Chapter 4
The Securities Market

Yields-to-maturity on government bonds and Treasury bills rose during 2002, after falling in 2001. In the equity market, prices fell heavily for the second consecutive year concurrent with the downturn in share prices abroad.

The development of yields-to-maturity on unindexed bonds was not uniform in the course of the year. During the first half of the year, yields-to-maturity, on CPI-indexed government bonds, unindexed bonds and Treasury bills exceeded their level in 2001, and the slopes of the yield curves became positive and steeper. In the same period, the implied volatility of shekel-dollar options issued in the Bank of Israel's weekly tenders rose considerably leading to a very large growth in turnover in options and futures contracts in the stock market and in the banking system.

During the second half of the year, following consecutive increases in the Bank of Israel's shekel interest rate, the large upturn in yields ceased, and the slopes of the Treasury yield curve became negative, reflecting expectations of a reduction in the interest rate within the term of the year. However, the level of bond yields and the level of uncertainty during that period, as reflected by derivatives trading, remained high. Yield developments during 2002 were accompanied by a large growth in average daily turnover in CPI-indexed bonds, Shahar fixed-rate unindexed bonds and Treasury bills series.

Although subject to uncertainty, the markets managed to function well as investors engaged in diverse areas of activity, and turnover in assets and derivatives increased.

The composition of the government's issues of trabable bonds changed during the second half of the year. Issues of unindexed bonds decreased, issues of CPI-indexed bonds increased, and the term-to-maturity of the bonds that were issued contracted.

1. MAIN DEVELOPMENTS

Nominal and real yields-to-maturity rose during 2002. Yields-to-maturity increased by an average of 4 percentage points on unindexed bonds, 3 percentage points in the Treasury bill market, and 1.5 percentage points in CPI-indexed bonds. In the equity market, prices fell heavily for the second consecutive year concurrent with the downturn in prices in foreign equity markets — principally in the shares of high-tech companies. The high level of uncertainty during 2002 was reflected by the level of activity in derivative financial assets and the pricing of these assets, indicating the extent of the risk as perceived by the investor public.

The development of bond yields differed notably between the first and the second half of the year.

Following the 2 percentage point reduction in the Bank of Israel's interest rate at the end of 2001, the first half of the year began with an upsurge in inflation expectations and a large rise in the dollar exchange rate. By March, yields-to-maturity on bonds and Treasury bills had already exceeded the level at the end of 2001, and the slope of the yield curve became positive and steeper. Concurrent with these developments, the implied volatility of the shekel-dollar options issued in the Bank of Israel's weekly tenders increased considerably. Turnover in options and futures contracts in the stock market and in the banking system also increased. These developments were indicative of the very high level of uncertainty in the first half of the year compared with previous years. This uncertainty derived from a number of factors, including the continued recession, the deterioration in the security situation and an over-expansionary macroeconomic policy (see Chapter 2 for details).

During the second half of the year, in July and August, following a series of rises in the Bank of Israel's interest rate, the dollar exchange rate and inflation expectations fell, the large upturn in yields ceased, and the slope of the Treasury bill curve became negative, reflecting expectations of a reduction in the interest rate within the term of a year. However, the level of bond yields and the level of uncertainty during that period as reflected by derivatives trading remained high.

Yields on CPI-indexed and unindexed bonds rose in September and October, mainly due to the growing uncertainty in the bond market, which was also reflected by the lowering of the rating of the country's three largest banks, by fears that Israel's debt rating would be reduced and by the threat of war with Iraq.

During the last months of the year and mainly in December, yields on unindexed and CPI-indexed bonds fell among all terms to maturity, thereby partly offsetting the rise in yields that was recorded in September and October. Treasury bill yields fell more heavily and reached the same average level as that recorded in June. However, the slope of the Treasury bill yield curve was negative, reflecting expectations of an interest rate reduction within the term of the year. The fall in Treasury bill yields towards the end of the year is attributed to the fact that the tax reform will not apply to Treasury bills during 2003.

Despite the numerous elements of uncertainty that affected developments in the financial markets during 2002, the markets managed to function well as investors engaged in diverse areas of activity, and turnover in assets and derivatives increased considerably. An impressive growth was recorded in average daily turnover in bonds, Treasury bills and derivatives. This increase came in response to developments in the market, and was facilitated by the infrastructure built during recent years, including the introduction of the *Retzef* method of trading.

The indexation composition and term-to-maturity of marketable government bond issues changed during 2002. The proportion to total issues of unindexed bonds decreased, while the proportion of CPI-indexed bonds increased. In addition, the term-to-maturity of the government bonds issued was reduced, among both CPI-indexed bonds and fixed-rate Shahar unindexed bonds.

2. THE TREASURY BILL AND GOVERNMENT BOND MARKETS

a. The Treasury bill market

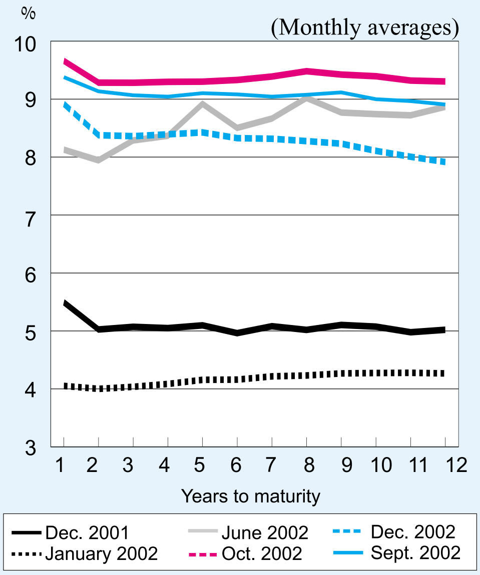
(1) The Treasury bill yield curve

Treasury bills are unindexed discount bonds that are issued for terms-to-maturity of up to one year. The Bank of Israel sells this instrument to the public as one of the tools used in managing its monetary policy.

Yields-to-maturity in the Treasury bill market rose by 3 percentage points during 2002 compared with December 2001, and reached a particularly high average level of over 9 percent in October (Figure 4.1). This compares with the downtrend in yields-to-maturity during the years 1999-2001, concurrent with the downturn in inflation expectations and the reductions in the Bank of Israel's interest rate during those years.

In the first half of the year, yields rose among all terms-to-maturity, from an average level of 5 percent in December 2001 to an average level of 8.6 percent in June 2002, and the slope of the yield curve became positive compared with the negative

Figure 4.1
Treasury Bill Yield Curve,
Dec. 2001–Dec. 2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

slope recorded in December 2001. The change in the curve appears to have reflected an increase in the risk premium and expectations of a rise in the Bank of Israel's interest rate as a result of the high level of uncertainty in the market, which was caused by the security situation, the state of the economy, the upsurge in inflation expectations and the depreciation of the shekel. The curve did not rise immediately. At the beginning of the year, following the 2 percentage point cut in the Bank of Israel's interest rate at the end of December 2001, yields-to-maturity fell to an average level of 4 percent, and it was only in March that yields exceeded their level of December 2001.

In the second half of the year, following the Bank of Israel's interest rate hikes, the fall in inflation expectations and the appreciation of the shekel, Treasury bill yields rose, principally among short terms. Although the yield curve remained at a high level of 8.3 percent, its slope became negative, reflecting expectations of a reduction in the interest rate within the term of the year. The slope of the yield curve did not develop in a uniform manner: From July, the slope rose and peaked in October, due to fears that Israel's debt rating would be reduced and the threat of war with Iraq. From November and particularly in December, this rise was offset, and the curve reverted to its average level in June but with a negative slope (compared with a positive slope in June).

(2) Activity in the Treasury bill market

The quantitative restriction on Treasury bill issues was lifted in February 2002.[1] At the end of 2002, the balance of Treasury bills held by the public totaled NIS 44 billion, compared with NIS 35.6 billion in 2001 and NIS 30.5 billion in 2000. The Bank of Israel thereby absorbed a net amount of NIS 6 billion by means of Treasury bills in 2002, compared with an absorption of NIS 2.5 billion in 2001 and an absorption of NIS 2.1 billion in 2000.

The removal of the Treasury bill ceiling makes it possible to swap the banks' deposits at the Bank of Israel, which are not tradable, with Treasury bills that are traded in the stock market. The removal of the ceiling thereby contributes to increased tradability in the Treasury bill market, and to an improvement in the pass-through mechanism between the system of interest rates in the economy. The lifting of this restriction has also paved the way for the development of the infrastructure that is essential for increasing the sophistication of the money market, and for enhancing the pass-through mechanism of monetary policy.

Average daily turnover in Treasury bills increased substantially during 2002, and amounted to NIS 350 million compared with NIS 200 million in 2001 (Table 4.1). Turnover was high during all months of the year, and from September, when the level of uncertainty increased and led to a rise in yields-to-maturity on Treasury bills, turnover rose even more, and towards the end of the year exceeded a daily average of NIS 500

[1] The ceiling on Treasury bill issues was set at NIS 15.5 billion in 1995 and was adjusted once every half year, in accordance with the cumulative change in the consumer price index or the cumulative change in the means of payment, whichever was higher (see Box 4.1 in the section on the Monetary Department in the Bank of Israel's Annual Report for 2001.)

Table 4.1
Average Daily Turnover in Treasury Bills and Bonds, 1999–2002

(NIS million, current prices)

	Treasury bills	Unindexed bonds Total	*Shahar*	*Gilon*	CPI-indexed bonds	Dollar-indexed bonds
1999	163	106	62	44	105	45
2000	192	147	81	65	92	55
2001	199	316	217	99	135	85
2002	354	411	297	114	249	87
	Stock exchange trades as percentage of total trades					
1999	91	84	87	78	71	74
2000	90	83	82	84	62	81
2001	89	77	78	76	68	77
2002	93	89	89	87	84	86

SOURCE: Based on data from TASE.

million. The tax reform contributed to growth in turnover because under the reform, in 2003 investment in Treasury bills will confer a tax advantage compared with other forms of investment. As in previous years, particularly high turnover was recorded in long-term series for a year.

The distribution of Treasury bill holdings shows that the balance held by the public rose considerably, from 24 percent at the end of 2001 to 62 percent at the end of 2002, mainly at the expense of the banks, whose share fell from 24 percent to 9 percent respectively, and the mutual funds, whose share fell from 43 percent to 26 percent respectively, following a consistent increase in the mutual funds' holding ratio from 1996 until 2001. The decrease was centered in the second and third quarters of the

Table 4.2
Distribution of Holders of Bonds and Treasury Bills, 2001–2002

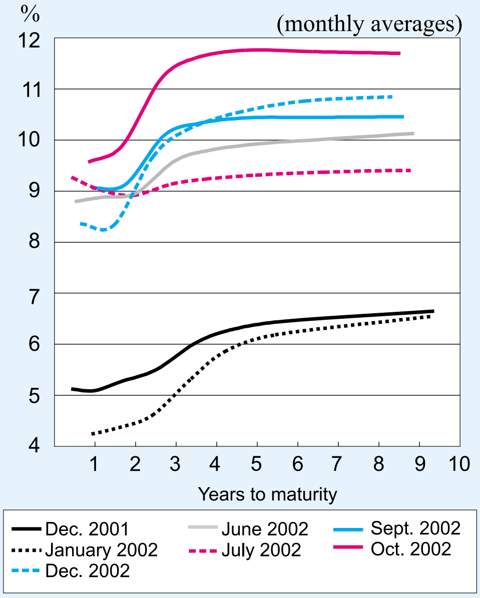
(percent)

	Treasury bills		Unindexed bonds (*Shahar*)		CPI-indexed bonds		Dollar-indexed bonds		Traded corporate bonds		Shares[a]	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
The public, directly	24.1	62.2	13.3	17.2	12.7	14.9	9.3	18.1	16.3	19.2	71.2	71.1
Mutual funds	43.4	26.1	32.7	17.4	4.1	2.6	31.1	27.7	3.0	2.3	2.8	1.9
Provident funds	5.0	1.5	32.3	35.2	55.7	49.7	21.3	14.1	53.6	51.9	9.2	8.9
Banks	24.1	8.8	7.8	12.7	12.8	15.2	32.1	34.1	13.4	10.6		
Nonresidents	0.4	0.5	0.5	2.5	0.1	0.1	0.6	1.4	0.1	0.2	8.7	10.0
Bank of Israel/govt.											5.6	5.1
Insurance firms	2.6	0.7	13.0	14.2	13.0	13.4	5.0	4.2	13.6	15.8	2.5	3.0
Pension funds	0.3	0.1	0.4	0.9	1.6	4.1	0.6	0.4				
Total[b]	100	100	100	100	100	100	100	100	100	100	100	100

[a] The government holds shares directly.
[b] Excluding Bank of Israel.
SOURCE: Based on banks' balance sheets, and TASE, the Securities Authority, the Capital Market, Department of the Ministry of Finance, and the Foreign Exchange Activity Department of the Bank of Israel.

year, due to large-scale redemptions from the mutual funds. From October, the holding ratio of the mutual funds and the public increased at the expense of the banks, due to the impact of the tax reform among other reasons. The public's and the mutual funds' purchases of Treasury bills from the banks towards the end of the year, purchases that were affected by the tax reform, may have contributed to the fall in Treasury bill yields (Table 4.2).

