Chapter 5
Risks and Capital Adequacy

In the last few years liberalization and globalization have made Israel's economy more sensitive to shocks and changes in the international financial markets. In 2001, the banks' exposure to credit risk and market risk increased as a result of the economic recession, which was affected by the worldwide slowdown and security incidents in Israel.

Exposure to credit risk increased due to a further large expansion of bank credit, concurrent with a decline in GDP. The ratio between the expense on the loan-loss provision and outstanding credit to the public increased at all the banking groups during 2001, as did the proportion of credit under special supervision to total credit at the groups' responsibility. The ratio of problem loans to shareholders' equity, as well as the ratio between risk-weighted assets to total assets rose at most of the banking groups.

A deterioration in the quality of the credit portfolio was recorded with respect to most sectors of the economy, particularly the telecommunications and computer services industry, the construction and real estate industry, and the hotels and catering industry. The expense on the specific loan-loss provision in the telecommunications and computer services industry rose to a considerable extent, because a number of large borrowers in the industry encountered financial distress.

The banks' exposure to market risks (as estimated for calculating capital adequacy) increased during the year, since most of the groups were exposed to the rise in interest rates, the fall in the inflation rate, and the rise in the real exchange rate.

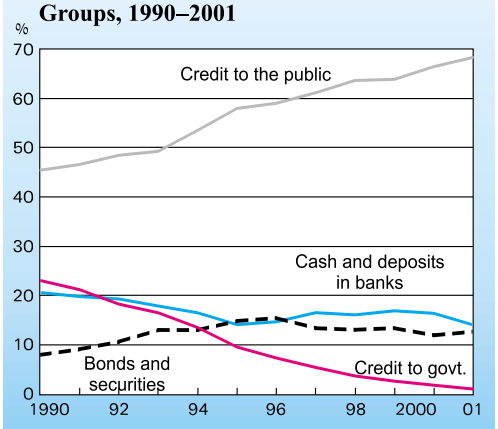
Capital adequacy, which is intended to enable the banks to absorb losses that could be caused by the realization of certain risks, rose slightly in the course of the year. But at most of the banking groups, it was very close to the minimum capital ratio required of the banks in Israel (9 percent). A continued large increase was recorded in Tier 2 capital, whose characteristics are less stable than those of Tier 1 capital. As a result, the ratio of deferred notes to Tier 1 capital rose appreciably, and at most of the groups came very near to the restriction imposed by the Supervisor of Banks.

1. INTRODUCTION

A bank is exposed to a wide range of risks in the course of its activity. These risks include financial risks and non-financial risks. Financial risks are: (1) credit risks; (2) market risks (interest-rate risks, inflation risks, exchange rate risks and share price risks); (3) liquidity risks. Non-financial risks include: (1) operational risk (including risk in respect of acts of embezzlement and fraud); (2) legal risks; (3) image risk. We will focus in this chapter[1] on the banks' financial risk exposure, and will address the question as to whether the banks hold enough capital in order to absorb expected and unexpected losses in the course of their activity, that is, the question of their capital adequacy.

Of all the financial risks to which a bank is exposed in the course of its activity, credit risk is the principal form of risk. This is because the majority of the banks' financial activity is based on the extension of credit. The rapid expansion of the credit portfolio of the five banking groups (outstanding credit and credit equivalents in off-balance-sheet items) continued in 2001. This was despite the fall in GDP and business-sector product during the year, which reflected a decline in borrowers' repayment ability. Bank credit to the public increased by NIS 45.6 billion or 9.8 percent, and its proportion to the total balance sheet rose from 66.4 percent in 2000 to 68.3 percent in 2001. The ratio between the five largest banking groups' credit portfolio and their shareholders' equity[2] also rose appreciably, from 12.7 at the end of 2000 to 13.4 at the end of 2001. The growth in credit encompassed all segments—unindexed, CPI-indexed and foreign currency, and a particularly large increase was recorded in dollar credit due to the growth in the average interest rate gap between sheqel and dollar credit and the relative stability of the exchange rate during most months of 2001. The rise in the proportion of credit to the public during 2001 was part of a multi-year trend apparent since the end of the 1980's, which mainly resulted from the liberalization of the financial markets and structural changes in the Israeli economy and in recent years, also apparently from decisions to increase credit that were not fully based on a proper analysis. This trend is apparent from the banks' expansion of activity that involves relatively high credit risk (credit to the public) at the expense of less risk-oriented activity, such as the extension of credit to the government (Figure 5.1).

Figure 5.1
Shares of the Main Items in the Total Balance Sheet, the Five Major Banking Groups, 1990–2001



SOURCE: Published financial statements.

[1] The data presented in this chapter are based on the published financial statements of the five largest banking groups, unless stated otherwise.

[2] Plus minority interest.

The growth recorded in the five banking groups' off-balance-sheet activity during 2001 is attributed to the climate of uncertainty prevailing in the money and capital markets and in the foreign currency market. In the continuation of a multi-year trend, futures transactions increased by 71.2 percent in notional value terms, and outstanding guarantees and other liabilities rose by 4.2 percent.

The indexes of *credit portfolio quality*, which reflect the probability that a borrower or borrower group will not repay part of their liabilities to the banks and are mainly affected by borrowers' repayment ability,[3] reveal a substantial deterioration in the quality of the credit portfolio at the five banking groups in 2001. This deterioration encompassed most sectors of the economy, and particularly the telecommunications and computer services industry, the construction and real estate industry, and the hotels, catering, and accommodation services industry. The decline in borrowers' repayment ability was apparent from the rise in the ratio between credit and business-sector product, from 1.6 in 2000 to 1.8 in 2001. The ratio between total risk assets and total assets (before weighting) increased by two percentage points in 2001, reflecting the move to a higher risk asset mix. Annual expenditure on loan-loss provision rose by 85.7 percent in 2001, and the ratio between this expense and outstanding credit to the public increased from 0.5 in 2000 to 0.85 in 2001. Total problem loans (except for debts under special supervision and realized real-estate collateral) increased by NIS 1.6 billion. The deterioration in the quality of the credit portfolio during 2001, and especially the large growth in problem loans and the specific loan-loss provision resulted from a number of main factors: (1) the economic recession, which derived from the worldwide recession and the security situation in Israel, was reflected by a 0.6 decrease in aggregate GDP and a 1.9 percent drop in business-sector product, leading to a decline in borrowers' debt repayment ability; (2) a number of large borrowers in the telecommunications and computer services industry encountered financial distress.

A special directive issued by the Supervisor of Banks in 2001 concerning the need to create special loan-loss provision due to the recession served as a catalyst for a re-examination of the banks' credit portfolios and an increase in the specific provision in respect of these portfolios. The need for a special provision also resulted from the relatively low rate of provisions in previous years. This need was particularly apparent in view of the rapid expansion in bank credit and the increased risks inherent in it, against the background of the slowdown in economic activity in Israel and the Western economies during recent years. The Supervisor of Banks' directive enabled banks that had made a particularly large specific provision to receive an exemption from the requirement for the special provision.

The *concentration of the credit portfolio* by economic sector (H-index) and by borrower size (Gini index) remained relatively stable at the five banking groups. However, the credit portfolio was again characterized by relatively high concentration and large differences between the banking groups. The proportion of credit to borrowers with

[3] Without taking into account collateral that has been placed against the credit.

outstanding indebtedness of over NIS 33 million rose at the two largest banking groups (Leumi and Hapoalim), and fell at the other groups. Although the proportion of credit to the construction and real estate industry is still creating a high level of concentration in the banks' credit portfolio, the proportion of this credit fell slightly during 2001 and amounted to 16.9 percent of outstanding credit compared with 17.6 percent in 2000.

According to the calculations of the five banking groups, which are based on standard models (as prescribed by the Basle Accord of 1996), the total capital that the groups are required to hold against their exposure to market risks amounted to a billion sheqels in 2001. Translated into risk asset terms for the purpose of integrating market risks in the overall capital ratio, this amount reached NIS 11.3 billion[4] compared with NIS 8.8 billion in 2000. The proportion of this amount to the banks' total risk assets reached only 1.8 percent, and in terms of the overall minimum capital ratio, its inclusion contributed only 0.17 percentage points.

Total value subject to *credit risk*, VaR (1 percent): amounted to NIS 2.1 billion at the five banking groups in 2001. In the area of interest-rate risks, it was found that all five banking groups were exposed to a rise in interest rates in the three indexation segments—unindexed sheqel, CPI-indexed and foreign currency (with the exception of the Hapoalim group, which is exposed to a decline in interest rates in the unindexed segment). Total value subject to indexation-basis risks (exchange rate and inflation risks)—VaR (1 percent) amounted to NIS 203.2 million in 2001 compared with NIS 103.9 million in 2000. This increase mainly resulted from a growth at the two largest banking groups. Most of the banking groups were exposed to an unexpected decline in the inflation rate and to an unexpected rise in the real $/NIS exchange rate.

Total value subject to indexation-basis risk (exchange rate and inflation risk) accounted for only 10 percent of total value subject to interest-rate risk due to the banks' extensive use of financial derivatives. In the area of interest-rate risks (principally in the CPI-indexed segment) however, activity in derivatives is relatively low because the market for these instruments is still in its infancy.

The *ratio of capital to risk assets* at the five banking groups rose slightly, from 9.24 percent at the end of 2000 to 9.38 percent at the end of 2001. At the Hapoalim and Mizrahi groups, the ratio fell slightly and amounted to 9.1 percent at the end of the year. Since this ratio is very close to the minimum capital ratio required of the banks in Israel (9 percent), a decline in it could reduce the banks' ability to cope with the potential realization of credit and market risks. It should be noted that the slight increase in the capital to risk assets ratio at the five banking groups in 2001 was accompanied by a change in the characteristics of this ratio: The ratio of Tier 1 capital, which reflects the more stable portion of capital, fell at all five banking groups from 6.6 percent in 2000 to 6.22 percent in 2001. The ratio of Tier 2 capital, which reflects the less stable portion of

[4] This amount was calculated by dividing the capital requirement in respect of exposure to market risks by the minimum capital ratio required of the banking corporations (1.017/0.09 = NIS 11.3 billion).

capital, rose at all the banking groups (except for the Mizrahi group) from 2.58 percent in 2000 to 3.16 percent in 2001. The changes in opposing directions in the capital components during the year marked the continuation of a trend that became apparent during the last five years. The increased share of Tier 2 capital resulted from the decision of the banks' management to adhere to the capital adequacy requirement by raising deferred notes. It is much quicker and easier to issue deferred notes than to raise Tier 1 capital (ordinary shares and preference shares that have been approved by the Supervisor of Banks), especially in periods of recession and uncertainty in the financial markets. The issue of these notes provides the issuing corporation with leverage, increases the return on equity, and also has tax advantages because interest expenses on capital notes—unlike dividend payments on shares—are recognized for tax purposes. The issue of deferred notes therefore increases the issuer's profitability. However, the closer a bank is to the Supervisor of Banks' restriction, whereby deferred notes must not exceed 50 percent of total Tier 1 capital, the less are its opportunities for using this capital instrument to expand bank credit. Apart from that, deferred notes are less stable than Tier 1 capital. This is because they are cumulative (the interest payments of them cannot be delayed), are issued for a limited period, there is no certainty regarding their availability (beyond a particular period defined in the directives) and the cost of renewing them, and they do not participate in the issuing corporation's losses on an ongoing basis.

The ratio of deferred notes (which are recognized for calculating Tier 2 capital) to Tier 1 capital at the five banking groups rose by 11.2 percentage points to 44.5 percent in 2001. At the First International and Mizrahi groups, the proportion of deferred notes to total Tier 1 capital amounted to 47.7 percent and 48.6 percent respectively—very close to the Supervisor of Banks' restriction (of up to 50 percent of total Tier 1 capital). The Discount group fully exhausted the total extent of the restriction in 2001, preventing it from using this capital instrument at a time of financial distress. At the Leumi and Hapoalim groups, the ratio rose considerably, by 15 and 9.1 percentage points respectively, and amounted to 43 percent at both groups.

The large NIS 5 billion growth in Tier 2 capital during 2001 derived not only from an increase in total risk assets, but also from the issuing requirements that resulted from the decline in net income. The five banking groups raised NIS 4.4 billion of capital in 2001 for capital adequacy purposes (due to the shortfall in annual net income), compared with NIS 2.8 and 0.4 billion in 2000 and 1999 respectively.[5]

If the upper limit of the ratio of deferred notes to Tier 1 capital permitted under the Supervisor of Banks' restrictions is reached, and the banks' net income in 2002 is lower than in 2001, this could reduce the ability to expand bank credit or increase the need for raising Tier 1 capital. As stated, the situation in the capital market during recent years has made it difficult to raise Tier 1 capital. However, the Hapoalim group was permitted

[5] The increased issue of Tier 2 capital in 1999 and 2000 resulted *inter alia* from the respective NIS 1.5 billion and NIS 2.5 billion increase in dividends that were distributed, principally at the Leumi and Hapoalim groups.

to issue deferred notes with a notional value of NIS 2 billion for the first time in 2001. These capital notes (which are regarded as 'sophisticated capital instruments') enable the bank to cope with a loss-absorption scenario because under certain conditions, the notes are to be converted to Tier 1 capital.

In this chapter we will examine the financial risks to which the banks are exposed, and will focus on the five largest banking groups. It is difficult to quantify the overall level of risks due to the fact that the banks are exposed to diverse risks, which sometimes develop in opposing directions. Moreover, the measurement instruments employed for this purpose are not uniform and are not comprehensive. Nevertheless, we will describe the development of several indexes, which reflect the different risks and the method of managing these risks during recent years.

2. CREDIT RISK

Among the range of financial risks to which a bank is exposed in the course of its activity, credit risk is the principal risk factor. This is because the majority of the banks' financial activity is based on extending credit. Credit risk derives from the possibility that a borrower or borrower group will fail to adhere to their obligations on time, adversely affecting the bank's income and capital. Exposure to credit risk can be divided into two: (1) exposure in respect of credit (balance-sheet activity). The proportion of credit to the public to the total balance sheet at the five banking groups rose from 66.4 percent at the end of 2000 to 68.3 percent at the end of 2001; (2) exposure in respect of off-balance-sheet activity, which derives from customers' liabilities relating to guarantees and transactions. The credit value equivalent[6] of off-balance-sheet financial instruments rose from 14.7 percent of the total balance sheet in 2000 to 15.6 percent in 2001, which is indicative of the considerable credit risk inherent in this activity.

Exposure to credit risk is comprised of three main elements: (1) The amount of credit relative to the bank's capital, which is positively related to the extent of exposure; (2) The quality of credit, which is negatively related to the extent of exposure; (3) The concentration of credit from various aspects (economic sector, borrowers), which is positively related to the extent of exposure. We will now analyze exposure to credit risk in the banking system as a whole and at the banking group level, on the basis of developments in these three risk components.[7]

[6] Under Directive 311 (Proper Banking Management Directives) concerning the weighting of assets and the credit value equivalent of off-balance-sheet items in risk coefficients.

[7] Although it is the principal risk to which the banks are exposed, the measurement of credit risk, unlike the measurement of market risks, is not based on any widely-accepted and sophisticated approach. Although advanced models for measuring credit risks have been developed in recent years, they have yet to be applied extensively. (See Box 4.2 in our 1998 review). In its new directives on capital adequacy (2001) the Basle Committee emphasizes the importance of developing advanced models for the measurement of credit risk.

a. Credit portfolio size

The credit portfolio of the five banking groups (outstanding credit and credit value equivalents[8] in off-balance-sheet items) continued to undergo a rapid expansion in 2001. This was despite the respective 0.6 percent and 1.9 percent decreases in aggregate GDP and business-sector GDP.[9]

Outstanding credit to the public at the five largest banking groups rose by 9.8 percent in 2001, following an increase of 12.5 percent in 2000, and totaled NIS 510 billion (Table 5.1). This development encompassed all the banking groups, and the growth in the credit portfolio ranged between 2.6 percent at the Discount group to 12.2 percent at the Hapoalim group. The ratio between the size of the credit portfolio and shareholders' equity at the five groups also increased.

