Chapter 4
Risk and Capital Adequacy

In the course of their activity, banks are exposed to a wide variety of financial and other risks. The financial risks include credit risk, market risks (interest, inflation, exchange rates, and share prices), and liquidity risk. The other risks include operational risk, legal risk, and image risk. This chapter focuses on financial risks and analyzes changes in the adequacy of the capital that banks use to cushion losses that they may incur if these risks become real.[1]

1. CREDIT RISK

Credit risk is the main financial risk that a bank faces in its activity. This section analyzes credit-risk exposure on the basis of the three main criteria in the literature: credit quality, amount of credit, and concentration of credit or diversification of the credit portfolio in various respects (industries and borrowers).[2]

a. Quality of the credit portfolio

(i) Accepted indicators of credit-portfolio quality

The relatively gentle recovery of economic activity was not yet reflected significantly in the indicators of **credit-portfolio quality.** These indicators express the probability of

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

[2] There is no accepted and perfect approach to the measurement of credit risk, unlike the measurement of market risks, even though this is the main risk that the banks face. Advanced models for measurement of credit risks have been developed in recent years but have not yet been widely applied. (See Box 4.2 in the 1998 Survey.) The Basel Committee, in its new directives concerning capital adequacy (2004), stresses the importance of developing advanced models for the measurement of credit risk. (See expanded discussion in the analysis of capital adequacy in this chapter.)

Table 4.1
Indices of Credit Portfolio Quality, the Five Major Banking Groups, 2001–2003

(percent)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Ratio of risk-weighted[a] assets to total assets						
2001	69.2	58.0	72.7	63.1	63.1	67.3
2002	70.1	57.1	71.5	65.3	65.6	67.5
2003	68.5	58.0	71.1	64.5	65.4	66.9
Share of problem loans in total credit at group's responsibility						
2001	10.0	10.9	8.4	7.6	6.6	9.0
2002	9.8	12.4	10.4	7.5	9.1	10.1
2003	9.8	11.7	11.3	7.7	12.3	10.5
Share of annual loan-loss provision in total credit						
2001	0.93	1.33	0.68	0.53	0.91	0.85
2002	1.11	1.21	1.70	0.52	1.76	1.32
2003	1.11	1.11	1.27	0.50	1.34	1.12
Ratio of balance of loan-loss provision to problem loans *plus* balance of loan-loss provision						
2001	25.4	33.3	28.5	27.9	24.2	28.0
2002	28.8	33.0	30.2	29.7	28.8	30.1
2003	31.7	36.6	33.3	31.9	25.6	32.6
Share of non-performing loans in total credit at group's responsibility						
2000	1.4	3.8	1.3	0.9	1.4	1.7
2001	2.3	3.9	2.1	1.7	2.9	2.5
2002	2.3	3.8	2.9	1.4	2.5	2.6

[a] Total risk-weighted assets calculated in accordance with the Supervisor of Banks' directives regarding the minimum capital ratio; these assets include balance-sheet credit and the credit-risk equivalent of off-balance-sheet items.
[b] Including minority shareholders.
SOURCE: Published financial statements.

default by a borrower or a group of borrowers on some liabilities (principal plus interest) to banks. Although most indicators of credit-portfolio quality improved slightly in 2003 relative to 2002 (apart from indicators related to problem loans), they remained much higher than their late 1990s levels.

The share of nonperforming credit in total credit for which the banking group is responsible—a parameter that correlates positively to the probability of a future increase in loan-loss provision—was 2.6 percent, approximating the 2002 level (Table 4.1) and 1 percentage point over the 1998–2000 average (Table 1-3). The trend in 2003 was uneven among the banking groups; the Hapoalim group reported a steep NIS 1.2 billion increase in nonperforming credit and a sharp upturn in the ratio of nonperforming credit in total credit to the public (Tables 4.1 and 4.2). The proportion of problem loans in total lending for which the group was responsible climbed to 10.5 percent at the end of 2003 as against

Table 4.2
Distribution of Problem Loans, the Five Major Banking Groups, 2001–2003

	Year	Leumi	Hapoalim	Discount	Mizrahi	First Intl.	Total
Non-performing	2001	2,416	2,386	2,805	527	711	8,845
	2002	3,999	4,041	2,925	989	1,387	13,341
	2003	3,845	5,290	2,872	807	1,119	13,933
Rescheduled	2001	560	1,642	417	153	61	2,834
	2002	831	1,376	539	101	31	2,878
	2003	525	1,857	556	111	173	3,222
Due to be rescheduled	2001	88	797	3	63	20	970
	2002	74	1,040	80	24	296	1,514
	2003	81	935	39	21	399	1,475
In temporary arrears	2001	1,518	2,267	500	1,211	367	5,863
	2002	1,306	3,190	714	1,281	837	7,328
	2003	931	2,923	644	1,281	1,416	7,195
Under special supervision	2001	12,035	8,304	4,333	2,483	2,150	29,305
	2002	10,655	9,931	4,932	2,065	1,859	29,442
	2003	11,120	9,760	4,850	2,329	2,513	30,572
Total balance-sheet credit to problem borrowers	2001	16,617	15,397	8,058	4,437	3,308	47,817
	2002	16,865	19,578	9,190	4,460	4,410	54,503
	2003	16,502	20,765	8,961	4,549	5,620	56,397

SOURCE: Published financial statements.

10.1 percent, 9 percent, and 7 percent in 2002, 2001, and 2000, respectively (Table 1.3). Two groups, Hapoalim and First International, account for most of the increase in problem loans and their share in total lending to the public (Tables 4.1 and 4.2).

The components of the problem-loan parameter behaved unevenly during the year, both in the system at large and at individual banks. Nonperforming debts, rescheduled debts, and debts under special supervision increased. Debts due to be rescheduled and debts in temporary arrears decreased slightly (Table 4.2). The share of annual loan-loss provision expenditure in outstanding credit to the public at the five large banking groups fell from 1.32 percent in 2002 to 1.12 percent in 2003 but remained much higher than the late-1990s level (0.54 percent on average in 1998–2000) (Tables 4.1 and 1.3). The slight decrease in the rate of loan-loss provision in 2003 is a reflection of the record NIS 7.2 billion loan-loss provision in 2002, which fell to NIS 6 billion in 2003 and is partly related to the slight improvement in economic activity. The Hapoalim group accounted for most of the decrease in loan-loss provision (NIS 680 million less than in 2002). The high share of loan-loss provision in outstanding credit to the public in the past three years reflects the poor quality of the credit portfolio during this time due to the recession (Figure 1.7).

Even though the current loan-loss provision was relatively large in 2003, the share of the five large banking groups' outstanding loan-loss provision in problem loans (*plus* the outstanding loan-loss provision)[3] increased by only 2.5 percentage points and came to 32.6 percent in 2003, due to the increase of credit classified as problematic (Tables 4.1 and 4.2).

The ratio of total risk components (risk-weighted assets) to total components (before weighting), reflecting the extent of risk in the portfolio of assets, dipped from 67.5 in 2002 to 66.9 in 2003 but remained higher than the 1998–2000 average (63.7) (Tables 4.1 and 1.3). The credit/GDP ratio,[4] which reflects the repayment ability of borrowers at large (the higher the ratio is, the poorer the quality of credit), declined for the first time in about a decade (after steady increases) at the five large banking groups and came to 1.08 in 2003 as against a peak of 1.11 in 2002 (Figure 1.4). However, the credit/product ratio[5] in construction and real estate (an industry that is a main source of credit risk to the banking system) remained at the 2002 level and came to 4.54.[6]

The behavior of the foregoing indicators shows that the quality of the banks' credit portfolio remained poor even amidst the first indications of economic recovery. Furthermore, the banking system, even in 2003, still had a high potential of future materialization of credit risks and recording of losses.

(ii) Credit-portfolio quality by industries and the household sector[7]

Despite initial signs of economic recovery, the repayment ability of borrowers in principal industries, especially those to which the banking system is particularly exposed—manufacturing, communications and computer services, construction and real estate, and hotels and catering—did not improve significantly.

This trend was reflected both in an increase in the classification of credit to these industries (apart from communication and computer services) as problematic and in a increase in the ratio of these types of problem loans to total lending to the industry. The ratio of loan-loss provision to total credit to the public did decline in most industries but

[3] This ratio measures the bank's estimate of the credit losses that it faces (as manifested in the past and present earnings statement) relative to the extent of the credit portfolio that it classifies as problematic. A high ratio reflects a lower potential of an additional future loss estimate from the bank's problem-loan portfolio. Thus, the higher the ratio, the lower the credit risk.

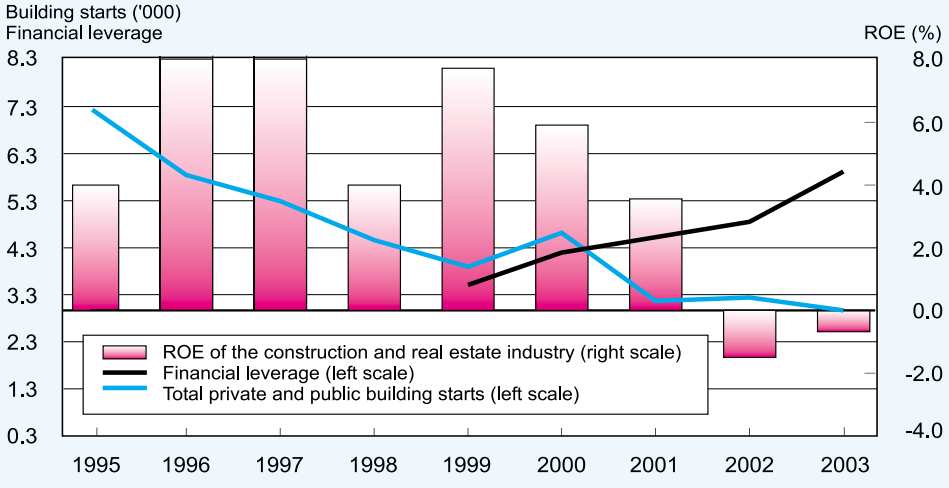
[4] Balance-sheet credit only.

[5] Including off-balance-sheet credit.

[6] The credit/product ratio is higher in construction and real estate than in other industries because the credit data and the product data do not fully correspond in this industry. For example, lending for the acquisition of an industrial or commercial building (built in the past) for the purpose of leasing it to a third party is expressed meaningfully in the data on construction and real-estate credit at the time of acquisition at the full value of the credit taken but is not reflected in a significant change in the data on industry product. Consequently, the parameter of importance in regard to the construction and real-estate credit/product ratio is long-term change and not its absolute level.

[7] The analysis of industry activity indicators is based on data from the Central Bureau of Statistics and the Bank of Israel Research Department, processed by the Research Unit of the Banking Supervision Department of the Bank of Israel.

Figure 4.1
Number of (Private and Public) Building Starts, Financial Leverage,[a] and the Return on Equity (ROE) in the Construction and Real Estate Industry, 1995-2003



[a] The ratio of total foreign capital to equity at the end of the period.

SOURCE: The DUCAS data base of financial statements, the Ministry of Construction and Housing and the Tel Aviv Stock Exchange.

remained much higher than the late-1990s level. The decrease in the ratio is the result of a decline in loan-loss provision in 2003 after record provisions in each of these industries in 2002. Furthermore, the credit/product ratio fell in these industries in 2003 (Table 4.4) due to the decrease in credit to the public and an improvement in these industries' product relative to 2002. The ratios do remain high, however, indicating that these industries are very risky borrowers.

Construction and real estate, which took 16 percent of total credit issued by the banking system, remained in a slump for the sixth consecutive year. Construction product alone (76 percent of the combined product of construction and real estate) contracted by 4 percent in 2003 and its share in business-sector product slipped to a paltry 8 percent. Construction output fell by 5 percent.[8]

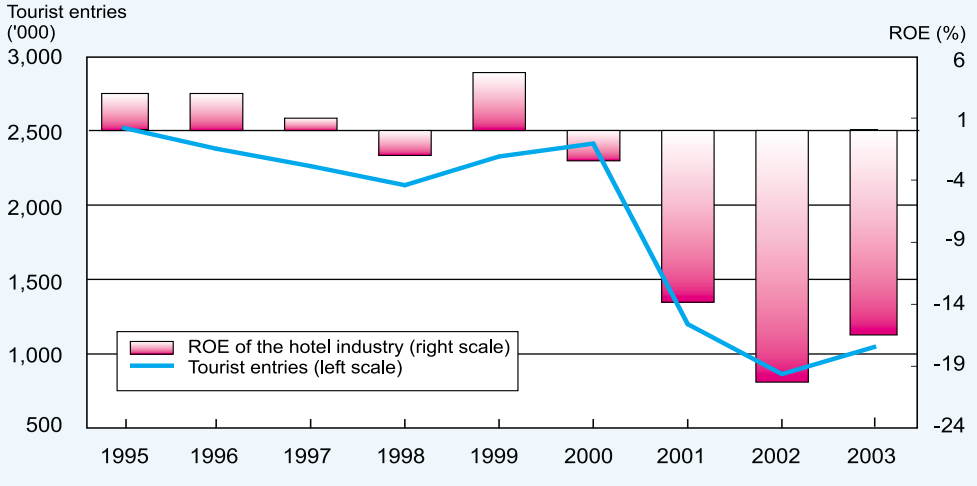
The decline in industry output traced to a combination of less homebuilding (-4 percent), less nonresidential building (-9.4 percent), and a perceptible increase in defense

[8] According to the National Accounts definitions, construction output is equal to construction investment and is calculated by multiplying the average price per square meter by building area built during that period. Construction product is derived from the production of the industry less intermediate purchases, which are estimated by means of input-output tables. Construction output is the newer and more accepted indicator for analysis of construction activity.

construction (+38 percent), mainly due to construction of the separation fence.[9] Residential starts decreased even more steeply (Figure 4.1). The doldrums of the industry were also reflected in the business results of public building companies; 106 companies recorded an industry-level loss of NIS 80 million in 2003 and only forty-five companies reported earnings. The return on equity of public companies in the industry was -1 percent. Average financial leveraging of the industry has been trending up for several years and attained relatively high levels in 2003 (also in comparison with other industries—Figure 4.1). The uptrend in industry risk was also reflected in the large number of construction companies that were placed in receivership. The data show that the construction and real-estate industry is a relatively risky borrower, as evidenced in an increase from 11.9 percent in 2002 to 13 percent in 2003 in the share of problem loans in total lending to the industry (Table 4.3). The credit/product ratio of construction and real estate was stable at the 2002 level at 4.54 (Table 4.4). The ratio of loan-loss provision to total credit in the industry stood at 0.95 percent, similar to the 2002 level, even though loan-loss provisions throughout the system declined by NIS 1.2 billion in 2003 (Table 4.3).

