Chapter 5
Risks and Capital Adequacy

Liberalization processes in Israel in recent years and the impact of globalization have increased the economy's sensitivity to shocks and changes in the international financial markets. The banks' exposure to credit risk and market risks increased in 1999. The capital adequacy of the five largest banking groups, which is intended to cushion them against losses should certain risks materialize, rose slightly in the course of the year reviewed. The increase in the ratio of capital to risk-weighted assets resulted mainly from a rise in the banks' Tier 2 capital, the characteristics of which are less stable than those of Tier 1 capital.

Exposure to credit risk grew due to the continued marked expansion of bank credit, despite the economic slowdown, which has the effect of reducing borrowers' repayment ability. Although foreign-currency credit continued to expand, it did so more slowly than in 1998. The year under review was notable for an increase in the concentration of the bank credit portfolio by borrower, as well as for a rise in the share of problem loans in total credit at most of the banking groups.

The banks' exposure to market risks also increased during the year under review: Interest-rate risk in the three indexation segments rose at most of the banking groups; indexation basis risk (exposure to changes in the inflation and exchange rates) increased in 1999, although it did not develop in a uniform way among the major banking groups.

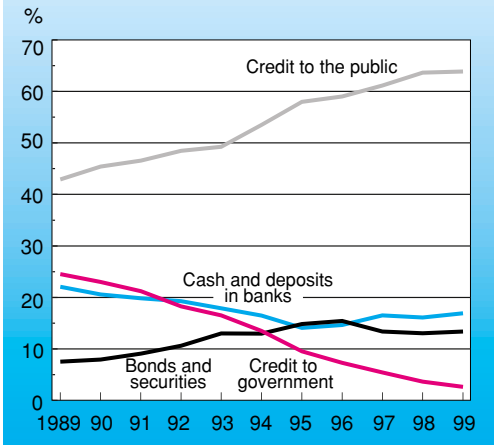
1. INTRODUCTION

The range of risks to which a bank is exposed in the course of its activity is diverse, and includes financial risks—credit risk, market risks and liquidity risk—and non-financial risks: operational risk, legal risk and risk in respect of fraud and embezzlement. In this

section [1] we will focus on the principal financial risks to which a bank is exposed, and on capital adequacy against this range of risks.

The banking system's exposure to credit risk increased during the year under review. Total bank credit grew by NIS 44 billion, an annual increase of 12.1 percent, and amounted to 63.9 percent of the total balance sheet. The rise in credit to the public was part of a long-term trend that has resulted mainly from the liberalization of the financial markets. In this framework, the banks have expanded activity that necessarily involves relatively high credit risk, at the expense of lower risk activity such as credit to the government (Figure 5.1). The ratio of risk-weighted assets to the banks' total assets, which include balance sheet assets and the credit equivalent of off-balance-sheet items, reached 62.9 percent at the end of 1999.

Figure 5.1
Main Balance-Sheet Items, the Five Major Banking Groups, 1989–99



SOURCE: Published financial statements.

The increase in credit risk derived *inter alia* from the substantial expansion of credit against the backdrop of the economic slowdown in 1999, as reflected by a GDP growth rate of only 2.2 percent. In addition, the year reviewed was notable for an increase in the concentration of the banking credit portfolio by borrowers, and for a rise in the proportion of problem loans to total credit at most of the banking groups.

The change in the Supervisor of Banks' regulations resulting from changes in the Basle Committee's recommendations concerning the weighting of unutilized credit frameworks when calculating risk-weighted assets had a technical impact on the growth in the credit equivalent of off-balance-sheet items in 1999. Due to the effect of the change and the absence of comparative data for 1998, credit risk is analyzed here principally on the basis of balance-sheet credit, with only minor reference to the credit equivalent of off-balance-sheet items.

An examination of the five major banking groups' credit components by indexation basis and industry reveals two aspects that affected exposure to credit risk in the course of the year:

(1) The rise in outstanding foreign-currency credit continued, although at a slower rate than in 1998. The marked local-currency depreciations during the last four months

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

of 1998 demonstrated the element of exchange-rate risk that is inherent in extending credit of this kind to customers whose income is not in foreign currency. This appears to have led to the slower rate of increase in foreign-currency credit. In addition, Bank of Israel regulations concerning foreign-currency credit contributed to the banks' closer supervision and monitoring of credit to borrowers whose banking indebtedness is sensitive to exchange-rate shifts.

(2) Outstanding balance-sheet credit to the construction and real estate industry grew by 11.4 percent despite the marked fall in its product. Credit to construction and real estate amounted to 15.2 percent of total credit in 1999, its level remaining stable from 1998. One of the reasons for the rise in balance-sheet credit despite the slowdown of activity in the construction and real estate industry is that borrowers in the industry are increasing their demand for credit for the purpose of financing inventories and current activity. This situation increases both the banks' exposure to risk in respect of credit extended to the industry and fears of a fall in their income if this risk materializes.

The banks' exposure to market risks also increased during the year under review, mainly due to a rise in interest-rate risk in the three indexation segments at most of the banking groups. Indexation basis risk (exposure to changes in inflation and the exchange rate) grew in 1999, although its development was not uniform among the major banking groups. Note that although the banks are not yet required to hold capital against exposure to market risks, under the Supervisor of Banks' regulations they will be required to do so from the third quarter of 2000.

The capital held by a bank serves as a cushion against the losses that will be incurred if the risks to which it is exposed materialize. The ratio of capital to risk-weighted assets at the five banking groups rose slightly, from 9.2 percent at the end of 1998 to 9.4 percent at the end of 1999. The increase in this ratio resulted mainly from the notable rise in the five banking groups' Tier 2 capital, the characteristics of which are less stable than those of Tier 1 capital. The share of Tier 1 capital fell in 1999 because the banks' capital grew less than their total risk-weighted assets, reflecting the increased financial intermediation of the banking groups. The fall in the share of Tier 1 capital was offset by a substantial increase in the ratio of Tier 2 capital to risk-weighted assets.

The composition of the banks' capital has changed in the last few years: The share in total capital of Tier 1 capital, which is the stable part of their capital, has decreased continually, while that of Tier 2 capital has increased. The growth in the share of Tier 2 capital is the result of a decision by the banks' boards of management to improve their capital adequacy by issuing subordinated notes.

In this chapter we examine the financial risks to which the banks are exposed, focusing on the five major banking groups in view of the fact that the Supervisor of Banks' capital requirement is determined on a consolidated basis. Quantifying the overall level of risk is difficult because the banks are exposed to a range of risks that sometimes develop in opposite directions. Moreover, the measuring instruments employed are neither uniform nor comprehensive. Nevertheless, we relate to several indices reflecting the various risks and the way they have been managed during recent years.

2. CREDIT RISK

Since most of a bank's financial activity involves extending credit, credit risk is the main risk factor among the range of financial risks to which it is exposed in the course of its activities. Credit risk derives from the possibility that a borrower or group of borrowers will not repay part of his/their liabilities on time, thereby adversely affecting the banks' income and capital. Exposure to credit risk can be divided into two components: (1) Exposure due to credit extended (balance-sheet activity)—the ratio of the five banking groups' credit to the public to the total balance sheet—which was 63.9 percent at the end of 1999; (2) Exposure due to off-balance-sheet activity, i.e., customers' liabilities in respect of guarantees and transactions—the credit equivalent[2] of off-balance-sheet financial instruments. This was 14.4 percent of the total balance sheet at the end of 1999, indicating the considerable credit risk inherent in this activity.

Credit risk exposure consists of three main elements: (1) The extent of credit, which is positively correlated with the extent of exposure; (2) The concentration of credit, which is positively correlated with the extent of exposure and is measured by various parameters (industry, borrowers); (3) The quality of credit, which is negatively correlated with the extent of exposure. Below we analyze exposure to credit risk, both in the banking system as a whole and at the level of the individual banking group, by examining developments in the three risk components.

a. Size of credit portfolio

The credit portfolio of the five banking groups continued to expand in 1999. Outstanding credit and the credit equivalent in off-balance-sheet items[3] increased despite the slowdown in economic activity, which was reflected by a GDP growth rate of only 2.2 percent, following a similarly low growth rate (2.2 percent) in 1998 (see Chapter 2 for a detailed discussion of the rise in the demand for credit despite the slowdown in economic activity).

Outstanding credit to the public at the five major banking groups rose by 12.1 percent in 1999 following an increase of 14.5 percent in 1998, and totaled NIS 407 billion[4] (Table 5.1). This development encompassed all of the banking groups, with the largest increase being recorded at the Leumi group.

An examination of the distribution of credit by indexation basis shows a rise in demand for all types of credit—unindexed, CPI-indexed and foreign currency. The five banking

[2] Under Regulation No. 311 (Proper Conduct of Banking Business) concerning the weighting of assets and the credit equivalent of off-balance-sheet items by risk coefficients.

[3] The credit equivalent of off-balance-sheet financial instruments, as calculated for the purpose of limiting single-borrower indebtedness and presented as off-balance-sheet credit risks in the published financial statements.

[4] The ratio of credit to shareholders' equity at the five major banking groups also rose considerably during 1999.

Table 5.1
Distribution of Credit by Indexation Base, the Five Major Banking Groups, 1998–99

		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	1998	27,232	40,995	33,261	9,669	111,157	24.5	36.9	29.9	8.7
	1999	33,717	45,324	36,396	10,385	125,822	26.8	36.0	28.9	8.3
Change (*percent*)		23.8	10.6	9.4	7.4	13.2				
Discount	1998	18,157	16,930	16,940	3,707	55,734	32.6	30.4	30.4	6.7
	1999	20,051	18,741	19,970	3,462	62,224	32.2	30.1	32.1	5.6
Change (*percent*)		10.4	10.7	17.9	–6.6	11.6				
Hapoalim	1998	25,874	49,327	36,199	10,143	121,543	21.3	40.6	29.8	8.3
	1999	30,097	53,333	42,604	9,530	135,564	22.2	39.3	31.4	7.0
Change (*percent*)		16.3	8.1	17.7	–6.0	11.5				
Mizrahi	1998	7,716	26,002	4,758	1,930	40,406	19.1	64.4	11.8	4.8
	1999	9,174	28,526	5,217	2,065	44,982	20.4	63.4	11.6	4.6
Change (*percent*)		18.9	9.7	9.6	7.0	11.3				
First International	1998	9,998	12,279	8,680	3,661	34,618	28.9	35.5	25.1	10.6
	1999	11,253	13,339	10,493	3,620	38,705	29.1	34.5	27.1	9.4
Change (*percent*)		12.6	8.6	20.9	–1.1	11.8				
Total	1998	88,977	145,533	99,838	29,110	363,458	24.5	40.0	27.5	8.0
	1999	104,292	159,263	114,680	29,062	407,297	25.6	39.1	28.2	7.1
Change (percent)		17.2	9.4	14.9	–0.2	12.1				

SOURCE: Published financial statements.