An examination of the distribution of credit by indexation bases shows a growth in demand for credit in all segments—unindexed, CPI-indexed and foreign currency—in the course of the year (except for a decrease in non-US dollar foreign currency credit). Most of the increase (NIS 25.9 billion or 21.7 percent) was centered in US dollar credit (Table 5.1). Since foreign currency credit exposes a bank's customers whose activity is largely sheqel-oriented to exchange rate risk, it exposes the bank to credit risk. The bank's exposure to credit risk is derived from the possibility that the customer will not fulfill his liabilities in the event of a depreciation, if the latter has not hedged himself against a depreciation. The rapid expansion of dollar credit derived from two main factors:

(1) A growth in the average interest rate gap between sheqel credit and dollar credit for three months; (2) the relative stability in the NIS/$ exchange rate during 2001, except for two observations at the end of the third and fourth with the cumulative 2.4 percent decrease in the Bank of Israel's interest rate (until the last week of 2001 and by a further two percentage points in that week). Another reason for the growth in demand for foreign currency denominated credit was the difficulty in raising capital in the financial markets abroad that resulted from the crisis in high-tech industry. This crisis was reflected by a large decrease in Israeli companies' issues in foreign stock markets, and by a reduction in the sources reaching the venture capital funds (Table 1.2 in Chapter 1). The increased feasibility of taking dollar credit and the deterioration in the security situation in Israel led to a growth in Israelis' investments abroad, as was apparent from the NIS 18 billion rise in outstanding credit to the public in respect of borrowers' activity abroad in 2001 (Table 5.6). Most of this increase, NIS 11.2 billion, was recorded at the Hapoalim group, compared with an increase of NIS 7.8 billion in 2000. The distribution of credit by principal industry shows a growth in demand for credit in all industries except for agriculture. A considerable increase was recorded in manufacturing industry (NIS 8.9 billion) although out of the total NIS 65.7 billion increase, NIS 34 billion was credit in respect of borrowers' activity abroad and credit to private individuals (Table 5.6).

[8] Credit value equivalent of off-balance-sheet financial instruments, as calculated for the purpose of limiting single-borrower indebtedness and presented in the published financial statements as off-balance-sheet credit risk.

[9] See Chapter 2 for a detailed discussion of the extent of demand for credit.

Table 5.1
Distribution of Credit by Indexation Base, the Five Major Banking Groups, 2000–2001

		End-year balances *(NIS million)*					Distribution *(percent)*			
		Unindexed	CPI-indexed	In US$	In other currencies	Total	Unindexed	CPI-indexed	In US$	In other currencies
Leumi	2000	45,002	48,464	38,427	11,679	143,572	31.3	33.8	26.8	8.1
	2001	50,164	51,396	46,927	11,289	159,776	31.4	32.2	29.4	7.1
Change (*percent*)		11.5	6.1	22.1	–3.3	11.3				
Discount	2000	22,694	19,941	22,078	4,445	69,158	32.8	28.8	31.9	6.4
	2001	23,133	20,230	23,344	3,278	70,985	32.6	28.5	34.3	4.6
Change (*percent*)		1.9	1.4	10.3	–26.3	2.6				
Hapoalim	2000	44,801	56,662	43,458	12,133	157,054	28.5	36.1	27.7	7.7
	2001	50,521	59,223	54,888	11,529	176,161	28.7	33.6	31.2	6.5
Change (*percent*)		12.8	4.5	26.3	–5.0	12.2				
Mizrahi	2000	12,370	31,129	5,963	2,765	52,227	23.7	59.6	11.4	5.3
	2001	13,817	31,940	7,226	2,768	55,751	24.8	57.3	13.0	5.0
Change (*percent*)		11.7	2.6	21.2	0.1	6.7				
First International	2000	16,477	12,600	9,354	4,432	42,863	38.4	29.4	21.8	10.3
	2001	17,346	13,800	11,773	4,841	47,760	36.3	28.9	24.7	10.1
Change (*percent*)		5.3	9.5	25.9	9.2	11.4				
Total	2000	141,344	168,796	119,280	35,454	464,874	30.4	36.3	25.7	7.6
	2001	154,981	176,589	145,158	33,705	510,433	30.4	34.6	28.4	6.6
Change (*percent*)		9.6	4.6	21.7	–4.9	9.8				

SOURCE: Published financial statements.

The banks' off-balance-sheet activity expanded in the course of the year,[10] and the five groups' outstanding guarantees and other liabilities totaled NIS 237.9 billion at the end of the year, an increase of 4.2 percent, which resulted from opposite changes in the guarantees and other liabilities items (Table 5.2).

Table 5.2
Distribution of Guarantees and other Liabilities, the Five Major Banking Groups, 2000–2001

	End-year balances *(NIS million)*[a]		Change from previous year *(percent)*	Distribution *(percent)*	
	2000	2001	2001	2000	2001
Documentary credit	5,431	5,091	–6.3	2.4	2.1
Credit guarantees	22,022	21,630	–1.8	9.6	9.1
Guarantees for home-buyers	19,644	20,022	1.9	8.6	8.4
Other guarantees and liabilities	19,816	22,584	14.0	8.7	9.5
Irrevocable liabilities on authorized credit not taken up	45,190	52,457	16.1	19.8	22.0
Liabilities on guarantee expenses	16,336	14,145	–13.4	7.2	5.9
Liabilities on unsettled credit-card transactions	13,178	11,920	–9.5	5.8	5.0
Overdraft facilities and other unutilized credit frameworks	52,326	45,399	–13.2	22.9	19.1
Unutilized credit card frameworks	34,480	44,685	29.6	15.1	18.8
Total	**228,423**	**237,933**	**4.2**	**100.0**	**100.0**

[a] At December 2001 prices.
SOURCE: Published financial statements.

As part of their market and investment risk management activity, the banks conduct futures transactions on behalf of their customers and on their own behalf. The volume of the five banking groups' futures transactions rose by 71.2 percent during 2001, in the continuation of a multi-year trend, and totaled NIS 606 billion (Table 5.3). The growth encompassed all derivative instruments: with respective increases of 60 percent, 73.3 percent and 105.3 percent in interest rate contracts, currency contracts and other contracts;[11] and is attributed to the need of the banks and their customers to hedge against these risks.

[10] This activity, in which credit risk is implicit due to customers' liabilities to the bank, is divided into two: (1) transactions in which the notional balance represents credit risks in respect of guarantees, documentary credits, guarantees for securing credit, guarantees for apartment buyers under the Sale Guarantees Law and other guarantees; (2) transactions in which the credit risk is not represented by the notional balance—forwards, futures swaps and options on exchange rates, interest rates, indexes and commodities.

[11] Other contracts include contracts in respect of shares, share indexes, future Treasury bills and commodities.

The substantial growth in the volume of futures transactions led to an increase in overall interest-rate risk exposure (present and potential exposure) in the five largest banks' derivatives activity, from NIS 13.1 billion in 2000 to NIS 22 billion in 2001 (67 percent).

Three main reasons can be cited for the large growth in the volume of futures transactions (especially currency contracts and other contracts): (1) the substantial 21 percent increase in dollar credit; (2) the growing awareness of the need for financial hedging instruments and the internalization of strategies for hedging against changes in the prices of different assets, especially in view of the uncertainty in the financial markets, and repercussions of the security situation in Israel and worldwide (concurrent with the growing climate of economic uncertainty with respect to the potential implications of the terror attacks in the USA); (3) technical changes in the derivatives traded in the stock markets—a move from one expiration every two months to one expiration every month in these derivatives (in response to investors' demand for short-term hedging transactions), a move to the continuous method of trading (on the underlying assets side) and the extension of trading hours. Acting against these three factors, and possibly offsetting them, were private forecasters' expectations of a relatively moderate depreciation and a decline in the daily implied volatility of the underlying assets (the Tel Aviv 25 index and exchange rate) meaning a fall in the level of actual risk that could be expected to reduce activity in derivatives. The growth in the volume of futures transactions encompassed all of the five largest banking groups, and the highest rate of growth (110.1 percent) was recorded at the Hapoalim group. The previously mentioned technical change in the stock market led to a 138.6 percent rise in the five groups' stock market transactions in 2001 (Table 5.3).

b. The quality of the credit portfolio

The quality of the credit portfolio reflects the probability that borrowers or groups of borrowers will fail to repay part of their liabilities to the banks, and is mainly affected by borrowers' repayment ability and the value of the collateral provided against the receipt of credit. We will now present developments in the quality of the credit portfolio on the basis of five indexes. However, it should be noted that these indexes do not take into account collateral provided against credit, or the correlations within the credit portfolio.

(1) The ratio of credit to business-sector product,[12] which reflects the repayment ability of borrowers in the economy, rose from 1.6 in 2000 to 1.8 in 2001 in the continuation of a growth trend during previous years. This resulted from a growth in the volume of credit and a 1.9 percent decrease in business-sector product. The ratio differs from industry to industry, and in 2001 ranged between 0.8 in the transport and storage industry to 8.6 in the real estate industry. The growth in 2001 encompassed all industries except for

[12] The analysis of credit risk (including off-balance-sheet credit) on the basis of this index was applied to the whole of the banking system in Israel.

Table 5.3
Distribution of Balances (Notional Value) of Financial Derivatives, the Five Major Banking Groups, December 2000 and December 2001

(NIS million)[a]

	December 2000				December 2001				Rate of change in total derivatives (%)
	Interest-rate	Exchange-rate	Other[b]	Total	Interest-rate	Exchange-rate	Other[b]	Total	
Leumi	39,672	68,762	4,385	112,816	59,587	90,615	10,334	160,536	42.30
Discount	7,481	28,336	5,351	41,168	8,805	44,493	4,710	58,008	40.91
Hapoalim	47,519	68,452	2,986	118,957	90,537	150,615	8,828	249,980	110.14
Mizrahi	596	18,522	4,262	23,380	2,460	34,805	8,249	45,514	94.67
First International	9,275	44,943	3,450	57,668	5,843	76,258	9,827	91,928	59.41
Total	104,543	229,015	20,431	353,989	167,232	396,786	41,948	605,966	71.18
Change from previous year (percent)					60.0	73.3	105.3	71.2	
of which									
Traded on stock exchanges	8.7	4.3	62.5	9.0	5.8	10.0	63.3	12.5	138.57
Over-the-counter	69.5	37.9	12.9	45.8	70.3	33.3	17.1	42.4	58.51
Other	21.8	57.8	24.6	45.2	23.9	56.7	19.6	45.1	70.63

[a] In terms of notional principal, at December 2001 prices.
[b] Contracts relating to shares, share indices, Treasury-bill futures, and commodities.
SOURCE: Published financial statements.

agriculture and the transport and storage industry. Considerable increases were recorded in the following industries:[13] real estate (from 7 in 2000 to 8.6 in 2001), telecommunications and computer services (from 0.9 in 2000 to 1.1 in 2001), construction (from 4.7 to 5.3 in 2001), and hotels and catering (from 1.7 to 2.1 in 2001). It should be noted that the indexation bases of credit have not been taken into account in this examination. A fall in the quality of credit also reflects a growth in outstanding 'open' foreign currency credit (credit *less* collateral). 'Open' foreign-currency credit exposes a bank's customers to exchange rate risk, and therefore exposes the bank itself to credit risk, which implies the possibility that customers will not be able to repay their liabilities in the event of a depreciation. Outstanding 'open' foreign-currency credit (exclusive of foreign-currency collateral and surplus local-currency collateral, at the commercial banks rose by 24.5 percent, from NIS 39.7 billion in 2000 to NIS 49.4 billion in 2001. The increase amounted to NIS 6.4 billion or 27.9 percent in 'open' foreign-currency credit excluding exporters, and a billion sheqels or 52.9 percent in credit to high-risk borrowers. The growth in 'open' foreign currency credit encompassed most of the principal industries in the economy. A considerable increase was recorded in manufacturing industry, which accounts for 49 percent of total 'open' foreign-currency credit by principal industries, from NIS 18.7 billion in 2000 to NIS 24.2 billion in 2001. A particularly large increase of NIS 2 billion was also recorded in the machinery, electrical, and electronics equipment industry, bringing total credit to that industry to a level of NIS 9.5 billion.

(2) The ratio of risk assets to total assets[14] (before weighting) rose by two percentage points to 67.3 percent at the five groups during 2001 (Table 5.4). The rise reflects a move to a more risk-oriented asset mix. The rise encompassed all the groups except for the Discount group, where the ratio fell by 1.5 percentage points following a decrease in 2000.

(3) The ratio between expenditure on loan-loss provision and outstanding credit to the public at the groups' responsibility rose considerably, by 0.35 percentage points at the five banking groups and amounted to 0.85 percent in 2001 (Table 5.4). The rise resulted from an increase at all the banking groups, and the largest increase was recorded at the First International group (Figure 5.2). The rise in this ratio derived from a considerable increase in the annual expenditure on loan-loss provision at the five banking groups from NIS 2.3 billion in 2000 to NIS 4.35 billion in 2001. This expenditure rose appreciably at all five groups: by NIS 856 million at the Leumi group, by NIS 498

[13] See Chapter 2 for an extensive discussion of the reasons for the changes in these indexes.

[14] Under Proper Banking Management Directive No. 311 and in accordance with the directives of the Basle Committee, risk assets are calculated by weighting the balances of all assets and the credit value equivalent of off-balance-sheet items in accordance with four risk coefficients: 0 percent, 20 percent, 50 percent, 100 percent. The credit value equivalent of an off-balance-sheet item is the balance of the item multiplied by the conversion coefficient, which reflects the probability that customer indebtedness to the bank will rise in respect of that item or in respect of a futures transaction. The conversion coefficients defined in Israel range between 0 percent and 100 percent.

Table 5.4
Indices of Credit Portfolio Quality, the Five Major Banking Groups, 1999–2001

(percent)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Ratio of risk-weighted[a] assets to total assets						
1999	62.6	59.8	67.0	60.3	58.3	62.9
2000	66.7	59.5	69.4	62.9	60.0	65.3
2001	69.2	57.9	72.7	63.2	63.1	67.3
Share of problem loans in total credit						
1999	9.3	9.8	9.6	6.7	2.7	8.6
2000	6.7	9.2	7.9	6.8	2.9	7.1
2001	9.9	10.8	8.7	8.3	6.6	9.1
Share of annual loan-loss provision in total credit						
1999	0.42	0.89	0.48	0.32	0.22	0.48
2000	0.43	1.02	0.44	0.36	0.27	0.50
2001	0.92	1.32	0.68	0.53	0.91	0.85
Ratio of balance of loan-loss provision to problem loans *plus* balance of loan-loss provision						
1999	0.28	0.30	0.29	0.30	0.35	0.29
2000	0.32	0.33	0.30	0.29	0.34	0.31
2001	0.25	0.33	0.27	0.27	0.24	0.28

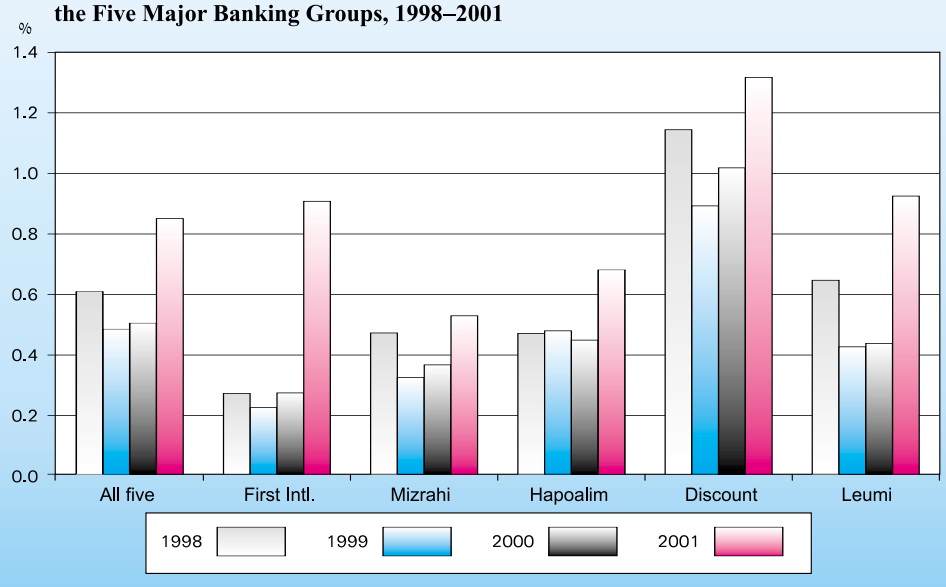
[a] Total risk-weighted assets calculated in accordance with the Supervisor of Banks' directives regarding the minimum capital ratio; total assets include balance-sheet credit and the credit-risk equivalent of off-balance-sheet items.