The **hotels and catering** industry has been severely battered in recent years, mainly by security events in Israel and abroad. Return on equity was –16 percent in 2003 (Figure 4.2). Developments in this industry had an adverse effect not only on firms active in it but also, indirectly, on related industries such as haulage, business services, and trade. The slump in hotels and catering bottomed out in the first quarter of 2003, amidst a

Figure 4.2
Annual Tourist Entries into Israel and the ROE of the Hotel Industry, 1995-2003



SOURCE: The DUCAS data base of financial statements, the Ministry of Construction and Housing and the Tel Aviv Stock Exchange.

[9] Source: *Bank of Israel Annual Report*, 2003.

Table 4.3
Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2002–2003

(NIS million, at December 2003 prices)

	Balance of credit to public[a]		Change in balance of credit	Distribution of credit balances[a] *(percent)*		Problem loans: Balance		Problem loans: Share in total credit *(percent)*		Annual specific loan-loss provision		Loan-loss provision/ total credit *(percent)*	
	2002	2003	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Agriculture	5,981	5,546	–435	0.7	0.7	1,190	958	19.9	17.3	51	64	0.85	1.15
Manufacturing	107,791	102,728	–5,063	13.5	13.0	10,191	10,758	9.5	10.5	1,452	1,312	1.35	1.28
Construction and real estate[b]	133,406	128,547	–4,859	16.7	16.3	15,920	16,686	11.9	13.0	1,252	1,226	0.94	0.95
Water and electricity	9,164	7,741	–1,423	1.1	1.0	136	104	1.5	1.3	6	8	0.07	0.10
Commerce	55,150	53,084	–2,066	6.9	6.7	3,957	4,007	7.2	7.5	379	514	0.69	0.97
Hotels and catering	14,875	14,363	–512	1.9	1.8	5,575	5,669	37.5	39.5	485	429	3.26	2.99
Transport and storage	18,812	17,205	–1,607	2.4	2.2	398	521	2.1	3.0	81	37	0.43	0.22
Communications and computer services	33,008	27,675	–5,333	4.1	3.5	7,412	5,185	22.5	18.7	1,661	507	5.03	1.83
Financial services	60,934	56,336	–4,598	7.6	7.1	3,202	3,673	5.3	6.5	350	314	0.57	0.56
Other business services	21,621	24,935	3,314	2.7	3.2	1,362	1,464	6.3	5.9	161	206	0.74	0.83
Public and community services	21,372	21,394	22	2.7	2.7	1,646	1,760	7.7	8.2	66	149	0.31	0.70
Individuals	199,486	207,094	7,608	25.0	26.2	7,301	8,016	3.7	3.9	584	827	0.29	0.40
Of which: housing loans	93,549	94,119	570	11.7	11.9	3,162	3.836	3.4	4.1	238	323	0.25	0.34
other loans	105,937	112,975	7,038	13.3	14.3	4,139	4,180	3.9	3.7	346	504	0.33	0.45
Borrowers abroad	117,912	122,402	4,490	14.7	15.5	2,376	2,595	2.0	2.1	501	310	0.42	0.25
Total	**799,512**	**789,050**	**–10,462**	**100**	**100**	**60,666**	**61,396**	**7.6**	**7.78**	**7,029**	**5,903**	**0.88**	**0.75**
Municipalities	**10,071**	**10,521**	**450**	**1.26**	**1.33**	**402**	**438**	**4.0**	**4.2**	**0**	**1**	**0.00**	**0.01**

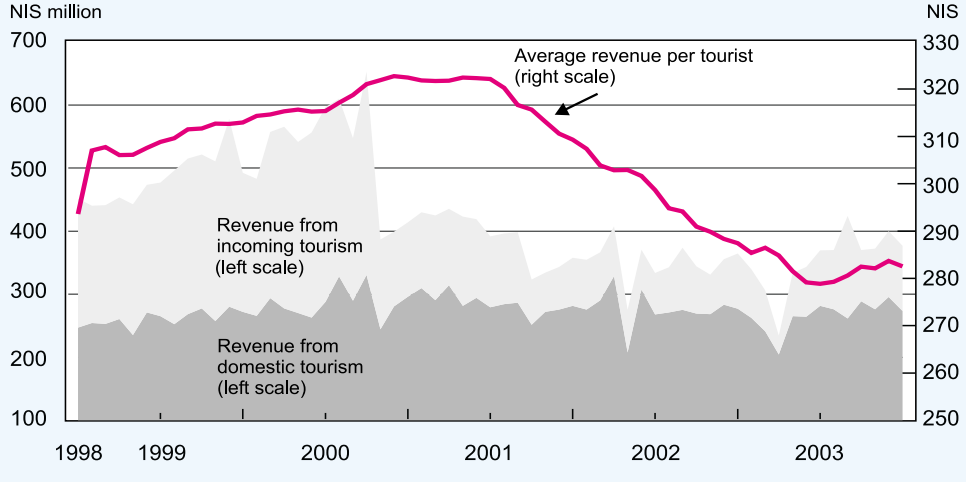
[a] Including credit to the public and the public's investment in bonds, and off-balance-sheet items.
[b] Data on this industry are not calculated in accordance with the industry concentration limitation.
SOURCE: Published financial statements.

deterioration in domestic security and the military campaign in Iraq. Tourism recovered somewhat after the declaration of the end of the war in Iraq, as reflected in an increase in inbound tourism and return on equity of leading tourism companies (Figure 4.2).

Although tourism activity improved considerably in 2003, it remains far below the levels that were typical of the industry before the intifada began in the last quarter of 2000. For example, inbound tourism in 2003 (about one million arrivals) was 11 percent under the 2001 level and 55 percent under 2000, the record year (Figure 4.2). These developments were also reflected in the business results of public companies in the field of inbound tourism, which recorded a composite loss of NIS 274 million. Another indicator of crisis in hotels and catering is the steep decrease in average revenue per bed night, which also affects hotels' cash flow and revenue. The 3.3 percent decrease in hotel prices had no significant effect on domestic demand, some of which may have been diverted to destinations abroad. For the year all told, industry product declined by 0.5 percent and industry revenue by 3.1 percent (Figure 4.3).

These negative developments boosted the share of problem loans in total credit to the industry from 37.5 percent in 2002 to a record 39.5 percent in 2003 (Table 4.3). The ratio of loan-loss provision to total credit did decline, from 3.26 percent in 2002 to 3 percent in 2003, but remained the highest among industries (Table 4.3). The credit/product ratio also dipped, from 1.99 in 2002 to 1.93 in 2003, but was the second largest among industries. The trends in these ratios and in the industry's repayment ability in recent

Figure 4.3
Total Revenue from Domestic and Incoming Tourism, and the Average Hotel Revenue per Tourist, 1998-2003
(monthly , seasonally adjusted, NIS million, December 2003 prices)



SOURCE: The Central Bureau of Statistics and the Bank of Israel Banking Supervision Research Department.

Table 4.4
Ratio of Credit[a] to Output, by Industry, 1997–2003

	1997	1998	1999	2000	2001	2002	2003
Agriculture	1.71	1.42	1.63	1.44	0.84	0.70	0.74
Manufacturing	0.82	0.99	1.30	1.18	1.46	1.44	1.37
Construction and real estate	2.68	2.80	3.50	3.98	4.50	4.53	4.54
Water and electricity	0.56	0.53	0.67	0.69	0.87	0.92	0.76
Commerce and services	0.61	0.76	1.08	0.90	0.97	1.02	1.00
Commerce	0.89	1.04	1.20	1.21	1.31	1.32	1.26
Services	0.49	0.64	1.03	0.78	0.85	0.91	0.90
Hotels and catering	1.19	1.39	1.69	1.70	1.96	1.99	1.93
Financial services	0.74	1.17	2.33	1.43	1.62	1.83	1.67
Communications and computer services	0.37	0.65	0.92	1.01	1.11	1.04	0.83
Transport and storage	0.45	0.51	0.85	0.81	0.80	0.84	0.78
Total	**0.98**	**1.13**	**1.45**	**1.45**	**1.60**	**1.62**	**1.51**

[a] Including off-balance-sheet credit. Bank credit is attributed to different industries according to the composition of GDP by industry, so that the data in this table may be incompatible with the data in other tables.
SOURCE: Based on returns to Supervisor of Banks and Central Bureau of Statistics data, and data from the Bank of Israel Research Department.

years, reviewed above, show that from a long-term perspective (including 2003) and in comparison with other industries, the hotel, restaurant, and hospitality industry is relatively poorly positioned to pay back its debts. One may demonstrate this by analyzing relative credit quality in various industries on the basis of two ratios: (a) problem credit to the industry in total problem credit to the share of credit in the industry to total credit,[10] and (b) the share of specific loan-loss provision in the industry in total loan-loss provision to the share of credit to this industry in total credit. In 2003, the ratios were higher in the restaurant and hospitality industry than in any other industry, at 5.1 and 4.0, respectively (Table 4.5).

In **manufacturing,** which generates about one fourth of business-sector product, activity was stable in early 2003 after steep decreases in the previous two years. The minuscule 0.3 percent decline in product reflected contrasting developments in domestic and export sales: a 1.6 percent decrease and a 2 percent upturn, respectively. Manufacturing product expanded in the second half of 2003 due to improved performance of the electronics industries,[11] which today account for about one-fourth of manufacturing product and one-third of manufacturing exports. The level of risk in manufacturing, as reflected in the banks' financial statements, also held steady in 2003: the share of problem

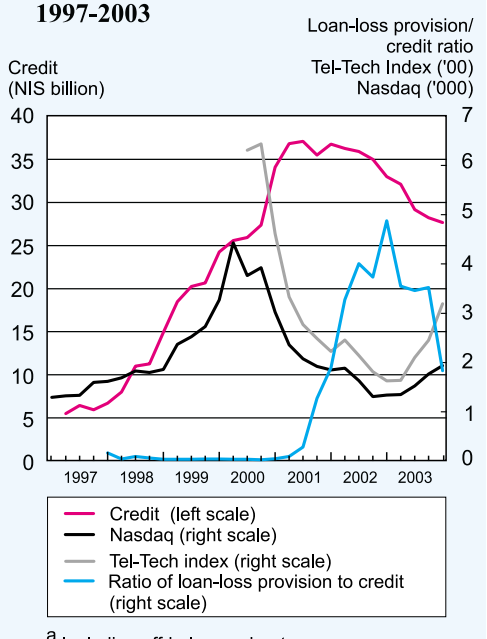
[10] When this ratio is greater than 1, the ratio of problem loans in the industry to total problem loans exceeds the ratio of lending to the industry in total lending. In this case, the industry's credit quality is relatively low, and vice versa.

[11] In this survey, the industries include electronic components, industrial equipment for control and supervision, medical scientific equipment, and electronic communications equipment.

credit in total credit in manufacturing climbed from 9.5 percent in 2002 to 10.5 percent in 2003 (Table 4.3) but the ratios of credit to product and loan-loss provisions to total credit in manufacturing declined to 1.37 and 1.28, respectively (Tables 4.3 and 4.4).

Activity in **communications and computer services** increased in 2003 and industry product[12] expanded by 4.6 percent after having declined by 3.8 percent in 2002. Most of the increase traces to an upturn in product of the communications industries (including 17.3 percent growth in postal and courier services) whereas the product of start-up firms contracted by 25.4 percent. The increase in communications and computer-services product is based on technological improvements and large investments made in the past. The increase in industry product, coupled with the upturn in the NASDAQ and Teltech share indices, allowed several indicators of credit quality in manufacturing to improve. Loan-loss provisions declined and their share in total credit fell from 5.03 percent in 2002 to 1.83 percent in 2003 (Figure 4.4). The decline in loan-loss provision in 2003 was also abetted by the record

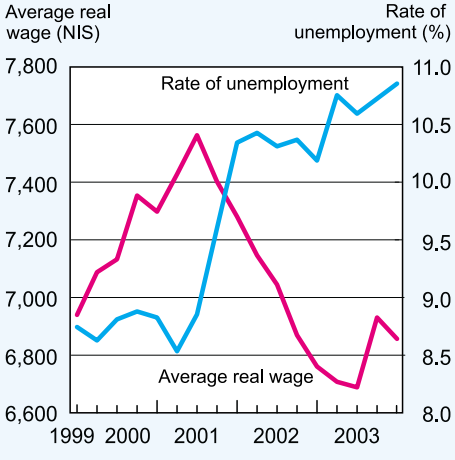
Figure 4.4
The Tel-Tech and Nasdaq Indices, Outstanding Credit,[a] and the Ratio of Loan-Loss Provision to Outstanding Credit[b] in the Communications and Computer Services Industry, 1997-2003



a Including off-balance-sheet.
b In the five major banking groups.

SOURCE: Published financial statements, Bloomberg and the Tel Aviv Stock Exchange.