Table 5.2
Distribution of Guarantees and other Liabilities, the Five Major Banking Groups, 1998–99

	End-year balances (NIS million)[a]		Change from previous year (percent)	Distribution (percent)	
	1998	1999	1999	1998	1999
Documentary credit	4,712	5,026	6.7	3.7	3.7
Credit guarantees	18,729	18,916	1.0	14.8	13.9
Guarantees for home-buyers	24,245	22,831	–5.8	19.1	16.8
Other guarantees and liabilities	19,151	18,518	–3.3	15.1	13.6
Irrevocable liabilities on authorized credit not taken up	33,234	43,476	30.8	26.2	31.9
Liabilities on guarantee expenses	19,657	18,696	–4.9	15.5	13.7
Liabilities on unsettled credit-card transactions	6,971	8,760	25.7	5.5	6.4
Total	**126,699**	**136,223**	**7.5**	**100.0**	**100.0**

[a] At December 1999 prices.
SOURCE: Published financial statements.

groups' outstanding foreign-currency credit grew by 11.5 percent in 1999 compared with an increase of 22.8 percent in 1998. The marked local-currency depreciations in the last four months of 1998 demonstrated the exchange-rate risk inherent in credit of this type for customers whose income is not in foreign currency. This development appears to have slowed the increase in foreign-currency credit. In addition, Bank of Israel regulations concerning foreign-currency credit led to the banks' increased supervision and monitoring of credit to borrowers whose indebtedness is sensitive to exchange rate shifts. The share of foreign-currency credit in total credit to the public remained at the previous year's level of 35.3 percent (Table 5.1).

The banks' off-balance-sheet activity increased during 1999.[5] The five banking groups' outstanding guarantees and other liabilities totaled NIS 136.2 billion at the end of 1999, an increase of 7.5 percent (Table 5.2). An examination of the components of this item reveals a rise in irrevocable liabilities for extending credit and liabilities against open credit-card transactions, a development due in part to a change in the Supervisor of

[5] This activity, which of necessity involves credit risk due to customers' liabilities to the bank, comprises two components: (1) Transactions in which the nominal balance represents credit risk—guarantees, documentary credits, guarantees for securing credit, guarantees for apartment buyers under the Sale Law, and other guarantees; (2) Transactions in which the credit risk is not represented by the nominal balance, such as forwards, futures, swaps, and options on exchange rates, interest rates, indices, and commodities.

Banks' regulations concerning the weighting of unutilized credit frameworks. There was a 5.8 percent decline in the 'Guarantees for apartment buyers under the Sale Law' item in 1999, reflecting the slowdown in the construction industry as well as the insurance companies' entry into this area of activity.

The banks conduct future transactions on behalf of their customers and on their own behalf within the framework of their market risk and investment management. The five banking groups' futures transactions in nominal value terms increased appreciably in 1999, in the continuation of a long-term trend. The volume of these transactions at the five major banking groups grew by 25 percent in terms of nominal value/notional principal and totaled NIS 329.6 billion (Table 5.3). Most of the increase was recorded in contracts in respect of shares, share indices and commodities, a development that is in line with the buoyant state of the stock market in 1999. A substantial increase was also recorded in the volume of interest-rate contracts, the vast majority of which are intended to hedge against a decline in the nominal interest rate and a rise in the real interest rate. Most of the banks' futures contracts are traded on stock markets in Israel and abroad or over-the-counter.

b. Concentration of credit portfolio

(1) Concentration of credit by industry

Exposure to credit risk is also affected by the concentration of the credit portfolio by industry, on the assumption that there is no complete correlation in volumes of activity and financial results between borrowers within the different economic sectors. The wider the dispersal of the credit portfolio among the various industries, the lower the risk.

The Herfindahl-Hirshman index (the H-index) [6] serves as an estimate of concentration of the credit portfolio by economic sector. The H-index exclusive of households, which is highly heterogeneous from the aspect of borrowers' financial position, was unchanged in 1999 from 1998 (Table 5.4). The level of the index varied appreciably between the banking groups, ranging from 0.025 at the Mizrahi group, where the proportion of credit to households is relatively high due to Tefahot Bank's large mortgage portfolio, to 0.099 at the Discount group as a result of that group's high proportion of credit to the construction and real estate and the manufacturing industries.

Note that the high proportion of credit to the construction industry creates a high level of concentration in the banking credit portfolio. Outstanding balance-sheet credit extended by the five groups to borrowers in the construction and real estate industry increased by 11.4 percent in 1999 despite the slowdown in activity in the industry, as reflected by a decrease in the industry's product and in the number of building starts in the economy (Table 5.5). One of the reasons for the growth in balance-sheet credit to construction despite the slowdown in the industry was that borrowers increased their demand for

[6] 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.

Table 5.3
Distribution of Balances[a] (Notional Value) of Financial Derivatives, the Five Major Banking Groups, December 1998 and December 1999

(NIS million)[b]

	Contracts, 1998				Contracts, 1999				Rate of change, total derivatives (%)
	Interest-rate	Exchange-rate	Other[c]	Total	Interest-rate	Exchange-rate	Other[c]	Total	
Leumi	26,012	48,177	3,869	78,058	36,720	46,609	10,531	93,860	20.24
Discount	3,889	28,937	4,989	37,815	11,850	24,739	7,722	44,311	17.18
Hapoalim	36,402	51,604	2,417	90,423	49,326	46,365	6,357	102,048	12.86
Mizrahi	63	11,663	11,302	23,028	348	19,647	18,685	38,680	67.97
First International	5,491	26,184	2,686	34,361	10,867	34,291	5,581	50,739	47.66
Total	**71,857**	**166,565**	**25,263**	**263,685**	**109,111**	**171,652**	**48,876**	**329,638**	**25.01**
Percent of which									
Traded on stock-exchanges	13.9	3.8	77.3	13.6	12.6	9.5	78.9	20.8	91.56
Over-the-counter	72.0	50.3	6.5	52.0	65.4	38.5	3.6	42.2	1.52
Other	14.1	45.9	16.2	34.4	21.9	52.0	17.5	36.9	34.24

[a] Consolidated basis.
[b] In terms of notional principal, at December 1999 prices.
[c] Regarding shares, share indices, Treasury bill futures, and commodities.
SOURCE: Published financial statements.

Table 5.4
Indices of Credit Concentration, the Five Major Banking Groups,[a] 1997–99

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Concentration by principal industry						
H-Index[b] of concentration of credit by principal industry						
1997	0.153	0.138	0.139	0.369	0.149	0.151
1998	0.151	0.133	0.129	0.371	0.150	0.146
1999	0.144	0.124	0.126	0.367	0.145	0.139
H-Index[b] of concentration of credit by principal industry excl. households						
1997	0.080	0.107	0.074	0.029	0.083	0.071
1998	0.086	0.101	0.077	0.027	0.089	0.074
1999	0.082	0.099	0.077	0.025	0.098	0.073
Concentration by size of borrower						
Share of credit to borrowers whose outstanding credit is greater than NIS 33 million						
1997	33.0	32.5	42.0	13.9	33.7	33.7
1998	36.8	37.0	49.7	15.8	42.7	39.4
1999	40.5	42.7	52.6	15.9	45.0	42.6
Gini Index[c]						
1997	0.946	0.934	0.950	0.815	0.917	0.934
1998	0.955	0.938	0.955	0.818	0.929	0.941
1999	0.924	0.943	0.957	0.814	0.937	0.943

[a] On balance-sheet basis only.
[b] This index is the sum of the squares of the share of credit in an industry in total credit to the public.
[c] The Gini Index of credit spread reflects the inequality of the distribution of credit by borrower (see note in text).
SOURCE: Published financial statements.

credit for the purpose of financing inventories and current activity. This situation increases the banks' exposure to risk in respect of credit extended to the construction industry.

The share in total credit of credit extended to the construction and real estate industry amounted to 15.2 percent at the end of 1999, remaining unchanged from 1998 (Table 5.5). The proportion of credit to the construction industry to total credit exclusive of credit to borrowers whose activity is carried out abroad also remained stable at 17.5 percent. The share in total credit of credit to construction ranged from 21.4 percent at the Discount group to 11.2 percent at the Mizrahi group, reflecting a high level of exposure to credit risk against the backdrop of the slowdown in activity in the industry. Banks that exceed the limitations prescribed for industry-specific concentration, namely banks whose credit to a particular industry exceeds 20 percent of their credit portfolio, are required to make an additional provision for loan losses in respect of this exception.

The high share (25.8 percent) in total credit of credit extended to private individuals (principally to households) is not necessarily indicative of a high level of exposure to

Table 5.5
Distribution of Credit by Principal Industry, the Five Major Banking Groups, 1998–99

	Balance of credit to public[a] *(NIS million)*		Distribution of credit balances[a] *(percent)*		Problem credit: Balance *(NIS million)*		Problem credit: Share in total credit *(percent)*		Expenditure on specific loan-loss provision *(NIS million)*[b]		Expenditure on loan-loss provision/ total credit *(percent)*	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Agriculture	8,911	9,016	2.4	2.1	6,073	5,862	68.2	65.0	59	45	0.66	0.50
Manufacturing	48,346	52,482	12.8	12.4	6,479	6,376	13.4	12.1	408	278	0.84	0.53
Construction and real estate[c]	57,944	64,571	15.3	15.2	9,561	9,642	16.5	14.9	709	620	1.22	0.96
Water & electricity[d]	3,435	4,364	0.9	1.0	61	68	1.8	1.6	1	9	0.03	0.21
Commerce	29,364	31,769	7.8	7.5	2,289	2,158	7.8	6.8	250	260	0.85	0.82
Food services & hotels	8,502	9,563	2.3	2.3	1,595	1,644	18.8	17.2	102	95	1.20	0.99
Transport and storage	7,309	10,844	1.9	2.6	515	449	7.0	4.1	37	34	0.51	0.31
Communications and computer services	10,434	15,874	2.8	3.7	107	119	1.0	0.7	5	10	0.05	0.06
Financial services	24,590	33,184	6.5	7.8	589	568	2.4	1.7	17	23	0.07	0.07
Other business services	10,043	11,564	2.7	2.7	1,209	1,257	12.0	10.9	95	102	0.95	0.88
Public and community services	15,578	15,698	4.1	3.7	3,388	1,850	21.8	11.8	33	24	0.21	0.15
Households: Residents	101,564	109,579	26.9	25.8	5,101	6,486	5.0	5.9	501	547	0.49	0.50
Borrowers abroad	51,799	55,961	13.7	13.2	1,017	842	2.0	11.5	27	18	0.05	0.03
Total	**377,818**	**424,469**	**100**	**100**	**37,984**	**37,322**	**10.1**	**8.8**	**2,244**	**2,065**	**0.59**	**0.49**

[a] Including credit to the public and the public's investment in bonds.
[b] At December 1999 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.
SOURCE: Published financial statements.

credit risk, however. This is because the correlation between households is not high as regards either their economic activity or their repayment ability, and it is doubtful whether they can be regarded as an industry in this respect.