SOURCE: Published financial statements.

million at the Hapoalim group, by NIS 318 million (274.1 percent) at the First International group, by NIS 234 million at the Discount group and by NIS 104 million at the Mizrahi group. The substantial growth in the loan-loss provision during 2001 resulted from the following main factors: (1) the recession in the Israeli economy, which was affected by the worldwide recession and the security situation in Israel, was reflected by a 1.9 percent drop in business-sector product and therefore impaired borrowers repayment ability; (2) a number of large borrowers in the telecommunications and computer services industry encountered financial distress.

A special directive issued by the Supervisor of Banks in 2001 concerning the need to create a special loan-loss provision because of the economic recession (Box 3.1 in Chapter 3) served as a catalyst for a renewed examination of the credit portfolios and a growth in the specific provision in respect of these portfolios. The need for a special provision also derived from the relatively low rate of provisions in previous years concurrent with a rapid growth in bank credit and the risks involved in it, against the background of the slowdown in economic activity in Israel and Western economies during recent years.

Figure 5.2
Ratio of Annual Loan-Loss Provision to Credit to the Public,[a] the Five Major Banking Groups, 1998–2001



[a] At the banks' responsibility.
SOURCE: Published financial statements.

The Supervisor of Banks' directive enabled the banks that had made a particularly large specific provision to obtain an exemption from the special provision.

The annual expenditure on the loan-loss provision is comprised of expenditure in respect of the specific loan-loss provision and the additional provision. The expenditure on the specific loan-loss provision, which is determined by the banks' management in accordance with borrowers' expected repayment ability and the nature of their collateral, rose by 81.7 percent in the course of the year. The five groups also recorded a positive expenditure in respect of the additional loan-loss provision of NIS 111 million compared with NIS 9 million in 2000. The additional provision was determined in accordance with the Supervisor of Banks' directives, on the basis of the risk criteria of the entire credit portfolio. (See Box 3.1 in Chapter 3 for more details). *Annual expenditure on the specific loan-loss provision in the principal industries* increased in all industries during 2001 by a particularly high rate in certain industries: a large increase was recorded in the telecommunications and computer services industry, from NIS 24 million in 2000 to NIS 748 million in 2001 (Table 5.6). 52 percent of this increase was recorded at the Leumi group. The growth in the provision for this industry resulted from two main factors: (1) the worldwide crisis in the telecommunications and high-tech industries, which led to a fall in the industries' product and thereby impaired the repayment ability; (2) the financial distress encountered by a number of large borrowers in the industry. A considerable increase in the specific provision was also recorded at the following industries: financial services, manufacturing industry (principally high-tech industries—

Table 5.5
Distribution of Problem Loans,[a] the Five Major Banking Groups, 2000–2001

	Leumi		Discount		Hapoalim		Mizrahi		First Intl.		Total	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
NIS million[b]												
Total problem loans	**3,706**	**4,386**	**3,195**	**3,400**	**6,750**	**6,791**	**1,665**	**1,805**	**614**	**1,109**	**15,931**	**17,491**
Non-performing	1,918	2,312	2,427	2,618	1,905	2,285	507	504	289	681	7,046	8,400
To agriculture	326	643	47	30	2,398	2,086	128	112	11	10	2,910	2,881
Other	3,380	3,743	3,148	3,370	4,352	4,705	1,537	1,693	603	1,099	13,021	14,610
Percent												
Share of problem loans in total credit at group's responsibility												
Total	**2.6**	**2.7**	**4.6**	**4.8**	**4.3**	**3.8**	**3.2**	**3.2**	**1.4**	**2.8**	**3.4**	**3.4**
Non-performing	1.3	1.4	3.5	3.7	1.2	1.3	1.0	0.9	0.7	1.7	1.5	1.6
To agriculture	0.2	0.4	0.1	0.0	1.5	1.2	0.2	0.2	0.0	0.0	0.6	0.6
Other	2.3	2.3	4.5	4.7	2.8	2.7	2.9	3.0	2.8	2.8	2.8	2.8
Percent												
Ratio of problem loans to group's equity												
Total	**31.7**	**34.1**	**55.9**	**59.1**	**52.5**	**52.4**	**54.4**	**54.4**	**19.5**	**33.2**	**43.6**	**45.8**
Non-performing	16.4	18.0	42.4	45.5	14.8	17.6	16.6	15.2	9.1	20.4	19.3	22.0
To agriculture	2.8	5.0	0.8	0.5	18.6	16.1	4.2	3.4	0.4	0.3	8.0	7.5
Other	28.9	29.1	55.1	58.6	33.8	36.3	50.2	51.0	19.1	32.9	35.7	38.2

[a] Including non-performing loans, rescheduled debts, and overdue loans (excluding debts under special supervision and realized real-estate collateral).
[b] At December 2001 prices.
SOURCE: Published financial statements.

Table 5.6
Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2000–2001

	Balance of credit to public[a] *(NIS million)*[b]		Change in balance of credit *(NIS million)*	Distribution of credit balances[a] *(percent)*		Problem credit: Balance *(NIS million)*		Problem credit: Share in total credit *(percent)*		Annual specific loan-loss provision *(NIS million)*		Loan-loss provision/ total credit *(percent)*	
	2000	2001	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Agriculture	9,993	9,509	–484	1.4	1.2	4,217	3,834	42.2	40.3	48	112	0.48	1.18
Manufacturing	94,894	103,819	8,925	13.4	13.4	6,419	5,724	6.8	5.5	309	563	0.33	0.54
Construction and real estate[c]	124,832	130,836	6,004	17.6	16.9	10,050	13,514	8.1	10.3	820	1,062	0.66	0.81
Water and electricity[d]	6,626	8,102	1,476	0.9	1.0	137	143	2.1	1.8	29	7	0.44	0.09
Commerce	50,323	53,474	3,151	7.1	6.9	2,529	3,107	5.0	5.8	196	270	0.39	0.50
Hotels and catering	12,706	14,064	1,358	1.8	1.8	1,729	3,073	13.6	21.9	122	254	0.96	1.81
Transport and storage	16,929	17,292	363	2.4	2.2	436	838	2.6	4.8	31	55	0.18	0.32
Communications and computer services	31,467	35,465	3,998	4.4	4.6	313	7,197	1.0	20.3	24	748	0.08	2.11
Financial services	49,058	54,881	5,823	6.9	7.1	819	1,271	1.7	2.3	12	156	0.02	0.28
Other business services	22,025	22,703	678	3.1	2.9	1,332	1,373	6.0	6.0	119	230	0.54	1.01
Public and community services	20,118	20,509	391	2.8	2.6	1,524	1,149	7.6	5.6	31	91	0.15	0.44
Individuals	174,630	190,713	16,083	24.6	24.6	6,732	6,557	3.9	3.4	495	580	0.28	0.30
Borrowers abroad	96,759	114,715	17,956	13.6	14.8	1,295	2,430	1.3	2.1	89	115	0.09	0.10
Total	**710,360**	**776,082**	**65,722**	**100**	**100**	**37,532**	**50,210**	**5.3**	**6.5**	**2,325**	**4,243**	**0.33**	**0.55**

[a] Including credit to the public and the public's investment in bonds, and the credit-risk equivalent of off-balance-sheet items.
[b] At December 2001 prices.
[c] Data on this industry are not calculated in accordance with the industry concentration limitation.
[d] Data on credit to this industry have a downward bias as they do not include credit extended by the Industrial Development Bank of Israel Ltd.
SOURCE: Published financial statements.

machinery and electrical and electronics equipment), hotels and catering, and construction and real estate (Table 5.6). The increased provision in the hotels and catering industry mainly resulted from a 12.4 percent decrease in the industry's product as a result of the violent confrontation with the Palestinians (the intifada) and the September 11 terror attacks in the USA, which worsened the situation in the tourism industry. Despite the low level of credit risk in this industry (1.8 percent), the decline in activity in the industry directly contributed 7 percent of the growth in the total specific loan-loss provision and indirectly, an unknown additional rate due to the adverse affect of the reduced activity in the industry on the activity of other industries, including transport, financial services and commerce. The specific loan-loss provision for the construction industry rose as a result of the 9 percent decrease in the industry's product, which impaired the repayment ability of borrowers in the industry. The decrease in product resulted from a substantial drop in both the demand for and supply of apartments. The fall in demand resulted from the reduced pace of immigration to Israel, the reduced investment feasibility of purchasing apartments in the local market, the continued erosion in the subsidy for those eligible under Housing Ministry criteria, and a rise in the unemployment rate. The decrease in supply was mainly reflected by a slower pace of building starts, and resulted from the growing uncertainty in the industry caused by the continued slack state of activity and the shortage of workers from the territory. A 7 percent decrease in product in the real estate industry adversely affected borrowers' repayment ability, and thereby led to a growth in the specific loan-loss provision.

The relative quality of the credit in the principal industries is measured on the basis of the *ratio of the proportion of the specific loan-loss provision in the industry to the total loan-loss provision, and the proportion of credit in the industry to total credit.*[15] In the agriculture, construction and real estate, hotels and restaurant, telecommunications and computer services, and other business services industries, a ratio greater than one is obtained, reflecting the relatively low quality of credit in these industries during 2001 (Table 5.7). In the telecommunications and computer services industry, a higher ratio was obtained (3.9 in 2001 compared with 0.2 in 2000).

(4) The proportion of problem loans to total credit at the groups' responsibility at the five major banking groups rose considerably in 2001, by two percentage points to 9.1 percent (Table 5.4). The increase encompassed all of the banking groups, and the largest growth was recorded at the First International group. *Total problem loans*[16] of the five banking groups, with the exception of debts under special supervision and credit discharged by transfer by the ownership of assets, increased by NIS 1.6 billion to NIS

[15] A ratio higher than one implies that the ratio of the specific loan-loss provision in the industry to the total loan-loss provision is higher than the ratio of credit in the industry to total credit. This means that the quality of credit in the industry is relatively low, and *vice versa.*

[16] Under the Supervisor of Banks' directives, problem loans are defined according to these categories: (full or partial) loan losses, non-performing debts, rescheduled debts (that have been or will be restructured), debts in temporary arrears and debts under special supervision.

Table 5.7
Distribution of Problem Credit and Specific Loan-Loss Provision Relative to Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2000–2001

(percent)

	Distribution of:									
	Outstanding credit[a]		Problem credit		Specific loan-loss provision		Problem credit/ outstanding credit		Specific loan-loss provision/ outstanding credit	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Agriculture	1.4	1.2	11.2	7.6	2.1	2.6	8.0	6.2	1.5	2.2
Manufacturing	13.4	13.4	17.1	11.4	13.3	13.3	1.3	0.9	1.0	1.0
Construction and real estate[b]	17.6	16.9	26.8	26.9	35.3	25.0	1.5	1.6	2.0	1.5
Water and electricity[c]	0.9	1.0	0.4	0.3	1.2	0.2	0.4	0.3	1.3	0.2
Commerce	7.1	6.9	6.7	6.2	8.4	6.4	1.0	0.9	1.2	0.9
Hotels and catering	1.8	1.8	4.6	6.1	5.2	6.0	2.6	3.4	2.9	3.3
Transport and storage	2.4	2.2	1.2	1.7	1.3	1.3	0.5	0.7	0.6	0.6
Communications and computer services	4.4	4.6	0.8	14.3	1.0	17.6	0.2	3.1	0.2	3.9
Financial services	6.9	7.1	2.2	2.5	0.5	3.7	0.3	0.4	0.1	0.5
Other business services	3.1	2.9	3.5	2.7	5.1	5.4	1.1	0.9	1.7	1.9
Public and community services	2.8	2.6	4.1	2.3	1.3	2.1	1.4	0.9	0.5	0.8
Individuals	24.6	24.6	17.9	13.1	21.3	13.7	0.7	0.5	0.9	0.6
Borrowers abroad	13.6	14.8	3.5	4.8	3.8	2.7	0.3	0.3	0.3	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**1.0**	**1.0**	**1.0**	**1.0**

[a] Including credit to the public and the public's investment in bonds, and the credit-risk equivalent of off-balance-sheet items.
[b] Data on this industry are not calculated in accordance with the industry concentration limitation.
[c] Data on credit to this industry have a downward bias as they do not include credit extended by the Industrial Development Bank of Israel Ltd.
SOURCE: Published financial statements.

17.5 billion in 2001 (Table 5.5). This increase encompassed all five banking groups, and ranged between NIS 140 million at the Mizrahi group to NIS 680 million at the Leumi group. The increase at the Leumi group derived from its share of the NIS 317 million growth in credit to the agricultural sector (in respect of credit that was rescheduled during 2001). This was in contrast to developments at the other banking groups and the multi-year downtrend in the agricultural sectors' outstanding problem loans, which reflects the implementation of the credit arrangements with the kibbutzim and the moshavim whereby part of their debts were written-off. The growth in outstanding problem loans to borrowers outside of the agricultural sector reflects the increased number of borrowers encountering repayment problems due to the slowdown in economic activity. Moreover, the rate of growth in outstanding problem loans to borrowers outside of the agricultural sector was greater than that of the shareholders' equity at the five groups, thereby leading to a growth in the ratio between them (Table 5.5). *The proportion of problem loans to borrowers outside the agricultural sector to total credit*[17] remained unchanged in 2001 compared with 2000 and amounted to 2.8 percent at the end of the year (Table 5.5). However, it is possible that this ratio does not provide the best indication of the quality of credit during periods of rapid growth in credit, as in recent years, because of the gap between the credit extension date and the date when the credit acquired the status of a problem loan.

Total credit under special supervision, which is based on the assessments of the banks' management regarding the quality of credit and on considerations relating to industry-specific or regional developments, rose by a substantial NIS 11.9 billion in 2001 compared with 2000 and totaled NIS 27.9 billion. The increase encompassed all the banking groups, and the Leumi group was notable for a particularly large rise of 132 percent (NIS 6 billion). The considerable growth in credit under special supervision (in respect of which the banking corporations' management do not expect losses) during 2001 appears to have resulted from the increased control and monitoring measures adopted by the banking groups and by the Supervisor of Banks, in view of the continued recession and the deterioration in the quality of borrowers' credit, which was reflected by the previously mentioned indexes. The proportion of problem loans to total credit by principal industries rose in most industries during 2001, and by high rates in certain industries. The largest increase (Table 5.6) was recorded in the telecommunications and computer services industry, from NIS 0.3 billion in 2000 (1 percent of total credit in the industry) to NIS 7.2 billion in 2001 (20.3 percent of total credit in the industry). The growth in problem loans in the industry during 2001 accounted for 54.3 percent of the total increase in all industries. Other industries in which problem loans expanded considerably due to the decline in economic activity were construction and real estate, and hotels and catering. The highest proportion of problem loans to total credit was recorded in the agricultural industry (40.3 percent), due to the credit arrangements with borrowers in the industry that were organized in the past. This proportion is falling continually.