Figure 4.5
Labor Market Indicators: The Rate of Unemployment and the Average Real Wage per Employee Post, 1999-2003 (quarterly, seasonally adjusted, wage at December 2003 prices)



SOURCE: The Central Bureau of Statistics and the Bank of Israel Banking Supervision Research Department.

[12] Communications and computer-services product includes communications, postal and courier services, research and development, computer services, and start-up companies.

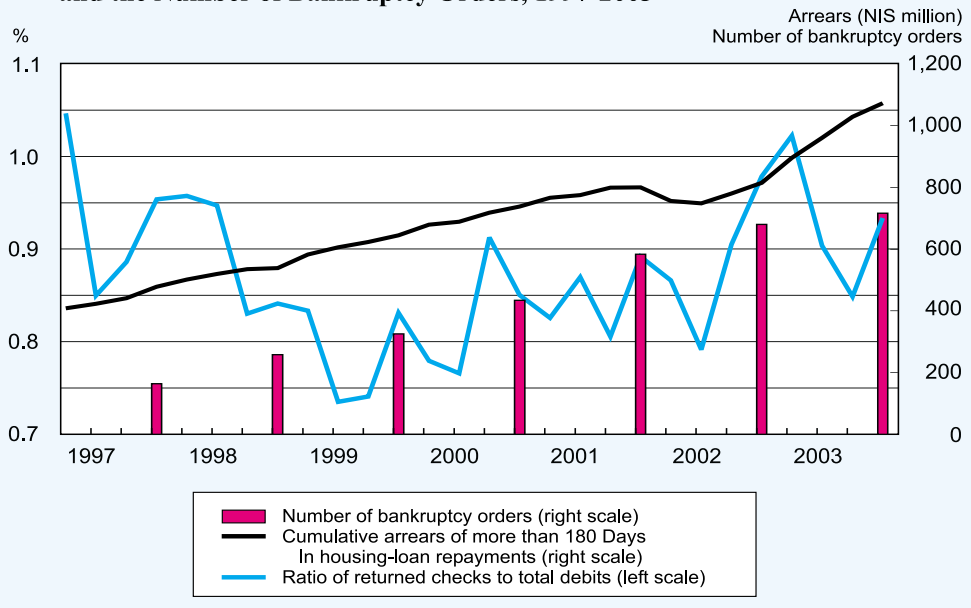
Table 4.5
Distribution of Problem Loans and Specific Loan-Loss Provision Relative to Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2002–2003

(percent)

	Distribution of:									
	Outstanding credit[a]		Problem credit		Specific loan-loss provision		Problem credit/ outstanding credit		Specific loan-loss provision/ outstanding credit	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Agriculture	0.7	0.7	2.0	1.6	0.7	1.1	2.6	2.2	1.0	1.5
Manufacturing	13.5	13.0	16.8	17.5	20.7	22.2	1.2	1.3	1.5	1.7
Construction and real estate[b]	16.7	16.3	26.2	27.2	17.8	20.8	1.6	1.7	1.1	1.3
Water and electricity	1.1	1.0	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1
Commerce	6.9	6.7	6.5	6.5	5.4	8.7	0.9	1.0	0.8	1.3
Hotels and catering	1.9	1.8	9.2	9.2	6.9	7.3	4.9	5.1	3.7	4.0
Transport and storage	2.4	2.2	0.7	0.8	1.2	0.6	0.3	0.4	0.5	0.3
Communications and computer services	4.1	3.5	12.2	8.4	23.6	8.6	3.0	2.4	5.7	2.4
Financial services	7.6	7.1	5.3	6.0	5.0	5.3	0.7	0.8	0.7	0.7
Other business services	2.7	3.2	2.2	2.4	2.3	3.5	0.8	0.8	0.8	1.1
Public and community services	2.7	2.7	2.7	2.9	0.9	2.5	1.0	1.1	0.4	0.9
Individuals	25.0	26.2	12.0	13.1	8.3	14.0	0.5	0.5	0.3	0.5
Of which Housing loans	11.7	11.9	5.2	6.2	3.4	5.5	0.4	0.5	0.3	0.5
Other loans	13.3	14.3	6.8	6.8	4.9	8.5	0.5	0.5	0.4	0.6
Borrowers abroad	14.7	15.5	3.9	4.2	7.1	5.3	0.3	0.3	0.5	0.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**1.0**	**1.0**	**1.0**	**1.0**
Municipalities	**1.2**	**1.3**	**0.6**	**0.7**	**0.0**	**0.0**	**0.5**	**0.5**	**0.0**	**0.0**

[a] Including credit to the public and the public's investment in bonds, and the off-balance-sheet items.
[b] Data on this industry are not calculated in accordance with the industry concentration limitation.
SOURCE: Published financial statements.

Figure 4.6
Cumulative Arrears of more than 180 Days in Housing-Loan Repayments, the Ratio of Returned Checks to Total Debits, and the Number of Bankruptcy Orders, 1997-2003



SOURCE: The Administrator General, published financial statements and the Bank of Israel Banking Supervision Research Department.

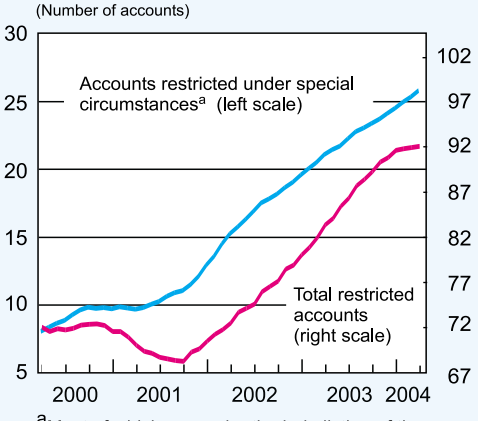
provision made for manufacturing in 2002 and, especially, for large borrowers in the industry. The credit/product ratio fell from 1.04 in 2002 to 0.83 in 2003 due to a steep decrease in credit for manufacturing (16.2 percent) and the increase in industry product (4.6 percent, as stated) (Tables 4.3 and 4.4). The share of problem loans in total lending to manufacturing also declined, from 22.5 percent in 2002 to 18.7 percent in 2003 (Table 4.3), mostly due to the reclassification of credit given for the purpose of buying shares (NIS 2.5 billion) as securities instead of credit to the public. Nevertheless, manufacturing continues to have a high ratio of problem loans to total lending relative to other industries and, therefore, carries a relatively high credit risk (Tables 4.3 and 4.5).

The **household sector** is typified by wide dispersion of borrowers and relatively low correlation among them. Accordingly, one would expect credit risk to be lower in this sector than in the principal industries. These characteristics, coupled with the severe decline in the repayment ability of principal industries in the past two years, induced each of the five large banking groups to increase its lending to households in 2003 (a total increase of 3.8 percent) even as they cut back on credit to most industries (Table 4.3). Importantly, however, the quality of the credit portfolio of households declined in 2003. As the unemployment rate climbed to a peak of 10.9 percent in late 2003 and as real wages declined relative to 2002, several indicators that affect households' repayment ability continued to worsen. They include increases in the number of restricted-account

customers (mainly due to actions by the Bailiffs' Service), the number of bankruptcy orders issued against households, the ratio of the sum of returned checks (due to insufficient funds) to total crediting of accounts by means of checks, and cumulative arrears in payback of housing loans (Figures 4.5, 4.6, and 4.7).

The increase in households' credit risk was manifested in an upturn in the credit/ disposable income ratio of this sector (Figure 4.8) and, for the first time since the beginning of the recession in late 2000, in larger provisions by the large banking groups. The ratio of loan-loss provision to total credit in this sector climbed from 0.29 percent in 2002 to 0.4 percent in 2003 (Table 4.3) and increases were recorded in

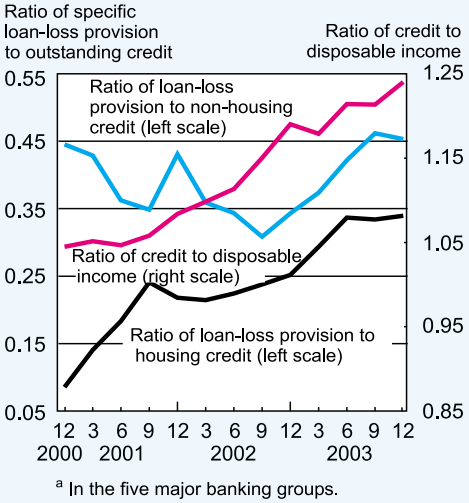
Figure 4.7
Restricted Accounts and Accounts Restricted Under Special Circumstances, January 2000-March 2004



[a]Most of which are under the jurisdiction of the Execution Office.

SOURCE: The Bank of Israel Banking Supervision Research Department.

Figure 4.8
Ratio of Credit to Disposable Income and the Ratio of Specific Loan-Loss Provision to Outstanding Credit[a] in the Household Sector, December 2000-December 2003



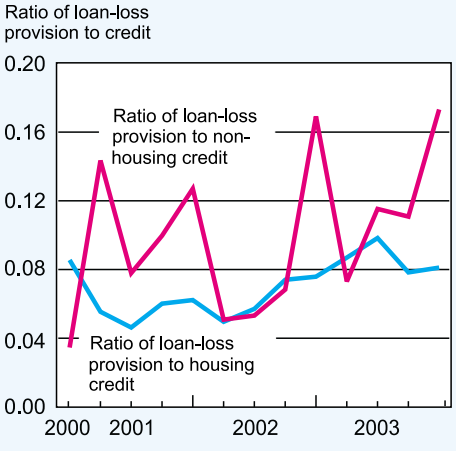
[a] In the five major banking groups.

SOURCE: Published financial statements, the Bank of Israel Research Department, and the Central Bureau of Statistics.

total credit for housing purposes and non-housing purposes alike (Figure 4.8). However, the loan-loss provision for the household sector for non-housing purposes, and its proportion in total credit, are typified by severe volatility from quarter to quarter during the year. This trend includes relatively large provisions in the last quarter of the year, even though the sector's repayment ability is not noted for seasonality and the wide dispersion of the loans should not result in volatility in provisions (Figure 4.9). Additionally, the financial statements of the banking groups did not express the increase in household credit in the classification of problem loans on account of this sector. The share of problem loans in total lending to households showed only a slight increase, from 3.7 percent in 2002 to 3.9 percent in 2003, and most of the upturn in the classification of credit as problematic

traces to housing loans (Table 4.3). The increase stemmed mainly from an upturn in arrears in payback of housing loans and is not subject to the discretion of the banks' managements. The Banking Supervision Department emphases various ways of evaluating the systems of management, control, and supervision of credit to households and the methods that banks use to identify problem loans for the purpose of classifying them as such. In this capacity, the Department will also engage, in the next few months, in profiling and critiquing the methodology that the bank are using to cope with the credit risk of this sector.

Figure 4.9
Ratio of Specific Loan-Loss Provision to Outstanding Credit in the Household Sector, December 2000-December 2003 (quarterly data)



SOURCE: Published financial statements.

The financial solvency of **municipal authorities** declined perceptibly in 2002 and 2003, considerably impairing the delivery of services by many authorities and harming their ability to pay back their debts. These developments affect the quality of the municipal credit portfolio and are analyzed in Box 4.1.

Box 4.1
Quality of the Municipal Credit Portfolio

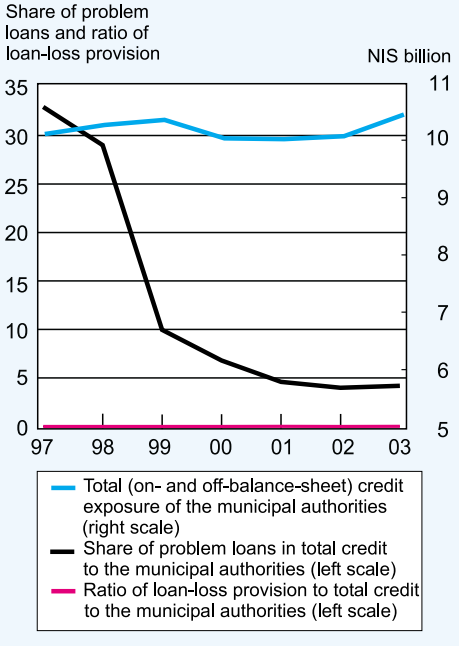
The financial solvency of Israel's municipal authorities has been noted over the past twenty years for recurrent crises that caused severe harm to the services they provide and forcing the central government to cover their deficits and repeatedly apply emergency bailout plans. Until the mid-1990s, an important factor in the rickety state of the municipal authorities was the absence of budget transparency due to weaknesses in municipal bookkeeping systems.[1] Afterwards, the municipal authorities improved their budget behavior and budget transfers from central government did not increase. This improvement was due mainly to more effective enforcement of financial reporting requirements, a toughening of the budget limit that the government imposed

[1] For an expanded discussion, see A. Brender (2003) "Effect of Budget Performance on the Results of Municipal Elections in Israel, 1989–1997," *Bank of Israel Survey* 75 (Hebrew), pp. 113–116.

on municipal authorities, and an improvement in voters' ability to monitor the financial management of the municipal authorities in their places of residence.[2] In 2002–2003, however, the municipal authorities' financial soundness again deteriorated perceptibly, leading to severe impairment of services in many locations, and, in some, to liquidity problems and default on current liabilities, including lengthy arrears in meeting payrolls. The main reason for the deterioration was a sharp and sudden NIS 1.4 billion cutback in state budgets to municipal authorities in 2003.[3] Importantly, municipal authorities' financial soundness is affected not only by their ability to manage their expenditures intelligently and efficiently but also, and mainly, on changes in their two main sources of revenue: their own revenues, including collection of municipal property tax, duties, etc. (60.6 percent of total revenues in 2002), and revenues from various central-government budgets, including the participation of the ministries of Education and Social Affairs and balancing grants (39.4 per-cent of total revenues in 2002).[4]

These data vary among municipal authorities. Authorities that serve economically weak populations are more reliant on balancing grants as the share of their own revenues is relatively low. Therefore, the cutback in central-government budgets has a stronger effect on weak authorities' ability to deliver requisite services and pay back their credit at a time when central-government budgets are being cut.