(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 wider the dispersal the lower the risk, and vice versa. The banks' credit portfolio in Israel is notable for a high degree of concentration by borrower, reflecting the concentration of economic activity among large borrowers. The high degree of concentration in the bank credit portfolio is apparent from the fact that 58 percent of the five groups' credit was granted to 9,030 borrowers,[7] who account for only 0.2 percent of all borrowers.

A number of indicators show that the five groups' concentration of credit by borrower increased during the year under review: (1) Average outstanding balance-sheet credit rose from NIS 86.5 thousand at the end of 1998 to NIS 89.5 thousand at the end of 1999 (Table 5.6); (2) The proportion of credit to borrowers whose balance of indebtedness exceeded NIS 33 million rose by 3.2 percentage points in 1999 and reached 42.6 percent (Table 5.6); (3) The Gini Index[8] of inequality in the distribution of credit, which reflects the lack of uniformity in the distribution of the credit portfolio, rose to 0.943 in 1999. The increase in credit concentration encompassed all the banking groups due to the rise in outstanding credit to industries that are notable for large borrowers, and to the expansion of investment and exports, which are credit-intensive.

c. Quality of credit portfolio

The quality of the credit portfolio reflects the probability that a borrower or group of borrowers will fail to repay part of his/their liabilities to the banks, and is affected mainly by borrowers' repayment ability and the amount of collateral that they provide against the receipt of the credit. We will present developments in the quality of the credit portfolio on the basis of four indices: the ratio of credit to GDP; the share of the banks' risk assets in their total assets; the proportion of problem loans to total credit; and the ratio of the annual expenditure on loan-loss provision to outstanding credit. These indices do not take into account collateral that has been provided against credit, and correlative factors in the credit portfolio.

[7] Starting from the NIS 7 million credit bracket, the classification was made on the basis of specific consolidation. However, the number of borrowers is upward biased because borrowers may be listed in several groups. In this case, adding the number of borrowers at the five banking groups will lead to double counting.

[8] The value of this index is the plane between the distribution curve of the credit portfolio (the cumulative percentage of credit to the cumulative percentage of borrower) and a 45 degree line, which reflects equitable distribution. It is accepted practice to divide this value in half, in order to obtain an index that ranges between zero and one.

Table 5.6
Distribution of Credit to the Public[a] by Single-Borrower Indebtedness, the Five Major Banking Groups,[b] 1998–99

	Balance of credit to public (*NIS million*)[c]		Number of borrowers		Average credit balance (*NIS thousand*)[c]		Proportion of credit balance (%)		Proportion of borrowers (%)	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
(NIS thousand)[c]										
Up to 7	1,699	1,678	2,165,462	2,240,981	0.8	0.7	0.5	0.4	51.2	48.9
From 7 to 16	4,049	3,023	758,958	662,280	5.3	4.6	1.1	0.7	17.9	14.5
From 16 to 33	6,393	6,114	458,692	581,402	13.9	10.5	1.7	1.5	10.8	12.7
From 33 to 65	9,634	9,000	312,047	410,525	30.9	21.9	2.6	2.2	7.4	9.0
From 65 to 130	16,986	16,894	203,873	300,252	83.3	56.3	4.6	4.1	4.8	6.6
From 130 to 265	30,672	33,893	175,048	208,275	175	163	8.4	8.3	4.1	4.5
From 265 to 490	30,250	33,726	94,836	105,498	319	320	8.3	8.2	2.2	2.3
From 490 to 990	18,507	21,465	32,461	37,567	570	571	5.1	5.2	0.8	0.8
From 990 to 1,640	10,641	11,388	10,637	11,237	1,000	1,013	2.9	2.8	0.3	0.2
From 1,640 to 3,300	14,500	15,491	7,772	8,841	1,866	1,752	4.0	3.8	0.2	0.2
From 3,300 to 6,600	18,070	18,578	4,975	5,556	3,632	3,344	4.9	4.5	0.1	0.1
From 6,600 to 16,400	30,568	32,213	3,840	4,368	7,960	7,375	8.4	7.9	0.1	0.1
From 16,400 to 33,000	29,895	31,884	1,739	2,038	17,191	15,645	8.2	7.8	0.0	0.0
From 33,000 to 164,000	77,942	86,149	1,831	2,232	42,568	38,597	21.3	21.0	0.0	0.0
From 164,000 to 330,000	23,382	30,982	156	243	149,885	127,498	6.4	7.6	0.0	0.0
From 330,000 to 655,000	23,058	33,551	62	114	371,903	294,307	6.3	8.2	0.0	0.0
From 655,000 to 985,000	9,093	13,045	14	23	649,500	567,174	2.5	3.2	0.0	0.0
From 985,000 to 1,310,000	4,960	4,144	6	5	826,667	828,800	1.4	1.0	0.0	0.0
From 1,310,000 to 1,970,000	5,782	6,733	5	7	1,156,400	961,857	1.6	1.6	0.0	0.0
Total	**366,081**	**409,951**	**4,232,414**	**4,581,444**	**86.5**	**89.5**	**100**	**100**	**100**	**100**

[a] Including outstanding credit to the public (balance-sheet only).

[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); adjusted for credit to single borrowers by indexation insurance from the Ministry of Finance.

[c] At December 1999 prices.

SOURCE: Published financial statements.

The ratio of balance-sheet credit to business-sector product rose considerably in 1999, due to the expansion of credit against the backdrop of the slowdown in the GDP growth rate. This ratio rose by 11 percentage points in 1999 and amounted to 0.95 (95 percent), following a 9 percentage-point increase in 1998. The marked rise in the volume of bank credit during the year, at a time of economic slowdown, indicates that the banks' exposure to credit risk increased. The credit/product ratio varied greatly between industries, ranging from 0.65 in the electricity and water industry to 2.84 in the construction and real estate industry.

The total risk-weighted assets of the five banking groups, which are calculated for the purpose of conforming to the minimum capital ratio requirement,[9] expanded by 10.6 percent in 1999 and totaled NIS 460 billion. Most of the increase was recorded in balance sheet risk assets, which rose by 12.7 percent in the course of the year. This development was a continuation of a long-term trend which reflects *inter alia* the expansion of the banks' activity. One of the indices of the quality of the banks' asset portfolio is the ratio between total risk assets and total items (balance sheet items and the credit equivalent of off-balance-sheet items, before the weighting). Although this ratio at the five banking groups did not change from 1998 and amounted to 62.9 percent (Table 5.7), its development among the different groups was not uniform.

Total problem loans[10] of the five banking groups, with the exception of special-mention debts and credit that has been discharged by the transfer of ownership of assets, rose during the year under review and totaled NIS 16.2 billion (Table 5.8). Continuing a long-term trend, outstanding problem loans to agriculture fell in 1999, reflecting the implementation of credit arrangements with the *kibbutzim* and the *moshavim* whereby part of their debts were written off. As a result, the outstanding problem loans extended to borrowers not included in the agricultural industry rose by the a steep 9.5 percent in 1999. This development, which was recorded at all the banking groups except for the Hapoalim group, reflects a rise in the number of borrowers encountering repayment difficulties, possibly due to the economic slowdown.

The share in total credit of problem loans to borrowers not in the agricultural industry, which serves as a good estimate of the quality of the credit portfolio because it does not

[9] Under Proper Conduct of Banking Business Regulation No. 311 and in accordance with the guidelines of the Basle Committee, risk-weighted assets are calculated by weighting the balances of all assets and the credit equivalent of off-balance-sheet items on the basis of four risk coefficients: 100 percent, 50 percent, 20 percent and 0 percent. The credit equivalent of off-balance-sheet items is the balance of the item multiplied by the conversion coefficient that reflects the probability of customer indebtedness vis-à-vis the bank arising in respect of that item or in respect of a future transaction. The conversion coefficients determined in Israel range between 0 percent and 100 percent.

[10] Under the Supervisor of Banks' regulations, problem loans are defined on the basis of the following categories: loan losses (in their entirety or in part), non-performing debts, restructured debts (debts that have been or will be restructured), debts in temporary arrears and special-mention debts.

Table 5.7
Indices of Credit Portfolio Quality, the Five Major Banking Groups, 1997–99

(percent)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Ratio of risk-weighted[a] assets to total assets						
1997	57.8	55.8	59.2	61.3	52.7	57.8
1998	62.4	58.6	66.3	63.1	59.3	62.9
1999	62.7	59.8	66.9	60.3	58.3	62.9
Share of special-mention credit in total credit						
1997	7.0	4.3	7.2	2.5	3.0	5.8
1998	6.1	5.1	7.4	3.0	2.4	5.7
1999	6.4	4.9	4.1	2.6	1.5	4.5
Share of annual loan-loss provision in total credit						
1997	0.82	1.06	0.76	0.41	0.34	0.75
1998	0.64	1.14	0.47	0.47	0.27	0.61
1999	0.42	0.89	0.54	0.32	0.22	0.50

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

SOURCE: Published financial statements.

include past arrangements with the *kibbutzim* and the *moshavim*, remained unchanged from 1998 (Table 5.8). This development resulted mainly from the reduced proportion of problem loans at the Hapoalim group, while the proportion of problem loans at the other banking groups rose in line with their outstanding problem loans. Note, however, that the effect of the economic slowdown on the quality of the credit portfolio may manifest itself with a lag. Accordingly, during periods of a rapid growth of credit, as in the past two years, no major increase was recorded in the share of problem loans.

An examination of the share of problem loans[11] in total credit by industry clearly reveals a low quality of credit in industries where credit arrangements were made with borrowers in the past, namely agriculture, where the share of problem loans in total credit is 65.0 percent, and the public services, where it is 11.8 percent (Table 5.5). Two other industries with a relatively high proportion of problem loans are the hotel, food and accommodation services industry (17.2 percent) and the construction and real estate industry (14.9 percent), a fact indicative of low credit quality and reflecting the slowdown in activity in these industries.

