of Periods for Each Country

	Period I	Period II	Period III
Israel	12/1991–01/1986 (72)	12/1998–01/1992 (84)	12/2003–01/1999 (60)
Italy	02/1985–01/1982 (38)	06/1995–03/1985 (124)	07/2003–07/1995 (97)
Portugal	08/1985–08/1978 (85)	04/1994–09/1985 (104)	07/2003–05/1994 (111)
UK	12/1982–01/1970 (156)	12/1992–01/1983 (120)	07/2003–01/1993 (127)
US	12/1982–01/1973 (120)	12/1992–01/1983 (120)	07/2003–01/1993 (127)
Mexico	04/1999–01/1997 (28)	12/2000–05/1999 (20)	07/2003–01/2001 (31)
Sweden	02/1978–01/1974 (50)	02/1993–03/1978 (179)	08/2003–02/1993 (127)
Poland	02/1998–02/1996 (25)	05/2001–03/1998 (39)	07/2003–06/2001 (26)
Denmark	05/1984–03/1979 (63)	12/1992–06/1984 (103)	08/2003–01/1993 (128)
Belgium	02/1977–01/1974 (38)	07/1985–03/1977 (101)	08/2003–08/1985 (217)
Canada	06/1983–01/1974 (114)	06/1991–07/1983 (96)	07/2003–07/1991 (145)
France	04/1982–05/1973 (109)	05/1985–05/1982 (36)	08/2003–06/1985 (219)
Korea	12/1981–01/1975 (84)	04/1991–03/1987 (50)	08/2003–05/1991 (148)
Norway	05/1982–01/1974 (101)	02/1993–06/1982 (129)	08/2003–03/1993 (125)
Ireland	–	07/2001–12/1999 (20)	08/2003–08/2001 (25)
Spain	12/1986–02/1977 (120)	08/1995–01/1987 (104)	06/2003–09/1995 (94)

[a] Inflation is the monthly change, in annual terms.
The numbers in parentheses are numbers of observations or months in each period.
For Ireland, unlike the other countries, inflation was within the relevant ranges in only two periods.
SOURCE: Based on IMF data.

In order to compare price volatility in Israel and other countries, we selected a group of developed and developing countries where, as in Israel, high inflation rates prevailed in the past then fell continually until consolidating at a low level. With each country, we selected inflation rates and a standard deviation during three periods, which were determined in accordance with the development of inflation in Israel (Table 2.12 and Figure 2.13).

The relationship between the standard deviation and average inflation is defined by means of the ratio between them (the coefficient of variation). Data in different countries show that in the transition from the first to the second period, that is from double-digit to (high) single-digit inflation, the standard deviation of inflation fell significantly as well. However, the decrease in the standard deviation appears to have been somewhat more moderate than the decline in inflation, as reflected by the increase in the coefficient of variation. The comparatively moderate decrease in the standard deviation is more evident in the transition from the second to the third period, that is from single-digit inflation to price stability (inflation of less than 5 percent). In all the countries, the transition from the second to the third period is reflected by an increase in the coefficient of variation.

Figure 2.13 shows the scatter of the standard deviation and average inflation in the different countries during the three periods, and presents the regression line that passes between these points. A positive correlation is apparent between the standard deviation and inflation: The higher the level of average inflation, the larger is the standard deviation. Since the slope of the line is less than 45 degrees, this means that when inflation is falling, the standard deviation is falling with it but more slowly, with the result that the coefficient of variation increases.

The table and the figure also show that developments in Israel were unexceptional relative to the other countries during the first and second periods. In the third period however, during the period of price stability that is, the standard deviation in Israel exceeded that in the other countries. This could indicate that the decrease in prices in Israel has yet to become firmly established.