Figure 4.2
Unindexed Bond Yield Curve
Dec. 2001–Dec. 2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

b. The government bond market

(1) The unindexed bond yield curve

Shahar is a fixed-rate unindexed government bond, and is issued for longer terms than Treasury bills.

Yields on unindexed bonds rose by an average of 4 percentage points in 2002, and reached an average level of 10 percent of the end of the year compared with 6 percent in December 2001. The rise in yields-to-maturity during the year encompassed all terms-to-maturity, and peaked in October (Figure 4.2).

During the first half of the year, yields rose sharply among all terms-to-maturity, from an average level of 6 percent in December 2001 to an average level of 9.6 percent in June 2002. The positive slope of the yield curve became steeper compared with December 2001, which appeared to imply that the expectations of a rise in the interest rate in the long term as well had increased. The yield curve did not rise immediately. At the beginning of the year, yields-to-maturity fell compared with December 2001 while from March, the curve rose. The rise in long-term yields reflected the large government bond issues and the level of issues expected in the future, which led to increased doubts over the government's commitment to reducing the budget deficit and the public debt during the coming years. Since most government bond issues during the first half of the year consisted of Shahar bonds, the yields on these bonds increased.

During July and August, in response to the Bank of Israel's large interest rate hikes in June and to the policy measures approved by the government for halting the growth in the budget deficit, the rise in yields ceased and the yields on medium and long terms fell. As a result, the slope of the yield curve, which was strongly positive in June, became more flat.

As the level of uncertainty increased in September and October, the rise in unindexed bond deals resumed, principally among medium and long terms, and the almost completely flat yield curve took on a steep positive slope. Long-term yields thereby reached a level over 11.5 percent, and short-term yields amounted to 9.5 percent. The steep slope of the yield curve appeared to reflect expectations of a continued rise in the nominal interest rate in the medium and long term over and above the risk premium, which was affected by the high level of uncertainty and the government’s expansionary macroeconomic policy. Nevertheless, the market performed well as investors engaged in diverse areas of activity, and turnover increased.

During the last months of the year and especially in December, yields fell among all terms. Short-term yields amounted to 8.5 percent and yields on medium and long terms averaged 10.5 percent, thereby partly offsetting the rise in yields that was recorded in September and October.

Developments in yields and the slope of the yield curve during the second half of the year were affected by the tax reform, under which bonds issued after May 2000 are to be taxed with effect from 2003 as compared to bonds issued before that date, which will not be taxed.

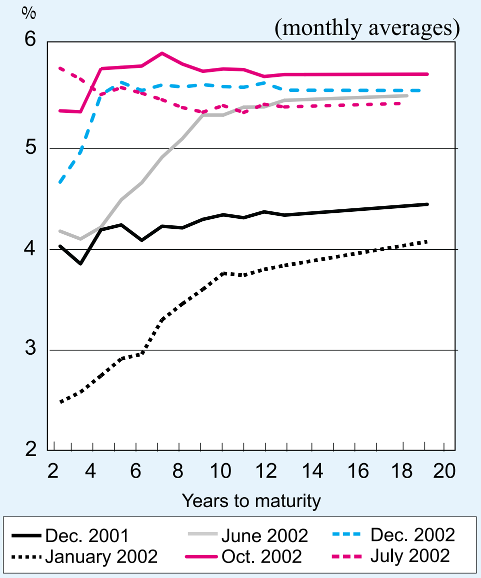
(2) The CPI-indexed bond yield curve

Galil is a CPI-indexed government bond that bears a fixed annual rate of interest.

Yields on CPI indexed bonds rose by an average of 1.5 percentage points during 2002 and reached an average level of 5.4 percent at the end of the year compared with 4 percent in December 2001. Developments in the CPI-indexed bond yield curve during the year can be divided into several periods (Figure 4.3). During the first half of the year, yields rose among all terms-to-maturity, and the slope of the yield curve was more steeply positive than in December 2001. During the second half of the year, yields rose more moderately although they remained at a high level, which was indicative of the high level of uncertainty in the area of real activity as well.

In January and December 2002, following the Bank of Israel’s 2 percentage point cut in the interest rate in December 2001, the CPI-indexed yield curve fell and took on a positive slope compared with an almost completely flat slope in December 2001. In March, as the security situation deteriorated and the government’s commitment to fiscal discipline (that was made prior to the surprise cut in the interest rate), the yield curve began to rise among all terms-to-maturity. In June, the curve reached an

Figure 4.3
CPI-Indexed Bond Yield Curve, Dec. 2001–Dec. 2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

average level of 4.6 percent and its slope was strongly positive. The developments in the curve resulted *inter alia* from the extensive government bond issues during that period, which exceeded their planned level by over 90 percent according to the budget plan.

During the second half of the year, following successive rises in the Bank of Israel's interest rate, the increase in the real short-term interest rate and the measures taken by the government to reduce the government deficit, yields rose among short and medium terms, and the slope of the curve became moderately negative, principally among terms of over 4 years to maturity, compared with a strongly positive slope in June. The change in the yield curve apparently reflected expectations of a reduction in the interest rate in the long run. Following the rise in yields among medium and short terms and the flattening out of the yield curve in July, from August and until the end of the year, yields were volatile. This volatility was reflected by a moderate rise in yields in October, and by a fall in yields during November and especially in December.

(3) Activity in the government bond market

The development of yields in the bond market was accompanied by very high turnover compared with previous years (Table 4.1). Average daily turnover on and off the stock exchange rose sharply in 2002 and averaged NIS 750 million, compared with NIS 540 million in 2001. This was in contrast to the equity market, where low turnover was recorded in the continuation of the trend which began in 2001. However, bond market turnover levels are still low by world standards.

The growth in turnover during 2002 encompassed all types of bonds. A particularly large increase was recorded in average daily turnover in Galil CPI-indexed bonds and in Shahar unindexed bonds. Daily turnover on the stock exchange during 2002 averaged NIS 210 million in CPI-indexed bonds, more than 2.5 times the average turnover in 2001, and NIS 265 million in Shahar unindexed bonds compared with NIS 150 million in 2001. The diversified activity and growth in turnover during this period of high uncertainty indicates that the markets performed well, as stated.

Although CPI-indexed bonds rose appreciably during the year, fixed-rate unindexed bonds are still the most highly traded bonds. It should be noted that the tradability of floating-rate Gilon unindexed bonds is far lower. The pricing of these bonds is relatively complex, because although they are not indexed, they contain an indexation component.[2] There is therefore no justification for continuing to issue these bonds, and it is important to increase issues of fixed-rate unindexed government bonds instead, while extending their term-to-maturity.

(4) The short sale market

In a short sale, an investor sells a security that he does not own but has borrowed from another investor, after having undertaken to return it to its owner by a specified date in the future. Such activity can constitute a substitute for credit or can derive from

[2] In Brazil for example, bonds of this type are issued and defined as indexed bonds.

speculative considerations. The development of the market for these transactions could increase the sophistication and the liquidity of the capital market, as well as the potential turnover of the securities that are traded in it.

Table 4.3
Government Borrowing, 2000–2002

(NIS billion, current prices)

	2000	2001	2002 I	2002 II	2002 III	2002 IV	2002	Budget proposal 2002
1. Overall surplus (+) / deficit (-) (excl. credit extended)	–3.2	–21.0	1.0	–7.3	–3.4	–9.7	–19.3	–19.3
2. Domestic surplus (+) / deficit (-) (excl. credit extended)	–2.5	–16.9	–2.6	–4.4	–2.4	–9.9	–19.2	–17.6
3. Total net borrowing (domestic and abroad)	3.2	19.8	10.4	4.2	5.1	2.1	21.7	22.7
4. Net domestic borrowing	2.4	16.2	9.7	4.4	5.1	5.1	24.3	23.7
of which Tradable	1.2	12.3	7.5	3.1	5.3	5.5	21.5	14.2
Gross domestic borrowing								
Tradable	20.8	39.5	13.4	9.0	9.1	13.4	44.9	42.9
Non-tradable	10.8	12.9	4.3	2.8	3.6	1.4	12.1	13.5
Total	31.7	52.4	17.7	11.9	12.8	14.7	57.0	56.4
6. Privatization	2.9	0.18					0.35	1.5
7. Domestic redemptions (principal)[a]								
Tradable	19.7	27.2	5.9	5.9	3.8	7.8	23.5	28.7
Non-tradable	12.5	8.7	2.1	1.6	3.8	2.2	9.7	3.5
Reserve		0.5	0.0	0.0	0.0	0.0	0.0	2.0
Total	32.2	36.4	8.0	7.5	7.7	10.0	33.2	34.2
8. Net borrowing abroad	0.8	2.9	0.7	–0.2	–0.1	–3.0	–2.6	–1.0
9. Injection (-) / absorption (+)	–0.1	–0.7	7.1	0.1	2.7	–4.8	5.1	6.1

[a] Excluding national insurance.
SOURCE: Based on data from the Ministry of Finance.

The short sales market has expanded considerably during recent years, from NIS 96 million at the end of 1998 to a billion shekels at the end of 2000 and NIS 2.3 billion at the end of 2002, similar to its size at the end of 2001. The growth in short sales turnover will contribute to the establishment of a Repo market as elsewhere in the world, and vice versa of course (see Box 4.2 in the section on the Monetary Department in the Bank of Israel's Annual Report for 2001).

The short sales market includes transactions in Treasury bills and CPI-indexed and unindexed government bonds. Interest appears to be centered among Treasury bills, which constitute 55 percent of outstanding transactions. The proportion of Treasury bills in short sales transactions increased from 32 percent in 2001 to 55 percent in 2002, at the expense of a decrease in the proportion of fixed-rate Shahar bonds, from 26 percent in 2001 to 6 percent in 2002. This large drop in short sales in Shahar bonds was recorded towards the end of the first half of the year, concurrent with a large rise in yields on these bonds. The minor, NIS 11 million balance of Gilon bonds, less than one percent of outstanding transactions in the short sales market, is indicative of the relative unattractiveness of these bonds in the short sales market, as in the entire bond market.