[17] This index is preferable to the one that includes the agricultural sector, because it does not include the past arrangements with the kibbutzim and the moshavim.

The ratio between the proportion of problem loans in an industry to total problem loans, and the proportion of credit in the industry to total credit[18] was considerably greater than one in the agricultural, construction and real estate, hotels and catering, and telecommunications and computer services industries during 2001, which was indicative of the relatively, very low quality of credit within those industries in that year (Table 5.7). In the agricultural industry, the high value of the index was derived from the poor quality of credit in previous years which had already been reflected in the credit arrangements that had been made in the past with the kibbutzim and the moshavim, and from the relatively low proportion of credit to the agricultural industry (1.2 percent of total credit in 2001). The relatively low quality of credit in this industry improved slightly during the year, in the continuation of a multi-year trend, due to the implementation of the credit arrangements with the kibbutzim and the moshavim whereby part of their debts were written-off.

(5) The ratio of the balance of loan-loss provision to problem loans (plus the balance of loan-loss provision) is also used for measuring the quality of the banks' credit portfolio. The higher this ratio, the greater is a bank's ability to absorb losses that could be caused by the non-repayment of credit. The ratio between the outstanding loan-loss provision and problem loans at the five banking groups fell from 31.2 percent at the end of 2000 to 27.6 percent at the end of 2001. During 2001, the ratio ranged between 33.2 percent at the Discount group to 24.3 percent at the First International group (Table 5.4).

To conclude: The quality of credit fell appreciably during 2001, as reflected by the five previously mentioned indexes. A deterioration in the quality of the credit portfolio was recorded in most principal industries, particularly in the telecommunications and computer services, construction and real estate, and hotels and restaurant industries.

c. The concentration of the credit portfolio

1. *Concentration of credit by principal industries*

Exposure to credit risk is also affected by the concentration of the credit portfolio by principal industries, on the assumption that there is no perfect correlation between the volume of activity and financial results of borrowers in different economic sectors. The wider the dispersal of the credit portfolio among the various industries, the lower will be the level of risk.

The Herfindahl-Hirschman index (the H-index)[19] of concentration of the credit portfolio by principal industries excluding private individuals (households[20]) remained stable at

[18] This ratio parallels that between the specific loan-loss provision in an industry to total loan-loss provision, and the ratio of credit in the industry to total credit.

[19] The H-index is calculated as $H = \sum S_i^2$, where S_i is the share of credit to industry *i* in total credit. The lower the value of the index, the lower the concentration of the credit portfolio, which will therefore be exposed to a lower level of risk in relative terms.

Table 5.8
Indices of Credit Concentration, the Five Major Banking Groups,[a] 2000–2001

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
H-Index[b] by principal industry (excluding households)						
2000	0.087	0.094	0.085	0.065	0.111	0.082
2001	0.085	0.095	0.091	0.064	0.110	0.083
Concentration by size of borrower[c]						
2000	41.8	49.5	53.9	28.3	54.0	47.2
2001	42.9	47.2	55.7	25.3	53.4	47.5
Gini Index[d]						
2000	0.903	0.928	0.904	0.826	0.935	0.907
2001	0.902	0.920	0.906	0.816	0.948	0.906

[a] On balance-sheet and off-balance-sheet basis.

[b] The H-index is calculated as $H = \sum S_i^2$, where *Si* is the share of credit to industry *i* in total credit.

[c] The share of credit granted to borrowers whose credit balance (on and off the balance sheet) is more than NIS 33 million for the purpose of the single-borrower indebtedness limitation.

[d] The Gini Index of credit spread reflects the inequality of the distribution of credit by borrower (see note in text).

SOURCE: Published financial statements.

the five groups in 2001 and amounted to 0.083 at the end of the year, similar to its value in 2000 (Table 5.8). Large differences were apparent in the level of the index between the banking groups, from 0.064 at the Mizrahi group to 0.11 at the First International group.

The proportion of credit to the construction and real estate industry is creating a high degree of concentration in the bank credit portfolio. This is despite the fact that this ratio fell slightly, from 17.6 percent of outstanding credit in 2000 to 16.9 percent in 2001 (Table 5.6). Outstanding balance-sheet credit and off-balance-sheet credit value equivalents granted by the five groups to borrowers from the construction and real estate industry increased by 4.8 percent during 2001, despite the continued slowdown in activity in the industry as reflected by a large 8.9 percent decrease in its product. The proportion of credit to the construction and real estate industry to total credit ranged between 15.6 percent at the Hapoalim group and 22.6 percent at the Mizrahi group.

[20] Households, whose share of total credit at the five banking groups amounted to 24.6 percent in 2001, are highly heterogeneous from the aspect of borrowers' financial position. The correlation between them is therefore small, both in their economic activity and in their repayment ability, and it is doubtful whether they can be regarded as an industry in this respect.

Table 5.9
Distribution of Credit to the Public[a] by Single-Borrower Indebtedness, the Five Major Banking Groups,[b] 2000–2001

	Balance of credit to public and credit risk (*NIS million*)[c]		Number of borrowers		Average credit balance (*NIS thousand*)[c]		Proportion of credit balance (%)		Proportion of borrowers (%)	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
(NIS thousand)[c]										
Up to 7	4,514	3,715	1,262,042	1,667,054	3	2	0.7	0.5	38.31	37.40
From 7 to 16	8,877	8,080	710,246	683,801	12	12	1.3	1.1	16.73	15.34
From 16 to 33	16,492	16,260	672,489	682,865	25	24	2.4	2.2	15.84	15.32
From 33 to 65	23,012	26,359	469,110	555,605	49	47	3.3	3.5	11.05	12.47
From 65 to 130	31,021	34,911	337,323	381,411	92	92	4.5	4.7	7.95	8.56
From 130 to 265	44,229	48,926	231,479	263,995	191	185	6.4	6.5	5.45	5.92
From 265 to 490	42,202	46,770	118,875	134,878	355	347	6.1	6.2	2.80	3.03
From 490 to 990	28,286	30,732	41,895	47,047	675	653	4.1	4.1	0.99	1.06
From 990 to 1,640	15,584	16,097	12,259	13,175	1,271	1,222	2.3	2.1	0.29	0.30
From 1,640 to 3,300	21,777	22,993	9,441	10,191	2,307	2,256	3.2	3.1	0.22	0.23
From 3,300 to 6,600	26,860	28,902	5,835	6,277	4,603	4,604	3.9	3.9	0.14	0.14
From 6,600 to 16,400	49,095	52,712	4,719	5,027	10,404	10,486	7.1	7.0	0.11	0.11
From 16,400 to 33,000	51,387	57,409	2,246	2,479	22,879	23,158	7.5	7.7	0.05	0.06
From 33,000 to 164,000	167,739	174,518	2,500	2,548	67,096	68,492	24.4	23.3	0.06	0.06
From 164,000 to 330,000	64,563	68,159	285	313	226,537	217,760	9.4	9.1	0.01	0.1
From 330,000 to 655,000	54,960	60,886	117	130	469,744	468,354	8.0	8.1	0.00	0.0
From 655,000 to 985,000	19,229	27,923	24	36	801,208	775,639	2.8	3.7	0.00	0.0
From 985,000 to 1,310,000	8,652	11,489	8	10	1,081,500	1,148,900	1.3	1.5	0.00	0.0
From 1,310,000 to 1,970,000	7,240	10,110	5	7	1,448,000	1,444,286	1.1	1.3	0.00	0.0
More than 1,970,000	2,246	2,717	1	1	2,246,000	2,717,000	0.3	0.4	0.00	0.0
Total	**687,965**	**749,668**	**4,244,899**	**4,456,850**	**162.1**	**168.2**	**100**	**100**	**100**	**100**

[a] Including outstanding credit to the public and credit-risk-equivalent of off-balance-sheet financial statements, calculated in accordance with the definitions relating to the calculation of the single-borrower limitation. Excluding the public's investment in bonds.

[b] The data in the categories up to NIS 6,600 represent the total of all credit categories of every consolidated company (consolidated by stratum), whereas in the remaining categories the credit data and number of borrowers are calculated as the sum of each borrower's credit in all the banking groups (specific consolidation).

[c] At December 2001 prices.

SOURCE: Published financial statements.

2. *Concentration of credit by borrower size*

Another indicator of the concentration of the credit portfolio is the extent of its dispersal among different borrowers: The greater the level of dispersal, the lower the level of exposure to credit risk, and vice versa. The credit portfolio of the banks in Israel is notable for a high degree of concentration by borrower, reflecting the concentration of economic activity among large corporations. The high degree of concentration in the bank credit portfolio is reflected by a number of indexes: (1) the Gini index of inequality in the distribution of credit, which reflects non-uniformity in the composition of the credit portfolio, amounted to 0.906 in 2001. The value of this index is the area between the credit portfolio distribution curve (the cumulative percentage of credit to the cumulative percentage of borrowers) and the 45 degree line that reflects egalitarian distribution; (2) the distribution of credit to borrowers whose outstanding indebtedness exceeded NIS 33 million amounted to 47.5 percent of the credit portfolio (including credit value equivalent in off-balance-sheet items), while the proportion to the total number of borrowers amounted to only 0.07 percent[21] of 3,045 borrowers (Table 5.9). These data are almost the same as the data obtained in 2000, and are indicative of relative stability in concentration by borrower size on aggregate at the five banking groups. However, changes occurred in the index at each separate group. The index rose at the two largest groups, Leumi and Hapoalim, and fell at the other groups (Table 5.8). The relative stability in concentration by borrowers at the five banking groups as a whole followed an increase in the concentration of the credit portfolio during the years 1999 and 2000. This increase derived inter alia from the privatization policy, whereby a relatively small number of corporations required large amounts of finance in order to purchase control of the companies that were privatized.

3. MARKET RISKS

Market risks are defined as the erosion of a bank's net worth as the result of unexpected changes in market prices (interest rates, shares, the exchange rate and inflation) during a particular period (day, month etc.) at a certain probability (99 percent, 95 percent etc.). During a period of liberalization in the financial markets, an increase in the volatility of market prices and the development of innovative financial instruments (including derivatives), local and worldwide banks' potential exposure to market risks increases.

The analysis of market risks in this chapter is based on a simplistic model of Value at Risk (VaR). This value reflects the maximum loss expected on the holding of financial

[21] Starting from the credit bracket of NIS 7 million, the classification is conducted under the specific unification method. However, the number of borrowers is upward-biased because there may be borrowers recorded at a number of groups and if so, adding borrowers at the five banking groups leads to duplication.

instruments in a long or short position-positions that are sensitive to changes in market prices-at a given planning horizon and level of significance at a particular point in time. The value is calculated by means of historical data, and is based on the following assumptions: (1) a planning period (horizon) of a month; (2) a confidence level of 99 percent; (3) correlations between changes in different market prices are not taken into account; (4) positions are based on data published in banks' financial statements (including the affect of futures transactions), but do not take into account the full affect of derivatives in general and of options in particular. It should be noted in this respect that the Banking Supervision Department requires the banks to estimate market risks via the use of more complex and more sophisticated models. In 2001, all the banking groups operated systems for the current calculation of market risks using the VaR method, as specified in Directive No. 339.

a. Interest-rate risks

Interest-rate risk is the risk that changes in interest rates will lead to a deterioration in a bank's financial position (or reduce its net worth[22]). This risk arises when the relative sensitivity of the value of the bank's assets to changes in interest rates differs from that of its liabilities. The development of exposure to interest-rate risk[23] is presented separately for each of the three indexation segments (unindexed, CPI-indexed and foreign currency), because the different types of interest rates among these segments constitute different risk factors. In this sub-section, we have referred to the rates of yield-to-maturity on Treasury bills and CPI-indexed bonds and to the Libor dollar interest rate as interest-rate risk factors in the unindexed, CPI-indexed and foreign currency segments respectively.[24] Exposure to interest-rate risk, as reflected by VaR,[25] is affected by three elements: the

[22] The difference between the present value of assets and liabilities. This is not necessarily equal to the fair value of financial instruments as presented in the financial report to the public. Reporting on the fair value of financial instruments by indexation basis and by period to maturity would make it possible to calculate the value subject to market risks more accurately.

[23] Interest-rate risk is calculated on the basis of Appendix D to the Management Review in the banks' published financial statements. Since this was the first year that data were reported on a consolidated basis, it is not possible to present comparative data from 2000.

[24] Interest rates in the three indexation segments are adjusted to the yield-to-maturity on Treasury bills, CPI-indexed bonds and the Libor interest rate, as relevant.

[25] This value is the change that is expected in the economic value of the position with respect to the maximum expected change in the interest rate, and is calculated according to the following equation: $\Delta P = P \cdot \frac{D}{(1+i)} \cdot \Delta(1+i)$, where P is the position, D is the duration and i is the discounted interest rate. The second component on the right-hand side of the equation is the standardized duration. The higher the standardized duration of the asset, the greater would be the change in the present value that is caused by a change in the interest rate, and therefore reflects a higher level of risk.

difference between the present value of assets and liabilities plus the effect of futures transactions-hereinafter, the position; (2) the sensitivity of the position to changes in interest rates as measured by duration (average term-to-maturity[26]); (3) the change in the interest rate in percentage points during the planning period. The first two elements are dependent on the distribution of each bank's assets and liabilities over time, while the third element is common to all of them, since it is derived from interest-rate fluctuations. The maximum expected change in the interest rate for which the VaR is calculated is derived from the cumulative distribution of the monthly changes in the rates of yield-to-maturity on Treasury bills, CPI-indexed bonds and the dollar Libor interest rate in the unindexed, CPI-indexed and foreign currency segments respectively during the previous five years. As stated, the maximum change is estimated from the 99th percentile[27] in this distribution for exposure to a rise in the interest rate, and from the first percentile[28] for exposure to a decline in the interest rate. The direction of the exposure to changes in interest rates is determined by the sign of the standardized capital duration. A banking corporation will be exposed to a rise in interest rates in the relevant segment in the case of a positive capital duration, and exposed to a decline in interest rates in the case of a negative capital duration. The value at interest-rate risk in the relevant segment is obtained by multiplying the position by the standardized capital duration and by the maximum expected change in the interest rate in the segment.

(1) *All segments*

The total value at interest-rate risk (in all three indexation segments) ranged between 2.9 percent of net worth (2.69 percent of shareholders equity) at the Hapoalim Group (NIS 348.3 million) and 11.39 percent of net worth (8.97 percent of shareholders equity) at the Discount Group (NIS 516.1 million) (Table 5.10). The highest VaR was recorded at the Leumi Group and amounted to NIS 890 million or 8.5 percent of net worth (6.9 percent of shareholders equity). Total VaR was calculated as the sum of the VaR's in each segment, on the conservative assumption that the worst case scenarios would occur in each segment simultaneously, ignoring the correlations between changes in the different interest rates. The calculation of the total value at interest-rate risk taking these correlations into account using the covariance matrix method is given in the appendix to this chapter.

[26] The duration index is $D = \frac{\sum_{t=1}^{n} \frac{t \cdot C_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+i)^t}} = \frac{\sum_{t=1}^{n} \frac{t \cdot C_t}{(1+i)^t}}{V}$ where C_t is the cash flow in the period t,n is the period to maturity, i is the discounted interest rate, and V is the present value of cash flows.

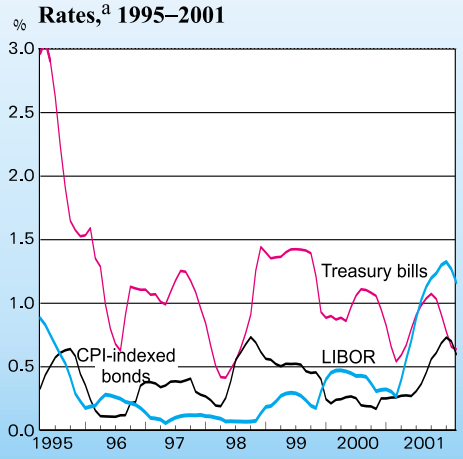
[27] The 99th percentile is the value that cuts off 99 percent of the cumulative distribution, that is, the probability of a change greater than this value is less than 1 percent.