Figure 4.10
The Municipal Authorities: Total Credit Exposure, Specific Loan-Loss Provision/Credit Ratio, and Share of Problem Loans in Credit, the Five Major Banking Groups, 1997-2003



SOURCE: Published financial

[2] Source: *Bank of Israel Annual Report*, 2003, and A. Brender (2003).

[3] Source: *Bank of Israel Annual Report*, 2003.

[4] Source: *Budget Proposal for 2004*, Booklet 5, Ministry of the Interior, Budget Division, www.mof.gov.il.

The data on the municipal credit portfolio shows that the amount of credit given to municipal authorities by the five large banking groups was relatively stable in 1997–2002 (Figure 4.10). In 2003, municipal authorities took more credit of this type because the central government reduced its budgets for them that year, as noted. Concurrently, credit given to municipal authorities by Otzar Hashilton Hamkomi Bank increased steadily. In 2003, the five large banking groups' credit exposure[5] to municipal authorities was NIS 10.5 billion (1.3 percent of the credit portfolio) (Table 4.3), of which NIS 5.3 billion was owed to the Hapoalim group (1.9 percent of this group's credit portfolio) and NIS 3.8 billion to the Leumi group (1.6 percent of the portfolio). Municipal authorities' outstanding credit with Otzar Hashilton Hamkomi Bank, NIS 2.3 billion in 2003, should be added to these sums. The decline in municipal financial solvency has not been reflected in the banks' financial statements in recent years. The proportion of problem loans in total lending to municipal authorities has been trending down since 1997 due to payback of loans under previous arrangements for reorganization of authorities' debts (signed since 1989) (Figure 4.10). However, the banks made hardly any loan-loss provision for this credit, causing the provision/lending ratio for this sector to tend to zero. One possible reason for the negligible loan-loss provision and for the relatively low classification of problem loans on account of this sector is a collateral system that allows banks to offset and encumber municipal authorities' own revenues and transfers from central government, forcing the authorities to pay back their debts sequentially. The decline in municipal solvency, coupled with legislative actions that made it harder for banks to rely on receipts from central-government budgets (by earmarking them for municipal recovery plans, education and development, and payrolls) as collateral may force the banks to classify more debts as problematic and, perhaps, to record loan-loss provisions for this sector in their financial statements.

[5] Including off-balance-sheet credit.

b. Size of the Credit Portfolio

(i) Balance-sheet activity

In 2003, outstanding credit from the five large banking groups was NIS 535 billion, down 1.3 percent (Table 4.6), after a positive growth rate of only 1.6 percent in 2002 and average annual growth of 11.2 percent in 1994–2001. This led, for the first time in a decade, to a decrease, albeit very slight, in the proportion of credit in the banking groups' total assets, from 69.6 percent in 2002 to 68.7 percent in 2003 (Figure 4.11). The contraction of credit to the public seems to have been abetted by a decrease in supply, reflecting the banks' acknowledgement of the steady increase in uncertainty about the

Table 4.6
Distribution of Credit by Indexation Base, the Five Major Banking Groups, 2002–2003

		End-year balances *(NIS million)*					Distribution *(percent)*			
		Unindexed	CPI-indexed	In $	In other currencies	Total	Unindexed	CPI-indexed	In $	In other currencies
Leumi	2002	50,132	55,035	52,746	13,848	171,761	29.2	32.0	30.7	8.1
	2003	51,925	54,794	46,823	15,609	169,151	30.7	32.4	27.7	9.2
Change (*percent*)		3.6	–0.4	–11.2	12.7	–1.5				
Discount	2002	24,564	19,857	25,842	4,071	74,334	33.0	26.7	34.8	5.5
	2003	26,750	18,840	25,457	5,335	76,382	35.0	24.7	33.3	7.0
Change (*percent*)		8.9	–5.1	–1.5	31.0	2.8				
Hapoalim	2002	54,527	64,716	58,767	13,076	188,086	29.0	32.8	31.2	7.0
	2003	56,586	58,287	52,734	16,480	184,087	30.7	31.7	28.6	9.0
Change (*percent*)		3.8	–5.6	–10.3	26.0	–2.1				
Mizrahi	2002	15,328	32,351	8,360	3,237	59,276	25.9	54.6	14.1	5.5
	2003	15,285	31,049	8,955	4,142	59,431	25.7	52.2	15.1	7.0
Change (*percent*)		–0.3	–4.0	7.1	28.0	0.3				
First International	2002	17,203	14,699	11,279	5,121	48,302	35.6	30.4	23.4	10.6
	2003	16,636	14,087	9,993	4,789	45,591	36.5	30.9	21.9	10.5
Change (*percent*)		–3.3	–4.2	–11.4	–6.5	–5.6				
Total	2002	161,754	183,658	156,994	39,353	541,759	29.9	33.9	29.0	7.3
	2003	167,182	177,057	143,962	46,355	534,642	31.3	33.1	26.9	8.7
Change (*percent*)		3.4	–3.6	–8.3	17.8	–1.3				

SOURCE: Published financial statements.

trend in customers' repayment ability due to the lengthy recession. The banks expressed this policy by toughening their lending criteria and policy in order to winnow out risky customers and reduce exposure to them. Efforts to improve capital adequacy, reflecting the declared policy of their managements, also contributed to the decline in credit supply.

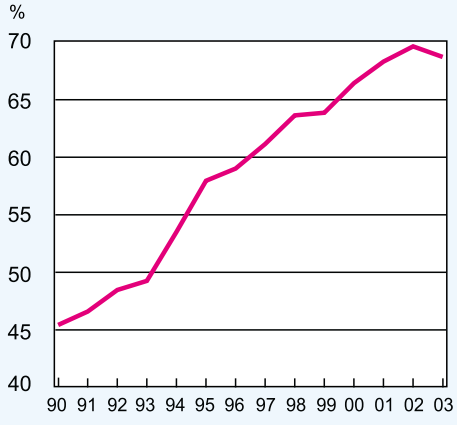
(ii) Credit exposure in off-balance-sheet activity

Off-balance-sheet activity is composed mainly of two kinds of transactions:

(a) *Guarantees and liabilities of the bank.*[13] Outstanding guarantees and other liabilities of the five banking groups were unchanged in 2003 at NIS 233.7 billion (Table 4.7). The unchanged balance was composed of contrasting changes in guarantees and liabilities lines and, mainly, decreases in credit-assurance guarantees, homebuyers' guarantees, and documentary credit, offset by an upturn in "irrevocable undertakings to issue credit that were approved but not implemented." These developments, like balance-sheet activity, were affected by the banks' response to the upturn in risk and to uncertainty and by the continued construction slump, especially in homebuilding.

(b) *Activity in derivatives.*[14] These transactions create a credit-risk exposure due to the possibility of default by the other party.[15] The futures transactions of the five banking groups, in par value, came to NIS 727.4 billion in 2003 (Table 4.8)[16] and the total credit risk from activity in

Figure 4.11
Share of Credit in Total Assets in the Five Major Banking Groups, 1990-2003



SOURCE: Published financial statements and the Bank of Israel Banking Supervision Research Department.

[13] In which the balance recorded represents a credit risk. These transactions are documentary credit, credit-assurance guarantees, homebuyers' guarantees under the Sales Guarantee Law, other guarantees and undertakings, irrevocable undertakings to issue credit that were approved but not implemented, undertakings to issue guarantees, revolving credit facilities, other credit facilities, and unused credit-card facilities.

[14] In which the recorded balance does not represent credit risk: forwards, futures, swaps, and options on exchange rates, interest rates, indices, commodities, etc.

[15] If such an event becomes an actuality, the bank has to return to the market and convert the defaulted contracts into alternative contracts under inferior conditions from its standpoint. This exposes the bank to market risks that become actual when the prices of the derived asset change due to an unforeseen change in prices of the underlying asset or an unforeseen fluctuation in interest rates, exchange rates, share indices, the Consumer Price Index, etc.

[16] Directives of the Supervisor of Banks concerning derivatives and hedging activities were applied for the first time in 2003. Thus, the data are not comparable to those of the year-earlier period.

Table 4.7
Distribution of Guarantees and other Liabilities, the Five Major Banking Groups, 2002–2003

	End-year balances *(NIS million)*[a]		Change from previous year *(percent)*	Distribution *(percent)*	
	2002	2003	2003	2002	2003
Documentary credit	6,986	6,182	–11.5	3.0	2.6
Credit guarantees	21,060	18,794	–10.8	9.0	8.0
Guarantees for home-buyers	21,830	19,429	–11.0	9.4	8.3
Other guarantees and liabilities	22,744	22,595	–0.7	9.7	9.7
Irrevocable liabilities on authorized credit not taken up	50,317	55,003	9.3	21.6	23.5
Liabilities on guarantee expenses	13,510	13,795	2.1	5.8	5.9
Liabilities on unsettled credit-card transactions	12,760	13,288	4.1	5.5	5.7
Overdraft facilities and other unutilized credit frameworks	45,387	45,508	0.3	19.4	19.5
Unutilized credit card frameworks	38,866	39,097	0.6	16.6	16.7
Total	**233,460**	**233,691**	**0.1**	**100.0**	**100.0**

[a] At December 2003 prices.
SOURCE: Published financial statements.

Table 4.8
Distribution of Balances (Notional Value) of Financial Derivatives, the Five Major Banking Groups, December 2003[a]

(NIS million)[b]

	December 2003			
	Interest-rate contracts	Exchange-rate contracts	Other[c]	Total
Leumi	63,387	127,547	22,863	213,796
Discount	10,099	48,850	6,909	65,858
Hapoalim	99,355	165,852	11,621	276,828
Mizrahi	3,934	59,224	17,755	80,913
First International	7,535	69,861	12,589	89,985
Total	184,310	471,334	71,736	727,381

[a] In 2003 the directives of the Supervisor of Banks with regard to derivative instruments and hedging activities were implemented for the first time, so that the data cannot be compared to those of December 2002.
[b] In terms of notional principal, at December 2003 prices.
[c] Contracts relating to shares, share indices, Treasury-bill futures, and commodities.
SOURCE: Published financial statements.

derivatives (present risk and potential after weighting for the other party to the transaction) was NIS 28.9 billion.

c. Concentration of the credit portfolio

(i) By size of borrower

The five large banking groups' credit portfolio by size of borrower became slightly less concentrated in 2003, as reflected in changes in several indicators. The Gini index for the distribution of the credit portfolio by borrower size[17] decreased gently at all banking groups in 2003 and came to 0.909 (Table 4.9). Concentration of credit among large borrowers also declined slightly: the proportion of credit given by the five banking groups to borrowers whose outstanding indebtedness exceeds NIS 35 million fell from 47.5 percent in 2002 to 46.3 percent in 2003. The share of credit given to borrowers whose outstanding debt exceeded 5 percent of group equity[18] declined at each of the five banking groups in 2003, with considerable differences among the groups—21.5 percent at the First International group, which is noted for high concentration among large borrowers, and only 5.4 percent at the Leumi group, which is known for relatively low concentration (Table 4.9). Credit-portfolio concentration by borrower size and, in particular, among large borrowers improved this year due to the banks' caution in issuing credit and also, evidently, their preparations for implementing the changes in the Proper Banking Management Directive (No. 313), promulgated in late 2003, that toughen the restrictions on single-borrower and borrower-group debt. This policy had the effect, among other things, of inducing other players to stanch the increase in credit to the public, foremost in the business sector and among large borrower groups. This policy also included an increase in the share of credit to households, a sector that carries less credit risk than the business sector due to its wide dispersion of borrowers and relatively low correlation among them (Tables 4.3 and 4.5). Importantly, however, the banks' credit portfolio remains highly concentrated among large borrowers and especially among the group of the largest borrowers. Indeed, 1 percent of borrowers received some 70 percent of credit in the system in 2003.[19] The indebtedness of the six largest borrower groups in the system was

[17] This index, reflecting the equality (uniformity) of the distribution of the banking credit portfolio, is measured by the space between the actual distribution of the credit portfolio (cumulative percent of credit to cumulative percent of borrowers) and the 45-degree line that signals equality in credit distribution. The higher the index, the more concentrated the portfolio by borrower size.

[18] Plus rights of outside shareholders.

[19] This statistic is culled from Table 4.10 for the cumulative distribution of borrowers and the cumulative distribution of credit starting from the credit bracket for a borrower of more than NIS 1,065 million. Importantly, in Table 4.10 (based on the banks' public financial statements), starting with the credit bracket of NIS 7 million, the sorting was based on the specific-consolidation method. Nevertheless, the number of borrowers is apparently skewed upward because some borrowers may have been recorded in several groups, meaning that adding up the borrowers from the five banking groups would result in redundancy.

Table 4.9
Indices of Credit Concentration, the Five Major Banking Groups,[a] 2002–2003

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Concentration by principal industry						
H-Index by principal industry (including households)[b]						
2002	0.085	0.092	0.091	0.058	0.116	0.083
2003	0.084	0.087	0.092	0.057	0.104	0.081
Share of credit to households in total credit (percent)						
2002	25.1	20.7	22.7	47.8	17.5	25.0
2003	26.1	21.9	23.8	48.7	20.4	26.2
H-Index by principal industry (concentration of business portfolio)[c]						
2002	0.151	0.146	0.152	0.212	0.170	0.147
2003	0.153	0.143	0.159	0.215	0.165	0.149
Concentration by size of borrower						
Share of credit to borrowers whose credit balance is more than NIS 35 million (percent)						
2002	46.6	42.2	54.8	26.0	53.6	47.5
2003	45.5	43.0	53.2	25.3	50.5	46.3
Gini Index[d]						
2002	0.913	0.916	0.928	0.822	0.940	0.916
2003	0.912	0.904	0.922	0.813	0.928	0.909
Share of credit to large single borrowers (percent)[e]						
2002	7.8	11.1	11.5	9.9	25.6	
2003	5.4	8.7	10.2	9.5	21.5	

[a] On balance-sheet and off-balance-sheet basis.
[b] This index is the sum of the squares of the share of credit to particular industries (excluding households) in total credit (including households).
[c] This index is the sum of the squares of the share of credit to particular industries (excluding households) in total credit (excluding households).
[d] The Gini Index reflects the inequality of the distribution of credit by borrower (see note in text).
[e] Borrowers whose credit balance is greater than 5 percent of the group's equity (including minority shareholders).
SOURCE: Published financial statements.