The rise in credit risk apparent from the concentration of the banking credit portfolio and the size of the portfolio relative to business-sector product, has not yet been reflected

[11] Including special-mention credit.

Table 5.8
Distribution of Problem Debts,[a] the Five Major Banking Groups, 1998–99[b]

	Leumi		Discount		Hapoalim		Mizrahi		First Intl.		Total	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
NIS million[c]												
Total problem debts	**3,334**	**3,710**	**2,577**	**3,089**	**8,838**	**7,600**	**1,154**	**1,325**	**152**	**475**	**16,055**	**16,199**
Non-performing	1,737	1,996	2,208	2,475	1,526	1,317	209	191	0	206	5,680	6,185
To agriculture	720	375	61	69	4,385	3,871	242	227	0	0	5,408	4,542
Other	2,614	3,335	2,516	3,020	4,453	3,729	912	1,098	152	475	10,647	11,657
Percent												
Share of problem debts in total debts at group's responsibility												
Total	**3.0**	**2.9**	**4.6**	**4.9**	**7.2**	**5.6**	**2.8**	**2.9**	**0.4**	**1.2**	**4.4**	**4.0**
Non-performing	1.6	1.6	3.9	3.9	1.2	1.0	0.5	0.4	0.0	0.5	1.6	1.5
To agriculture	0.6	0.3	0.1	0.1	3.6	2.8	0.6	0.5	0.0	0.0	1.5	1.1
Other	2.3	2.6	4.5	4.8	3.6	2.7	2.2	2.4	0.4	1.2	2.9	2.8
Ratio of problem debts to group's equity												
Total	**32.1**	**33.7**	**48.8**	**55.3**	**80.5**	**66.6**	**44.5**	**49.1**	**5.6**	**16.6**	**50.2**	**48.3**
Non-performing	16.7	18.1	41.8	44.3	13.9	11.5	8.1	7.1	0.0	7.2	17.8	18.4
To agriculture	6.9	3.4	1.2	1.2	39.9	33.9	9.3	8.4	0.0	0.0	16.9	13.5
Other	25.1	30.3	47.7	54.1	40.5	32.7	35.2	40.7	5.6	16.6	33.3	34.7

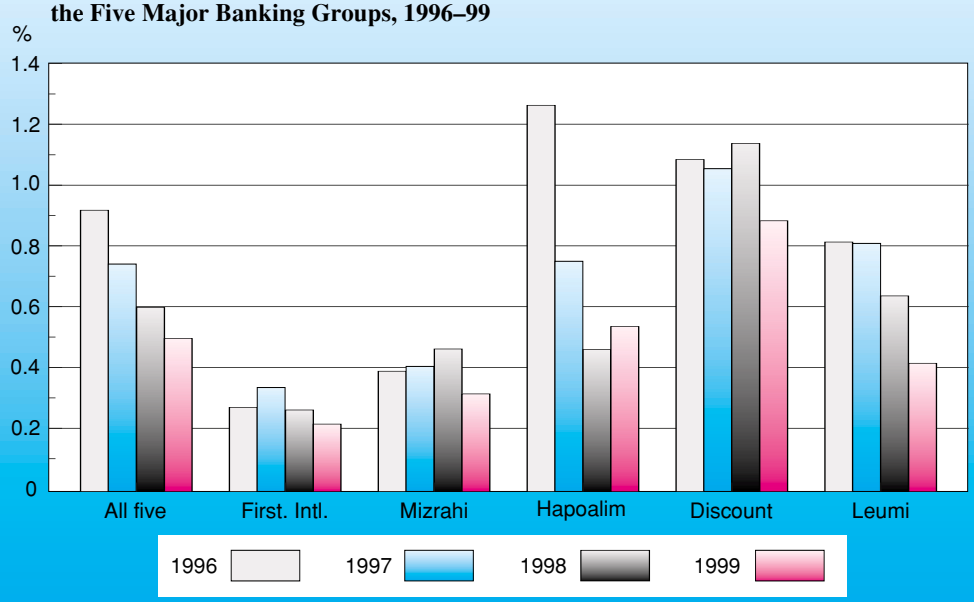
[a] Including non-performing loans, rescheduled debts, and overdue loans (not including special-mention debts and realized real-estate collateral).
[b] Reclassified.
[c] At December 1999 prices.
SOURCE: Published financial statements.

in the extent of annual expenditure on loan-loss provision. At the five banking group this fell by 6.9 percent in 1999 and totaled NIS 2.1 billion. Expenditure on the specific loan-loss provision, which the banks' managements determine in accordance with borrowers' anticipated repayment ability and the nature of their collateral, fell by 8.9 percent in 1999. The general loan-loss provision of the five groups increased, however, after reaching a negative rate in 1998.

The ratio of expenditure on loan-loss provision to outstanding credit to the public at the five groups' risk dropped from 0.61 in 1998 to 0.5 in 1999 (Table 5.7), ranging from 0.2 at the First International group to 0.92 at the Discount group, and indicating the high degree of variability in the quality of the credit portfolio among the different banks (Figure 5.2).

An examination of annual expenditure on the specific loan-loss provision for the various industries reveals major differences in the quality of credit among them. In the communications and computer services industry this ratio has averaged 0.07 percent in the past three years, indicating that the quality of credit to this industry was good, due *inter alia* to the notable expansion in its activity during recent years. In the hotel, food and accommodation services industry, however, the ratio for the same period averaged 1.1 percent, indicating that the quality of credit to borrowers in this industry was relatively poor. In agriculture the ratio fell from 2.2 percent in 1997, to 0.66 percent in 1998 and 0.5 percent in 1999 (Table 5.5) as a result of the implementation of arrangements with the *kibbutzim* and the *moshavim*.

Figure 5.2
Ratio of Annual Loan-Loss Provision to Credit to the Public, the Five Major Banking Groups, 1996–99



SOURCE: Published financial statements.

3. MARKET RISKS

Market risks are defined as the probability of changes in market prices that could harm a bank's financial position—its income, profitability, and even its capital. The potential exposure to market risks of banks in Israel and abroad has grown during a period in which the financial markets were opened up, there was increased volatility in market prices, and new financial instruments (including derivatives) were developed.

The analysis of market risks in this chapter is based on a highly simplistic model of Value at Risk (VaR). This value expresses the maximum loss expected on holding financial instruments in long or short position—which 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 a historical simulation based on the following assumption: (1) A planning period (horizon) of a month; (2) A level of significance of 99 percent; (3) Correlations between changes in different market prices are not taken into account; (4) Positions are based on data that are published in the bank's financial statements, and do not take into account the full effect of derivatives, and of options in particular. [12]

Note that the Banking Supervision Department requires the banks to estimate market risks using more complex and more sophisticated models. All the banking groups reported that in 1999 they began to operate systems for the current calculation of market risks under the VaR method, as required in Regulation No. 339.

a. Interest-rate risk

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 [13]). 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 [14] is presented for each

[12] Under the regulations governing financial reporting to the public, with effect from the year 2000 the banks will be required to present in their financial statements the value of options in underlying asset terms, in addition to the presentation of the value of options in nominal value terms. This form of reporting will make it possible to calculate market risk VaR more accurately by taking the delta derivative of options into account. Some of the banks applied the new regulations already in 1999.

[13] The difference between the present value of assets and that of liabilities. This is 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 will make it possible to calculate the value subject to market risks more accurately. In the course of the year under review, the fair value of net worth (the difference between the fair value of assets and of liabilities) increased at most of the banking groups.

[14] Interest-rate risk is calculated on the basis of Appendix D to the Management Review in the banks' financial statements.

of the three indexation segments (unindexed, CPI-indexed, and foreign currency) separately, 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 sectors respectively. [15]

Exposure to interest-rate risk, as reflected by Value at Risk,[16] is affected by three elements: (1) The difference between the present value of assets and the present value of liabilities *plus* the effect of futures transactions—henceforth positions; (2) The sensitivity of positions to changes in interest rates as measured by duration (average term to maturity); [17] (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.

(1) All segments

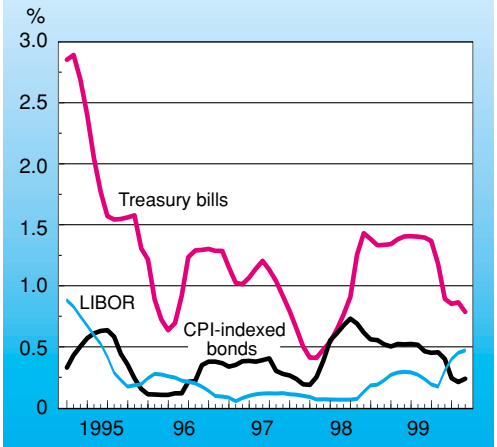
The total VaR related to interest-rate risk (in all three indexation segments) rose at all the banks during 1999, with the exception of Bank Leumi. At the five largest banks the VaR ranged from 7.0 percent of net worth at Bank Hapoalim, which was equivalent to NIS 130 million, to 13 percent of net worth at Discount Bank, which was equivalent to NIS 191 million (Table 5.9). The VaR was calculated as the sum of the values subject to risk 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 VaR related to interest-rate risk taking these correlations into account using the covariance matrix method is given in the appendix to this chapter.

[15] Interest rates in the three indexation segments are adjusted to the rates of yield to maturity on Treasury bills and CPI-indexed bonds, and to the Libor interest rate, whichever is appropriate.

[16] 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 adjusted duration. The higher the adjusted duration of the asset, the greater will be the change in the present value that is caused by a change in the interest rate and thereby reflects a higher degree of risk.

[17] 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.

Figure 5.3
Standard Deviation of Selected Interest Rates,[a] 1995–99



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

(2) The unindexed local-currency segment

Assets and liabilities in this segment are less sensitive to interest-rate shifts than in the other intermediation segments due to their short term to maturity, as well as to the fact that they are usually priced on the basis of floating rates of interest. However, interest rates in this segment, which are generally 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 is greater than that of CPI-indexed bonds and the standard deviation of the dollar Libor interest rate (Figure 5.3).

The VaR in this segment relative to interest-rate risk is obtained by multiplying the position by the standard average duration of capital and by the greatest expected change in the rate of interest. The latter is derived from the distribution of the monthly changes in the yield to maturity on Treasury bills during the previous five years. The maximum change is estimated from the 99th percentile[18] in this distribution, and at the end of 1999 this was 1.8 percentage points, compared with 2.3 percentage points at the end of 1998. The decline in the maximum rate of change reflects the reduction in interest-rate volatility, as indicated by the reduction in the standard deviation of Treasury bill yields (Figure 5.3). The high interest-rate volatility in the unindexed local-currency segment in 1998 derived mainly from the 4 percentage-point rise in the interest rate within a short period of time in the last quarter of the year, as part of the monetary policy response to purchases of foreign currency and the resulting local-currency depreciation.