[28] The first percentile is the value that cuts off 1 percent of the cumulative distribution, that is, the probability of a change smaller than this value is less than 1 percent.

(2) *The unindexed local-currency segment*

Assets and liabilities in this segment are less sensitive to interest-rate adjustments than in the other intermediation segments due to their short term-to-maturity and the fact that they are usually priced on the basis of floating-rate interest. However, interest rates in this segment, which are usually adjusted to the yield-to-maturity on Treasury bills, are highly volatile compared with those in other segments. As a result, the standard deviation of the Treasury bill yield was greater than that of CPI-indexed bonds and the standard deviation of the dollar Libor interest rate until the first quarter of 2001 (Figure 5.3).

Figure 5.3
Standard Deviation of Selected Interest Rates,[a] 1995–2001



[a] Over previous 12 months.
SOURCE: Monetary Department, Bank of Israel.

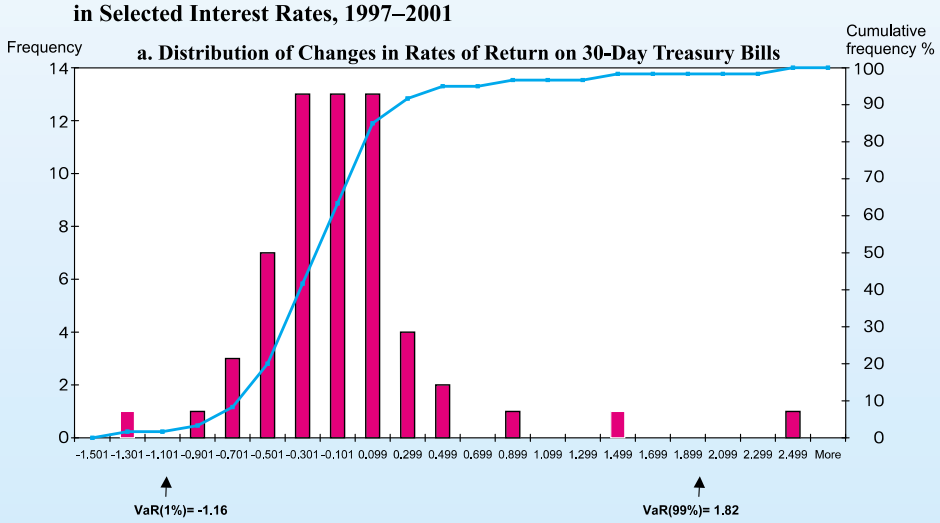
At the end of 2001, all the banking groups were exposed to a rise in the interest rate by a maximum rate of 1.82 percentage points, except for the Hapoalim Group, which was exposed to a decline in the interest rate by a maximum of 1.16 percentage points (Figure 5.4). This means that such an increase would lead to an erosion in the net worth deriving from this segment. The VaR in this segment at the five banking groups ranged between NIS 10.3 million at the Hapoalim Group and NIS 480.3 million at the Leumi Group (Table 5.10). In other words, an increase of 1.82 percentage points in the unindexed interest rate within the period of a month (when the probability of a change greater than this is less than 1 percent), would lead to erosion in the net worth deriving from this segment by these amounts.

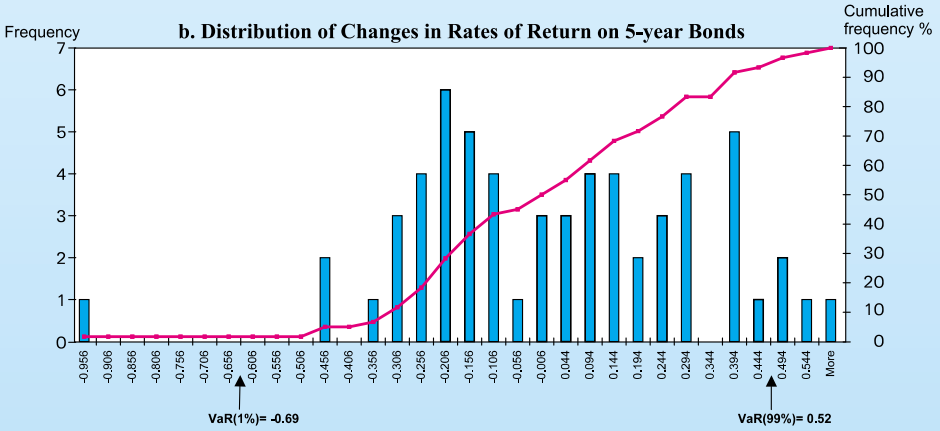
(3) *The CPI-indexed segment*

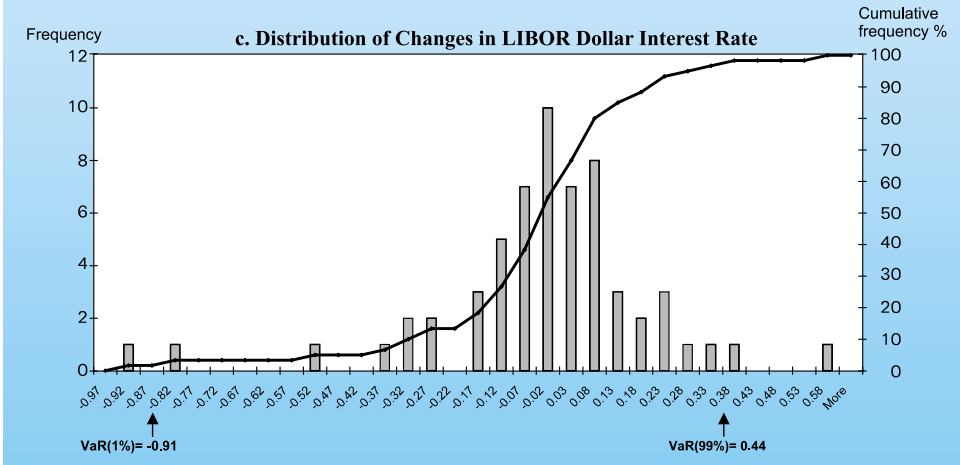
Assets and liabilities in this segment are more sensitive to changes in interest rates than are those in other intermediation segments, because they have a long term-to-maturity and are generally priced at fixed rates of interest. However, interest rates in this segment are usually adjusted to the yield-to-maturity on CPI-indexed bonds and their volatility is relatively low. These features helped to reduce the potential exposure to interest-rate risk, as expressed by the standard deviation of the yields-to-maturity on CPI-indexed bonds during the years 1996 to 2000. The increased yield volatility during 2001 compared with 2000 (Figure 5.3) derived from a decline in yields-to-maturity that was mainly recorded in the first half of the year.

At the end of 2001, all five banking groups were exposed to a rise in the real interest rate. This was because the relative sensitivity of the value of their assets to interest-rate

Figure 5.4
Distribution and Cumulative Distribution of Month-on-Month Changes in Selected Interest Rates, 1997–2001







SOURCE: Monetary Department, Bank of Israel.

Table 5.10
Exposure to Changes in Interest Rates, the Five Major Banks,[a] December 2001

	Leumi	Discount	Hapoalim	Mizrahi	First International
Unindexed segment					
Total exposure[b] *(NIS million)*	566	–852	–2,512	–429	–2,433
Duration of assets (*years*)	0.51	0.46	0.27	0.29	0.24
Duration of liabilities (*years*)	0.18	0.23	0.28	0.17	0.17
Duration of net worth[c] (*percent*)	49.01	12.02	–0.37	7.38	0.69
Modified duration[d] (*percent*)	46.58	11.42	–0.35	7.01	0.66
Duration gap[e] (Dgap) *(years)*	0.33	0.23	–0.01	0.12	0.06
Maximum change in interest	1.82	1.82	–1.16	1.82	1.82
VaR[f] (*NIS million*)	480.3	177.4	10.3	54.8	29.1
Indexed segment[g]					
Total exposure	10,094	4,001	11,569	3,529	4,314
Duration of assets	4.10	4.21	3.94	4.28	3.87
Duration of liabilities	3.35	3.69	3.99	3.96	3.14
Duration of net worth	7.88	7.11	3.69	7.17	6.20
Modified duration	7.57	6.82	3.54	6.88	5.95
Duration gap (Dgap)	1.31	1.08	0.61	0.71	1.47
Maximum change in interest	0.52	0.52	0.52	0.52	0.52
VaR	397.5	142.1	213.1	126.4	133.6

Table 5.10 (continued)

	Leumi	Discount	Hapoalim	Mizrahi	First International
Foreign-currency segment[h]					
Total exposure	–208	1,381	2,867	98	1,099
Duration of assets	0.65	1.35	0.62	0.40	0.31
Duration of liabilities	0.62	0.61	0.35	0.37	0.25
Duration of net worth	13.43	32.79	10.03	5.08	1.71
Modified duration	13.15	32.11	9.82	4.97	1.67
Duration gap (Dgap)	0.03	0.75	0.28	0.03	0.07
Maximum change in interest	0.44	0.44	0.44	0.44	0.44
VaR	12.1	196.6	124.9	2.2	8.1
Total value at risk[i] *(NIS million)*	**889.9**	**516.1**	**348.3**	**183.3**	**170.9**
Total position[j] *(NIS million)*	10,451	4,529	11,923	3,198	2,979
VaR as percent of net worth	8.51	11.39	2.92	5.73	5.74
VaR as percent of equity	6.93	8.97	2.69	5.53	5.12

[a] This year, for the first time, the figures were submitted on a consolidated basis, and hence cannot be compared with those for 2000.

[b] Present value of assets and liabilities (NIS million) is obtained by capitalizing the future flow (principal *plus* interest) at the market rate according to the time structure of the interest rates relevant to each segment, the yield to maturity on Treasury bills in the unindexed segment, interest on indexed bonds in the indexed segment, and Libor in the foreign-currency segment, including the effect of futures and special commitments.

[c] If the sign is positive, an unexpected rise in the interest rate will erode the net worth and a fall will increase it, and vice versa if it is negative.

[d] The modified duration is the duration of net worth *divided* by (1 + *r*), where *r* is the rate of interest. The modified duration of net worth may be seen as the rate of exposure of the position, for a 1 percentage-point change in the interest rate.

[e] The sensitivity of net worth to interest-rate changes is in terms of years.

[f] The change, in NIS million, that will occur in the state of the bank due to the maximum change in interest rates.: a rise of 1.82 or a fall of 1.16 percentage points in unindexed interest; a rise of 0.52 or a fall of 0.69 percentage points in real interest; and a rise of 0.44 or a fall of 0.91 percentage points in dollar interest. According to the distribution of changes in the interest rates in the last five years, the probability of changes greater than those cited is less than one percent.

[g] Including the CPI/dollar indexation option.

[h] Including foreign-currency-indexed.

[i] Total value at interest-rate risk is obtained by adding the risk-adjusted values in the three segments, under the strong assumption that the worst change will occur to the banks' situation in all segments (perfect correlation, negative or positive, between the risks).

[j] The difference between the present values of financial assets and financial liabilities in each segment.

SOURCE: Published financial statements and Bank of Israel.

adjustments was greater than that of the value of their liabilities as reflected by a positive duration of capital (Table 5.10). Accordingly, a rise in the interest rate would have the effect of eroding the net worth deriving from this segment.

The value at interest-rate risk in this segment reflects the deterioration that could occur in a bank's financial position due to the maximum change in the real interest rate. The VaR at the five largest banking groups in this segment at the end of 2001 ranged between NIS 126.4 million at the Mizrahi Group to NIS 397.5 million at the Leumi Group (Table 5.10). This means that the maximum expected increase in the interest rate within a single month, 0.52 percentage points (Figure 5.4), would have the effect of eroding the net worth deriving from this segment by these amounts.

(4) *The foreign-currency segment*

Exposure to interest-rate risk is lower in this segment than in the local-currency segments for two reasons: (1) The banks maintain low positions in this segment, partly because assets and liabilities in the segment are priced at a floating rate of interest (usually Libor), and are short-term and medium-term. The banks also use derivatives in this segment-swap contracts on interest rates-to reduce their exposure to interest-rate risk. These instruments, which are traded in the world's markets, are less developed in the local-currency segments; (2) Interest rates in the foreign currency segment are less volatile, as is apparent from the standard deviation of the Libor dollar interest rate during the years 1996 to 2000. The growth in interest-rate volatility in 2001 compared with previous years (Figure 5.3) resulted from the decline in Libor dollar interest rates in that year.[29] The cuts in the Libor rate were reflected in the VaR because all five banking groups retained a positive capital duration, with the result that they were exposed to a rise in interest rates. The value at interest-rate risk in this segment is calculated with respect to the maximum monthly anticipated rise in the Libor-dollar interest rate during the previous five years at a confidence level of 99 percent. This value at the five largest banking groups ranged between NIS 2.2 million at the Mizrahi group to NIS 196.6 million at the Discount group (Table 5.10). The maximum expected rise in the Libor dollar interest rate within a single month, which amounted to 0.44 percentage points (Figure 5.4), similar to the increase in 2000, would have the effect of eroding the banking groups' net worth deriving from this segment by these amounts.

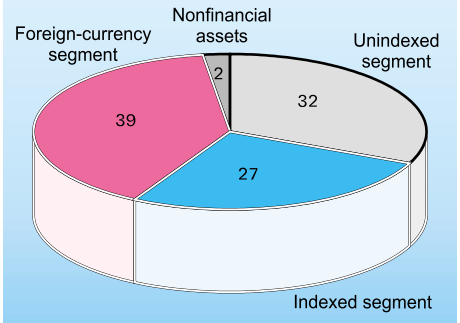
b. Indexation basis (inflation and exchange rate) risks

A bank is exposed to indexation-basis risks when in the course of its financial intermediation activities, it obtains sources with one indexation basis for uses with a

[29] The decline in the Libor dollar interest rate from 6.27 percent at the end of 2000 to 1.76 percent at the end of 2001 was correlated with the reduction in the US central bank's interest rate on inter-bank loans by 4.75 percent in 2001.

different basis. Changes in the relative prices of the different indexation bases could therefore have an adverse effect on a bank's income. Financial intermediation activity in Israel is carried out in three principal segments: unindexed, CPI-indexed and foreign currency. In the latter segment, the majority of activity is denominated in US dollars. These segments developed as a result of the high rates of inflation prevailing in Israel compared with other Western countries, the system of CPI-indexation mechanisms, and the large volume of foreign trade conducted by both the public and private sectors. The proportion of the foreign currency segment to the five largest banking groups' total assets rose by 6 percentage points during 2001 and amounted to 39 percent at the end of the year (Figure 5.5).

Figure 5.5
Share of Intermediation Segments in Total Assets of the Five Major Banking Groups, December 2001 (Percent)



SOURCE: Published financial statements.

Exposure to indexation basis risks is affected by two factors: (1) The quantitative effect (position), which is the difference between the value of assets and the value of liabilities plus the net affect of futures transactions; and (2) the price factor, which is the affect of a change in relative prices in the different indexation segments. The analysis of exposure to indexation-basis risks in this chapter is based on a measurement of the banks' financial results and the development of their capital in real terms. The analysis is centered on the three indexation segments alone, without reference to the wide range of foreign currencies. Accordingly, price risks are derived from the difference in relative prices in the unindexed and foreign-currency segments, and the CPI-indexed segment[30]—inflation and the real NIS/$ exchange rate.