NIS 81.6 billion in 2003 and their share in total credit[20] and the capital base of the banking system was 10.1 percent and 122.8 percent, respectively.[21]

[20] Including off-balance-sheet items.
[21] Based on data reported to the Banking Supervision Department.

Table 4.10
Distribution of Credit to the Public[a] by Single-Borrower Indebtedness, the Five Major Banking Groups,[b] 2002–2003

	Balance of credit to public, and credit risk (*NIS million*)[c]		Number of borrowers		Average credit balance (*NIS thousand*)[c]		Proportion of credit balance (%)		Proportion of borrowers (%)	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
(NIS thousand)[c]										
Up to 7	3,539	4,555	1,725,555	1,737,854	2	3	0.46	0.59	38.14	37.52
From 7 to 18	9,778	10,195	777,288	802,384	13	13	1.26	1.33	17.18	17.32
From 18 to 35	15,531	16,243	612,443	635,371	25	26	2.00	2.12	13.54	13.72
From 35 to 70	27,072	28,739	557,778	583,448	49	49	3.49	3.74	12.33	12.60
From 70 to 140	35,735	37,438	371,363	385,277	96	97	4.61	4.88	8.21	8.32
From 140 to 285	51,391	52,801	261,604	266,028	196	198	6.63	6.88	5.78	5.74
From 285 to 530	50,060	50,631	136,330	135,577	367	373	6.46	6.60	3.01	2.93
From 530 to 1,060	31,996	32,195	46,661	46,070	686	699	4.13	4.19	1.03	0.99
From 1,060 to 1,770	17,004	17,252	13,005	13,106	1,307	1,316	2.19	2.25	0.29	0.28
From 1,770 to 3,500	23,293	23,352	9,763	9,777	2,386	2,388	3.01	3.04	0.22	0.21
From 3,500 to 7,100	30,705	30,947	6,229	6,439	4,929	4,806	3.96	4.03	0.14	0.14
From 7,100 to 17,700	53,225	53,403	4,868	4,919	10,934	10,856	6.87	6.96	0.11	0.11
From 17,700 to 35,000	57,775	54,538	2,380	2,262	24,275	24,111	7.45	7.10	0.05	0.05
From 35,000 to 177,000	180,075	178,457	2,556	2,534	70,452	70,425	23.23	23.25	0.06	0.05
From 177,000 to 355,000	68,741	71,462	290	294	237,038	243,068	8.87	9.31	0.01	0.01
From 355,000 to 710,000	69,066	62,013	145	126	476,317	492,167	8.91	8.08	0.00	0.00
From 710,000 to 1,065,000	22,556	18,581	27	22	835,407	844,591	2.91	2.42	0.00	0.00
From 1,065,000 to 1,420,000	9,519	9,686	8	8	1,189,875	1,210,750	1.23	1.26	0.00	0.00
From 1,420,000 to 1,770,000	10,754	7,593	7	5	1,536,286	1,518,600	1.39	0.99	0.00	0.00
From 1,770,000 to 2,130,000	0	0	0	0			0.00	0.00	0.00	0.00
From 2,130,000 to 5,096,000	7,239	7,557	3	3	2,413,000	2,519,000	0.93	0.98	0.00	0.00
Total	**775,054**	**767,638**	**4,524,598**	**4,631,504**	**171**	**166**	**100.00**	**100.00**	**100.00**	**100.00**

[a] Including outstanding credit to the public and credit-risk-equivalent of off-balance-sheet financial derivatives, calculated in accordance with the definitions relating to the calculation of the single-borrower limitation. Excluding the public's investment in bonds.
[b] The data in the categories up to NIS 7,100 represent the total of all credit categories of every consolidated company (consolidated by stratum), whereas in the remaining categories the credit data and number of borrowers are calculated as the sum of each borrower's credit in all the banking groups (specific consolidation).
[c] At December 2003 prices.
SOURCE: Published financial statements.

(ii) By industry

The concentration of the large banking groups' credit portfolio by industries was relatively stable in 2003, as in the past. This stability is reflected in the behavior of the Herfindahl-Hirschman index[22] (H-index) for concentration of the credit portfolio and of the business credit portfolio (Table 4.9). The H-index for credit-portfolio concentration[23] shows perceptible differences among the banking groups—from 0.057 at the United Mizrahi group to 0.104 at the First International group. The United Mizrahi group had a relatively low credit-portfolio concentration because households account for much of its portfolio (48.7 percent), mainly due to the large share of housing loans by Tefahot Bank in total group credit. In contrast, the business-portfolio concentration of this group, as calculated by the H-index,[24] was the highest among the groups in 2003 at 0.215 (Table 4.9).

In sum, the five large banking groups remained highly exposed to credit risk in 2003. This is because the onset of the upturn in economic activity was not yet reflected in a meaningful improvement in the accepted indicators of credit quality. Thus, the banks' credit portfolio was still noted for high concentration by borrower size and, foremost, by large borrowers and borrower groups. This concentration, however, is expected to decline in the years to come, as implementation of the changes in Directive 313, concerning the single-borrower and borrower-group limitation, intensifies. Already in 2003, the banks' preparations for the implementation of this directive caused to credit concentration among large borrowers to decrease slightly. Credit concentration by industries was unchanged and evinced considerable differences among the banking groups.

2. MARKET (INTEREST AND INDEXATION-BASIS) RISKS

This survey tests exposure to market risk by means of the Value at Risk index, which reflects the maximum loss that the bank may face to a given planning horizon (usually one month) at a certain level of significance (usually 99 percent). This survey calculates

[22] The H-index equation is $H = \sum_{i=1}^{n} S_i^2$, where *Si* is the share of credit to industry *i* in total credit and n is the number of industries. The function may also be expressed as $H = \sigma^2 \cdot n + \frac{1}{n} = \sum_{i=1}^{n} (S_i - \bar{S})^2 + \frac{1}{n}$, where $\bar{S}$ is the share of credit to the average industry and σ^2 is the variance of market shares of credit among industries. The lower the index, the less concentrated and, therefore, the less risky the credit portfolio.

[23] The H-index for credit-portfolio concentration is the sum of the squares of credit weights in a given industry (excluding the household sector) in total credit to the public (including the household sector). This is because households, whose share in total credit from the five banking groups was 26.2 percent in 2003, are very heterogeneous in terms of borrowers' financial state and therefore are not strongly correlated either in economic activity or in solvency. Thus, it is doubtful that they may be treated as an industry in this context.

[24] Concentration of the business portfolio was measured by an H-index computed as the sum of the squares of the weight in credit in a given industry (excluding the household sector) in total credit to the public (excluding the household sector).

the VaR index for interest-rate risks in the three indexation segments (unindexed, CPI-indexed, and forex-indexed) and for indexation-basis risks (exchange-rate and inflation) by means of a historical-scenarios approach based on two main premises: (1) use of historical data from the past five years[25]; (2) disregard of correlations among changes in market prices.[26]

a. Interest-rate risks

(i) General remarks

The **Bank of Israel interest rate** was lowered by 3.9 percentage points in cumulative terms in 2003 and ended the year at 5.2 percent. The rate cuts, carried out as part of an expansionary monetary policy, took place in ten steps during the year and coincided with the adoption by the Government a fiscal-restraint plan. The credibility of the fiscal policy, coupled with the rapid termination of the war in Iraq, the resumption of the political process, and the receipt of guarantees from the U.S. Government, allowed the Government to increase its issuing in foreign markets—reducing the domestic bond supply, raising the price of bonds, and lowering yields to maturity.

The declines in the key rate and domestic interest rates generally also raised the net worth of each of the five large banking groups. This is the result of positive duration gaps[27] in the three indexation sectors (unindexed, CPI-indexed, and forex-indexed) at all five large banking groups in late 2002 and in 2003 (Table 4.11).

(ii) Value at interest-rate risk

The total value at interest-rate risk[28] in the three indexation segments increased at most of the large banking groups in 2003 and ended the year at NIS 3.8 billion as against

[25] The historical data were used because analysis of the actual distributions of the changes in risk factors showed that these distributions are not normal.

[26] See explanation of this approach in the 2002 Survey of the Banking Supervision Department.

[27] The duration gap, first presented by Bierwag and Kaufman in 1985, expresses the sensitivity of a bank's net worth to interest changes in terms of time (months, years, etc.) and, for this reason, makes it possible to estimate the duration of assets/liabilities that should be bought/sold in order to protect net worth from interest-rate risks. The duration-gap index is calculated in the following way: $Dgap = D_A - D_L \cdot \frac{L}{A}$, where D_A is asset duration, D_L is liability duration, A is the current value of assets, and L is the current value of liabilities. The sensitivity of net worth to interest-rate changes as a dependency of the duration gap is calculated as follows: $\Delta K = -Dgap \cdot \frac{\Delta(1+i)}{(1+i)} \cdot A$, where *i* is the discounting interest rate. The more positive and large the duration gap is, the more a change in the interest rate causes a greater change in the current value of net worth. In this situation, an increase in interest rates will erode the current value of net worth and a decline in interest rates will increase it.

[28] The 2002 Survey of the Banking Supervision Department, Appendix 2, p. 198, explains how the given value at interest-rate risk is calculated according to the historical-scenarios approach.

NIS 2.7 billion in 2002. All groups were exposed to higher interest rates in all three indexation segments.

The value at interest-rate risk ranged from 7.3 percent of net worth (6.7 percent of equity) at the Hapoalim group, about NIS 1 billion, to 88.7 percent of net worth (15.2 percent of equity) at the First International group, NIS 560 million (Table 4.11). The Leumi and Hapoalim groups had the highest total VaRs—NIS 1 billion for each group—and the Hapoalim group's VaR doubled relative to the 2002 level.[29] Total VaR was calculated as the sum of the VaRs in each segment, reflecting the conservative assumption of a worst-case scenario in which the risk in all segments is realized concurrently and the correspondence among changes in interest rates is disregarded.

Most of the hefty NIS 1.1 billion increase in the VaR of the five large banking groups at the end of 2003 took place in the NIS activity segments (unindexed and CPI-indexed) and traces to an appreciable increase in the duration gap—the gap between duration of assets and the duration of liabilities—in each segment (Table 4.11). The increase in duration gap in unindexed activity had an especially powerful effect, particularly at the Discount, Hapoalim, and First International groups. The widening of the duration gap in this segment caused most banking groups' VaR to increase, even though the groups' maximum exposure to interest rate increases declined from 2.51 percentage points in 2002 to 1.61 in 2003 (Table 4.11 and Figure 4.12). In CPI-indexed activity, the effect of the price did not change; all banking groups were exposed to a maximum interest increase of 0.95 percentage point in 2003, as in 2002 (Table 4.11 and Figure 4.12).

In practice, interest rates declined in 2003, especially in the NIS activity segments (unindexed and CPI-indexed), as described above. These decreases, coupled with the aforementioned positive duration gaps in all three indexation segments for each banking group at the end of 2003, raised the net worth of all five groups. For example, the yield to maturity of thirty-day Treasury bills, which correlates positively with interest rates in unindexed activity and is used to discount assets and liabilities in this segment for the calculation of their current value, declined by 0.3 percentage point on monthly average in 2003 (3.6 percentage points in annual terms). The monthly decrease, coupled with the positive duration-gap data—computed on the basis of Appendix D of the 2003 annual financial statements—indicate that the net worth of the banking groups increased by NIS 223.2 million per month on average on account of unindexed activity. Similarly, the yield to maturity of five-year CPI-indexed government bonds (Sagi and Galil), which correlates positively to interest rates in the CPI-indexed segment and is used to discount assets and liabilities in this segment, declined by 0.14 percent point on monthly average in 2003. This decline, coupled with the positive duration gaps observed in this segment, point to an increase of NIS 289.9 million on average in the net worth of the banking groups during one month in CPI-indexed activity.

[29] Some of the increase in VaR/net worth at the Hapoalim and First International groups occurred because these banks, for the first time, classified of overruns of credit facilities as assets without payback term in Appendix D of their annual financial statements.