(5) Distribution of bond holdings

An examination of the composition of Shahar unindexed bond holdings shows that the proportion held by the mutual funds fell in 2002 as the result of large-scale redemptions, while other investors and the banks increased their holdings of these bonds (Table 4.2). This development was not uniform in the course of the year.

The mutual funds reduced their holdings of Shahar bonds during the second quarter of the year in response to the large-scale redemptions from the funds in that period. These withdrawals forced the funds to realize assets, including their holdings of Shahar bonds, on which the yield rose sharply.

The provident funds exploited the rise in yields in order to increase their holdings of Shahar bonds. This was despite the net withdrawals of money from the funds during the same period, although the extent of the withdrawals was not exceptional. As a result, the proportion of the provident funds' holdings of Shahar bonds increased during this period. Other institutional investors, such as the insurance companies, the advanced study funds and the new pension funds, also increased their holdings of Shahar bonds during the period, albeit to a more moderate extent. Since it can be assumed that the growth in institutional investor's holdings of Shahar bonds helped to moderate the rise in yields, they played a stabilizing role in the market.

During July and August, the majority of institutional investors increased their holdings of Shahar bonds, apparently due to expectations that a rise in the Bank of Israel's interest rate would stabilize the markets, halt inflation and subsequently lead to a reduction of the interest rate, which would produce capital gains for them on their investment in Shahar bonds. But in mid-September, the financial markets became nervous again and Shahar yields rose. This time however, the redemptions from the mutual funds were relatively moderate. As a result, the funds were not forced to sell Shahar bonds at any price, and obviously did not account for the rise in yields. The mutual funds hardly changed their holdings of Shahar bonds during September. Other institutional investors, principally the banks and the advanced study funds, increased their holdings of Shahar bonds, and thereby maintained the proportion of these bonds in their asset portfolio. Only the provident and severance payments funds reduced the proportion of Shahar bonds in their asset portfolios. But since the decrease in the value of Shahar holdings matched the rate of price decreases, these sales did not appear to be substantial. During the last quarter of the year, the banks increased their holding ratio of Shahar bonds, mainly at the expense of the mutual funds, which apparently preferred to move to Treasury bills as a result of the tax reform.

The change in the distribution of CPI-indexed bond holdings was different. The share of the provident funds, which hold the majority of bonds of this type, fell by 6 percentage points to 50 percent, while the banks' share rose by 2.5 percentage points to 15 percent. The concentration of CPI-indexed bonds at the provident funds is attributed to the structure of the market, whereby long-term saving consists of CPI-indexed assets. The provident funds and the mutual funds' holdings of dollar-indexed bonds also decreased, concurrent with an increase in the share of the banks, the insurance companies and foreign residents (Table 4.2). The proportion of foreign investors' holdings of other types of bonds is less than 3 percent, which shows a lack of interest in the bond and Treasury bill market in Israel. One of the reasons for this is the low level of turnover in the market by international standards, which is attributed *inter alia* to the absence of market makers.

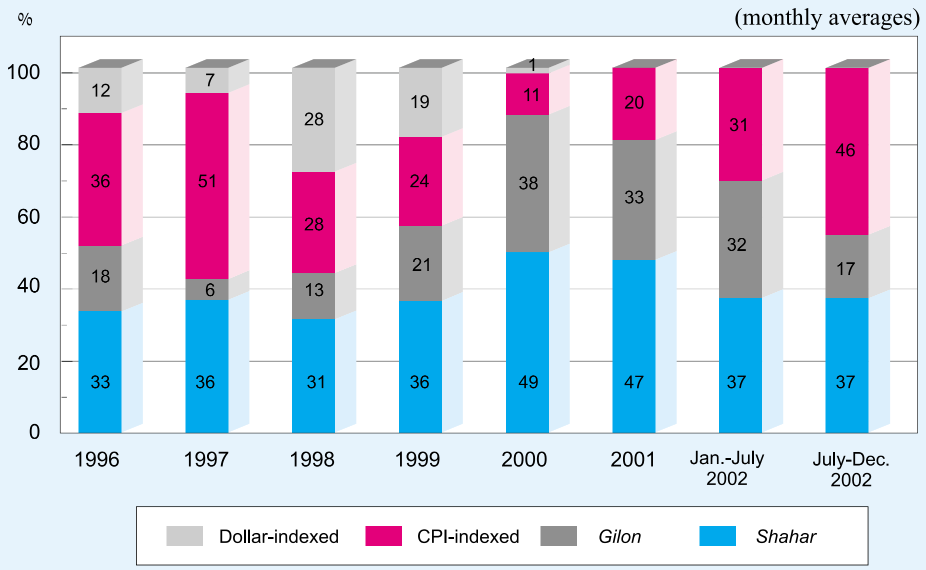
(6) Domestic borrowing

The government's gross borrowing totaled NIS 57 billion (Table 4.3), similar to the planned amount, with gross domestic borrowing instruments accounting for NIS 45 billion of the total in 2002. Since the extent of non-tradable borrowing is determined according to the requirements of the pension funds and the insurance companies under the existing arrangements with the Histadrut Labor Federation, the government raises in the local *tradable* capital market only the remaining capital that it requires for financing its budget deficit, in excess of privatization receipts and overseas borrowing. Privatization and overseas borrowing were again static in 2002. The government's privatization receipts amounted to only NIS 360 million, mainly from the sale of Bank Leumi shares, compared with planned receipts of NIS 1.5 billion.

The timing and indexation composition of tradable government borrowing changed during the second half of the year, as follows:

The indexation composition of government borrowing changed (Figure 4.4). The proportion of borrowing by means of fixed-rate Shahar unindexed bonds to total tradable

Figure 4.4
Indexation Composition of Government Borrowing, 1996–2002



SOURCE: Based on data from Capital Market Department of Ministry of Finance, and Monetary Department of Bank of Israel.

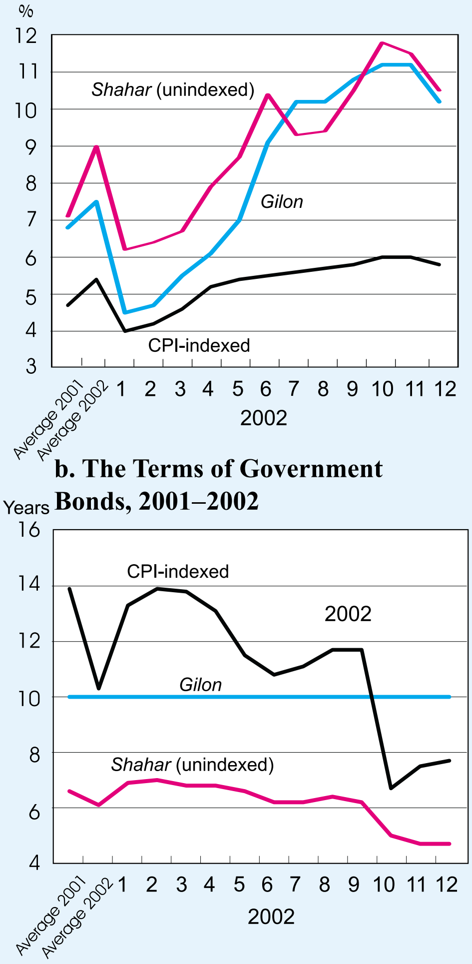
borrowing fell to 37 percent in 2002, after accounting for 100 percent at the end of 2000 and approximately half of total borrowing in 2001. The proportion of floating-rate Gilon bonds fell to 17 percent during the second half of 2002, compared with approximately a third of total borrowing in 2001. The proportion of CPI-indexed bonds to total government bond issues increased, and averaged approximately one half of total issues during the second half of 2002, compared with 20 percent in 2001 and 11 percent in 2000. As a result, against the background of the large rise in unindexed yields during the year, which increased the cost of borrowing (see Figure 4.5) and the upsurge in inflation expectations, the share of the CPI-indexed component increased at the expense of a decrease in the unindexed component. This is in contrast to the trend of previous years when tradable bond issues largely consisted of unindexed Shahar bonds, due to the consolidation of inflation expectations at a low level.

Worldwide, government borrowing largely consists of straight bonds—unindexed bonds that like Shahar bonds, pay a fixed rate of interest. This type of borrowing promotes the development of the bond market, and helps to attract foreign investors to the local market. A reduction in government borrowing via Shahar bonds therefore has negative implications for the development of the bond market in Israel.

The timing composition of government bond issues changed. During 2001 and until September 2002, the maximum term-to-maturity of Shahar bond issues was extended from 7 to 10 years, and these bonds were issued for terms of 5, 7 and 10 years. In the CPI-indexed bond market, the maximum term-to-maturity of Galil bonds was extended from 15 to 20 years in 2001, and issues were centered on series of these bonds for terms of 10 and 20 years. Since October 2002, due to the rise in yields in the bond market, which has increased the cost of borrowing, Shahar unindexed bonds have been issued for the term of 5 years alone. In November, the issue of an existing series of Shahar bonds with a remaining term-to-maturity of 3.5 years was resumed.

Figure 4.5
a. The Cost of Government Bonds, 2001–2002

b. The Terms of Government Bonds, 2001–2002



SOURCE: Based on data from the Capital Market Department, the Ministry of Finance.

Also in October 2002, the term-to-maturity of Government borrowing was shortened by means of CPI-indexed bonds that were issued for 5 and 10 years.

As a result of these measures, the average term-to-maturity at issue of Shahar unindexed bonds reached 5 years at the end of 2002 compared with 6.6 years at the end of 2001, and the average term-to-maturity at issue of the CPI-indexed debt reached 8 years at the end of 2002 compared with 14 years at the end of 2001 (see Figure 4.5).

The change in issue structure, even if only temporary, could detract from the government debt management policy of recent years that was directed *inter alia* at developing the bond market (see Box 4.1). Accordingly, when a rise in yields-to-maturity in the secondary market derives from an expansionary fiscal policy, as happened during the last two years, the solution to the increased cost of borrowing lies in a resolute return to fiscal discipline, and not in a change in issue structure.

Box 4.1
The Change in the Timing Structure of Government Bond Issues

During recent years, the government has created an issue structure based on a number of benchmark series, while reducing the number of series and increasing their size. In addition, the maximum term-to-maturity of Shahar unindexed bonds and Galil fixed-rate CPI-indexed bonds has been extended during recent years. These measures are important for the development of a bond market that is based on straight bonds, a limited number of benchmark series that are issued in relatively large quantities, and for the medium and long-term interest rate. The benchmark series compiled in the past few years are known to be of great importance in developed bond markets. Investors are aware that bonds are issued for fixed terms, and can make investment decisions in the knowledge that there will be a current supply of sources for these terms. In addition, the terms also serve as a benchmark and basis for pricing and financing private sector investments.

In October 2002, the government changed the timing composition of its bond issues, and shortened the term of the tradable bonds that are issued in the local market. The average term-to-maturity of issues of fixed-rate and indexed government bonds fell from 6.6 years in 2001 to 5 years at the end of 2002, and the average term-to-maturity of issues of fixed-rate CPI-indexed government bonds was reduced from 14 years in 2001 to 8 years at the end of 2002.

Even if it is only temporary, the change in the structure of issues has numerous implications in addition to the cost-saving aspect. The change could adversely affect the known characteristics of the bond market. The move away from benchmark series constitutes a regression from the (albeit non-committal) practice of issuing bonds whose term is known well in advance, and thereby introduces a major element of uncertainty into the market. This development could also lead to a drop in turnover among the benchmark series. The change in the structure of issues also impairs the policy of reducing the number of series while increasing their size and as a result, could harm turnover in the market and the development of a network of market makers.