Among the five largest banking groups, the value at interest-rate risk in this segment ranged from NIS 3.7 million at the First International group to NIS 78.4 million at the Leumi group (Table 5.9). This means that a 1.8 percentage-point change in the unindexed interest rate within the course of a month (the probability of a larger change being less than one percent) would have eroded the net worth deriving from this segment by that amount. At the end of 1999 most of the banks were exposed to a rise in the interest rate, meaning that such a rise would have led to the erosion of the net worth deriving from this segment.

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

Table 5.9
Exposure to Changes in Interest Rates, the Seven Major Banks, December 1998 and December 1999

	Leumi		Discount		Hapoalim		Union		Mercantile Discount		Mizrahi		First International	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Unindexed segment														
Total exposure[a]	1,134	–760	286	–1,042	954	–1,696	–178	48	74	83	219	341	77	–785
Duration of assets *(years)*	0.19	0.25	0.20	0.22	0.08	0.10	0.14	0.21	0.11	0.13	0.12	0.14	0.11	0.13
Duration of liabilities *(years)*	0.14	0.17	0.18	0.19	0.13	0.17	0.14	0.15	0.11	0.13	0.09	0.10	0.09	0.11
Duration of net worth[b] *(percent)*	1.96	6.35	1.74	0.53	–2.49	–2.51	–0.06	8.01	0.25	0.39	1.79	2.50	2.81	0.29
Modified duration[c] *(percent)*	1.73	5.77	1.54	0.48	–2.21	–2.28	–0.05	7.28	0.22	0.35	1.59	2.27	2.49	0.26
VaR[d] (*NIS million*)	44.7	78.4	10.0	9.0	47.8	69.2	0.2	6.2	0.4	0.5	7.9	13.9	4.4	3.7
Indexed segment[e]														
Total exposure	3,282	5,349	2,820	5,090	2,005	2,572	805	524	404	436	401	195	1,757	2,604
Duration of assets *(years)*	3.31	2.86	3.26	3.89	3.25	3.17	2.81	2.80	2.63	2.61	3.19	3.15	3.26	3.30
Duration of liabilities *(years)*	2.51	2.41	2.98	3.20	3.56	3.48	2.29	2.21	2.73	2.69	2.69	2.63	2.59	2.51
Duration of net worth *(percent)*	13.11	6.49	4.69	5.90	–4.86	–2.89	4.29	5.60	1.93	2.01	13.27	27.98	7.41	6.93
Rate of exposure *(percent)*	12.45	6.15	4.45	5.58	–4.61	–2.73	4.08	5.30	1.83	1.91	12.60	26.48	7.04	6.56
VaR (*NIS million*)	255.8	205.8	78.6	177.9	57.9	44.0	20.5	17.4	4.6	5.2	31.7	32.3	77.4	106.9

Table 5.9 (continued)

	Leumi		Discount		Hapoalim		Union		Mercantile Discount		Mizrahi		First International	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Foreign-currency segment[f]														
Total exposure	–1,350	–2,289	–1,657	–2,575	199	975	30	22	16	30	–233	–105	–479	–276
Duration of assets (*years*)	0.35	0.38	0.25	0.35	0.34	0.43	0.19	0.18	0.20	0.28	0.34	0.21	0.22	0.24
Duration of liabilities (*years*)	0.35	0.39	0.24	0.36	0.38	0.38	0.23	0.25	0.23	0.29	0.22	0.24	0.33	0.34
Duration of net worth (*percent*)	–0.47	–0.82	–0.05	–0.45	–12.77	4.56	–10.09	–22.77	–5.15	–0.68	5.27	–3.94	–4.24	–8.36
Modified duration (*percent*)	–0.44	–0.78	–0.05	–0.42	–12.14	4.30	–9.59	–21.44	–4.90	–0.64	5.01	–3.71	–4.03	–7.87
VaR (*NIS million*)	3.2	7.3	0.4	4.4	12.7	17.1	1.5	2.0	0.4	0.1	6.2	1.6	10.1	8.9
Total value at risk[g]	303.7	291.4	89.1	191.3	118.4	130.3	22.3	25.5	5.4	5.8	45.7	47.8	92.0	119.5
Total position[h]	3,066	2,300	1,449	1,473	3,158	1,851	657	594	493	549	386	431	1,356	1,543
VAR as percent of net worth	9.91	12.67	6.15	12.99	3.75	7.04	3.39	4.30	1.10	1.06	11.82	11.09	6.78	7.75

[a] Current 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.

[b] 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.

[c] 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 one percentage-point change in the interest rate.

[d] The change (in NIS million) in a bank's situation resulting from the maximum change in the interest rate. In 1998, these were 2.3 percentage points in unindexed interest, 0.63 percentage points in real interest, and 0.53 percentage points in dollar interest. In 1999 these were 1.8, 0.63 and 0.41 percentage points respectively; based on changes in interest rates over the last 5 years; the probability of changes greater than these is less than 1 percent.

[e] Including the CPI/dollar indexation option.

[f] Including foreign-currency-indexed.

[g] Total value at interest-rate risk is obtained by adding the adjusted risk values in the three segments, under the strong assumption that the worst change will occur to the banks' situation in all segments.

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

SOURCE: Published financial statements and Bank of Israel.

(3) The CPI-indexed segment

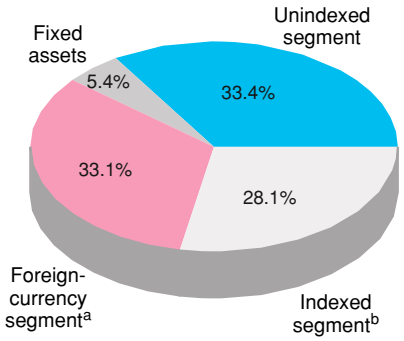
Assets and liabilities in this segment are more sensitive to changes in interest rates than in the other intermediation segments, because they have a long term to maturity and are generally priced at fixed rates of interest. However, interest rates in this segment are generally matched to the yield to maturity on CPI-indexed bonds and have a relatively low degree of volatility, which helps to reduce the potential exposure to interest-rate risks.

At the end of 1999 most of the large banks were exposed to a rise in the real interest rate, because the relative sensitivity of the value of their assets to changes in interest rates was higher than that of their liabilities (Table 5.9). The VaR related to interest-rate risk in this segment reflects the maximum deterioration in a bank's financial position that could result from the maximum change in the real interest rate. At the end of 1999 the VaR in this segment at the five largest banks ranged from NIS 32.3 million at Mizrahi Bank to NIS 205.8 million at Bank Leumi (Table 5.9), i.e., the maximum expected change in the interest rate in the course of the month (0.63 percentage points) would have eroded the net worth deriving from the segment by these amounts.

(4) The foreign-currency segment

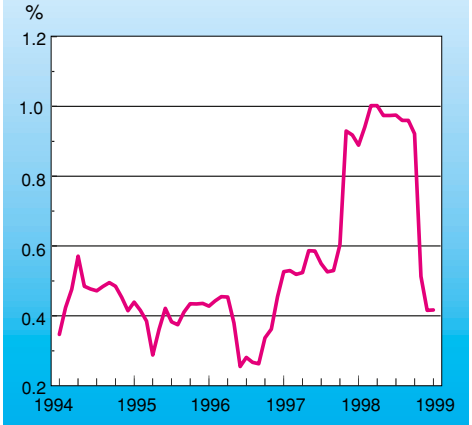
Exposure to interest-rate risk in this segment is lower than in the local currency segments for two reasons: (1) The banks maintain low positions in this segment, partly because the assets and liabilities in it are priced at floating interest (usually Libor), and are short and medium term. In this segment the banks use derivatives—swap contracts on interest rates—to reduce their exposure to interest-rate risk. These instruments, which are traded in the leading international markets, are less developed in the local-currency segments; (2) The volatility of interest rates in this segment is relatively low, as is apparent from the standard deviation of the dollar Libor interest rate (Figure 5.3). The value of interest-rate risk in this segment was calculated with respect to the maximum expected monthly change in dollar Libor interest rates during the previous five years. At the five largest banks this value ranged from NIS 1.6 million at Mizrahi Bank to NIS 17.1 million at Bank Hapoalim (Table 5.9). The maximum expected change in the dollar Libor interest rate within a single month (0.41 percentage points) would have eroded the net worth deriving from this segment by those amounts.

Figure 5.4
Share of Intermediation Segments in Total Assets of Ordinary Banking Corporations, December 1999



[a] Including foreign-currency-indexed.
[b] Including CPI/dollar indexation option.
SOURCE: Published financial statements.

Figure 5.5
Standard Deviation[a] of Monthly Changes in CPI, 1994–99



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

b. Indexation basis (inflation and exchange-rate) risks

A bank is exposed to indexation basis risks when, in the framework of its financial intermediation activities, it obtains sources with one indexation basis for uses with a different one. Changes in the relative prices of the different indexation bases could therefore have an adverse effect the banks' profits and even cause losses. Financial intermediation activity in Israeli comprises three main segments of similar size: unindexed, CPI-indexed, and foreign currency. In the foreign-currency segment, the majority of activity is in US dollars (Figure 5.4). These segments developed as a result of Israel's high rate of inflation compared with other Western countries, a system of mechanisms for linkage to price indices and the large volume of foreign trade conducted by both the public and the private sectors. Potential exposure to indexation basis risks has risen during recent years following the removal of various supervisory and monetary restrictions on uses and sources in different indexation bases, and the greater substitutability between segments.

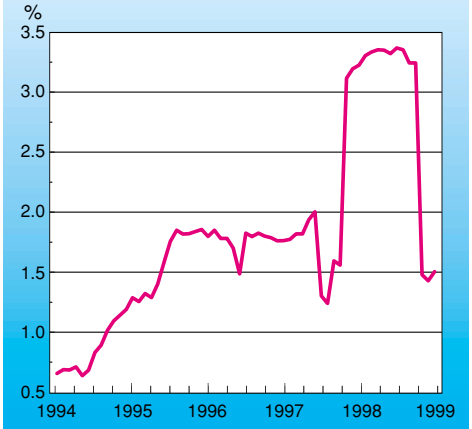
Exposure to indexation basis risks is affected by two factors: the position, i.e., the difference between the value of assets and that of liabilities *plus* the net effect of futures transactions; and the effect of a change in relative prices in the various indexation segments. The analysis of exposure to indexation basis risks presented here focuses on measuring the banks' financial results and the development of their capital in real terms. The analysis focuses 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, on the one hand, and the CPI-indexed segment[19] on the other, i.e., inflation and the real NIS/$ exchange rate.