The maximum expected changes in inflation rates and in the real inflation rate, for which VaR is calculated, are derived from the cumulative distribution of the monthly changes in the rates of inflation and the real exchange rate during the previous five years. As stated, the 99th percentile in the distribution was selected for the maximum change in the inflation rate (when the position in the unindexed segment is positive), and the first percentile was selected with respect to exposure to a decline in the inflation rate (when the position is negative). Also as stated, the first percentile in the distribution was selected for the maximum change in the real exchange rate with respect to exposure to a decline in the exchange rate (when the position in the foreign currency segment is positive) and the 99th percentile in the distribution was selected with respect to an exposure to a rise in the exchange rate (when the position in the segment is negative).

[30] On the assumption that financial capital is part of the CPI-indexed segment, and that the foreign currency segment is a dollar segment.

Price risk, which relates to exposure to a rise in inflation and in the real exchange rate, remained largely unchanged in 2001. As stated, this risk is calculated on the basis of the maximum change in price risk as estimated in accordance with the 99th percentile in the distribution of monthly changes in the risk factor during the previous five years. Developments during the five measurement years therefore have a major impact on the maximum change in price risk during the year under review. Accordingly, the level of the 99th percentile in the distribution of changes in the inflation rate and the real exchange rate during the previous two years and in 2001 was directly affected by the rapid depreciation in the exchange rate of the sheqel during the months of August and October 1998.[31]

(1) All segments

Total value at indexation basis risk (inflation and exchange rate risk) rose in 2001 to a considerable extent at the Leumi and the Hapoalim Groups. A more moderate increase was recorded at the First International Group, while slight decreases were recorded at the other groups. The VaR ranged between NIS 3.4 million at the Mizrahi Group or 0.15 percent of its financial capital and 0.1 percent of its shareholders equity, to NIS 75.6 million at the Leumi and the Hapoalim Groups which was equivalent to 0.96 percent of financial capital and 0.6 percent of shareholders equity at each of the groups (Table 5.12). The total value at indexation basis risk is calculated as the sum of a value at inflation risk, and the value at exchange rate risk under the conservative assumption of the worst-case scenario for each of the risk factors, ignoring the correlations between changes in inflation and changes in the real exchange rate. The calculation of the total VaR related to indexation basis risk taking these correlations into account using the covariance matrix method is given in the appendix to this chapter.

(2) The unindexed local-currency segment

The position of the five major banking groups in this segment totaled minus NIS 3.1 billion. This deficit resulted from developments in both of its components-balance-sheet and off-balance-sheet (Table 5.11). In the former the difference between assets and liabilities in the segment increased from NIS -26.2 billion at the end of 2000 to NIS -31.5 billion at the end of 2001, mainly due to an increase in the difference between assets and liabilities at the Hapoalim group.

In 2001 as well, the banking groups attempted to reduce their total positions in the segment by means of off-balance-sheet activity. Futures transactions totaling NIS 28.4 billion, compared with NIS 22.5 billion in 2000, did indeed have the effect of reducing the total position in the segment to minus NIS 3.1 billion (Table 5.11).

The value at inflation risk reflects the maximum deterioration in a bank's financial position that could result from a change in the inflation rate. This value is obtained by

[31] See Figures 5.5 and 5.6 in our review for the year 2000.

Table 5.11
Difference Between Assets and Liabilities and the Effect of Derivatives, by Indexation Base, the Five Major Banking Groups, 1999–2001

(NIS million, December 2001 prices)

	Un-indexed	CPI-indexed[a]	Foreign currency: US dollar	Foreign currency: Other currencies	Financial capital	Non-financial items	Total
1999							
Assets *less* liabilities	–18,274	19,141	13,379	5,399	19,645	14,386	34,031
Effect of derivatives	17,251	1,506	–14,214	–4,543			
Total position in segment	–1,023	20,647	–835	856			
2000							
Assets *less* liabilities	–26,223	26,399	10,631	10,446	21,253	15,260	36,513
Effect of derivatives	22,544	–1,915	–9,852	–10,777			
Total position in segment	–3,679	24,484	779	–331			
2001							
Assets *less* liabilities	–31,476	28,654	19,451	5,939	22,568	15,636	38,204
Effect of derivatives	28,365	–2,782	–19,631	–5,952			
Total position in segment	–3,111	25,872	–180	–13			

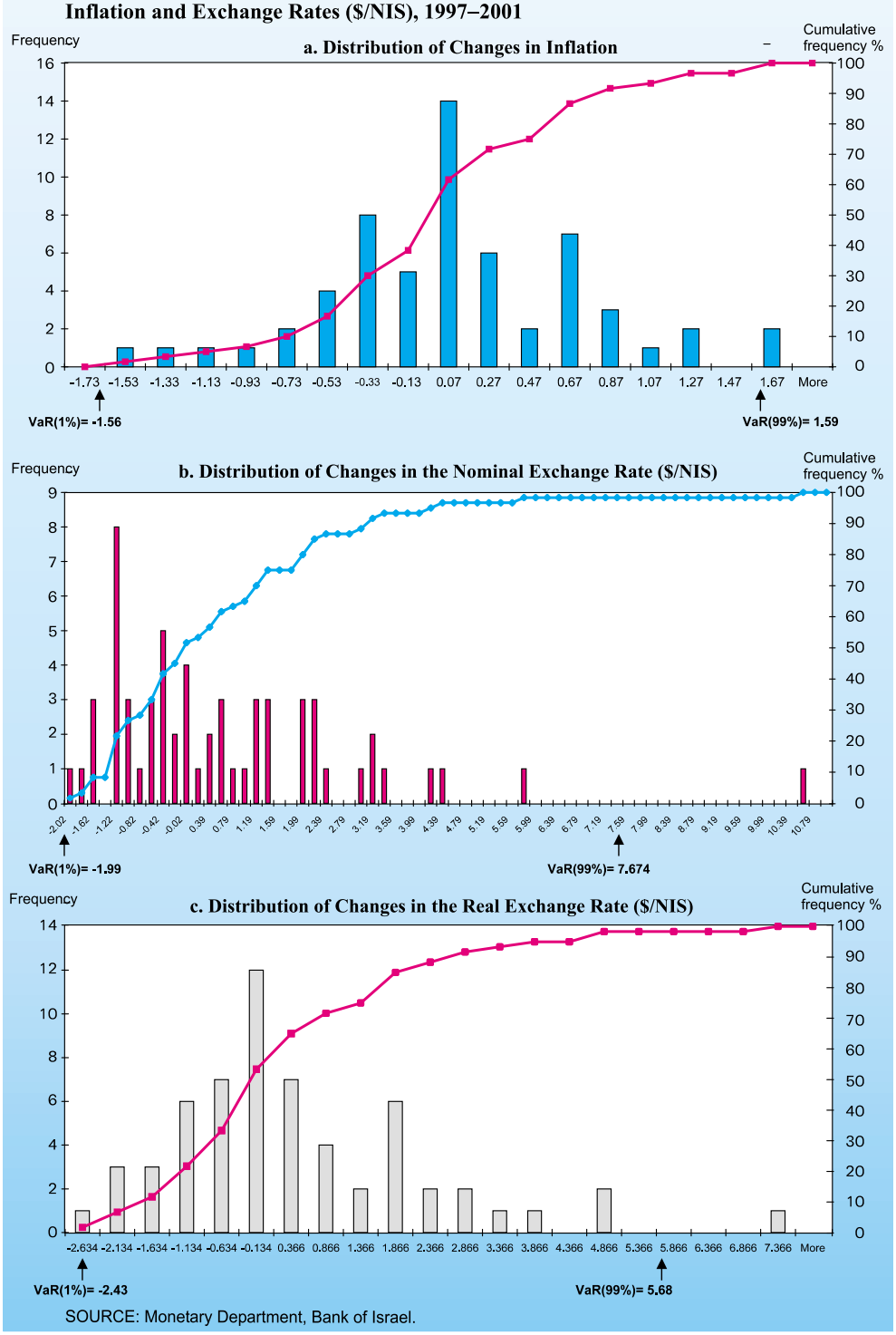
[a] Including the CPI/dollar indexation option.
SOURCE: Published financial statements.

multiplying the total position by the maximum monthly changes expected in the inflation rate according to the direction of exposure (a rise or fall in the inflation rate). All the groups except for the Leumi group were exposed to a decline in the inflation rate by a maximum rate of 1.56 percentage points as a result of the negative position in the segment (Figure 5.6). The Leumi group was subject to exposure to a rise in the inflation rate by a maximum of 1.59 percentage points as the result of a positive position in the segment. The value at inflation risk at the end of 2001 ranged between NIS 2.3 million at the Mizrahi group to NIS 42.5 million at the Hapoalim group (Table 5.12). This means that the maximum expected decline in inflation (1.56 percentage points) would erode the value of the position deriving from this segment by these amounts. The largest change in VaR in 2001 was recorded at the Hapoalim group, where exposure rose due to an NIS 2 billion increase in the position.

(3) The CPI-indexed segment

Price risk in this segment is zero by definition, because the total position in the segment in real terms is not affected by changes in relative prices, that is, by changes in inflation

Figure 5.6
Distribution and Cumulative Distribution of Month-on-Month Changes in Inflation and Exchange Rates ($/NIS), 1997–2001



SOURCE: Monetary Department, Bank of Israel.

Table 5.12
Exposure to Changes in Inflation and the Exchange Rate, the Five Major Banking Groups, December 2000 and December 2001

(NIS million, December 2001 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Unindexed segment										
Assets *less* liabilities	–8,804	–8,524	–3,020	–1,404	–7,610	–14,575	–3,995	–1,710	–2,794	–5,263
Effect of futures and options	7,414	9,571	2,147	1,041	6,911	11,856	3,920	1,563	2,152	4,334
Total position in segment[a]	–1,390	1,047	–873	–363	–699	–2,719	–75	–147	–642	–929
Change in inflation rate[b] (%)	–1.56	1.59	–1.56	–1.56	–1.56	–1.56	–1.56	–1.56	–1.56	–1.56
Value at risk[c]	21.63	16.60	13.58	5.67	10.88	42.47	1.17	2.30	9.99	14.51
Indexed segment[d]										
Assets *less* liabilities	9,414	9,133	3,602	2,442	7,996	10,795	2,475	2,568	2,942	3,716
Effect of futures and options	–705	–1,263	–83	239	–1,010	–1,583	–258	–125	141	–50
Financial capital	7,270	7,879	2,604	2,184	7,089	7,857	2,081	2,276	2,209	2,372
Total position in segment	1,439	–9	915	497	–133	1,355	136	167	874	1,294
Foreign-currency segment[e]										
Assets *less* liabilities	6,660	7,270	2,022	1,146	6,733	11,637	3,601	1,418	2,061	3,919
Effect of futures and options	–6,709	–8,308	–2,064	–1,280	–5,901	–10,273	–3,662	–1,438	–2,293	–4,284
Total position in segment[f]	–49	–1,038	–42	–134	832	1,364	–61	–20	–232	–365
Change in real exchange rate[g]	5.63	5.68	5.63	5.68	–3.02	–2.43	5.63	5.68	5.63	5.68
Value at risk	2.76	59.00	2.36	7.62	25.09	33.16	3.43	1.14	13.06	20.75
Total value at risk[h]	**24.39**	**75.60**	**15.95**	**13.29**	**35.96**	**75.63**	**4.60**	**3.43**	**23.05**	**35.26**
As percentage of financial capital	0.34	0.96	0.61	0.61	0.51	0.96	0.22	0.15	1.04	1.49
As percentage of equity	0.21	0.59	0.28	0.23	0.28	0.58	0.15	0.10	0.73	1.06

[a] If the sign is positive an unexpected rise in inflation will erode capital, and a decline will increase it, and vice versa if the sign is negative.

[b] Maximum change in inflation derived from the distribution of changes over the last five years; the probability of a change greater than this is less than 1 percent.

[c] The change (in NIS million) in a bank's situation which would arise from the maximum change in inflation and the exchange rate. A 1.59 percent rise or 1.56 percent fall in 2001, 1.58 percent rise or 1.56 percent fall in 2000 for changes in inflation, and a 5.68 percent rise or 2.43 percent fall in 2001, and a 5.63 percent rise or 3.02 percent fall in 2000 for changes in the real exchange rate.

[d] Including the CPI/dollar indexation option.

[e] Including foreign-currency indexation.

[f] If the sign is positive an unexpected decline in the real exchange rate will erode capital, and a rise will increase it, and vice versa if the sign is negative.

[g] Percentage change in the $/NIS exchange rate and in the CPI derived from exchange-rate changes over the last five years; the probability of a change greater than this is less than 1 percent.

[h] Total value at risk is obtained by adding risk-adjusted values in the unindexed and foreign-currency-indexed segments, under the strong assumption that the worst change (for the bank) will occur in both segments (perfect correlation, negative or positive, between the risks).

SOURCE: Published financial statements, and Central Bureau of Statistics data.

or by changes in the exchange rates of foreign currencies against the sheqel. Nevertheless, positions in this segment are significant, because they are closed by reverse positions in the other two indexation segments (the unindexed and foreign currency segments).

The total position of the five banking groups in this segment amounted to NIS 3.3 billion in 2001, taking financial capital as a source in this segment, similar to the amount recorded in 2000 (Table 5.11).

(4) The foreign-currency segment

The position of the five banking groups in this segment amounted to only minus NIS 193 million, as the result of a balance sheet position of NIS 25.39 billion and an off-balance-sheet reverse position of minus NIS 25.58 billion (Table 5.11). The balance-sheet assets over balance≠sheet liabilities of the five major banking groups in this segment rose by NIS 4.3 billion in 2001 (Table 5.11). In this segment as well, activity was a mirror image of that in the unindexed segment, and the banks reduced their exposure to exchange rate (NIS/$) risk by means of off-balance-sheet activity. This activity had the effect of offsetting the surplus of balance-sheet assets by NIS 25.58 billion, an increase of NIS 5 billion. The increase reversed the direction of the position in the segment, and brought it to the relatively low value of only minus NIS 193 million (Table 5.11).

Since risk is measured in real terms, the position in this segment is exposed to changes in the exchange rate of the sheqel as well as to changes in the exchange rate and in inflation. In other words, the position is exposed to changes in the real exchange rate. All the groups except for the Hapoalim group were exposed to a rise in the real exchange rate by a maximum of 5.68 percent due to the negative position in the segment (Figure 5.6). The Hapoalim group was exposed to a decline in the real exchange rate by a maximum of 2.3 percent because of the positive position in the segment. The value at exchange rate risk ranged between NIS 1.1 million at the Mizrahi group to NIS 59 million at the Leumi group. This means that the maximum expected change in the real NIS/$ exchange rate in the course of a month (5.68 percent) would have eroded the groups' position in the segment by those amounts (Table 5.12). The value at real exchange rate risk rose considerably at the Leumi group because of an increase in the position in the segment. The different level of exposure to exchange rate risk at each of the groups, in terms of sign and size, reflects inter alia their management's assessments regarding the development of the exchange rate and the nature of each group's risk management practices.

4. LIQUIDITY RISKS

Liquidity risk derives from uncertainty regarding changes in the supply of deposits from the public (sources) and changes in demand for credit (uses). This risk results from unexpected withdrawals, which could cause a (monetary and business) liquidity shortage, and compel a bank to sell assets at less than their market price (active management of

assets), or raise sources in the secondary market at a cost above the market price (active management of liabilities). One aspect of the reform and liberalization of the money and capital markets during the past decade has been the considerable reduction in the Bank of Israel's requirements regarding the reserve ratio (liquidity for monetary purposes). Today, these ratios are similar to those that the banks hold in any case, for pure business motives.

Activity aimed at solving liquidity risk problems is centered in the secondary market for liquidity—the inter-bank market and activity with the Bank of Israel (monetary loans or deposit tenders at the Bank of Israel).