It should be realized that while the impact of a one-time change in government borrowing is not excessive, if the trend continues it could reduce the duration of the debt. The duration of the debt is one of the indicators of investors' confidence in the government and one of the indexes of the debt's stability, especially in the eyes of foreign investors. If the government reduces the duration of the debt, it might be regarded as having borrowing problems, which could increase the premium that investors will require for new debt. This would be reflected by a higher cost of borrowing, and could even harm the government's credit rating.

The changes in the structure of issues was prompted by the rise in yields in the market. However, the rise in bond yields during 2002 may have derived from the government's fiscal policy, which necessitated very large-scale borrowing and created uncertainty regarding the government's commitment to adhering to a reduction in the budget deficit. The desired solution should therefore be a resumption of fiscal discipline that will reduce the debt-GDP ratio, rather than a change in the composition of government borrowing.

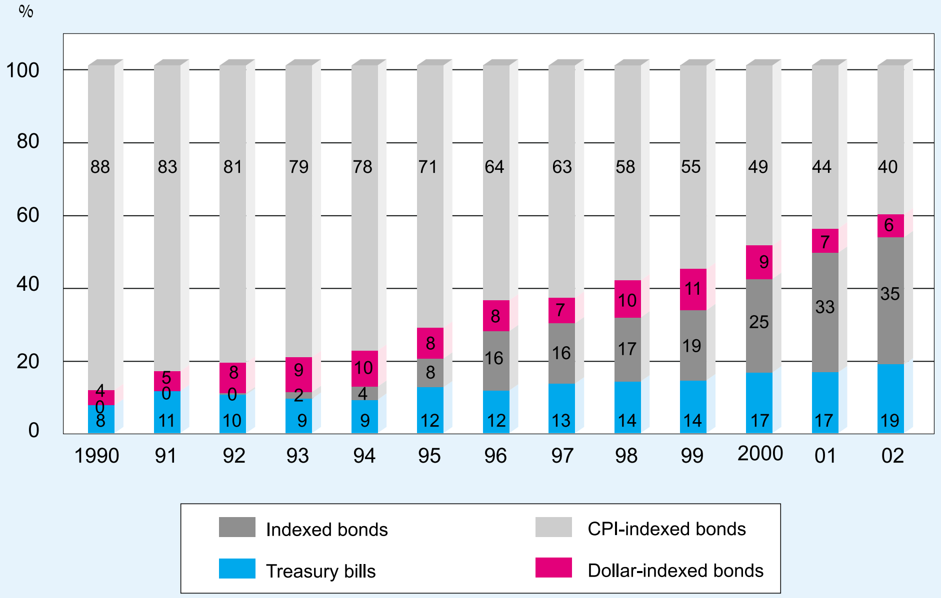
(7) The distribution of listed capital

The share of Treasury bills and unindexed bonds in total listed capital increased during 2002, at the expense of a decrease in the share of CPI-indexed bonds. This marked a continuation of the trend of recent years, whereby the share of CPI-indexed bonds in total listed capital has fallen and the share of unindexed bonds has risen, although this trend became more moderate in 2002 (Figure 4.6)

The proportion to total issues of unindexed bonds had increased continually from 8 percent in the mid-1990s to 33 percent in 2001, and the proportion of CPI-indexed bonds had concurrently decreased from 70 percent to 44 percent, but in 2002 the proportion of unindexed bonds to total listed capital rose by 2 percentage points, while the proportion of CPI-indexed bonds fell by only 4 percentage points. The more moderate rate of change resulted from the restructured composition of government borrowing, whereby the share of CPI-indexed bonds increased in 2002 at the expense of a decrease in the share of unindexed bonds.

The share of dollar-indexed bonds in total listed capital remained low and amounted to only 6 percent in the absence of net issues by the government (redemptions without issues).

Figure 4.6
Distribution of Listed Capital in Bonds and Treasury Bills, 1990–2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

3. THE CORPORATE BOND MARKET

a. Private issues of securities

Issues of capital via non-tradable securities that did not constitute public offerings amounted to approximately NIS 5.7 billion in 2002, an increase of 70 percent compared with 2001. The majority of private issues during the year were CPI-indexed and part of them, especially at the beginning of the year, were indexed to the dollar. As happened with the indexation composition of tradable government bond issues, the proportion to the total of CPI-indexed securities rose from 69 percent in 2001 to 86 percent in 2002, at the expense of a decrease in the proportion of issues of unindexed securities from 22 percent in 2001 to 5 percent in 2002 (see Table 4.4).

Private issues are usually made by large companies with a high credit rating that wish to diversify their sources of capital and enhance their bargaining position with the banking system. Such issues expose the companies to activity in the capital market, which can facilitate potential future issues on the stock exchange. Most securities in private issues are rated or issued by organizations that are subject to supervision (banks and insurance companies) or that are required to place a specific pledge on an asset as security for them. Private issues usually involve an offer to institutional investors. This is because private issues are exempt from the requirement to publish a prospectus and the requirement to register and report to the securities authority, and are therefore not

Table 4.4
Distribution of Bond Issues in Israel, 2001–2002

(NIS million, current prices)

	NIS million		Percent	
	2001	2002	2001	2002
Private issues of bonds				
Unindexed	743	265	22	5
CPI-indexed	2,321	4,854	69	86
Foreign-currency-denominated and indexed	145	460	4	8
Shares	150	86	4	2
Total	3,359	5,665	100	100
Corporate bonds on TASE				
Unindexed	626	400	23	18
CPI-indexed	1,935	1,271	72	58
Foreign-currency-denominated and indexed	115	535	4	24
Total	2,677	2,206	100	100

SOURCE: Based on data from TASE.

subject to the Authority's regulations and current supervision. Institutional investors are also targeted due to the low tradability of corporate bonds (not to mention government bonds). The banks use private issues to raise subordinated capital notes in order to increase their capital base and adhere to the requirement for a minimum capital ratio. The main organizations that raised private issues in 2002 were the Israel Electric Corporation, Africa-Israel, Azorim Assets, Elco Holdings and Shikun Vebinui, for the purpose of financing infrastructure and construction projects.

The buyers in private issues are usually long-term institutional investors (see the Monetary Department's Annual Report for 2001). Some institutional investors prefer to hold a certain proportion of their portfolio in non-tradable bonds in order to moderate the volatility in the portfolio.

b. Corporate bond issues on the stock exchange

Corporate bond issues on the stock exchange totaled NIS 2.2 billion in 2002, compared with NIS 2.7 billion in 2001 and NIS 300 million in 2000. CPI-indexed bonds accounted for 58 percent of the total issues (Table 4.4). Issues of corporate bonds to the public accounted for only 6.6 percent of the total tradable bond and Treasury bill market. The principal holders of these bonds are the provident funds and the advanced study funds, although the share of their holdings fell from 54 percent in 2001 (and 61 percent in 1998) to 52 percent in 2002 (Table 4.2).

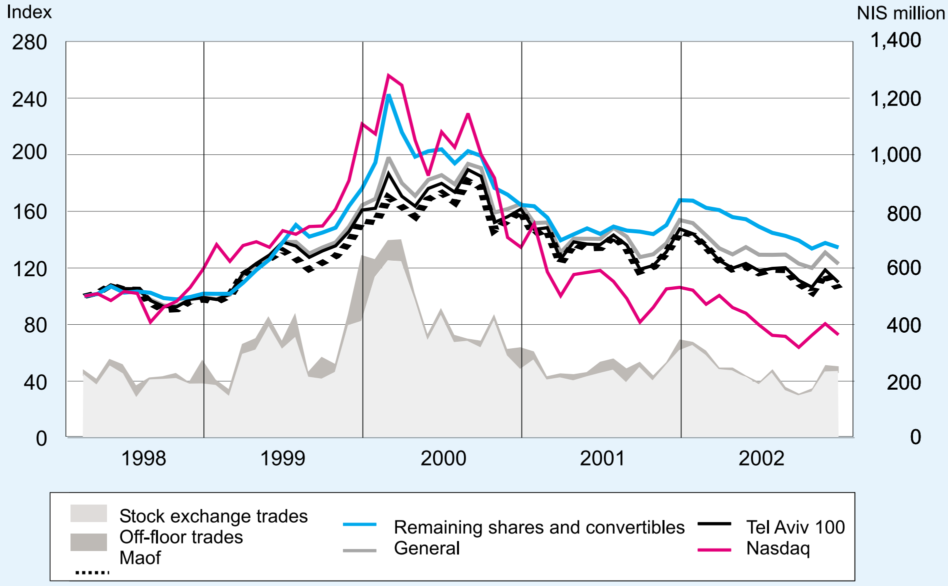
Companies also raised capital by means of private placements of bonds to the amount of NIS 2.3 billion, most of which (98 percent) were CPI-indexed. The issues in question consisted of private placements of corporate bonds to existing shareholders without a prospectus. Prominent among the issuers were the Israel Electric Corporation, which raised NIS 1.5 billion in this manner, and the commercial banks, which raised subordinated capital notes for the purpose of adhering to the minimum capital ratio. The issue of capital by means of corporate bonds and private placements resulted from the difficulty in raising bank credit, and from the high interest rates in the government bond market.

As was the case with government bonds, average turnover in corporate bonds increased during 2002. But as in previous years, average daily turnover in these bonds amounted to only a few million shekels. This is indicative of the lack of a deep and liquid market for corporate bonds in Israel, neither for the short term and definitely not for the long term. The absence of a sizeable corporate bond market creates a dependency on bank credit, especially among small and medium-size companies in traditional industries that are unable to raise capital abroad. The development of the corporate bond market could contribute to the sophistication of the capital market and reduce the dominance of the banking system.

4. THE EQUITY MARKET

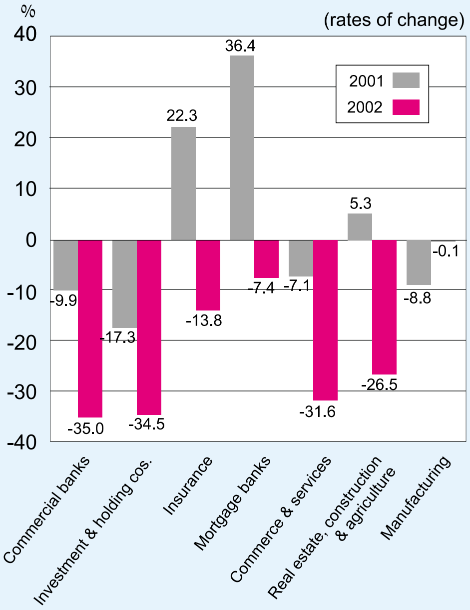
The previous year's trend in the equity market, a downturn in prices and low levels of turnover continued in 2002. This resulted from the continued slowdown in economic activity, the deterioration in the security situation, and the impact of the slide in share prices abroad, principally in the high-tech shares traded on the NASDAQ (Figure 4.7).

Figure 4.7
General Shares, Tel Aviv 100, Tel Aviv 25 and Remaining Shares and Convertibles Indexes and Nasdaq (month end, March 1998=100) and Average Daily Turnover (monthly data, NIS million), Mar. 1998–Dec. 2002



SOURCE: TASE.

Figure 4.8
Shares and Convertibles Prices, Selected Sectors, 2001–2002



SOURCE: The Stock Exchange.

The general share index fell by 20 percent in 2002, and the Tel Aviv 100 index and the Maof index dropped by over 25 percent. Concurrently, the NASDAQ index in the USA fell by 31.5 percent following large decreases of 21 percent in 2001 and 39 percent in 2000. The impact of the American market on the Israeli market is particularly strong because of the increase in the number of double-listed companies.