Price risk, which is used for calculating VaR, remained unchanged in 1999. This obtained despite the stabilization of the inflation and exchange-rate environment, as reflected by a decrease in the standard deviation of the changes in inflation and the exchange rate of the NIS against the dollar during the year (Figures 5.5 and 5.6). As stated, the calculation of VaR is based on the maximum change in price risk as estimated by the 99th percentile of the distribution of the monthly changes in the risk factor during

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

the previous five years. Events occurring during the measurement period therefore have a strong effect on the maximum change in price risk during the year reviewed. As a result, the level of the 99th percentile of the distribution of the changes in the inflation rate and the real exchange rate in 1999 is directly affected by the sharp local-currency depreciation of August and October 1998.

Figure 5.6
Standard Deviation[a] of Monthly Changes in Real NIS/$ Exchange Rate, 1994–99



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

(1) All segments

The total value at basis (inflation and exchange-rate) risk of the five banking groups increased in 1998. The VaR ranged from 0.26 percent of net worth or NIS 4.9 million at the Mizrahi group to 2.74 percent of net worth or NIS 85 million at the Discount group (Table 5.11). The VaR was calculated as the sum of the value subject to inflation risk and the value subject to real exchange-rate risk, on the conservative assumption of the worst case scenario for each of the risk factors while ignoring the correlations between the changes in inflation and in the real exchange rate. The calculation of the total VaR relating to indexation basis risks taking these correlations into account under the covariance matrix method is presented in the appendix.

(2) The unindexed local-currency segment

The total position of the five banking groups in this segment amounted to NIS 1.1 billion and resulted from the development of its on- and off-balance-sheet components (Table 5.10). The difference between assets and liabilities in balance sheet activity in this segment rose from NIS –5.3 billion at the end of 1998 to NIS –18.1 billion at the end of 1999. The increased deficit on balance-sheet activity in the segment (the surplus of liabilities over assets) derived from the following developments in assets and liabilities: (1) On the assets side, demand for unindexed credit grew, as did the banks' deposits at the Bank of Israel, because of the relatively high rate of risk-free interest on them; (2) On the liabilities side, term deposits of the public increased more steeply in comparison with both 1998 and the expansion of credit in 1999. This development resulted from the decline in inflation expectations during the first half of 1999, and from the higher real yield on these deposits than on deposits in the other intermediation segments.

The banks continued in their attempt to reduce the total position in the segment during 1999, by means of off-balance-sheet activity. The NIS 17.0 billion overall effect of the banks' futures transactions did in fact reduce the total position in the segment to NIS –

Table 5.10
Difference Between Assets and Liabilities and the Effect of Derivatives, by Indexation Base, the Five Major Banking Groups, 1997–99

(NIS million, December 1999 prices)

			Foreign currency				
	Un-indexed	CPI-indexed[a]	US dollar	Other currencies	Financial capital	Non-financial items	Total
1997							
Assets *less* liabilities	–7,389	15,813	9,088	458	17,970	13,002	30,972
Effect of derivatives	7,453	1,325	–8,605	–173			
Total position in segment	64	17,138	483	285			
1998							
Assets *less* liabilities	–5,339	12,548	7,366	4,520	19,095	12,871	31,966
Effect of derivatives	10,011	1,251	–8,315	–2,947			
Total position in segment	4,672	13,799	–949	1,573			
1999							
Assets *less* liabilities	–18,093	18,872	13,193	5,324	19,296	14,262	33,558
Effect of derivatives	17,011	1,485	–13,895	–4,601			
Total position in segment	–1,082	20,357	–702	723			

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

1.1 billion (Table 5.11). A considerable proportion of these transactions were swaps,[20] whereby the Bank of Israel sells the banks dollars and undertakes to repurchase them at a fixed price one month later.

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 multiplying the total position by the maximum monthly changes expected in the inflation rate. The value at inflation risk at the end of 1999 ranged from NIS 3.3 million at the Mizrahi group to NIS 13.9 million at the Discount group (Table 5.11). This means that the maximum expected change in inflation (1.6 percentage points) will erode the value of the position deriving from activity in this segment by those amounts.

[20] Foreign-currency swaps are recorded in banks' balance sheets as future foreign-currency liabilities and as future local-currency assets.

Table 5.11
Exposure to Changes in Inflation and the Exchange Rate, the Five Major Banking Groups, December 1998 and December 1999

(NIS million)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Unindexed segment										
Assets *less* liabilities	–2,516	–5,969	–257	–3,716	–825	–3,177	–577	–1,548	–1,164	–3,683
Effect of futures and options	3,709	5,482	914	2,834	3,771	4,002	480	1,758	1,137	2,935
Total position in segment	1,193	–487	657	–882	2,946	825	–97	210	–27	–748
Change in inflation rate[a] (%)	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Value at risk[b]	18.91	7.72	10.42	13.98	46.70	13.08	1.54	3.33	0.43	11.86
Indexed segment[c]										
Assets *less* liabilities	4,396	5,780	2,433	4,814	1,900	3,436	1,922	1,659	1,897	3,183
Effect of futures and options	683	1,262	408	428	–145	204	51	–43	254	–366
Financial capital	–6,653	–6,348	–3,092	–3,106	–5,693	–6,012	–1,766	–1,853	–1,891	–1,977
Total position in segment	–1,574	694	–251	2,136	–3,938	–2,372	207	–237	260	840
Foreign-currency segment[d]										
Assets *less* liabilities	4,773	6,537	916	2,008	4,618	5,753	421	1,742	1,158	2,477
Effect of futures and options	–4,392	–6,744	–1,322	–3,262	–3,626	–4,206	–531	–1,715	–1,391	–2,569
Total position in segment	381	–207	–406	–1,254	992	1,547	–110	27	–233	–92
Change in real exchange rate[e]	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68
Value at risk[b]	21.66	11.77	23.08	71.27	56.38	87.93	6.25	1.53	13.24	5.23
Total value at risk[f]	**40.57**	**19.49**	**33.49**	**85.26**	**103.09**	**101.01**	**7.79**	**4.86**	**13.67**	**17.09**
As percentage of financial capital	**0.61**	**0.31**	**1.08**	**2.74**	**1.81**	**1.68**	**0.44**	**0.26**	**0.72**	**0.86**

[a] 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.
[b] The change (in NIS million) in a bank's situation which would arise from the maximum change in inflation and the exchange rate.
[c] Including the CPI/dollar indexation option.
[d] Including foreign-currency indexation.
[e] 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.
[f] 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.

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

The total position of the five major banking groups in this segment amounted to NIS 1.1 billion in 1999, taking financial capital as a source belonging to this segment, compared with NIS –5.3 billion in 1998 (Table 5.10). The position in the CPI-indexed segment varies between groups in sign and size. The variation results from the different emphases placed on the management of assets and liabilities due to differing assessments of prices and relative risks, as well as to different degrees of risk aversion.

(4) The foreign-currency segment

The total position of the five banking groups in this segment amounted to only NIS 21 million, and derived from a balance-sheet position of NIS 18.51 billion and from a reverse off-balance-sheet position of minus NIS 18.49 billion (Table 5.10). The five major banking groups' surplus of balance-sheet assets over balance-sheet liabilities in the segment rose to NIS 6.6 billion in 1999 (Table 5.10). The growth in the balance-sheet surplus in the segment resulted from the following developments in assets and liabilities: (1) On the assets side, the demand by residents for foreign-currency credit persisted; (2) On the liabilities side, the rise in deposits of the public, of both nonresidents and residents, was smaller than that in credit and deposits from banks.

In a mirror-image of activity in the unindexed segment, the banks' reduced their exposure to exchange-rate risk by means of off-balance-sheet activity. The effect of this was to offset the surplus of balance-sheet assets by NIS 18.49 billion, and reduce the total position in the segment to only NIS 21 million (Table 5.10).

Since risk is measured in real terms, the position in this segment is exposed to changes in the exchange rate of the NIS as well as to changes in inflation or in the real exchange rate. The value at exchange-rate risk ranged from NIS 2 million at the Mizrahi group to NIS 88 million at the Hapoalim group. This means that the maximum expected change in the real NIS/$ exchange rate in the course of a month (5.7 percentage points) would have eroded the group's position in the segment by those amounts (Table 5.11). The different level of exposure of each of the groups to exchange-rate risk, in terms of sign and size, reflects *inter alia* their managements' 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 the supply and composition of the deposits of the public. The risk is created by unexpected withdrawals, which could cause a temporary shortage of liquidity that may compel a bank to sell assets at prices below

market prices. One aspect of the reform and liberalization of the money and capital markets in the past decade has been the considerable reduction of the Bank of Israel's reserve ratio (liquidity for monetary purposes). As a result, the banks have had to manage their liquidity risk (prudent liquidity management) in a dynamic manner.

A bank has access to two tools (markets) for solving temporary liquidity problems. One such tool is the inter-bank liquidity market, in which a bank with a surplus of liquid assets over liquid liabilities sells assets to a bank in the opposite situation. The other tool consists of monetary loans from the central bank which are used for reducing exposure to liquidity risk.

The banks' term deposits at the Bank of Israel served as a major instrument in the management of current liquidity during 1999, as they had in 1998. The relatively high interest rate offered by the Bank of Israel led to the faster rise in the supply of unindexed deposits than in the demand for unindexed local-currency credit. This development led to liquidity surpluses at the banks, which they deposited with the Bank of Israel at a risk-free rate of interest. The average nominal interest rate on the banks' deposits at the Bank of Israel reached 10.8 percent in 1999. The commercial banks' total balance of these deposits rose from NIS 45.4 billion in December 1998 to NIS 53.9 billion in December 1999, an increase of 18.7 percent compared with the 10 percent rise in 1998.

As with non-financial firms, one way of measuring the banks' level of business liquidity risk is to examine the ratio between their current assets and current liabilities. When a bank's stock of liquid assets exceeds its stock of liquid liabilities the probability that it will encounter liquidity difficulties is low. The ratio of the large banks' total current assets to total current liabilities amounted to 2.1 at the end of 1999, compared with 2.0 at the end of 1998. This ratio ranged from 1.6 at Bank Leumi to 3.1 at First International Bank. A ratio greater than one indicates a low level of exposure to liquidity risk, implying a very high probability that the bank will be able to meet its liabilities in the short term.