In 2001 as in 2000, the banks' time deposits at the Bank of Israel served as an important instrument in the management of current liquidity. The relatively high interest rates prevailing in the unindexed local-currency segment during previous years led to a large growth in the supply of unindexed deposits from the public compared with demand for unindexed local-currency credit and created surpluses of liquidity sources at the banks, which they deposited at risk-free interest at the Bank of Israel in deposit tenders. The average interest rate on the banks' deposits at the Bank of Israel fell from 9.5 percent in 2000 to 7 percent in 2001. The balance of deposits of all the commercial banks decreased by NIS 4.5 million compared with 2000 and totaled NIS 52.8 billion, following an increase of NIS 2.7 billion in 2000.

One way of measuring the banks' level of business liquidity, as with non-financial firms, is to examine the ratio between current assets and current liabilities (the short ratio). When a bank's stock of liquid assets exceeds its stock of liquid liabilities, the probability that it will encounter liquidity problems is low. The ratio of the five major banking groups' total current assets to total current liabilities[32] amounted to 1.4 at the end of 2001 compared with 1.6 at the end of 2000. This ratio ranged between 1.70 at the Hapoalim group and 2.4 at the Discount group. A ratio greater than one is indicative of a low level of exposure to liquidity risk that is, a high probability that the bank will be able to fulfill its liabilities in the short run.

Demand for credit in the foreign currency segment continued to expand. In December 2001, the outstanding foreign currency credit balance of all the commercial banks was $ 2.6 billion or 8.9 percent higher than in December 2000. Much of the increase in foreign currency credit during 2001 was financed by a $ 2.0 billion reduction in the banks' deposits at banks abroad. This differed from the situation during the years 1998-2000, when a large part of the growth in foreign currency credit was financed by an increase in the Israeli residents' and foreign residents' deposits in foreign currency. Foreign and Israeli residents' total deposits in foreign currency at the commercial banks fell by $ 0.4 billion and totaled $ 36.1 billion in 2001. The decrease in the banks' deposits at banks

[32] Current assets include: cash in the banks, the banks' deposits at the central bank and other commercial banks, and the banks' investments in unindexed government bonds (including Treasury bills). Current liabilities include: demand deposits from the public, SROs, and deposits from central banks and other banks.

abroad, for the purpose of financing the growth in demand for foreign currency credit, led to a fall in the ratio between current assets and current liabilities[33] (the short ratio) in the commercial banking system in the foreign currency segment from 0.37 in 2000 to 0.32 in 2001. This decrease reflects a rise in liquidity risk in the foreign currency segment in the entire commercial banking system.

5. CAPITAL ADEQUACY

The capital held by a bank serves as a cushion against losses that could be caused due to the realization of the risks to which it is exposed. In the course of their risk management policy, the banks' management usually define limitations for exposure to the different risks (credit risks, market risks and operational risks). Derived from these limitations is the level of capital that the bank will hold against the risks. The level of capital is also derived from the Supervisor of Banks' directives regarding the maintenance of a minimum capital ratio.

The Supervisor of Banks requires the banks to maintain a suitable minimum capital ratio in order to preserve the stability of the banks and the entire banking system. The minimum capital ratio required from the banks in Israel amounted to 8 percent until March 1999, in accordance with the recommendations of the Basle Committee (the International Committee for Banking Affairs), and in March 1999 the Supervisor of Banks increased this ratio to 9 percent. In January 2001, the Basle Committee approved a revised proposal to issue new regulations on capital adequacy (following an initial proposal published in June 1999), and the Committee intends to publish the final version in the year 2002.

The formal capital requirement in Israel is currently based on credit risks and market risk, and does not take into account other risks such as operational risks and legal risks. Important to note in this respect is that the Basle Committee's recommendations concerning the holding of additional capital against exposure to market risks were applied in Israel in September 2000. Under the Supervisor of Banks' directives, with effect from the third quarter of 2000, the banks are required to include the element of exposure to market risks in the calculation of the ratio of capital to risk-weighted assets.

The ratio of capital to risk-weighted assets at the five banking groups rose slightly during 2001, from 9.24 percent at the end of 2000 to 9.38 percent at the end of 2001 (Table 5.13). The increase was recorded at the Leumi and the First International groups and the largest increase was recorded at Leumi group, from 9.19 percent at the end of 2000 to 9.74 percent at the end of 2001. Slight decreases were recorded at the Discount,

[33] Current assets in the foreign-currency segment include notes and coins, net deposits at banks abroad, net deposits at banks in Israel, deposits at the Bank of Israel and securities. Current liabilities in this segment include foreign residents' deposits, residents' and restitutions foreign-currency deposits, and other deposits of Israeli residents.

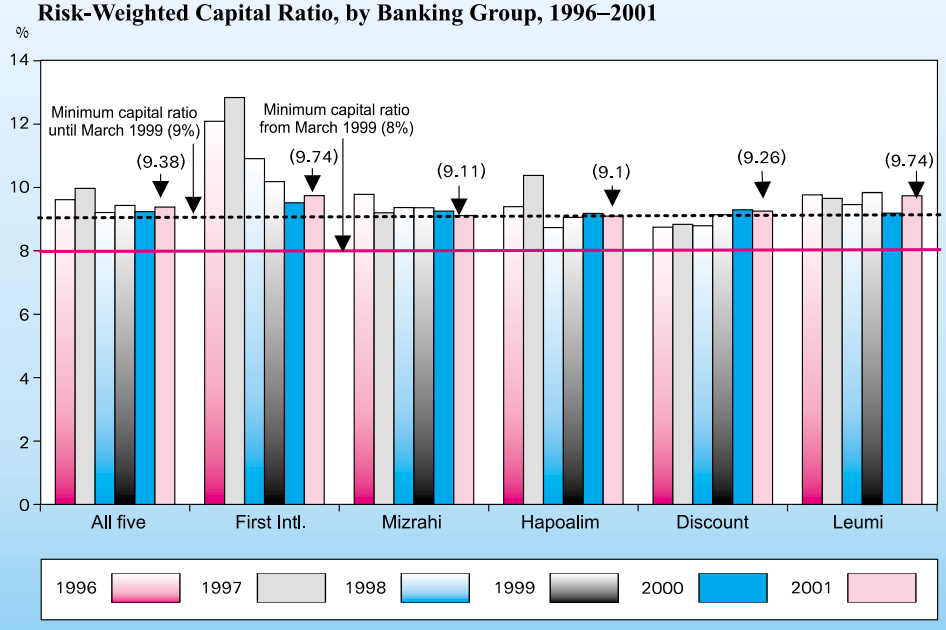
Table 5.13
Capital Ratio of the Five Major Banking Groups, 2000–2001

(NIS million, December 2001 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International		Total	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Capital[a]	11,709	12,844	5,718	5,752	12,866	12,951	3,061	3,318	3,159	3,339	36,513	38,204
Tier 1 capital[b]	11,802	12,750	5,783	5,697	12,890	12,948	3,080	3,316	3,140	3,322	36,695	38,033
Tier 2 capital[b]	3,720	5,902	2,932	3,092	4,184	6,381	1,631	1,712	1,304	1,656	13,771	18,743
Investment in shares and subordinated notes of consolidated companies	–125	–127	–896	–853	–6	–6	–86	–96	–38	–49	–1,151	–1,131
Total capital for risk-weighted capital ratio calculation	15,397	18,525	7,819	7,946	17,068	19,323	4,652	4,932	4,406	4,929	49,315	55,655
Total balance sheet	217,230	234,261	121,594	130,252	226,894	240,927	69,921	75,153	65,025	67,609	700,664	748,202
Balance of off-balance-sheet instruments (notional value)	110,521	169,615	66,617	75,264	173,353	256,720	28,484	39,158	76,573	78,300	455,548	619,057
Credit value of off-balance-sheet items	28,269	31,837	17,501	16,447	37,074	46,948	8,691	9,926	11,271	11,194	102,806	116,352
Weighted balance-sheet balances of credit risk	141,240	158,806	70,183	73,286	154,090	174,444	41,282	44,938	37,593	41,386	444,388	492,860
Weighted off-balance-sheet balances of credit risk	22,500	25,341	12,571	11,723	29,107	34,884	8,172	8,794	8,204	8,330	80,554	89,072
Market risks	3,804	6,083	1,352	840	2,670	3,078	508	378	491	878	8,825	11,257
Total weighted items	167,544	190,230	84,106	85,849	185,867	212,406	49,962	54,110	46,288	50,594	533,767	593,189
Percent												
Capital/balance-sheet ratio	5.39	5.48	4.70	4.42	5.67	5.38	4.38	4.41	4.86	4.94	5.21	5.11
Tier 1 risk-weighted capital ratio[c]	6.97	6.64	5.81	5.64	6.93	6.09	5.99	5.95	6.70	6.47	6.66	6.22
Tier 2 risk-weighted capital ratio	2.22	3.10	3.49	3.60	2.25	3.00	3.26	3.16	2.82	3.27	2.58	3.16
Total risk-weighted capital ratio	9.19	9.74	9.30	9.26	9.18	9.10	9.26	9.11	9.52	9.74	9.24	9.38

[a] Equity and minority interests, according to groups' balance sheets.
[b] In accordance with the minimum capital ratio requirement.
[c] After deducting investments in shares and subordinated notes of companies included on an equity basis.
SOURCE: Published financial statements.

Figure 5.7
Risk-Weighted Capital Ratio, by Banking Group, 1996–2001

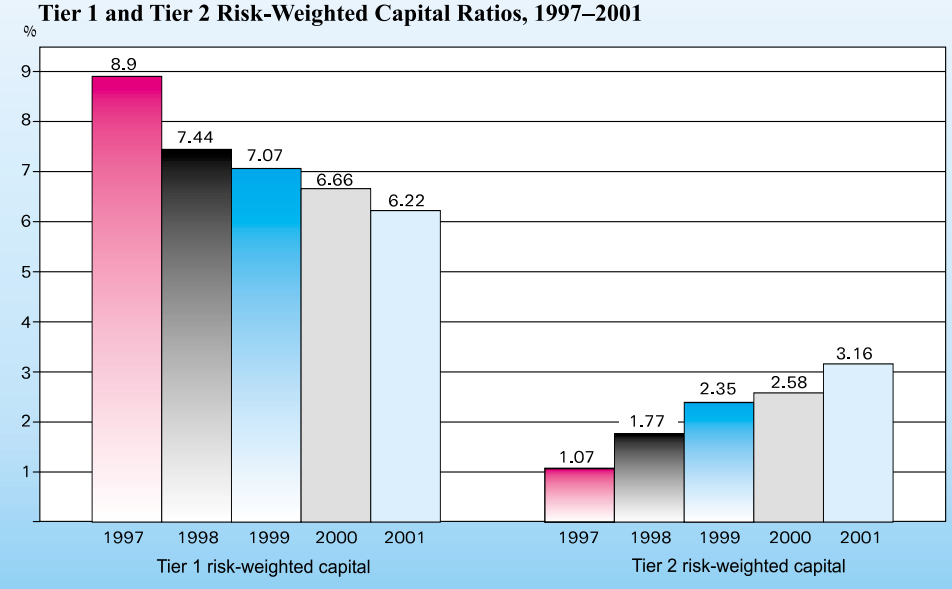


SOURCE: Published financial statements.

Hapoalim and Mizrahi groups. The lowest ratio, 9.1 percent, was obtained at the Hapoalim and Mizrahi groups. This ratio was only one tenth of a percentage point above the minimum capital ratio required from the banks in Israel (Figure 5.7). A decrease in the ratio could thereby reduce these banks' ability to cope with a potential realization of credit and market risks in the future. It should be noted that the slight increase in the ratio of capital to risk-weighted assets at the five banking groups was accompanied by a change in the distribution of the components of the capital ratio during 2001. The ratio of Tier 1 capital, which reflects the more stable part of the banks' capital, fell from 6.66 percent in 2000 to 6.22 percent in 2001. The decrease in the ratio of Tier 1 capital encompassed all of the banking groups. The ratio of Tier 2 capital, which reflects the less stable part of the banks' capital, rose from 2.58 percent in 2000 to 3.16 percent in 2001. The increase in the ratio of Tier 2 capital encompassed all of the banking groups except for the Mizrahi group, where it fell slightly because this group had reached the limitation of the ratio of deferred notes[34] to Tier 1 capital (which amounts to 50 percent) during the previous two years. The changes in the capital components in opposing directions during 2001 marked the continuation of a trend that prevailed during the past five years: a decrease in the ratio of Tier 1 capital to risk-weighted assets, concurrent with an increase in the ratio of Tier 2 capital to risk-weighted assets (Figure 5.8).

[34] Deferred notes are a significant part of Tier 2 capital.

Figure 5.8
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 1997–2001



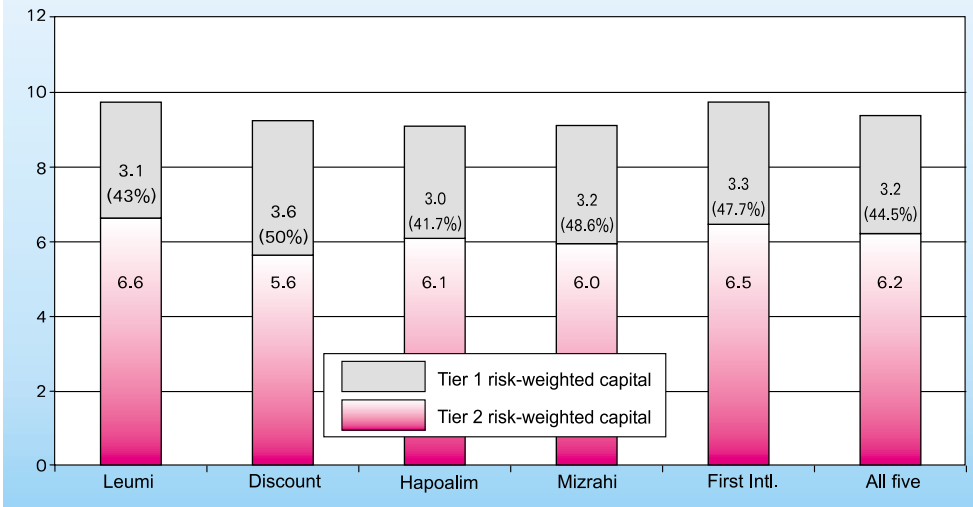
SOURCE: Published financial statements.

The capital ratio obtained by dividing total capital by risk-weighted assets and the development of this ratio are therefore derived from development in these two components. Total capital for the purpose of calculating the ratio of capital to risk-weighted assets (which includes Tier 1 capital and Tier 2 capital minus investments in companies included on an equity basis) rose by NIS 6.3 billion or 12.9 percent in 2001 and totaled NIS 55.7 billion (Table 5.13). The increase resulted from a growth in Tier 1 and Tier 2 capital at the five major banking groups except for the Discount Group, where Tier 1 capital fell slightly.

A large increase of NIS 5 billion or 36.1 percent was recorded in the five banking groups' Tier 2 capital in 2001, following an increase of 25 percent in 2000, 47 percent in 1999 and 104 percent in 1998. Tier 2 capital increased at all of the groups, and to a considerable extent at the Leumi and Hapoalim Groups.