Share prices did not develop in an uniform manner in the course of the year. During the first half of 2002, prices fell heavily and were highly volatile, and turnover and issues of capital were low. The volatility in share prices was reflected by the large upturn in prices that followed the two percentage point cut in the Bank of Israel's interest rate in December 2001 and that lasted until the beginning of January 2002, and by the large downturn in prices from that time and until the end of June. The fall in prices resulted from the heavy price slide on the NASDAQ, the deterioration in the security situation (Operation Defensive Shield) and the serious recession in the economy. During July and August, the share indexes remained practically unchanged. But from September and until the end of the year (with the exception of November), the downturn in the share indexes resumed due to Standard and Poor's lowering of its rating of Israel's three largest banks in September, fears that Israel's debt rating would be reduced, and the political uncertainty during those months. During November however, prices in the stock market rose sharply due *inter alia* to the upturn in the NASDAQ. The publication of profit warnings and financial statements showed a downtrend in the profitability of listed companies, and thereby contributed to the downturn in prices during the year.

The fall in prices during 2002 encompassed all sectors (Figure 4.8). Particularly large decreases were recorded in the investment companies and commercial banks sector, which fell by 35 percent. The shares of industrial companies dropped by a minor rate of because of the upturn in Teva's share, whose weight in the index of industrial companies' shares exceeded 50 percent towards the end of the year.

Total share capital listed for trading fell to NIS 202 billion, compared with NIS 264.4 billion in 2001 and NIS 271.5 billion in 1999. Trading turnover was particularly low due to the heavy slide in prices, and averaged NIS 220 million a day compared with NIS 425 million in 2000 (Figure 4.7). After trading had largely centered in the equity market during 1999 and 2000, in 2002 as in 2001 interest was focussed on the bond and Treasury bill market.

Following the interest rate cut in December 2001, relatively high turnover averaging more than NIS 300 million a day was recorded in January 2002. During the subsequent months, turnover was lower. It should be noted that turnover in the Israeli equity market is relatively small, and was particularly low during the last two years. This was due *inter alia* to the arrangements governing the issue of earmarked bonds to the pension funds, which prevent the transition of capital to the free market, including the equity market.

With respect to the low levels of turnover, in 2002 the Tel Aviv Stock Exchange adopted a number of measures that were aimed at increasing turnover in sparsely-traded securities, including: a decision to incorporate in its regulations the temporary directives that permit the dual listing of Israeli shares that are traded in the USA, and an amendment to the regulations in order to shorten the maximum period of time that needs to elapse between the date a share is listed on the Tel Aviv Stock Exchange until it is included in the Tel Aviv 25 index under the 'rapid track' from 60 to 45 days; the opening of a special account for securities at the clearing house in the USA, the DTC (Depository Trust Corporation), which reduces the period of time required for transferring dual-listed shares from the USA to Israel from three to four weeks to one day; and a decision to make it easier for companies to make private placements by abolishing the requirement for a minimum value of holdings by the public as a condition for the private placement (previously, the minimum required holding by the public in companies was set at NIS 6 million and at a minimum rate of 15 percent of total share capital), a measure that is intended to help companies make private placements and raise money, especially during periods when it is difficult to raise capital from the public.

Also in 2002 the Tel Aviv Stock Exchange launched a new service for conducting transactions of over NIS 500 thousand. This service, which is called *Retzef-jumbo*, enables investors to conclude the details of a transaction between them, and immediately thereafter to input buy and sell orders designated for the *Retzef* list at the continuous trading stage and at the closing stage. This service is intended to facilitate institutional investors' activity and to increase liquidity in bonds and Treasury bills as well, and to promote a growth in turnover. Investors from the general public will also be able to benefit from the service, because orders at rates better than the *jumbo* transaction rate that are awaiting transaction will be implemented together with the *jumbo* transactions.

The stock of foreign investors' holdings in shares reached 10 percent at the end of the year compared with 8.7 percent at the end of 2001. Most of the shares in question were held by interested parties (Table 4.2). This ratio is higher than foreign investors' holding ratio among other forms of investment. The government reduced its share of listed capital to 5.1 percent, earning privatization receipts of only NIS 360 million, mainly from the sale of Bank Leumi shares, compared with planned receipts of NIS 1.5 billion. The privatization process thereby remained static in 2002 as well.

The slowdown in the equity market during the year was also reflected by the paucity of issues in the primary market. The amount of capital raised from the public in the local market totaled NIS 1.4 billion in 2002, compared with NIS 2.8 billion in 2001 and NIS 5.2 billion in 2000. Most of the decrease in 2002 resulted from the large drop in investment companies' issues, which totaled NIS 154 million compared with NIS 2.5 billion in 2001. Following a large decrease in the previous two years, the total dividends distributed by stock exchange companies fell in 2002 due to the companies' reduced profitability and in certain cases, heavy losses. The decrease also resulted from the fall in the amount of dividend distributed by the banks in line with the Supervisor of Banks' recommendation not to distribute dividend, the decline in the banks' profitability, and the increase in the banks' loan-loss provision.

The concentration of the largest controlling groups among stock exchange companies decreased in 2002, in a continuation of the trend of the previous two years. The contraction of the largest groups on the stock exchange resulted from mergers, purchase offers and the sale of companies whose activity is not synergetic with the controlling groups' core activity, implying a real decrease in concentration in the economy. However, the ownership structure in the equity market is still highly concentrated. While interested parties' holdings of total listed capital have fallen by 14 percentage points since 1999, their holding ratio is still high at 56 percent.

Box 4.2
The Establishment of a Network of Market Makers in Tradable Securities on the Stock Exchange

In order to encourage the development of a network of market makers in securities, the Securities Authority established a committee headed by Prof. Shmuel Hauser that includes representatives of the Bank of Israel, the Ministry of Finance, the Tel Aviv Stock Exchange and the Securities Authority. The introduction of market makers to the stock exchange, whose function is to supply liquidity for trading, could serve as an important measure for improving the liquidity of the securities traded on the stock exchange, including those whose tradability is currently low. This is conditional on market-making activity being conducted in an orderly manner and subject to supervision. The frameworks that the committee has proposed for regulating market-making activity in the securities market as a whole and in government bonds and Treasury bills in particular, are based on a number of important principles:

- The method of trading currently practiced on the Tel Aviv Stock Exchange (the *Retzef* method) will be maintained, meaning that the market makers will not be accorded preference in the implementation of orders on the stock exchange.
- Market making activity will be subject to predetermined restrictions with respect to such matters as the maximum level of the margin between buying and selling prices quoted, and the minimum period of time during each trading day in which the market maker will be required to input orders.
- Market making activity will not be obligatory for firms; economic incentives will be provided for those who wish to be market makers.

In the area of government securities, the committee recommended that a market maker be appointed for all series of Treasury bills and Shahar bonds, and for five series of Galil CPI-indexed bonds. The market makers will be appointed by the Ministry of Finance and the Bank of Israel, which will also determine the amounts to be quoted and the maximum margin between purchase and selling prices. In return, the market makers will enjoy certain benefits, such as preference at tenders, and additional or exclusive allocations in certain tenders.

The committee recommended examining the possibility of establishing a central lending bank, from which the chief market makers will be allowed to borrow government bonds and Treasury bills. As an alternative, the committee recommended the establishment of a central lending bank that will serve all market makers in these securities. The committee also recommended that a separate trading system be established for the market makers.

The establishment of a network of market makers in bonds and Treasury bills could help to deepen and develop the market, and enhance the sophistication of the pass-through mechanism of monetary policy. The absence of a developed Repo market and a larger lending market is hindering market-making activity, due *inter alia* to the various costs involved, such as the costs of holding stocks or securities.

5. THE DERIVATIVES MARKET

Transactions in derivative financial assets are conducted in three frameworks – on the stock exchange, at the commercial banks and at the Bank of Israel. On the stock exchange, futures contracts and options on the Maof (Tel Aviv 25) index and the exchange rate of the dollar and the euro are traded. At the commercial banks, transactions are conducted with customers in futures contracts and non-tradable options on a variety of underlying assets. The Bank of Israel writes shekel-dollar options and future Treasury bill contracts, and sells them to the public via tenders.

Turnover levels in derivative financial assets during 2002 fluctuated sharply. During the first half of the year, turnover expanded considerably due to the upturn in the exchange rate following the Bank of Israel's interest rate cut in December 2001, and to the level of uncertainty resulting from security-related developments that affected the economy at home and abroad (see Chapter 2 for details). The growth in turnover during the first half of 2002 encompassed the majority of derivatives and especially exchange rate derivatives, both on the stock exchange and at the commercial banks. The growth in activity in derivative financial assets and as a whole and in exchange rate derivatives in particular derived from the increased level of uncertainty, which was reflected by a large rise in the actual volatility of the underlying assets (the Maof index, the shekel interest rate and exchange rates). This implied a higher level of actual risk, which increased the necessity for financial hedging instruments. Turnover fell during the second half of the year and reverted to the level prevailing at the beginning of 2001. During the year as a whole, turnover in derivatives remained at a level similar to that in 2001, ending the upturn that began in 1998.

The level of uncertainty in the financial markets is affected by internal and external factors, and is reflected by the amount of activity in derivative financial assets and in their pricing — information reflecting the level of risk as perceived by players in the capital market. The trend in the derivatives market during 2002 changed appreciably. This was exemplified by the level of uncertainty that prevailed throughout the entire year and especially during the first half due to the numerous domestic and external factors that affected the economy (see Chapter 2 for details), and as a result of the sharp fluctuations in the shekel interest rate that had a major impact on the development of assets.

a. Exchange rate derivatives

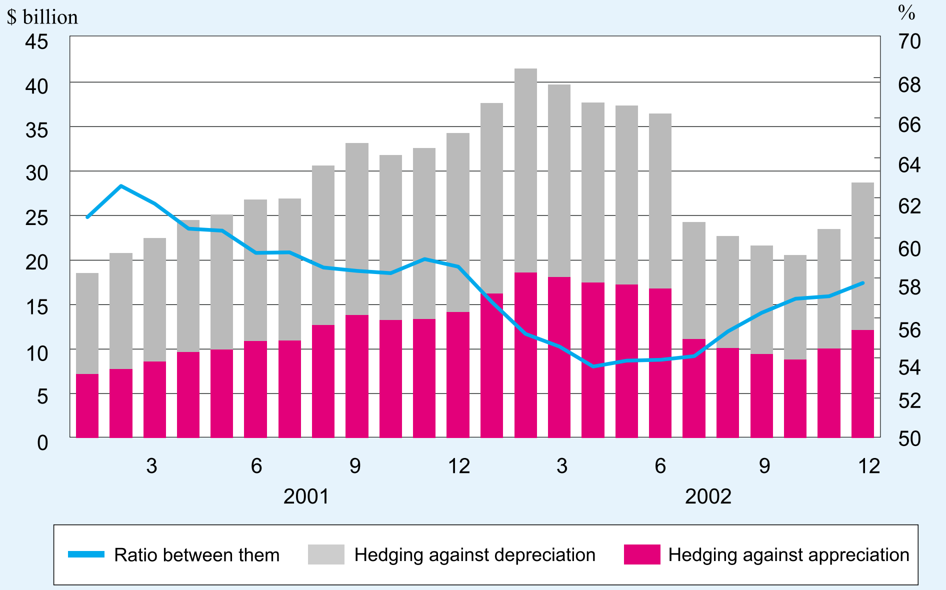
Turnover in options and futures contracts on the exchange rates rose considerably during the first half of 2002, both at the banks and on the stock exchange, due to the sharp fluctuations in the shekel exchange rate. During the second half of the year, following the last two interest rate hikes by a cumulative rate of 3.5 percentage points, and as a result of the slightly reduced apprehension regarding security-related developments, activity slackened and turnover reverted to the level prevailing at the beginning of 2001. Despite the decrease in turnover during the second half of the year, uncertainty over unanticipated changes in the exchange rate was reflected in the implied volatility of shekel-dollar options, which remained high during the second half as well.