The demand for foreign-currency credit continued to expand and in December 1999 the commercial banks' total balance of this credit was $ 3.5 billion or 15 percent higher than in December 1998. As in 1998, the growth in foreign-currency credit in 1999 was financed in its entirety by a rise in residents' and nonresidents' deposits in foreign currency ($ 4.0 billion). This was in contrast to 1996 and 1997, when a large proportion of foreign-currency credit was financed by a reduction in the banks' deposits at banks abroad.

Foreign currency cash and deposits at the five banking groups rose by $ 0.7 billion in 1999. In other words, the bank's business liquidity in the area of foreign-currency activity increased, parallel to the development of the unindexed local-currency segment.

5. CAPITAL ADEQUACY

The capital held by a bank serves as a cushion against losses that could occur if the risks to which it is exposed materialized. Accordingly, the supplementary analysis of banking risks presented in this chapter (interest-rate, market and liquidity risks) is an analysis of

the development of the banks' capital and capital ratios. This is because the level of risk at a bank rises if its risk exposure increases without an appropriate increase in its capital. In practice, the bank's management determines both the limitations on the exposure to the different forms of risk and the amount of capital that must be held against such exposure. This is within the framework of the banks' risk management policy, and is subject to the Supervisor of Banks' regulations with respect to the minimum capital ratio.[21]

The Supervisor of Banks, who is responsible for maintaining the stability of the banking system, requires the banks to hold a suitable minimum of capital (relative to their total risk-weighted assets). The capital requirement for banks in Israel was 8 percent until March 1999, in accordance with the recommendations of the International Committee on Banking—the Basle Committee. In March 1999 the Supervisor of Banks raised the minimum required capital ratio to 9 percent. In June 1999 the Basle Committee approved a proposal to issue new regulations on capital adequacy and intends to publish the final version during the year 2000 (see Box 5.1 for details of this and the subjects discussed by the Basle Committee).

The formal capital requirement in Israel is currently based on credit risk alone, and does not take into account other risks, such as market risks, operational risks and legal risks. Note in this respect that the Basle Committee's recommendations of January 1996 concerning holding additional capital against exposure to market risks will be applied in Israel in 2000. Under the Supervisor of Banks' regulations, the banks will also be required to include the element of exposure to market risks in the calculation of the ratio of capital to risk-weighted assets, with effect from the third quarter of 2000. The ratio of capital to risk-weighted assets of the five banking groups rose from 9.2 percent at the end of 1998 to 9.4 percent at the end of 1999 (Table 5.12). An increase in the ratio was recorded at the Leumi, Discount and Hapoalim groups due *inter alia* to the Supervisor of Banks' regulations raising the minimum required capital ratio to 9 percent.

The increase in the ratio of capital to risk-weighted assets resulted from opposing changes in its components. The ratio of Tier 1 capital, which comprises the more stable part of the banks' capital, fell from 7.4 percent in 1998 to 7.1 percent in 1999, following a 1.5 percentage-point decline in 1998. The decrease in the ratio of Tier 1 capital was offset by a 0.6 percentage-point increase in the ratio of Tier 2 capital, which is less stable than Tier 2 capital. At the end of 1999, the ratio of capital to risk-weighted assets ranged from 9.06 percent at the Hapoalim group to 10.2 percent at the First International group (Figure 5.7).

The ratio of capital to risk-weighted assets in a sample of banks abroad was higher in absolute terms than the major banks in Israel, and averaged 11.2 percent (Table 3.2). This suggests that banks abroad have a more conservative risk-management policy, which may be partly dictated by the supervisory authorities. Although the ratio of Tier 2 capital at banks abroad is higher than that of banks in Israel, it has been declining for several years.

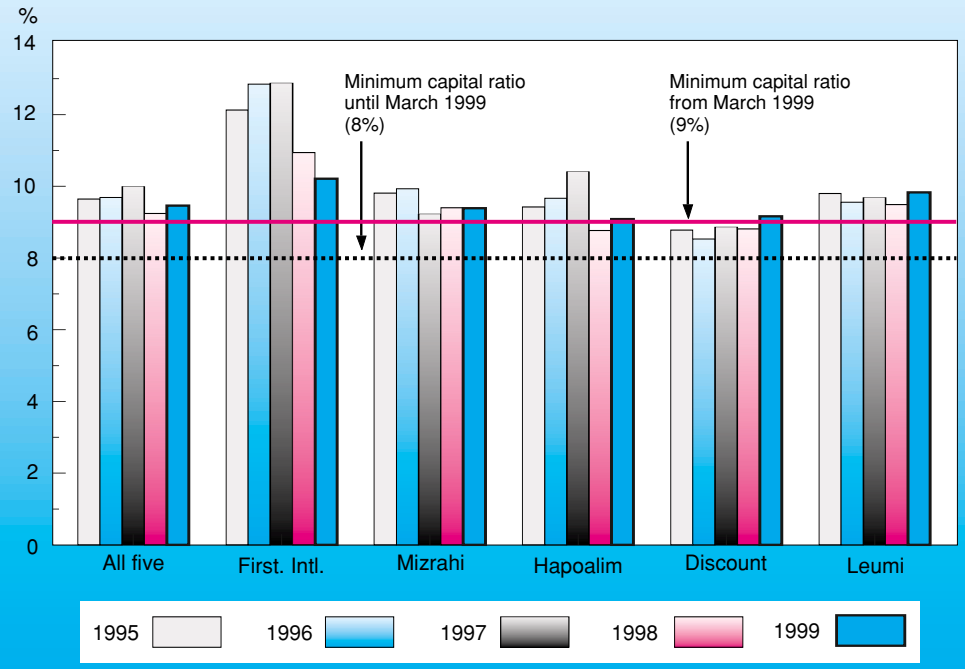
[21] The minimum ratio of total capital to total risk-weighted assets.

Table 5.12
Capital Ratio of the Five Major Banking Groups, 1998–99

	Leumi		Discount		Hapoalim		Mizrahi		First International		Total	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
NIS million, December 1999 prices												
Capital[a]	10,399	11,004	5,276	5,584	10,982	11,417	2,592	2,697	2,717	2,856	31,966	33,558
Tier 1 capital[b]	10,400	10,960	5,347	5,695	11,043	11,492	2,556	2,674	2,716	2,860	32,062	33,681
Tier 2 capital[b]	1,697	2,924	1,280	1,918	2,070	3,215	1,151	1,438	1,155	1,305	7,353	10,800
Investment in shares and subordinated notes of companies included on an equity basis	–63	–68	–848	–873	–102	–102	–72	–79	–20	–15	–1,015	–1,137
Total capital for risk-weighted capital ratio calculation	12,034	13,816	5,779	6,740	13,011	14,605	3,635	4,033	3,851	4,150	38,310	43,344
NIS billion, December 1999 prices												
Total balance sheet	177.4	199.4	100.2	110.5	190.3	206.7	52.5	61.8	51.6	60.1	571.9	638.6
Balance of off-balance-sheet instruments (nominal value)	110.7	128.3	56.8	59.4	126.4	154.2	42.2	59.9	65.0	89.7	401.1	491.6
Weighted balance-sheet balances of credit risk	105.4	121.6	56.1	63.4	122.4	134.5	30.3	34.0	29.4	33.9	343.6	387.3
Weighted off-balance-sheet balances of credit risk	21.8	19.4	9.6	10.4	26.5	26.8	8.5	9.1	5.9	6.9	72.3	72.5
Total weighted items	127.2	141.0	65.7	73.7	148.9	161.2	38.8	43.1	35.3	40.8	415.9	459.9
Percent												
Capital/balance-sheet ratio	5.86	5.52	5.27	5.05	5.77	5.52	4.94	4.36	5.27	4.75	5.59	5.25
Tier 1 risk-weighted capital ratio	8.13	7.72	6.85	6.54	7.35	7.06	6.40	6.02	7.64	6.98	7.44	7.08
Tier 2 risk-weighted capital ratio	1.33	2.07	1.95	2.60	1.39	1.99	2.97	3.34	3.27	3.20	1.77	2.35
Total risk-weighted capital ratio	9.46	9.80	8.79	9.14	8.74	9.06	9.37	9.36	10.91	10.18	9.21	9.43

[a] Equity and minority interests, according to groups' balance sheets.
[b] In accordance with the minimum risk-weighted capital ratio requirement.
SOURCE: Published financial statements.

Figure 5.7
Risk-Weighted Capital Ratio, by Banking Group, 1995–99



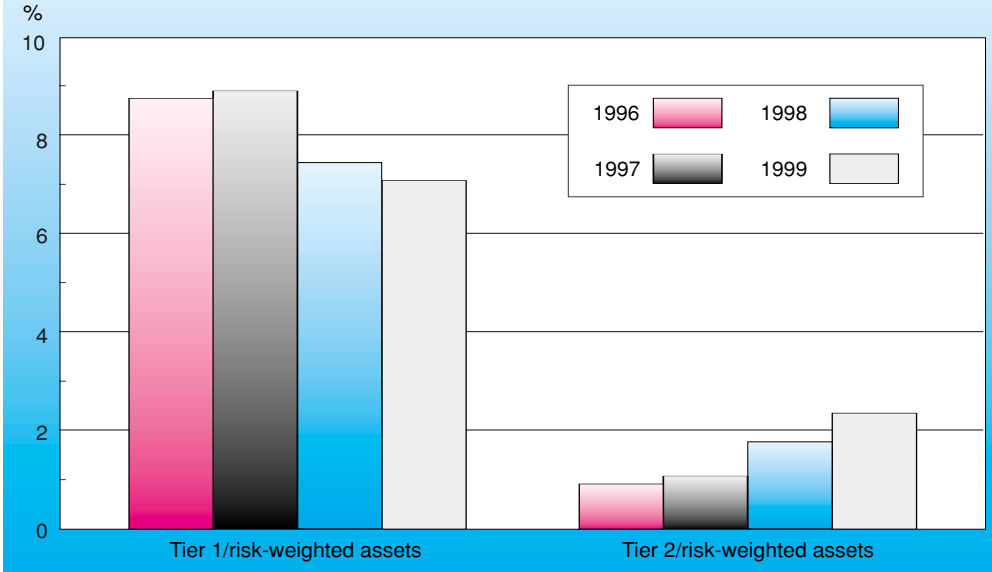
SOURCE: Published financial statements.

Since the capital ratio is obtained by dividing total capital by total risk-weighted assets, the development of the ratio is a function of the development of these two elements. Total capital for the purpose of calculating the ratio of capital to risk-weighted assets includes Tier 1 capital and Tier 2 capital *less* investment in companies included on an equity basis. The total capital for the purpose of calculating the capital ratio of the five banking groups increased by NIS 5.0 billion or 13.1 percent during 1999 and totaled NIS 43.3 billion (Table 5.12). The rise derived mainly from a notable NIS 3.4 billion or 47 percent rise in the five banking groups' Tier 2 capital. This followed increases of 104 percent in 1998 and 30 percent in this capital in 1997.