The increased share of Tier 2 capital resulted from the decision of the banks' managements to adhere to the capital adequacy requirement by issuing deferred notes. Issuing deferred notes is quicker and much easier than raising Tier 1 capital (ordinary shares and preference shares that have been approved by the Supervisor of Banks), particularly during periods of uncertainty in the financial markets. Deferred notes also provide the issuing corporation with leverage, increase its shareholders' equity, and thereby confers tax advantages. This is because interest expenses on capital notes are recognized for tax purposes, while dividend payments on shares are not recognized. The issue of deferred notes thereby increases the issuer's profitability. However, the closer a bank

Figure 5.9
Total Risk-Weighted Capital Ratio and its Division into Tier 1 and Tier 2 Capital in the Five Major Banking Groups, 2001



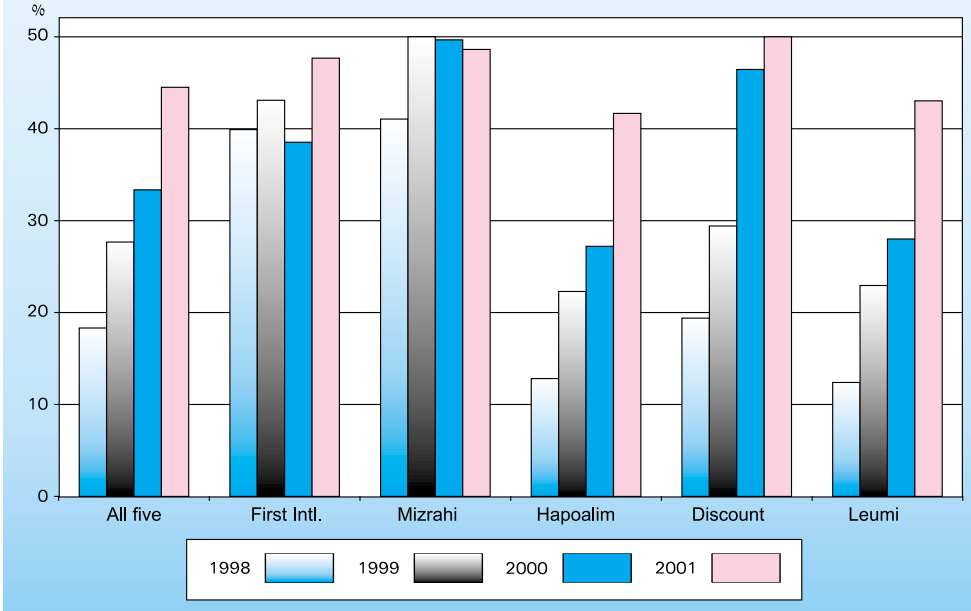
Figures in parentheses are the ratios of **Deferred** notes (which are recognized for calculating Tier 2 capital) to Tier capital.
SOURCE: Published financial statements.

reaches the Supervisor of Banks' restriction whereby deferred notes must not exceed 50 percent of total Tier 1 capital, the fewer are its opportunities of using this capital instrument in order to expand its credit portfolio. Apart from that, the features of deferred notes are less stable than those of Tier 1 capital because they are cumulative (interest payments on them cannot be postponed), they are issued for a limited period, there is no certainty regarding their availability (beyond a specific period determined in the directives) and the cost of their renewal, and they do not participate in the issuing corporation's losses on a current basis.

The ratio of deferred notes recognized as Tier 1 capital at the five banking groups rose by 11.2 percentage points to 44 percent in 2001. At the First International and Mizrahi Groups, the ratio of deferred notes to total Tier 1 capital amounted to 47.7 percent and 48.6 percent respectively, very close to the Supervisor of Banks' limitation of 50 percent of total Tier 1 capital. The Discount Group actually reached this limitation in 2002 (Figures 5.9 and 5.10), which is reducing the bank's opportunities for using this capital instrument in times of financial distress. At the Leumi and Hapoalim Groups, the ratio rose considerably in 2001, by 15 and 9.1 percentage points respectively, and amounted to 43 percent at both of them.

The substantial NIS 5 billion growth in Tier 2 capital in 2001 derives not only from an increase in total risk-weighted assets, but also from the borrowing requirements that resulted from the decrease in net profit. Issues of capital required for the purpose of capital adequacy, over and above the five banking groups' annual net income, totaled

Figure 5.10
Ratio of Deferred Notes to Tier-1 Capital Not Allocated Against Market Risks, the Five Major Banking Groups, 1998–2001



SOURCE: Published financial statements.

NIS 4.4 billion in 2001, compared with NIS 2.8 billion and NIS 0.4 billion in 2000 and 1999 respectively.[35]

The total risk-weighted assets (for the purpose of calculating the minimum capital ratio) of the five groups grew by 11.1 percent in 2001, following an increase of 14.4 percent in 2000, and reached NIS 593.2 billion (Table 5.13). This increase reflects a growth in the banks' financial intermediation activity, and derived from increases in balance-sheet credit risk (balance-sheet credit accounts for 83 percent of total risk-weighted assets) and off-balance-sheet credit risk by similar rates of 10.9 percent and 10.6 percent respectively. Exposure to market risks (which accounts for only 1.8 percent of total risk-weighted assets) grew from NIS 8.8 billion in 2000 to NIS 11.3 billion in 2001.

The fact that issues of deferred notes are reaching the maximum ratio of Tier 1 capital stipulated under the Banking Supervision Department's restriction and the possibility that the banks' net income in 2002 will be lower than in 2001, could reduce the ability to expand bank credit or increase the need to raise Tier 1 capital. As stated, the situation in the capital market during recent years has made it difficult to raise Tier 1 capital. In 2001

[35] The growth in Tier 2 capital during 1999 and 2000 resulted inter alia from respective increases in dividend distributions of NIS 1.5 billion and NIS 2 billion, mainly at the Leumi and Hapoalim groups.

however, the Hapoalim group was permitted to raise NIS 2 billion par value of deferred capital notes.[36] These capital notes are regarded as 'complex capital instruments' that apart from being deferred notes, participate in losses even if the banking corporation has not closed its operations. In addition, if the banking corporation's profitability is inadequate for payment purposes, the dividend or interest on them can be postponed.[37] These capital notes ('Upper Tier 2 capital') enable a bank to absorb losses because they should be converted to Tier 1 capital under certain conditions.

Box 5.1
Operational Risk

The banking corporations are exposed to a wide range of risks in the course of their activity—financial and non-financial risks. Financial risks include credit risk, market risks (interest rate and indexation bases risks) and liquidity risk. Non-financial risks include inter alia operational risk, legal risk and image risk. The formal capital requirement in Israel, as in the western world, is currently based on credit risks and market risks alone.

In 2001, the Basle Committee circulated a draft version of new recommendations concerning capital adequacy. These new recommendations relate to non-financial risks as well, especially operational risk. Comments made by banking supervisors, bankers and others active in the banking industry were taken into account in the Basle Committee's discussion paper of September 2001. This publication presents significant changes in the original proposals for estimating the capital adequacy required in respect of exposure to operational risk as they appeared in the draft of January 2001. The work on this subject has not yet ended, and conceptual and other changes are expected to be applied to the recommendations.

The Basle Committee attributes major importance to operational risk, due to the considerable changes that have occurred in banking systems during recent years. These changes have been apparent in three main areas:
1. The use of information and communication systems for the operation of on-line banking services and direct banking.
2. Globalization and consolidation processes are transforming the banks into corporate giants supplying a wide range of services to their customers.

[36] In 2001, Bank Hapoalim actually issued NIS 278 million par value of differed capital notes as complex capital instruments for NIS 308 million for a period of a hundred years that can be redeemed early with effect from the 15th year of their issue, subject to certain conditions.

[37] Under Directive 5.311 of the Supervisor of Banks' Proper Conduct of Banking Business Directives.

3. The use of sophisticated financial methods for the purpose of limiting the risks that could derive from exposure of credit risk and market risks.

These developments are increasing the level of the banks' operational risk, and the need for assessing, managing and controlling this risk.

The Basle Committee defines operational risk as 'the risk of loss deriving from deficiencies, obstacles in internal processes, the human factor and systems, or from external events'. Examples of operational risk are embezzlement and fraud, human errors, loss of information and impairment of computerization ability, robbery and fire.

The Basle Committee suggests three main approaches for the purpose of calculating the capital requirement in respect of operational risk: the Basic Indicator Approach (BIA), the Standard Approach (SA) and the Internal Measurement Approach (IMA).

Under the BIA—Basic Indicator Approach—the capital requirement is calculated as a fixed percentage of a bank's gross income, which serves as an approximation of the bank's overall exposure to risk. This percentage is denominated as α (the alpha factor).

Under the SA—Standardized Approach—the capital required for the coverage of operational risk is the total capital allocated to each of eight segments of activity.[1] For each segment of activity (i), a specific fixed percentage is determined and is denoted as the β factor of the exposure index (at this stage, gross income).

IMA—Internal Measurement Approaches—These approaches enable banks that adhere to the minimum standards (qualitative and quantitative directives) that are determined by the supervisory authorities, to use estimates and internal information in order to calculate the capital requirement in respect of operational risk. For the purpose of this calculation, the bank will use a fixed percent defined as the γ factor (gamma factor) in respect of its internal estimates of the loss expected in each of the segments of business activity. As with the standardized approach, the overall capital requirement in respect of operational risk will be calculated as the sum of the capital requirement in all segments of activity. However, the Basle Committee believes that the banks do not currently have enough internal information in order to enhance the sophistication of the capital requirement in respect of operational risk via these approaches.

[1] These segments are: corporate finance, commerce and sales, retail banking, commercial banking, payments and clearing, custodial services, brokerage services and asset management.

The Basle Committee intends to calibrate the coefficients (α β and γ) in order that the capital a specific bank allocates for operational risk will decrease more as the bank uses methods that reflect greater sensitivity to operational risk. This method conforms to the Basle Committee's guiding principal, whereby a bank is to be remunerated for the higher quality management and measurement of risk, by reducing the capital requirement.

All the coefficients, α β and γ are determined by the supervisory authority. Since the information available to the banks for the purpose of assessing losses in respect of operational risk is limited, as a starting point for the assessment of the α and β factors, the Basle Committee decided to define the banks' provisions for this type of risk at a minimum of 12 percent of the total minimum capital requirement[2] (MRC—Minimum Regulatory Capital).

The Basle Committee expects large international banking corporations and banks that are exposed to a high level of operational risk, to calculate the capital requirement on the basis of the more sophisticated approaches (the standardized approach or the internal measurement approach). A bank that has started to measure the capital requirement on the basis of a more sophisticated approach will not be entitled to revert to measuring this requirement on the basis of a simpler approach.

[2] This percentage is determined on the basis of the results of a survey that the Basle Committee conducted at a number of international banking corporations.

APPENDIX 5.1
Calculation of Value at Market Risk by the Covariance Matrix Method

There are three main methods of calculating value at market risk: (1) historical simulation; (2) a covariance matrix; (3) a Monte Carlo simulation. In this appendix, VaR is calculated by means of a covariance matrix in a manner whereby the total VaR will take into account the correlations between the changes in the different risk factors.

The covariance matrix method is based on two principal assumptions: (1) The distributions of the changes in all the risk factors are normal, and their average change tends to zero. (The shorter the planning period, the less valid is this assumption); (2) The affect of the changes in the risk factors on the value of the position is linear. In practice, only the first derivative of the value of the position relative to the risk factor is taken into account, and the effect of the remaining derivatives is ignored. The smaller the changes in the risk factors, the less valid is this assumption).

The advantages and disadvantages of a method derived from the following assumptions: On the one hand, the method is very simple to apply and is used extensively throughout the world, because it makes it relatively easy to calculate the VaR in respect of a position that is sensitive to changes in only one risk factor. This value, which reflects the maximum loss from holding the position at a competence level of 99 percent is equal to 2.33 times the standard deviation of the changes in the risk factor (on the assumption that the expectation of changes in a short period is zero). On the other hand, the results obtained under this method will be biased the more the actual distributions of the changes in the risk factors are characterized by fat tails, skewness, or kurtosis structure. Moreover, the method is not suitable for financial instruments with non-linear features, such as an options portfolio.

In order to simplify the process of calculating the VaR and make it possible to compare it to the calculations that were made within the body of this chapter (Tables 5.10 and 5.12), we selected only five risk factors: (1) Purchasing power (the inverse of inflation), which affects the value of the position in both the unindexed and the foreign currency segments; (2) The NIS/$ exchange rate, which affects the value of the position in the foreign currency segment; (3) The yield-to-maturity on Treasury bills; (4) The yield-to-maturity on CPI-indexed bonds; (5) The dollar Libor interest rate. Interest rates affect the relevant position according to the indexation basis in question. The database is identical to that used for calculating the VaR in the body of the chapter, and includes the monthly developments in the risk factors for the period between 1997 and 2001.

As stated, the calculation of the VaR by this method take into account the correlations between the changes in the different risk factors. According to the covariance matrix of the changes in the five different risk factors mentioned above there is, as expected, a high degree of correlation between the changes in purchasing power in Israel and the changes in the NIS/$ exchange rate. The VaR is obtained as a multiplier of the positions vector (P), which reflects the quantitative exposure to each market risk, by the covariance of matrix of changes in the risk factors (S), according to the following equation:

$$VaR_{1\%}(P) = 2.33 \cdot \sqrt{P \cdot S \cdot P^T}$$

The above table reveals two main findings: (1) The values of the data for each specific risk are not materially different from those that were presented in the main body of the chapter. This means that the calculation method does not have a material effect on the estimation of the risks; (2) The correlations between the changes in the risk factors have a material effect on the total VaR with respect to each risk group (indexation basis and interest-ate risk), and with respect to total market risks.

Table A.5.1
Matrix of the Covariance and Correlation Coefficients[a] of Changes in the Five Risk Factors, January 1997–December 2001

(percent)

	Purchasing power	Exchange rate	Nominal interest	Real interest	Dollar interest
Purchasing power[b]	0.390 (1)				
Exchange rate[c]	–0.770 (–0.572)	4.646 (1)			
Nominal interest[d]	–0.116 (–0.351)	0.057 (0.049)	0.282 (1)		
Real interest[e]	0.031 (0.168)	–0.232 (–0.369)	0.060 (0.387)	0.085 (1)	
Dollar interest[f]	0.015 (0.098)	–0.027 (–0.051)	0.013 (0.100)	0.013 (0.181)	0.058 (1)

[a] Correlation coefficients are in parentheses.

[b] The inverse of changes in the CPI.

[c] Monthly changes in the NIS/$ exchange rate. Two risk fators were used to obtain an estimate of the value at risk in the foreign-currency segment—purchasing power and the exchange rate—thereby expressing the correlation between them. Tables 5.10 and 5.12 show this estimate based on changes in the real exchange rate.

[d] Monthly changes (in percentage points) in the yield to maturity on Treasury bills with one month to maturity.

[e] Monthly changes (in percentage points) in the yield to maturity on CPI-indexed bonds with five years to maturity.

[f] Daily changes (in percentage points) in the yield to maturity on dollar-indexed bonds with three months to maturity.

Table A.5.1
Values at Market Risk in the Five Major Banks,[a] December 2001

(NIS million)

	Leumi	Discount	Hapoalim	Mizrahi	First International
Indexation-base risks					
Unindexed segment	15.2	5.3	39.5	2.1	13.5
Foreign-currency segment	45.2	5.8	59.4	0.9	15.9
Correlation effect[b]	–8.2	–4.6	–17.6	–1.0	–12.2
Indexation-base risk 2001	52.2	6.5	81.4	2.0	17.2
Interest-rate risks					
Unindexed segment	326.2	120.5	11.0	37.2	19.8
CPI-indexed segment	520.4	186.0	279.0	165.5	174.9
Foreign-currency segment	15.4	249.6	158.5	2.7	10.3
Correlation effect[c]	–145.8	–166.7	–107.3	–21.8	–19.4
Interest-rate risk 2001	716.2	389.4	341.2	183.7	185.6
Total market risks					
Correlation effect[d]	–63.2	–8.4	–48.8	–2.1	–20.6
Total market risk 2001	705.1	387.5	373.8	183.6	182.3
Equity/market risk (%)	5.49	6.74	2.89	5.53	5.46

[a] Since this is the first year in which the data are reported on a consolidated basis, they cannot be compared with the 2000 data.

[b] Effect of the correlations between changes in purchasing power and changes in the NIS/$ exchange rate on the value at indexation-base risk.

[c] Effect of the correlations between changes in the various rates of interest on the value at interest-rate risk.

[d] Effect of the correlations between changes in purchasing power, the exchange rate, and the various rates of interest on the total value at market risk.