The banking system

The transactions conducted in the banking system are transactions between the banks and the public[3] in non-tradable derivative financial assets based on a variety of exchange rates, and are defined as over-the-counter transactions. Activity in the banking system is mainly conducted in shekel-dollar and shekel-euro exchange rate derivatives, which account for 85 percent and 12 percent respectively of total activity in shekel-foreign currency derivatives. Figure 4.9 shows the balance of open positions in instruments for hedging against unexpected changes in nominal exchange rates. During the first half of 2002, the balance of open positions between the public and the banks in exchange rate derivatives reached an average of $ 38 billion. During the second half of the year, when the exchange rate became somewhat more stable, this balance fell considerably and reached $ 21 billion in October, the level prevailing at the beginning of 2001. During the last two months of the year, the balance of open positions rose slightly to a level of $ 29 billion due to the increased probability of an American attack on Iraq.

[3] Since transactions are also conducted between the banks and other banks, these lead to an upward bias in the estimate of the amount of the public's hedging transactions against changes in the prices of underlying assets.

Figure 4.9
Balance of Open Positions in Shekel-Dollar Hedging Transactions Between the Banks and the Public, 2001– 2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

Figure 4.9 also shows that the proportion of open positions for hedging against a rise in the exchange rate to the total balance of open positions continued to fall in 2002, and reached 54 percent compared with an average proportion of 60 percent and 67 percent during the years 2001 and 2000 respectively (Figure 4.9). This further decrease in the proportion of exchange rate hedging instruments indicates that the public are internalizing the fact that the exchange rate can fall as well, in view of the distance of the currency basket exchange rate from the lower limit of the band of mobility.

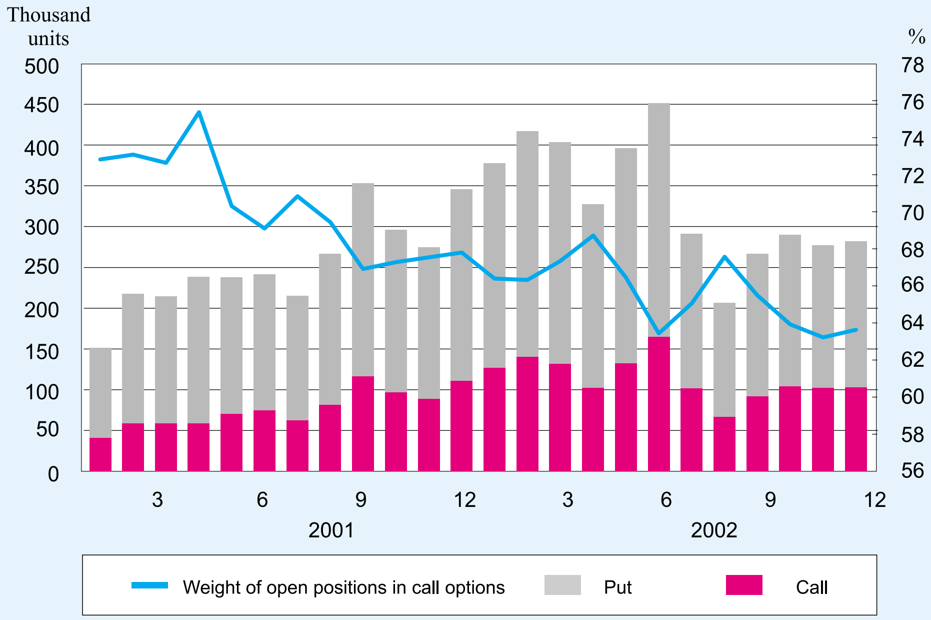
While turnover in nominal exchange rate derivatives expanded, trading in real exchange rate derivatives contracted during 2002 in the continuation of a trend that began at the beginning of 2000, and the balance of open positions in these derivatives amounted to only $ 0.5 billion.

The stock exchange

Exchange rate derivatives activity increased in the stock exchange as well during the first half of 2002. The number of open positions in shekel-dollar options[4] reached an average of 400 thousand in the first half, covering underlying assets totaling $ 4 billion as compared to $ 2.1 billion in the first half of 2001. During the second half of the year, the number of open positions fell to an average of 270 thousand, covering underlying assets of $ 2.7 billion — similar to the average level in the second half of 2001 (Figure 4.10). However, the changes in turnover were centered among short-term series of options (of up to a month to maturity), which accounted for an average of 80 percent of

[4] The underlying asset in shekel-dollar options is $ 10,000.

Figure 4.10
Shekel-Dollar Options on the Stock Exchange, Number of Open Positions in Put-Call Options, 2001– 2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

total turnover in 2002 compared with an average of 70 percent in 2001. Accordingly, hedging activity on the stock exchange is conducted for the short-term in contrast to activity in the banking system, in which short-term shekel-dollar options accounted for an average of only 40 percent of total turnover during 2002.

An examination of trading by option type shows that as in the banking system, the proportion to total open positions of open positions in call options decreased in 2002 and reached 63 percent, compared with 74 percent at the beginning of 2001 (Figure 4.10).

At the end of November 2001, the stock exchange launched shekel-euro options, complementing the shekel-dollar options that have been traded since 1994. Daily turnover in options on the euro exchange rate increased to an average of 2000 units during 2002. It should be noted that this level of turnover is very low relative to the volume of activity in shekel-dollar derivatives, which in contrast to turnover in these options in the banking system, accounts for 12 percent of total trading in shekel-foreign currency derivatives.

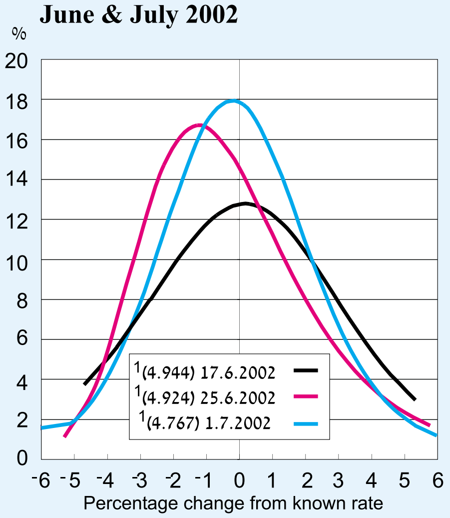
Box 4.3
Expected Distribution of the Shekel-Dollar Exchange Rate

There are diverse methods for estimating the expected distribution of the shekel-dollar exchange rate. One such method, which is employed by the

Bank of Israel, estimates the distribution without assumption of its form by examining the prices of the shekel-dollar options that are traded on the stock exchange at a fixed term-to-maturity and at different exercise rates. This method is based on the economic significance of the price of a special asset called an ‘elementary asset.’ This theoretical asset yields a return of one shekel only if the exchange rate is equal to a certain value on a pre-defined date; otherwise the asset will not yield anything at all. The price of the asset is dependent on investors’ expectations that the exchange rate will indeed be equal to that on the specified date, that is, there is a probability of this occurring. The assets with the features most similar to an elementary asset are options, because they produce a positive flow at certain exercise rates and nothing at the other rates. By using a combination of a number of shekel-dollar options with identical maturity dates and different exercise rates, it is possible to create an investment portfolio whose rate of return will be similar in its features to an elementary asset. Such a portfolio can be created by combining[1] options with different exercise rates, which is known as a ‘butterfly transaction,’ and whose price is dependent on the probability that the portfolio will actually yield a positive return.

Under the formula described at the end of the box, it is possible to calculate the highest probability and see to which exchange rate it relates. This rate can differ from the expected rate, indicating an asymmetrical distribution. In addition, we can calculate the probability of a certain depreciation and the probability of an appreciation in that rate, parameters reflecting the level of uncertainty and the level of asymmetry in the market’s expectations regarding the shekel-dollar exchange rate will prevail in the future. An analysis of these parameters within the framework of monetary policy, which examines the indicators obtained from the capital market, provides important information regarding the potential development of the shekel-dollar exchange rate.

Figure 4.11
Expected Distribution of NIS/$ Exchange Rate, from Options Traded on TASE, at Various Exercise Rates, June & July 2002



a NIS/$ exchange rate.
SOURCE: Monetary Department, Bank of Israel.

[1] The purchase of one option at exercise rate ***X***, the sale (writing) of two options at exercise rate ***Y*** and the purchase of another option at exercise rate ***Z***, where ***X*** < ***Y*** < ***Z***.

Figure 4.11, shows the expected distribution of the shekel and dollar exchange rate at three dates around the time of the Bank of Israel's 2 percentage point increase in the interest rate in July 2002.

On June 17, 2002, following the publication of the consumer price index for May, which rose by one percent and a week after the Bank of Israel raised the shekel interest rate by 1.5 percentage points, the shekel-dollar exchange rate reached a level of over NIS 4.9 to the dollar. As is apparent from the diagram (the green line), the distribution was symmetrical around the known dollar exchange rate and with fat tails (distribution extremes), indicating that the level of uncertainty over future developments in the foreign currency market was very high, and that the probability of large changes in exchange rate, in both directions, was also high. As a result, the probability that the exchange rate would remain at its current level was only 13 percent, and the probability of a depreciation (appreciation) of 4 percent and more was relatively high—16.7 (8.3) percent. On June 25, when the Bank of Israel raised the interest rate by 2 percentage points (the pink line), the distribution largely tended towards an appreciation of the exchange rate: the highest probability, at the level of 16.5 percent, was that the shekel would appreciate by one to two percent. This distribution was not symmetrical, and it can be seen that the probability of slight fluctuations in the exchange rate of up to 3 percent was greater in the direction of an appreciation, while the probability of large fluctuations — of over 3 percent — was greater in the direction of a depreciation. This finding shows that the investor public believed that the high shekel interest rate, which was increasing the opportunity cost of holding foreign currency, would create pressure for a moderate appreciation of the exchange rate, and were at the same time apprehensive of a relatively slight depreciation in the exchange rate as the result of continued negative developments. On July 1, after the exchange rate become more stable and the shekel appreciated to a level of NIS 4.75 to the dollar (the blue line), the distribution was symmetrical around the present exchange rate of the dollar and with thinner tails, indicating that the level of uncertainty had fallen and that the probability of sharp changes, in the direction of a depreciation and of an appreciation, was relatively low. As a result, the probability that the exchange rate would remain at its present level was then 18 percent, and the probability that the exchange rate would depreciate (appreciate) by 4 percent and more was relatively low at only 6.4 (5.2) percent.

It can therefore be seen that shekel-dollar options at different exercise rates conceal a considerable amount of important information on the expected development of the shekel-dollar exchange rate. This information makes it

[2] The assumption in this equation is linearity between each two observations (*i*), an assumption that necessitates calculating the distribution on the basis of individual observations.

possible to analyze the foreign-currency market more accurately.

Set out below is a description of the calculation equation[2] that applies the method of calculation by means of shekel-dollar options that are traded on the stock exchange:

$$P(x_i^*) = A \leftrightarrow \frac{C(x_{i-1}) + C(x_{i+1}) - 2C(x_i)}{K}$$

$P(X^*)$ - the probability of exchange rate *X*.

C() – the price of one dollar option (price of the option divided by 10,000)

A – discounting factor, taking into account the shekel interest rate, the dollar interest rate and the redemption time.