Table 4.11
Exposure to Changes in Interest Rates Using the Historical Scenario Method, the Five Major Banking Groups, December 2002 and December 2003

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Unindexed segment										
Total exposure[a] *(NIS million)*	1,351	437	–675	492	850	–3,176	–616	–654	–174	–2133
Duration of assets (*years*)	0.48	0.54	0.40	0.58	0.31	0.60	0.20	0.27	0.22	1.12
Duration of liabilities (*years*)	0.20	0.26	0.21	0.23	0.28	0.40	0.11	0.14	0.17	0.27
Duration of net worth[b] (*percent*)	16.35	50.91	12.15	33.90	2.67	5.06	3.45	5.40	7.47	10.20
Modified duration[c] (*percent*)	14.90	47.85	11.07	31.86	2.44	4.75	3.14	5.08	6.81	9.58
Duration gap (Dgap) *(years)*	0.28	0.27	0.19	0.36	0.03	0.19	0.08	0.12	0.05	0.83
Maximum change in interest *(percentage points)*	2.51	1.61	2.51	1.61	2.51	1.61	2.51	1.61	2.51	1.61
VaR[d] (*NIS million*)	504.4	336.9	187.5	252.8	51.9	243.4	48.5	53.5	29.7	329.7
Indexed segment[e]										
Total exposure *(NIS million)*	7,484	9,270	3,004	3,185	10,079	14,119	3,529	3,941	2,628	2,955
Duration of assets *(years)*	3.91	4.26	3.93	4.36	3.69	3.89	4.06	4.24	3.57	3.77
Duration of liabilities (*percent*)	3.37	3.77	3.33	3.47	3.70	3.76	3.67	3.88	2.78	2.83
Duration of net worth (*percent*)	7.80	7.13	8.58	10.68	3.63	4.40	7.57	7.09	7.99	8.45
Modified duration (*percent*)	7.39	6.84	8.12	10.25	3.44	4.22	7.17	6.81	7.56	8.11
Duration gap (Dgap) *(years)*	0.96	1.05	0.97	1.32	0.53	0.90	0.77	0.79	1.21	1.42
Maximum change in interest *(percentage points)*	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
VaR *(NIS million)*	523.9	601.1	231.1	309.4	328.2	564.7	239.7	254.3	188.3	227.1

Table 4.11 (continued)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Foreign-currency segment[f]										
Total exposure *(NIS million)*	1,481	1,839	1,087	101	900	2,693	56	–162	238	–190
Duration of assets (*years*)	0.52	0.79	1.62	2.11	0.62	1.11	0.41	0.51	0.29	0.36
Duration of liabilities (*years*)	0.49	0.63	0.92	1.05	0.42	0.78	0.41	0.31	0.28	0.32
Duration of net worth (*percent*)	2.80	10.08	44.51	707.89	23.73	16.02	0.45	23.08	1.15	4.11
Modified duration (*percent*)	2.74	9.85	43.50	691.82	25.14	15.65	0.44	22.54	1.12	4.01
Duration gap (Dgap) *(years)*	0.04	0.18	0.72	1.07	0.20	0.35	0.00	0.19	0.01	0.04
Maximum change in interest *(percentage points)*	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
VaR (*NIS million*)	18.0	80.3	209.7	309.2	100.4	186.9	0.1	16.2	1.2	3.4
Total value at risk[g] *(NIS million)*	1,046.3	1,018.4	628.3	871.3	480.5	995.0	288.4	324.1	219.2	560.1
Total position[h] *(NIS million)*	10,316	11,546	3,416	3,778	11,829	13,635	2,969	3,124	2,692	632
VaR as percent of net worth	10.1	8.8	18.4	23.1	4.1	7.3	9.7	10.4	8.1	88.7
VaR as percent of equity	7.7	7.0	11.4	13.5	3.6	6.7	7.8	7.8	6.4	15.2

[a] Present value of assets and liabilities, 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 1 percentage-point change in the interest rate.

[d] The change, in NIS million, that will occur in the state of the bank due to the maximum change in interest rates: a rise of 1.61 or a fall of 1.14 percentage points in unindexed interest in 2003; a rise of 2.51 or a fall of 1.47 percentage points in unindexed interest in 2002; a rise of 0.95 or a fall of 0.83 percentage points in real interest in 2003; a rise of 0.95or a fall of 1.1 percentage points in real interest in 2002, and a rise of 0.44 or a fall of 0.91 percentage points in dollar interest in 2002 and 2003. According to the distribution of changes in the interest rates in the last five years, the probability of changes greater than those cited is less than one percent.

[e] Including the CPI/dollar indexation option.

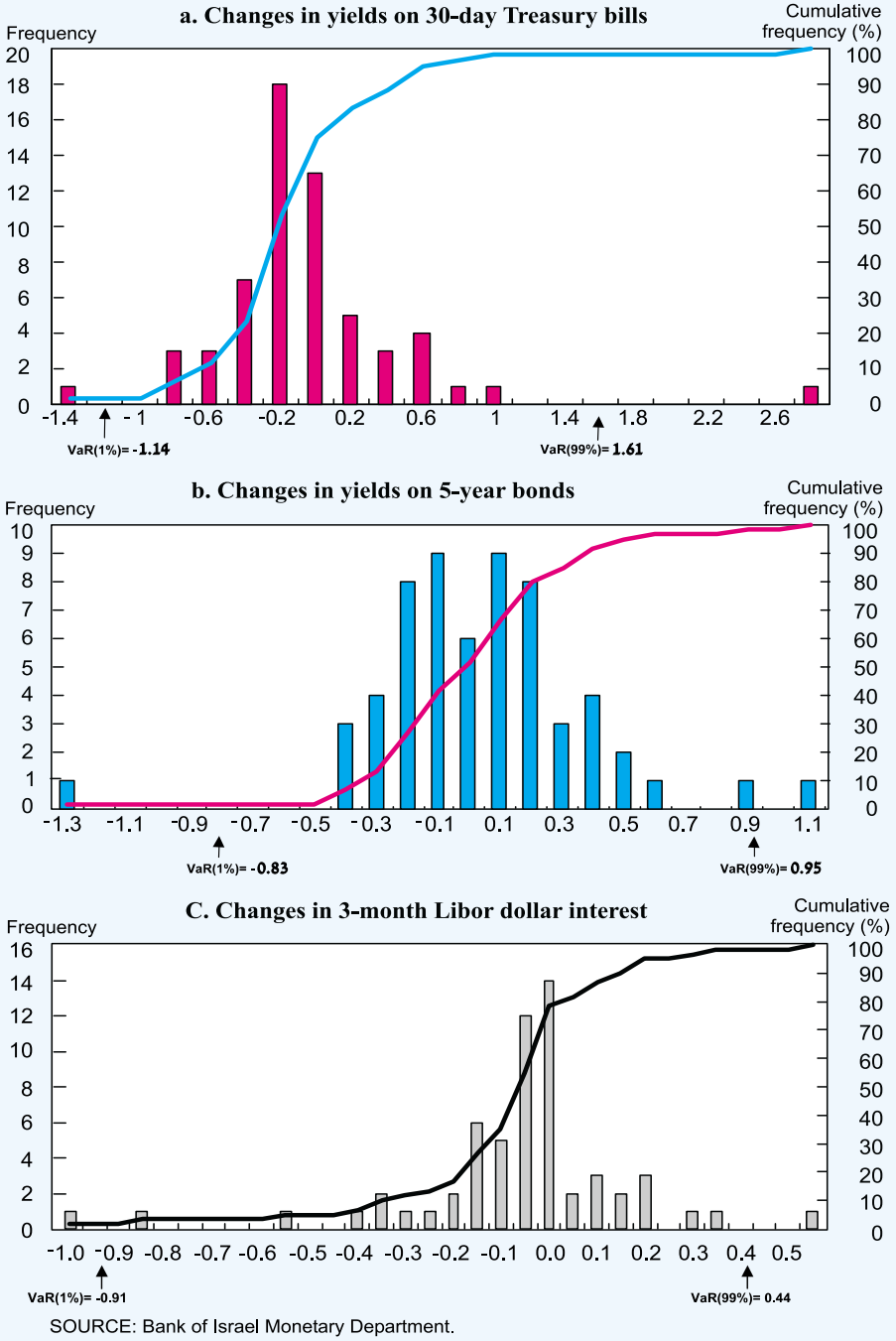
[f] Including foreign-currency-indexed.

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

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

SOURCE: Published financial statements and Bank of Israel Monetary Department.

Figure 4.12
Frequency and Cumulative Frequency of Monthly Changes in Selected Interest Rates, 1998-2003



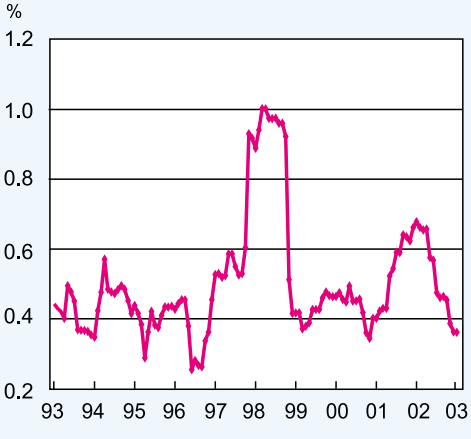
SOURCE: Bank of Israel Monetary Department.

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

(i) General remarks

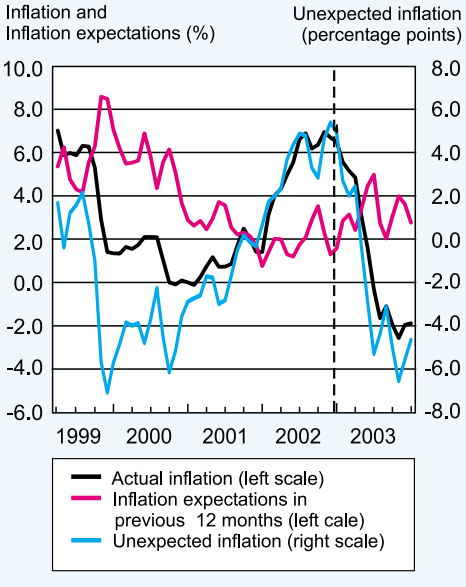
The Consumer Price Index declined by 1.9 percent in 2003, including 1.4 percent in the second half of the year. The main factors behind the decrease were the recession and the 5.2 percent appreciation of the NIS against the dollar.[30] Inflation uncertainty also declined, as reflected in a decrease in the standard deviation of inflation during all months of the year (Figure 4.13). The standard deviation decreased because the downtrend in prices in 2003 was gentler than the steep price increases that occurred in 2002. Additionally, the favorable trend of the unforeseen component of inflation[31] (4.9 percentage points at the end of 2002) reversed direction and became negative (–4.6 percentage points at the end of 2003), due to the gap between the capital market's inflation expectations (2.7 percent) and actual inflation (–1.9 percent) (Figure 4.14). The unexpected CPI decrease eroded the net worth of banks that had net liabilities surpluses in unindexed NIS activity.

Figure 4.13
Annual Standard Deviation of Inflation, December 1993-December 2003



SOURCE: Bank of Israel Monetary Department and the Bank of Israel Banking Supervision Research Department.

Figure 4.14
Actual Inflation, Inflation Expectations and Unexpected Inflation in Previous 12 months, March 1999-December 2003



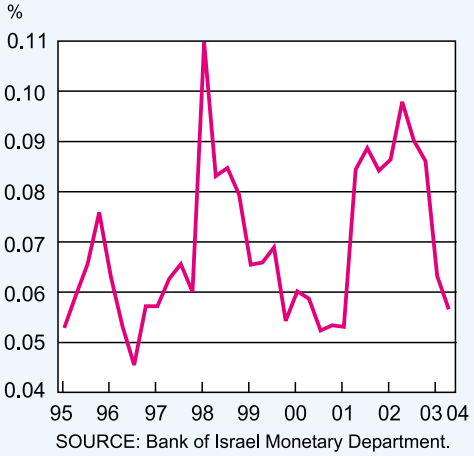
SOURCE: Bank of Israel Monetary Department and the Bank of Israel Banking pervision Research Department.

[30] Although real activity recovered in the second half of the year, the GDP gap remained severely negative, easing pressure for price increases and even generating deflationary pressure (Inflation Report for the second half of 2003).

[31] The difference between actual annual inflation and inflation expectations in the preceding twelve months.

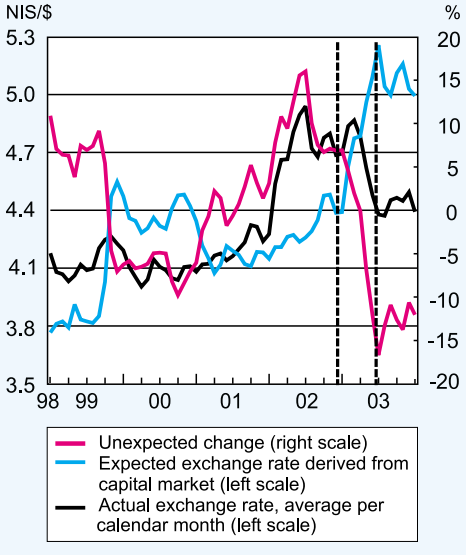
The decline in economic uncertainty in 2003 was manifested in a decrease in expected exchange-rate risk in the forex market. The decline in expected risk was reflected in a decrease in the implicit standard deviation[32] of NIS/dollar options (Figure 4.15) and mirrored the expectation of stability in the forex market. The NIS in fact appreciated against the dollar considerably in nominal terms, in contrast to the capital market's expectations. The gap between expectations and actual changes in the exchange rate caused the unforeseen component of the exchange rate to increase in 2003 by 12 percent (Figure 4.16).[33] The result was erosion in the net worth of banks that had net assets surpluses in their forex segment.

Figure 4.15
Implied Volatility of Foreign-Currency 3-Month Call Options, December 1995-March 2004



SOURCE: Bank of Israel Monetary Department.

Figure 4.16
The Actual NIS/$ Exchange Rate, The Expected Exchange Rate, and the Unexpected Change in the Exchange Rate in 12 Months, December 1998-December 2003



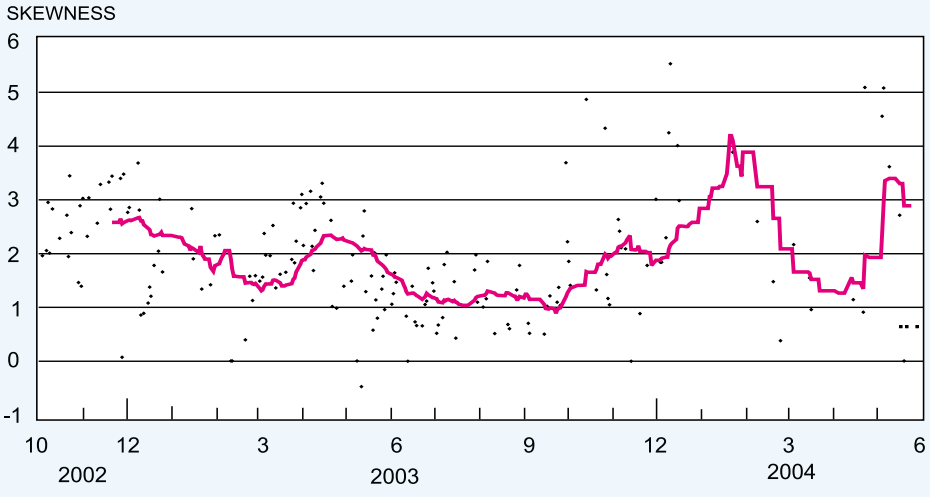
SOURCE: Bank of Israel Monetary Department and the Bank of Israel Banking Supervision Research Department.