The ratio of Tier 2 capital has grown in recent years at the expense of the ratio of Tier 1 capital, and at the small banks the proportion of subordinated notes to total Tier 1 capital is close to reaching the Supervisor of Banks' upper limit of 50 percent[22] (Figure 5.8). The increased proportion of Tier 2 capital resulted from the decision of the banks' managements to improve their capital adequacy by raising subordinated notes.

[22] The closer a bank comes to the Supervisor of Banks' restriction that prohibits subordinated notes from exceeding 50 percent of total Tier 1 capital, the fewer are its opportunities of using this capital instrument at a time of financial distress.

Figure 5.8
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 1996–99



SOURCE: Published financial statements.

Tier 2 capital expanded at all of the banking groups in 1999, and especially at the Leumi and Hapoalim groups. This resulted *inter alia* from the privatization of the banks during recent years, which led to an increase in dividend distributions. All the banking groups except the Discount group distributed dividends in 1999, and these dividends totaled NIS 2.0 billion (this was in addition to the total dividend of NIS 1.5 billion distributed in 1998). The transfer of the banks' ownership to private hands, the owners' willingness to repay loans that were taken in order to finance the acquisition, and the government's resolutions on the subject led to a rise in the rate of dividend that was distributed. In the Western world however, dividend policy is usually stable and determined in advance, and dividend distribution rates there derive mainly from the extent of a bank's growth, stability, and profitability.

The Tier 1 capital of the five major banking groups, including equity and minority rights, grew by NIS 1.6 billion in 1999 (Table 5.12). The total net profit of the five large groups for 1999 contributed NIS 3.5 billion to the growth in capital, while the distribution of dividends totaling NIS 2.0 billion served to reduce Tier 1 capital.

The total risk-weighted assets of the five major banking groups increased by 10.6 percent during 1999 and totaled NIS 460 billion (Table 5.12). This increase reflects the growth in the banks' financial intermediation activity, and is largely the result of a rise in balance-sheet credit risk.

Box 5.1
Proposal for a New Capital Adequacy Framework

The Basle Committee circulated a draft framework for new regulations concerning capital adequacy in June 1999, and intends to publish the final version during 2000. The new regulations are meant to replace the committee's regulations of 1988. The new draft regulations also relate to risks other than credit risks, and take into account financial innovation, especially complex financial instruments. The regulations essentially require capital adequacy to be based on a standard model, although they welcome the internal models that have been built by banks with complex and/or global activity.

The proposed new regulations place great importance on supervision of the banks, particularly where internal models are concerned, and also note the importance of applying the regulations on a consolidated basis. However, banking supervisors should ensure that all the components of a banking group are stable and adhere to the capital adequacy conditions prescribed for a single bank.

The draft framework for the new regulations contain three main elements: minimum capital requirements, supervision of capital adequacy, and the effective use of market discipline.

Capital requirements

The existing regulations attribute a lower risk weighting to loans extended to governments and central banks of OECD member countries than to those of non-member countries. The same applies to corporations. The disadvantage of this approach is that 'high-risk' countries belonging to the OECD are given a low risk weighting, while countries with a high quality of credit that are not in the OECD receive a high risk rating. The new draft regulations present a different approach for estimating credit risks that could serve as a standard approach for calculating capital requirements at most banks. Under this approach, the use of external credit assessments (by credit rating companies, for example) could provide additional assessment tools for estimating credit risks. The Basle Committee has suggested that the use of these forms of assessment should be permitted for determining the risk category for the banks' different assets. The committee expressed the opinion that a number of factors should be taken into account before permitting the use of external assessors of credit risk as a basis for determining minimum capital requirements. Supervisors will have to ensure that these assessors adhere to minimum standards, including transparency, objectivity, independence, reliability and documentation for monitoring purposes.

The Basle Committee's proposed weightings for loans to governments and to corporations and for deposits at the banks are presented in the following table:

Weighting According to Basle Committee Proposal, June 1999

(percent)

	AAA to AA–	A+ to A–	BBB+ to BBB–	BB+ to B–	Below B–	Not rated
Entity taking credit or receiving deposit						
Country	0	20	50	100	150	100
Bank						
Option 1	20	50	100	100	150	100
Option 2	20	50	50	100	150	50
Corporation	20	100	100	100	150	100

Supervision of capital adequacy

The purpose of supervising a bank's capital is to ensure that the level of capital matches the bank's general risk profile, and permit timely supervisory intervention when capital does not provide an adequate cushion for risk absorption. This approach is called Prompt Corrective Action. The four fundamental and complementary principles at the basis of the supervisory process are as follows: (1) The supervisory authority expects the banks to operate at a capital ratio that is higher than the minimum required level, and is entitled to demand this of them; (2) A bank must structure its capital adequacy relative to its risk profile, and adopt a strategy of maintaining the level of capital over time; (3) Supervisors must examine the assessment of a bank's internal capital adequacy, its strategy for determining the required level of capital, and its adherence to the capital ratio; (4) Supervisors must intervene early in order to prevent capital falling below the minimum levels.

Market discipline

'Market discipline' can serve as a means for imposing capital regulations and other supervisory measures in order to increase the security and stability of the banks in particular and the financial system in general. Market discipline encourages the banks to operate efficiently and cautiously, and also motivates them to hold a suitable capital base as a precautionary measure against future losses that may arise from risk exposure. Supervisors have an interest in

promoting effective market discipline as a lever for enhancing the stability of the banking system. According to the Basle Committee's position, a bank that operates cautiously conducts transactions at better terms in all matters relating to investors, borrowers, depositors and other interested parties in the bank. But a bank that operates in a risk-exposed environment has to a pay a high risk premium on its transactions and/or supply guarantees and additional collateral. Market pressure will encourage a bank to allocate its sources more efficiently and to disperse its risks.

APPENDIX 5.1
Calculation of Market Risk VaR by the Covariance Matrix Method

There are three main methods for calculating Value at Risk: (1) Historical simulation; (2) A covariance matrix; (3) Monte Carlo simulation. In this appendix, VaR is calculated via a covariance matrix, so that 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 main assumptions: (1) The distributions of the changes in all the risk factors are normal, and that their average change tends to zero (the shorter the planning period, the less valid is this assumption); (2) The effect 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 the method derive from the above 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 level of significance 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 5.9 and 5.11), 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 1995 and 1999.

As stated, the calculation of the VaR by this method takes 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 those 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 matrix of changes in the risk factors (S), according to the following equation:

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

Table A.5.1
Matrix of Covariance and Correlation Coefficients[a] of Changes in Five Risk Factors, January 1995–December 1999

(percent)

	Purchasing power	Exchange rate	Nominal interest	Real interest	Dollar interest
Purchasing power[b]	0.378 (1)				
Exchange rate[c]	–0.772 (–0.596)	4.443 (1)			
Nominal interest[d]	–0.143 (–0.327)	0.039 (0.026)	0.506 (1)		
Real interest[e]	0.053 (0.301)	–0.254 (–0.419)	0.060 (0.293)	0.083 (1)	
Dollar interest[f]	0.007 (0.085)	–0.038 (–0.134)	0.019 (0.197)	0.006 (0.161)	0.018 (1)

[a] The correlation coefficients are in parentheses.
[b] The inverse of changes in the CPI.
[c] Monthly changes in the NIS/$ exchange rate. In order to estimate the VaR in the foreign currency segment we used two risk factors, purchasing power and the exchange rate, thereby expressing the correlation between them. On the other hand, in the body of the chapter (Tables 5.9 and 5.10) this estimate was made on the basis of changes in the real exchange rate.
[d] Monthly changes (percentage points) in the yield to maturity of Treasury bills with two months to maturity.
[e] Monthly changes (percentage points) in the yield to maturity on CPI-indexed bonds with five years to maturity.
[f] Daily changes (percentage points) in the yield to maturity on dollar-indexed bonds with three months to maturity.

Table A.5.2
VaR Related to Market Risk, the Five Major Banking Groups,[a] December 1999

(NIS million)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.
Indexation-base risk					
In unindexed segment	7.8	15.5	33.4	3.5	10.8
In foreign-currency segment	99.4	113.6	30.0	4.9	17.0
Effect of correlations[b]	–10.3	–20.0	–11.2	–1.4	–11.2
Total indexation-base risk 1999	96.9	109.1	52.2	7.0	16.6
Total indexation-base risk 1998	76.7	83.3	8.3	11.7	22.9
Interest-rate risk					
In unindexed segment	72.7	8.3	64.2	12.8	3.4
In CPI-indexed segment	220.2	190.4	47.0	34.6	114.4
In foreign-currency segment	5.6	3.4	13.1	1.2	6.8
Effect of correlations[c]	–48.2	–9.7	–36.4	–8.6	–10.1
Total interest-rate risk 1999	250.3	192.4	88.0	40.0	114.5
Total interest-rate risk 1998	297.9	90.5	87.9	38.9	87.0
Total market risk					
Effect of correlations[d]	–113.1	–117.5	–41.7	–8.7	–18.8
Total VaR to market risk 1999	234.0	184.0	98.5	38.3	112.3
Total VaR to market risk 1998[e]	272.3	92.5	89.7	35.1	80.3

[a] Values at indexation-base risk are calculated using the position of the banking corporation, so that they can be added to data on interest-rate risk. Hence, they cannot be compared with figures of indexation-base risk given in the chapter, as the latter are based on consolidated positions.

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

[c] The effect of the correlation between changes in the various interest rates on the VaR related to interest-rate risk.

[d] The effect of the correlation between purchasing power, the exchange rate, and interest rates on total VaR related to market risk.

[e] In accordance with the regulations regarding published financial statements, in 1999 the banks began to include in their financial reports the value of options in terms of the underlying asset (including comparisons to 1998), in addition to the face value of the options. This enables a more precise calcuation (taking delta derivatives of options into account) of market risk *VaR*, and so these were recalculated for 1998. The *VaR* values obtained by some of the banks are different from those reported in last year's edition of this publication, which were calculated on the basis of the face value of options and hence were less accurate.

The above table points to two main findings. The first is that the given values for each specific risk do not differ appreciably from those presented in the main body of this chapter. The calculation of the VaR via the covariance matrix also indicated a rise in market risks, including both interest-rate risks and indexation basis risks, in the course of the year reviewed. This means that the calculation method does not have a significant effect on the estimation of risks. The second finding is that the correlations between the changes in the risk factors have a substantial effect on the total VaR, with respect to each risk group (indexation bases and interest rates) and to total market risks.