Xi – exercise rate.

i=2, 3,…n where: $X_{i-1} < X_{i,}$

and - $K = X_{i+1} - X_i$ (the fixed differences between the exercise rates)

Xi^* - the rate environment, which is within the range:

$$x_i - \frac{K}{2} \le x_i^* \le x_i + \frac{K}{2}$$

The Bank of Israel

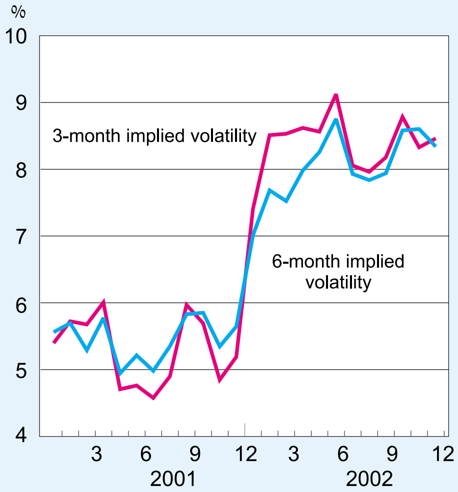
In 2002, the Bank of Israel issued series of call options for three and six months at weekly amounts of $ 10 million and $ 5 million respectively, and put options for three months at a weekly amount of $ 10 million ‘pure in the money.’[5] Regular information can be derived from these options on the risks in the foreign currency market. This is unique information that cannot be derived from other shekel-dollar options that are traded at the banks and on the stock exchange. The Bank of Israel is therefore continuing to issue these options, even after achieving the initial objective in issuing the options of developing an exchange rate derivatives market in the Israeli economy.

The options that the Bank of Israel sells at weekly tenders at an exercise rate approximately equivalent to the forward rate, and at a fixed term-to-maturity of three months and six months, makes it possible to calculate the implied volatility that serves as a continuous index of the uncertainty surrounding expected changes in the dollar exchange rate. This can be used to assess the level of risk in the foreign currency market. The implied volatility obtained from three month put and call options averaged 8.3 percent in annual terms, compared with 5.3 and 6 percent in 2001 and 2000

[5] Options at a discounted exercise rate that is equal to the underlying asset — the representative rate of the dollar.

respectively. The 2 percentage point cut in the interest rate in December 2001 raised the level of uncertainty reflected by the implied volatility in shekel-dollar options to a high level at the end of December, and to an even higher level of the beginning of January 2002, apparently due to fears (which actually materialized) of sharp fluctuations in the shekel-dollar exchange rate.

Figure 4.12
Implied Volatility of Bank of Israel NIS/$ 3- and 6- Month Options, 2001–2002 (monthly averages)

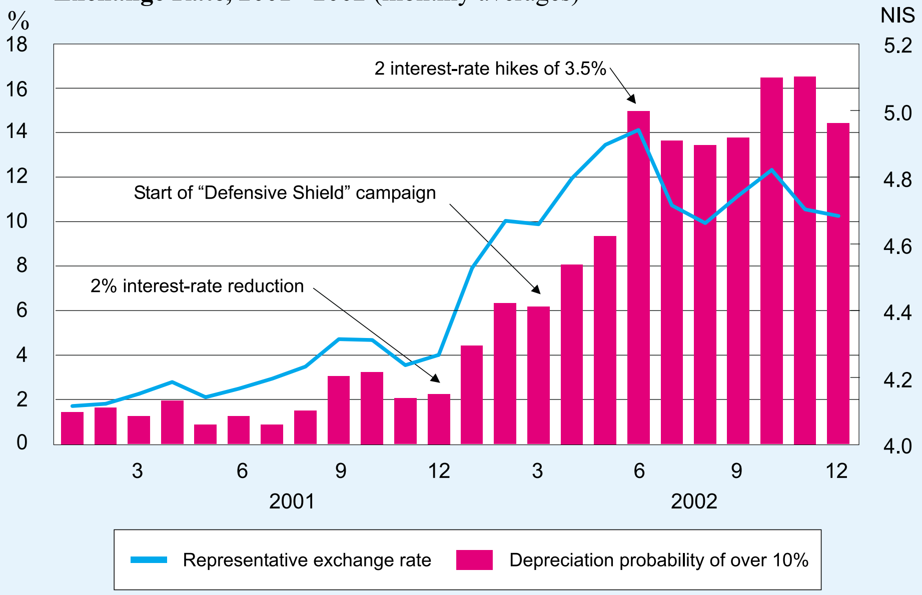


SOURCE: Based on data from the Monetary Department, Bank of Israel.

Figure 4.12 shows that in the first half of 2002, the implied volatility for three months and six months rose sharply, and continued to rise at a more moderate rate until July as a result of the increased uncertainty prevailing in the markets that led to fears of a financial crisis. Following the series of interest rate hikes in June and July, the rise in implied volatility ceased and even fell slightly, and remained at a relatively high level until September, indicating that the market was expecting the exchange rate to remain highly volatile. During the months October to December, the implied volatility rose again to a high level due to the increased volatility of the actual exchange rate following the lowering of the credit rating of the country's three largest banks, and due to fears that Israel's credit rating would be reduced. The implied volatility remained high until the end of 2002 because of the growing probability of war with Iraq. The gap between the implied volatility for six months and that for three months reveals the difference between expectations of exchange rate volatility in the short term (three months) and the longer term (six months). It can be seen that from January 2002 until October, the implied volatility for three months was higher than that for six months. This implied volatility gap reflected expectations that volatility would be relatively high mainly for short-terms (up to three months), and lower for longer terms (up to six months). However, during the last two months of the year the implied volatility for six months reached the same level as that for three months. This revealed that expectations of volatility were high for both short terms and for longer terms.

The probability of a large depreciation of over 10 percent in the range of six months, which is affected by the level of uncertainty in the foreign currency market and the interest rate gap between the shekel and the dollar, serves as an estimate for the potential development of the exchange rate. This probability increased in January 2002 as a result of the growing uncertainty in the foreign currency market and despite the reduction in the interest rate gap between the shekel and the dollar that resulted from the interest rate cut in December 2001 (Figure 4.13). During the first half of the year, as the state of

Figure 4.13
Depreciation Probability of Over 10% Over Six Months, and Shekel-Dollar Exchange Rate, 2001– 2002 (monthly averages)



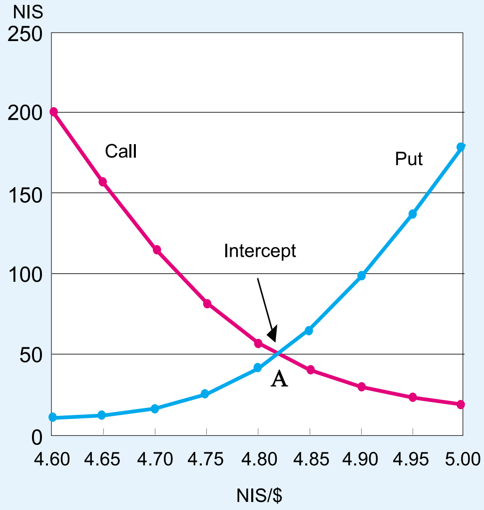
SOURCE: Based on data from the Monetary Department, Bank of Israel.

the economy and the security situation deteriorated even more, the probability of a large depreciation increased and in June 2002 reached 15 percent, compared with an average of 2 percent in December 2001. In the third quarter of the year, despite the relative stability in the exchange rate and the actual appreciation of the shekel, the probability of a large depreciation remained high at an average of 13.6 percent. This seems to have represented expectations of continued sharp fluctuations in exchange rate in the longer term. During the last quarter of the year, the level of uncertainty rose again due to the increased probability of war with Iraq, the lowering of the credit rating of the three largest banks and fears that the government's credit rating would be reduced as well. As a result, the probability of a large depreciation increased, and during October and November surged to 16 percent. In December, the probability of a large depreciation fell slightly to 14.4 percent.

Box 4.4
The Relationship Between the Prices of Call and Put Options and the Exercise Price

An option is a financial instrument that confers on its owner the right to purchase or sell a given number of units of an underlying asset at a predetermined price —'the exercise price.' A distinction is made between two basic types of options: a call option, which is an option for the purchase of an underlying asset, and a put option, which is an option for the sale of an underlying asset. With a call option, the buyer has the right to purchase an underlying asset at the exercise price, while the writer of the option has to supply this asset if a decision is taken to exercise it. With a put option, the buyer has the right to sell an underlying asset at the exercise price, while the writer of the option must buy it if a decision is taken to exercise it.

Figure 4.14
A Theoretical Example:
Price of Put-Call Options at Various Exercise Prices



When the exercise price of a call option is lower than the price of the underlying asset, a situation in which the option is ‘in the money,’ its high price reflects expectations of a positive cash flow at the time of exercise. When the exercise price of a call option rises, the price of the option falls to as little as zero, a situation in which the option is ‘out of the money’ (Figure 14.4). However, when the exercise price of a put option is less than the price of the underlying asset, a situation in which the option is ‘out of the money,’ its price will be low, and will reflect expectations of a zero cash flow at the time of exercise. When the exercise price of a put option rises, the price of the option will increase and reflect expectations of a larger cash flow at the time of maturity (Figure 4.14). Accordingly, there is a certain exercise price at which the price of the call option and the put option will meet (Point A), which will indicate that the expectations of a cash flow are equal with both types of option. This exercise price therefore reflects the average underlying asset price that is expected at the time of exercise.

The Bank of Israel sells by means of tenders call and put options with a term-to-maturity of three months and at an identical exercise rate that is approximately equivalent to the forward rate — the exchange rate that is expected according to the difference between the interest rate in Israel and in the USA. The prices of the options that the Bank of Israel sells at the tenders — the average premiums in the tenders — can therefore be expected to be identical for call options for three months and put options for three months at each and every tender. At tenders where there is a significant difference between the prices, it is possible to conclude that the exercise price of those options differs from the expected exchange rate. An examination of the tenders held during 2002 shows that the average difference between the prices of call options and the prices of put options is estimated at NIS 4, a difference of less than a single standard deviation — NIS 13. It was also found that at 63 out of the 90 tenders that were held during 2002, differences smaller than a single standard deviation were obtained, and only at 6 tenders were differences larger than two standard deviations obtained: a positive difference at 4 tenders where the price of the call options was higher, and a negative difference at 2 tenders. At the majority of tenders in 2002, the prices of call options were therefore similar to the prices of put options. This indicates that the exercise rate set for those options was the exchange rate expected by the investor public at the time of expiration.

In 2003, changes were made to the Bank of Israel's shekel-dollar options tenders: A put option for six months was added, and the amount of other types of options issued was changed

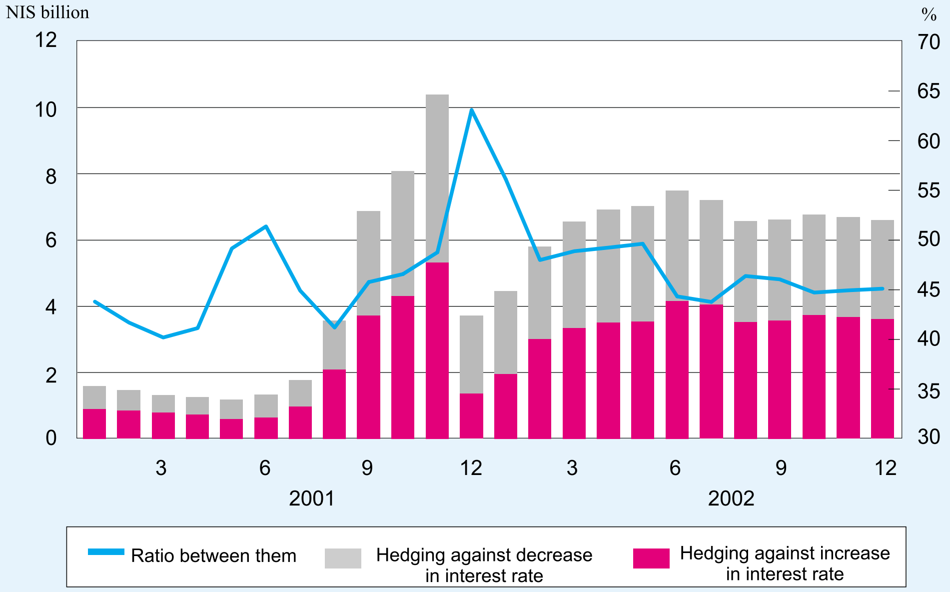
Call options for a period of three months — $ 8 million a week (divided between two tenders). Put options for a period of three months — $ 8 million a week (divided between two tenders). Call options for a period of six months — $ 4 million a week, and put options for a period of six months — $ 4 million a week.