The perceptible misalignment between the public's expectations of exchange-rate changes and actual developments shows that Israelis at large have not internalized the risk of currency appreciation. This led to forex instability, due to decisions made by some banks about the direction of the exposure to exchange-rate changes, and to a decrease in the contribution of the forex sector to interest earnings (Figure 3.9).

[32] Calculated on three-month call options issued by the Bank of Israel.

[33] One may calculate the public's expectations of the expected distribution of the exchange rate on the basis of trading of NIS/dollar options for each trading day during the recent period. On the basis of the distribution, one may calculate a daily skewness index that shows how badly the distribution is skewed. When the index is positive, expectations point in the direction of depreciation, and vice versa. As Figure 4.17 shows, the index was positive throughout 2003 (except for one day of trading), denoting depreciation expectations, even as the actual exchange rate moved in the opposite direction (Figure 4.16).

Figure 4.17
Skewness of the Distribution of the NIS/$ Exchange Rate, October 2002-June 2004



SOURCE: Y. Hecht and E. Pompushko, 2004, "*Normality, Common Risk Level, and Exchange-Rate Jumps*," Monetary Studies, Bank of Israel Monetary Department (forthcoming).

(ii) Value at indexation-basis risk

The total value at indexation-basis risk (exchange-rate and inflation) increased at the Discount and Hapoalim groups, increased slightly at the First International group, and declined at the others (Table 4.13). The banking groups have long been less exposed to indexation-basis risk than to interest-rate risks. In 2002, the value at indexation-basis risk was no more than 0.5 percent of net worth or 0.3 percent of equity for most of the large banking groups. The highest ratio of VaR to net worth was that of the Discount group (1.6 percent).

Unindexed activity

The five banking groups' position in this segment was –NIS 0.27 billion (a negative position) as against a positive position of NIS 2.3 billion in 2002. This is the result of developments in the two elements that make up this position—balance-sheet and off-balance-sheet activity (Table 4.12). In balance-sheet activity, the difference between assets and liabilities in this segment decreased from –NIS 20.4 billion at the end of 2002 to –NIS 23.5 billion at the end of 2003. This year, as before, the banking groups used off-balance-sheet activity to limit their exposure to inflation risk. Thus, the effect of futures transactions (NIS 23.2 billion in 2003 as against NIS 22.8 billion in 2002) reduced the total position in this segment by only NIS 0.27 billion (Table 4.12), as stated.

The value at inflation risk reflects the maximum deterioration that the financial condition of a bank may suffer due to a change in the Consumer Price Index. VaR was obtained by multiplying the total position by the maximum expected monthly change in

the Consumer Price Index, in accordance with the direction of the exposure (increase or decrease in the CPI). The direction of the exposure was different among the banking groups; Leumi, Discount, and First International were exposed to CPI increase at a maximum rate of 1.41 percent because they had positive positions in this segment, whereas the Hapoalim and United Mizrahi groups were exposed to a maximum decrease of 0.79 percent due to a negative position in the segment (Table 4.13 and Figure 4.18). At the end of 2003, VaR ranged from NIS 1.9 million at the First International group to NIS 15.4 million at the Hapoalim group—much smaller sums than those at interest-rate risk, indicating that inflation risks were low in 2003, as in previous years.

CPI-indexed activity

Price risk in this segment is zero by definition, since the total position in real terms is unaffected by changes in relative prices, i.e., by changes in the Consumer Price Index and NIS exchange rates. Nevertheless, positions in this segment are meaningful because they are closed by counter-positions in the two other indexation sectors (unindexed and forex-indexed).

The total position of the five banking groups in this segment was NIS 8.1 billion (including financial capital as a source in this segment) as against a negative position of NIS 4 billion in 2002 (Table 4.12).[34]

Forex-indexed activity

The five banking groups' position in this activity segment was NIS 898 million in 2003 as against NIS 1.6 billion in 2002. This sum is the result of the performance of its two components—balance-sheet and off-balance-sheet (Table 4.12). In balance-sheet activity, the difference between assets and liabilities in this segment narrowed slightly, from NIS 22.6 billion at the end of 2002 to NIS 22.4 billion at the end of 2003.

This year, as before, the banking groups used off-balance-sheet activity to reduce their exposure to exchange-rate risk. Thus, the effect of NIS 21.5 billion in futures transactions (as against NIS 21 billion in 2002), reduced the total position in this segment to only NIS 898 million, as stated (Table 4.12).

The groups' exposure to exchange-rate risk, in terms of both direction and size, reflects among other things their belief about where the exchange rate is heading and the way they manage risks. Since risks are measured in real terms, a position in this segment is susceptible to changes in both the exchange rate and inflation, i.e., the real exchange rate. The Leumi and Hapoalim groups were exposed to a 3.72 percent maximum real

[34] In June 2004, the Supervisor of Banks, in an ad hoc directive, amended Proper Banking Management Directive 341, concerning "management of risks and capital allocation for exposure to market risks." The ad hoc directive was promulgated in response to the decision of the Israel Accounting Standards Board to revert to nominal, as opposed to adjusted, financial statements starting on January 1, 2004. The amendment to the Directive indicates that financial capital may be charged to the unindexed segment and not only to the CPI-indexed segment, as in foregoing computation.

Table 4.12
Difference Between Assets and Liabilities, and the Effect of Derivatives, by Indexation Base, the Five Major Banking Groups, 2000–2003

(NIS million, December 2003 prices)

			Foreign currency				
	Un-indexed	CPI-indexed[a]	$	Other currencies	Financial capital	Non-financial items	Total
2000							
Assets *less* liabilities	–27,400	27,584	11,108	10,915	22,207	15,945	38,151
Effect of derivatives	23,556	–2,001	–10,294	–11,261			
Total position in segment	–3,844	25,583	814	–346			
2001							
Assets *less* liabilities	–32,887	29,937	20,323	6,207	23,581	16,338	39,919
Effect of derivatives	29,640	–2,905	–20,503	–6,222			
Total position in segment	–3,247	27,032	–189	–16			
2002							
Assets *less* liabilities	–20,443	22,162	20,817	1,779	24,315	15,411	39,725
Effect of derivatives	22,758	–1,796	–18,969	–1,992			
Total position in segment	2,315	20,365	1,847	–213			
2003							
Assets *less* liabilities	–23,512	27,288	13,840	8,524	17,381	26,140	43,521
Effect of derivatives	23,242	–1,776	–11,363	–10,103			
Total position in segment	–270	25,512	2,477	–1,579			

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

depreciation because they had positive positions in this segment, whereas the Discount, United Mizrahi, and First International groups were exposed to a 4.26 percent maximum real appreciation because their positions in this segment were negative (Table 4.13 and Figure 4.18).

VaR ranged from NIS 3.8 million at the United Mizrahi group to NIS 34.3 million at the Hapoalim group. These sums are much lower than the values at interest-rate risk and point to a low level of exposure to exchange-rate risks in 2003, as in previous years.

In sum, market risks increased considerably in 2003 due to an NIS 1.1 billion increase in the value at interest-rate risk. The upturn in this VaR traces largely to a widening of duration spreads in the NIS segments and is a direct outcome of banks' decisions about how to manage interest-rate risks. However, the level of market risks is still relatively low and its share in the banks' total VaR was only 1.7 percent. In terms of minimum capital ratio, market risks increased by a negligible 0.15 percentage point (out of the total ratio of 10.3 percent in 2003).

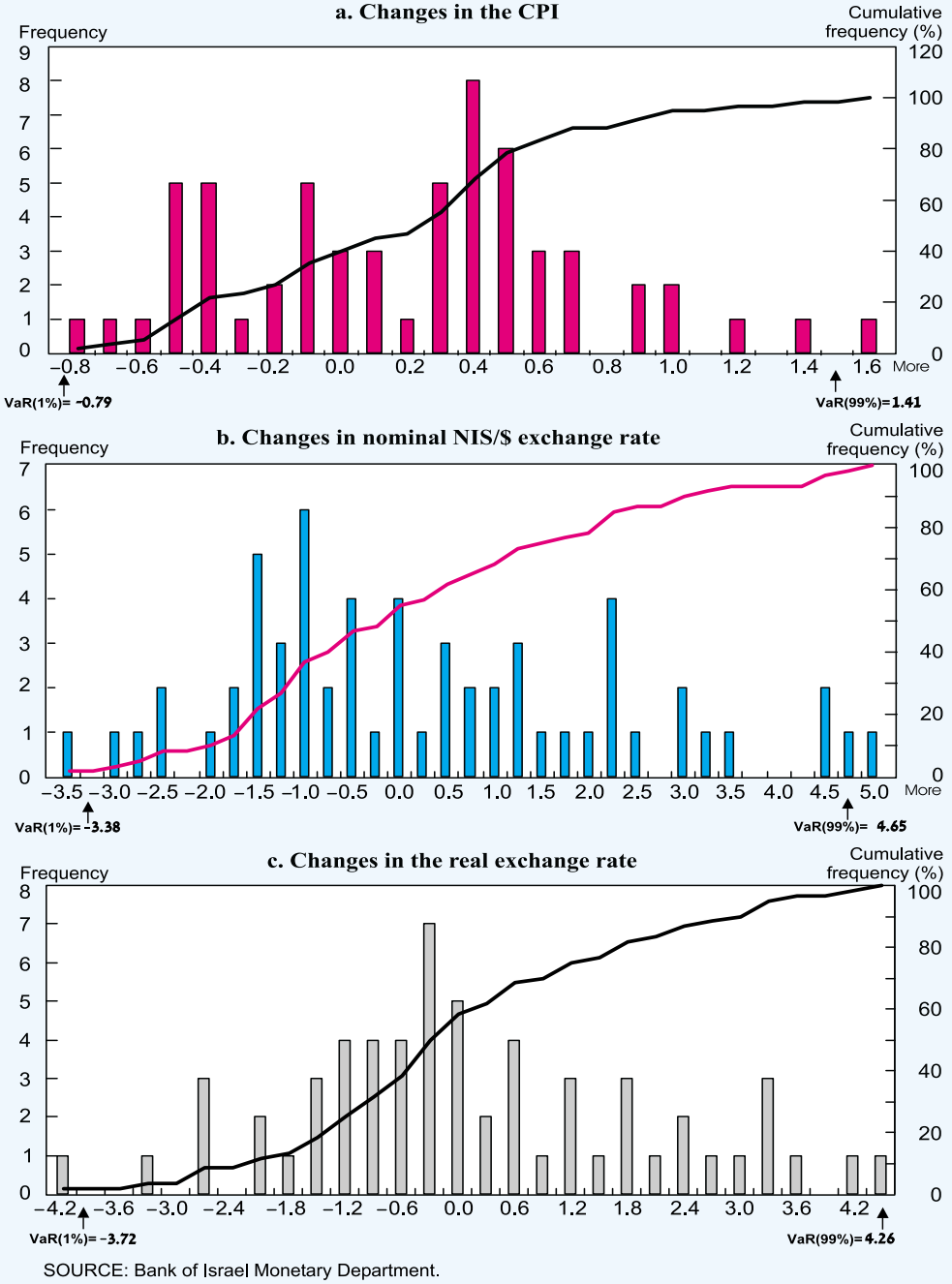
Table 4.13
Exposure to Changes in Inflation and the Real Exchange Rate, the Five Major Banking Groups, December 2002 and December 2003

(NIS million, December 2003 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Unindexed segment										
Assets *less* liabilities	–7,287	–3,103	–2,650	–1,918	–7,234	–11,492	–2,557	–4,512	–715	–2,487
Effect of futures and options	9,528	3,970	2,276	2,853	7,605	9,540	2,252	4,260	1,097	2,619
Total position in segment[a]	2,241	867	–374	935	371	–1,952	–305	–252	382	132
Change in CPI[b] (%)	2.14	1.41	–0.79	1.41	2.14	–0.79	–0.79	–0.79	2.14	1.41
Value at risk[c]	48.0	12.2	2.9	13.1	7.9	15.4	2.4	2.0	8.2	1.9
Indexed segment[d]										
Assets *less* liabilities	6,426	8,019	1,807	1,891	9,373	11,384	2,319	3,664	2,236	2,330
Effect of futures and options	–687	–603	121	–221	–1,379	–294	368	–725	–219	67
Financial capital	8,817	9,082	1,684	2,117	8,890	10,061	2,531	2,597	2,393	2,283
Total position in segment	–3,077	–1,666	244	–447	–897	1,029	156	342	–376	114
Foreign-currency segment[e]										
Assets *less* liabilities	9,677	4,166	2,526	2,144	6,751	10,169	2,769	3,445	872	2,440
Effect of futures and options	–8,841	–3,367	–2,397	–2,632	–6,225	–9,246	–2,620	–3,535	–878	–2,686
Total position in segment[f]	836	799	130	–488	526	923	149	–90	–6	–246
Change in real exchange rate[g] (%)	–3.39	–3.72	–3.39	4.26	–3.39	–3.72	–3.39	4.26	5.60	4.26
Value at risk[c]	28.4	29.7	4.4	20.8	17.9	34.3	5.1	3.8	0.3	10.5
Total value at risk[h]	**76.4**	**41.9**	**7.3**	**33.9**	**25.8**	**49.7**	**7.5**	**5.8**	**8.5**	**12.3**
As percentage of financial capital	0.9	0.5	0.4	1.6	0.3	0.5	0.3	0.2	0.4	0.5
As percentage of equity	0.6	0.3	0.1	0.5	0.2	0.3	0.2	0.1	0.2	0.3

[a] If the sign is positive an unexpected rise in inflation will erode capital, and a decline will increase it, and vice versa if the sign is negative.
[b] Maximum change in CPI derived from the distribution of changes over the last five years; the probability of a change greater than this is less than 1 percent.
[c] The change (in NIS million) in a bank's situation which would arise from the maximum change in CPI and the exchange rate. A 2.14 percent rise or 0.79 percent fall in 2002, 1.41 percent rise or 0.79 percent fall in 2003 for changes in inflation, and a 5.6 percent rise or 3.39 percent fall in 2002, and a 4.26 percent rise or 3.72 percent fall in 2003 for changes in the real exchange rate.
[d] Including the CPI/dollar indexation option.
[e] Including foreign-currency indexation.
[f] If the sign is positive an unexpected decline in the real exchange rate will erode capital, and a rise will increase it, and vice versa if the sign is negative.
[g] Change in the $/NIS real exchange rate derived from exchange-rate changes over the last five years; the probability of a change greater than this is less than 1 percent.
[h] Total value at risk is obtained by adding value at risk in the unindexed and foreign-currency-indexed segments, under the assumption that the worst change (for the bank) will occur in both segments (perfect correlation, negative or positive, between the risks).
SOURCE: Based on published financial statements.