In 2003 the Bank of Israel therefore began to sell at tenders call and put options with the same exercise rate, which is approximately equivalent to the forward rate, and with a term-to-maturity of six months in addition to options for three months. The prices of the options that the Bank of Israel sells in 2003 — the average premiums in the tenders — can therefore be expected to be identical for call options for six months and put options for six months at each and every tender; in accordance with the parity existing in the prices of call and put options for three months.

b. Interest rate derivatives

Turnover in interest rate derivatives in the banking system, where most of this activity is centered, increased greatly during 2002 and the balance of open positions reached an average of NIS 6.5 billion (Figure 4.15). However, interest rate derivatives turnover was still low compared with the volume of turnover in exchange rate derivatives. This differs from the situation in the developed countries, where the proportion of turnover in interest rate derivatives to total turnover in derivatives is very high. The relatively low turnover in interest rate derivatives appears to derive from the small size and extreme openness of the Israeli economy. For these reasons, the development of the exchange rate affects the inflation environment and as a result, the nominal interest

Figure 4.15
Open Positions in Shekel Interest Rate Hedging Transactions Between the Banks and the Public, 2001–2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

rate as well. This makes it possible to engage in financial hedges on the shekel interest rate by means of exchange rate derivatives, although the pass-through in this respect is not complete.

The banking system

The level of turnover between the banks and the public increased greatly during the last quarter of 2001, and the balance of open positions in nominal interest rate derivatives (Figure 4.15) reached an average of NIS 7 billion in the last quarter compared with an average of NIS 1.4 billion during the first half of 2001.

Following the 2 percentage point interest rate cut at the end of 2001, the volume of hedges fell, especially the volume of hedges against a decrease in the nominal interest rate, which for the first time was lower than the volume of hedges against a rise in the nominal interest rate. But the balance of open positions increased from February until June, and reverted to an average level of NIS 7 billion. The volume of hedges did not fluctuate to a major extent during the second half of the year, and the balance of open positions remained at the same level, with a slight tendency towards hedges against a decline in the shekel interest rate.

Apart from nominal interest rate derivative transactions, real interest rate derivative transactions are also conducted in the banking system as required by the market. The volume of transactions in these derivatives decreased, continuing a trend that began in March 1999, and the balance of open positions in future assets on the real interest rate fell to NIS 250 thousand in December 2002.

The Bank of Israel

In 1991, the Bank of Israel began to sell non-tradable futures contracts on the nominal interest rate in order to assist in the development of a derivatives market in the economy. In these transactions, the central bank promises to sell to the winning bidders, at the end of three months from the date of the tender, a series of Treasury bills for three months or 12 months at a guaranteed yield that is determined in the tender.

The monthly amount offered for each series of Treasury bills remained fixed in 2002 in accordance with Bank of Israel policy, and amounted to NIS 80 million. Demand for the tenders during 2001 and especially in the first three quarters of the year was particularly high, and reached an average of 10 times the amount offered on the two series. The growth in demand appears to have resulted from the increased uncertainty regarding the future nominal interest rate. The gap between the average yield on the tenders and the yield on the series traded in the market at the time of the tender was indicative of the investor public's expectations regarding a change in the shekel interest rates within three months. This gap was positive during the first half of 2002 in series of three months and series for a year, and during May and June reached one percentage point, reflecting expectations of a relatively large increase in the shekel interest rate.

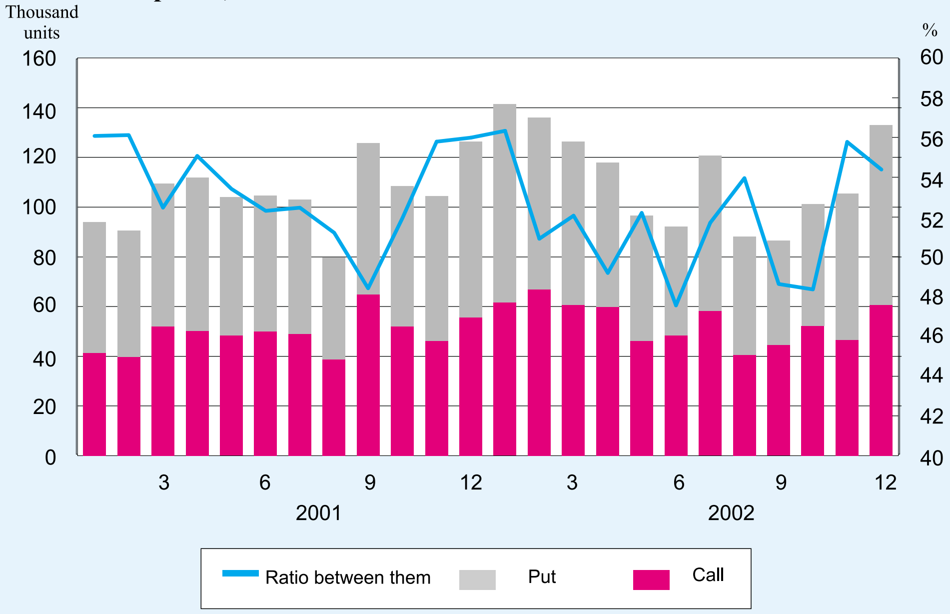
An examination of the average yields set in the tenders compared with those prevailing in the market on the exercise date shows that the yield set at the tenders during the first five months of 2002 was lower than the yield in the secondary market at the time of exercise, apparently because of the series of 'surprises' regarding the rise in the inflation environment. During June and July however, the yield set at the tender was higher than that prevailing in the secondary market at the time of exercise, apparently due to concern during those months that the inflation environment would continue to rise and thereby necessitate a further increase in the interest rate. But as a result of the two interest rate hikes in June, this did not happen.

c. Derivatives on the share indexes

The stock exchange conducts trading in options and futures contracts on the Maof index. Daily turnover averaged 110 thousand units in 2002,[6] which was slightly more than in 2001 and 2000 (Figure 4.16). Daily turnover in put options rose by 10 percent and by 3.7 percent in call options. The proportion to total daily turnover of put options thereby increased, reflecting fears of a further drop in share prices. Figure 4.16 presents the daily turnover in the two types of options and the proportion to total turnover of call options. It can be seen that this proportion between the months of February and October was in the region of 50 percent, indicating that turnover in call options and put options was the same. When a positive trend emerged in the equity market in November, the proportion of call options reached 56 percent of total turnover. In December 2002 however, the number of open positions increased in both types of options, revealing expectations of relatively sharp changes in the Tel Aviv 25 index after the index had risen by 11 percent in November.

[6] The underlying asset on the Maof index is the Maof index multiplied by a hundred.

Figure 4.16
Options on the TA25 Index on TASE, Average Daily Turnover in Put and Call Options, 2001–2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

The number of open positions in call options fell by 7.5 percent during 2002, as compared to a 5 percent increase in the number of open positions in put options. These developments substantiate the theory that the investor public did not expect the equity market to recover in 2002.

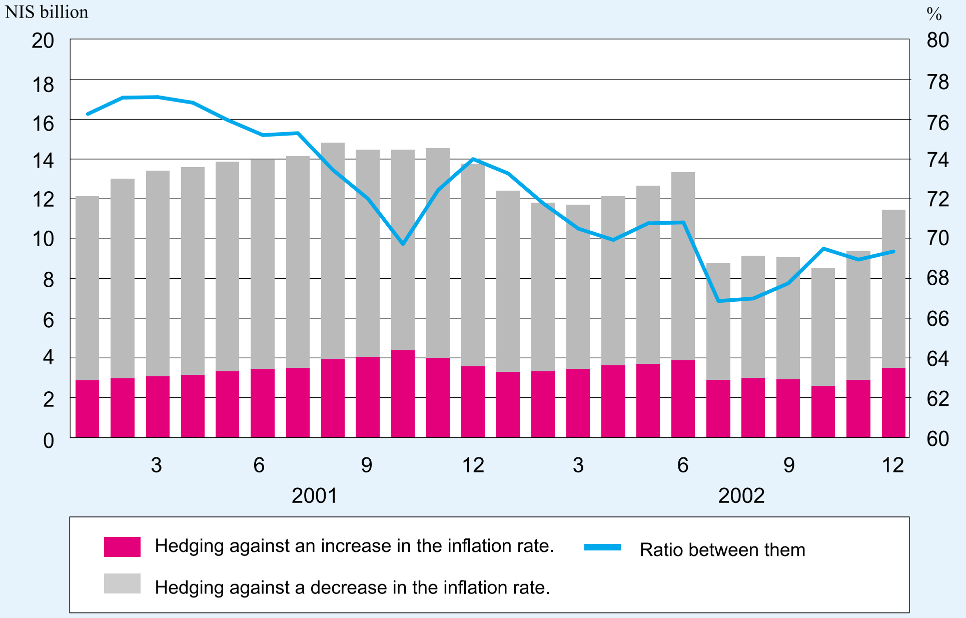
The average daily turnover weighted by the probability of exercise (*delta*[7]) during 2002 was 12 times greater than daily turnover in the shares included in the Maof index. This represented the continuation of a growth in option turnover relative to share turnover that began in 2000. This high volume of turnover might serve as an incentive to distort the Maof index on expiration dates by distorting the prices of the shares that are included in this index. Accordingly, turnover in derivatives that is appreciably higher than turnover in the underlying assets is suggestive of a lack of sophistication in the market.

d. Derivatives on the consumer price index

Transactions in derivative assets on the consumer price index are currently only conducted in the banking system (Figure 4.17), and their balance reflects the public's demand for financial hedges against unexpected changes in the consumer price index

[7] Since the probability of exercise increases in direct proportion to the exercise rate on call options and in inverse proportion to the exercise rate on put options, these options' share of average daily turnover will be higher.

Figure 4.17
Balance of Open Positions in CPI Hedging Transactions Between the Banks and the Public, 2001–2002



SOURCE: Based on data from the Monetary Department, Bank of Israel.

(see Footnote 3). The volume of hedges against an upsurge in inflation remained stable during the first half of 2002, and the balance of open positions averaged NIS 9 billion, similar to the balance recorded in 2001. The balance of hedges against a fall in the inflation rate was also stable during the first half of the year at an average level of NIS 4 billion, similar to that recorded in the last quarter of 2001. During the second half of the year, a decrease was recorded in the volume both of hedges against a fall in inflation and of hedges against an upsurge in inflation.

The proportion of hedges against an upsurge in inflation declined during 2002 in a continuation of the previous year's trend, and reached 68 percent of total hedges during the second half of 2002, compared with 76 percent in the first half of 2001 (Figure 4.17). The decline in the proportion of hedges against an upsurge in inflation did not match the high level of uncertainty regarding inflation during 2002. This development appears to have resulted from the increase in the proportion of CPI-indexed assets at the expense of unindexed assets (as detailed in Chapter 3). The growing tendency to hold CPI-indexed assets directly reduced the need to hedge against an upsurge in inflation by means of derivative financial assets.