Figure 4.18
Frequency and Cumulative Frequency of Monthly Changes in the CPI and in the NIS/$ Exchange Rate, 1999-2003



SOURCE: Bank of Israel Monetary Department.

3. LIQUIDITY RISK

Liquidity risk is defined as uncertainty about unforeseen withdrawals of deposits by the public and unforeseen demand for credit. If this risk becomes real, the bank may experience a shortage of liquidity (monetary and business) and have to liquidate assets at a submarket price (active asset management) and/or raise sources in the secondary market, e.g., by borrowing from other banks or from the Bank of Israel (active liability management) at an over-market price. In other words, changes in relative prices reflect the price of realization of the risk. The risk focuses mainly on balance-sheet items that have no contractual expiration dates, such as current deposits and SROs, but it also pertains to non-renewal of balance-sheet items that have known expiration dates, such as time deposits. This definition also includes off-balance-sheet items such as changes in the unused portion of credit facilities in current accounts and overdraft-facility accounts and in the level of credit guarantees.

Pursuant to the rising importance of liquidity-risk management in Israel and abroad, as reflected in the publication of principles for sound banking management of liquidity risk by the Basel Committee, the Supervisor of Banks, on August 26, 2003, issued a directive concerning the management of liquidity risk.[35] The directive requires banking corporations to manage liquidity risk in such a way that the ratio of liquid assets to liabilities of up to a one-month payback term shall not be lower than 1 (standard model). Alternatively, the bank may develop an internal model for the estimation of its liquidity risk, provided that the model takes all risk components into account.

This chapter presents a calculation for use in testing the liquidity risk of the five large banks in the unindexed and forex-indexed activity segments. Because daily data are lacking, the calculation is based on average monthly data in unindexed activity and on end-of-month data in forex activity, as reported to the Supervisor of Banks.[36]

Unindexed activity

The basis for calculating liquidity risk in unindexed activity is the bank's exposure to (net) withdrawals of liquid liabilities, including current deposits and SROs (balance-sheet items) and an increase in demand for credit, reflected in a decline in the unused portion of credit facilities (off-balance-sheet items).[37] Below we define the aforementioned balance-sheet and off-balance-sheet items that are exposed to the realization of liquidity risk as a "position." To estimate the bank's exposure to liquidity risk on account of these items, we choose in this report, for each of the five large banks, the value that truncates 1 percent (99 percent probability) from the distribution of actual changes in this position

[35] Proper Banking Management Directive 342.

[36] Importantly, the calculation is meant to provide only general information about the banks' liquidity risks in 2003 and should not be considered a recommendation to the banks to adopt it as an internal model of liquidity-risk management.

[37] The inclusion of only these items is due to data limitations. When banks calculate their exposure of liquidity risk, they should include additional items such as outstanding credit guarantees.

to the horizon of the coming month.We computed this value on the basis of the historical distribution of actual changes in the past three years and defined the result as the Value at Risk (VaR(1%)).[38] Performing a back test for this value during the 3/99–3/2004 period, we found that the value that truncates the distribution at a 1 percent level is still lower than the large (net) withdrawals that all banks experienced in several cases during the research period (mainly July 2002)[39] (Figures 4.18a and 4.18a). Pursuant to this finding, we performed a monthly stress test for VaR (1 percent) by multiplying VaR by 2. We found that this function does elicit values that exceeded the (net) withdrawals in the banks' positions at the time (Figures 4.19a and 4.19b).[40] This multiple, which we define as Value of Liquidity at Risk (LaR(1%)=VaR(1%)x2), reflects the bank's exposure to (net) withdrawals in its unindexed activity.[41] At the end of 2002, the results ranged from NIS 811 million at United Mizrahi Bank to NIS 2.6 billion at Bank Leumi (Table 4.14).

Banks' ability to cope with the possibility of the realization of this extent of liquidity risk in unindexed activity depends on how well they can sell and liquidate relatively liquid assets such as cash on hand, deposits with the Bank of Israel within the framework of daily and weekly monetary auctions (less the monetary liquidity requirement), and bank deposits and securities (Treasury bills and bonds held to maturity that are available for sale and trading). All five large banks held such assets in sums that far exceeded their exposure (Table 4.14), although their ability to liquidate some of these assets, especially bonds, quickly and with no material loss is limited. Generally speaking, then, the banks are well able to cope with liquidity risk in their unindexed activity by means of active asset management even in extreme events such as those that have occurred in recent years.[42]

[38] Although this value is expressed in NIS, one may also calculate it in percent. By calculating the maximum net expected withdrawal from the bank as a percent of outstanding liquid liabilities, one may express differences among banks in the level of these assets.

[39] In practice, the large net withdrawals at the end of the second quarter of 2002, peaking in July of that year, were occasioned by large withdrawals of SROs that month. The withdrawals took place due to a shift in the public's investments from unindexed assets to CPI-indexed assets in order to hedge against the upturns in inflation and inflation expectations that occurred at the time, and a shift from investing in unindexed assets to forex-indexed and -denominated assets. This was due to the narrowing of the NIS–forex interest spread, expectations of a steep currency depreciation against the dollar, and an upturn in economic uncertainty in the first half of 2002. These developments, coupled with a deterioration in security and an upturn in Israel's country risk as perceived by depositors, caused the public to reinvest some of its unindexed assets abroad.

[40] In a stress test, it is customary to examine the bank's ability to cope with the realization of a liquidity risk in respect to extreme exogenous events at other Israeli and foreign banks.

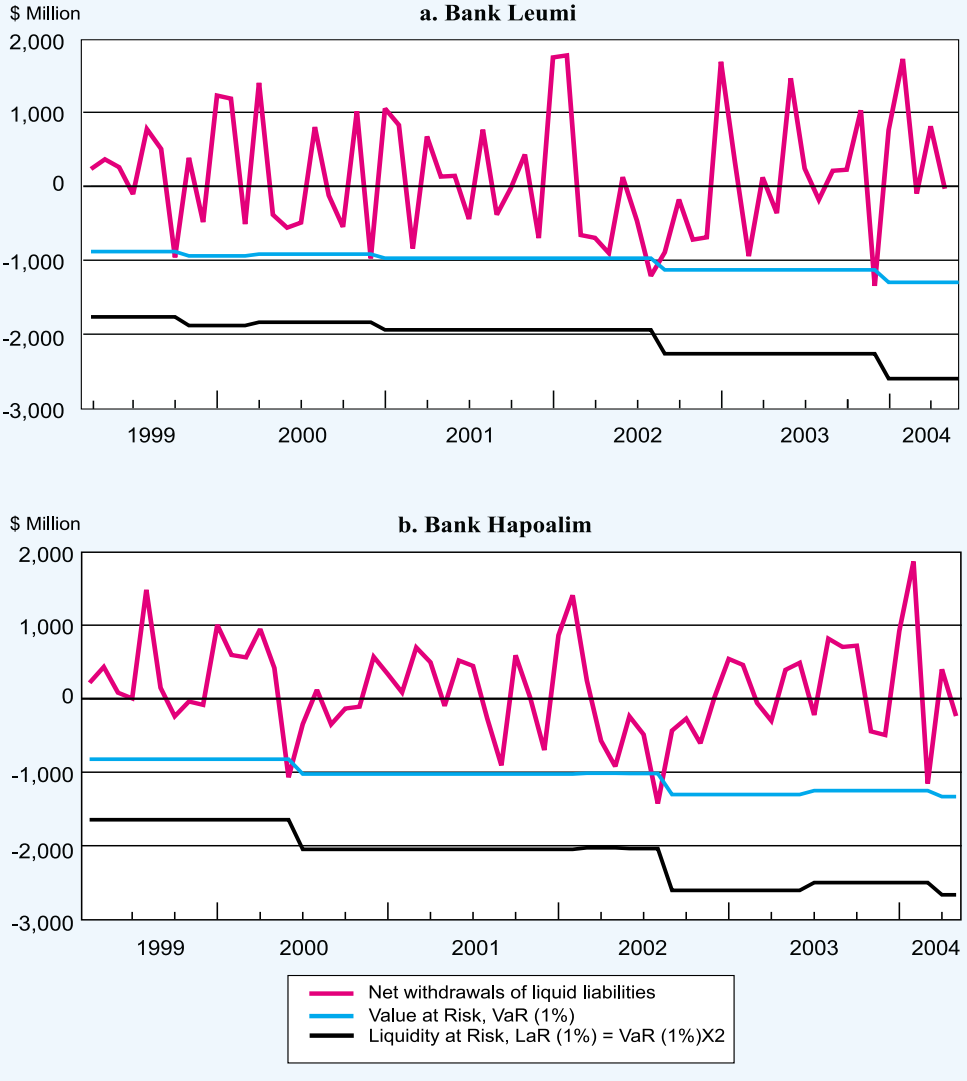
[41] Importantly, LaR reflects the potential (net) withdrawal liquid liabilities. In an analysis of liquidity risk, it is important to examine, in addition to the level of this value, the long-term volatility of the bank's liquid liabilities. Specifically, a bank that is noted for severe volatility in liquid liabilities would be considered at greater risk.

[42] As the banks' ability to cope with liquidity risk by means of active asset management is tested, their ability to do so by means of active liability management, such as borrowing from the Bank of Israel or from another commercial bank, should also be tested.

Forex activity

The calculation of liquidity risk in the forex activity segment is based on the foregoing computation of liquidity risk in unindexed activity. It is predicated on the bank's exposure

Figure 4.19
Back Test and Stress Test of Value at Liquidity Risk of Actual Withdrawals of Balances in Current Accounts and SROs and the Change in the Unutilized Component of Credit Facilities in the Unindexed Segment, March 1999-April 2004 (monthly averages)



SOURCE: Returns to the Supervisor of Banks.

Table 4.14
Liquidity-Risk Indices in the Five Major Banks, 2002–2003

(NIS million, December 2003 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Unindexed segment (end of year)										
Liquidity at risk (LaR) (NIS million)[a]	2,263	2,600	1,357	1,357	2,608	2,503	1,006	811	1,152	1,152
Total liquid assets that can be used to finance net withdrawals (NIS million)[b]	15,157	17,851	13,792	13,006	11,668	8,774	7,402	6,468	2,918	6,140
Ratio of liquid assets to LaR	6.7	6.9	10.2	9.6	4.5	3.5	7.4	8.0	2.5	5.3
Unindexed segment (annual average)										
Liquidity at risk (LaR) (NIS million)[a]	2,076	2,291	1,276	1,357	2,274	2,547	1,014	941	1,021	1,152
Total liquid assets that can be used to finance net withdrawals (NIS million)[b]	13,162	16,028	13,844	12,439	12,975	10,689	7,740	6,879	4,698	5,010
Ratio of liquid assets to LaR	6.3	7.0	10.8	9.2	5.7	4.2	7.6	7.3	4.6	4.4
Foreign currency segment (end of year)										
Liquidity at risk (LaR) (NIS million)[c]	831	1,547	441	441	769	622	242	189	424	454
Total liquid assets that can be used to finance net withdrawals (NIS million)[d]	7,173	8,800	2,694	2,331	3,427	5,936	2,246	2,390	1,644	1,913
Ratio of liquid assets to LaR	8.6	5.7	6.1	5.3	4.5	9.5	9.3	12.7	3.9	4.2
Foreign currency segment (annual average)										
Liquidity at risk (LaR) (NIS million)[c]	832	1,262	441	441	769	740	242	231	424	450
Total liquid assets that can be used to finance net withdrawals (NIS million)[d]	7,669	8,136	2,887	2,090	2,680	2,301	1,454	1,484	1,484	1,532
Ratio of liquid assets to LaR	9.2	6.4	6.5	4.7	3.5	3.1	6.0	6.4	3.5	3.4

[a] The value that cuts off 1 percent of the distribution of actual changes in the position with a planning horizon of one month based on the historical distribution of actual changes in the previous three years, at the 99% significance level. This value is multiplied by 2. The balance of liquid liabilities (the position) in the unindexed segment includes the current-account and SRO balance and the unutilized component of credit lines.

[b] Including cash and deposits in the Bank of Israel related to the daily and weekly auctions, *minus* the reserve requirement, deposits in banks and securities (held to maturity and available for sale and trading).

[c] The value that cuts off 1 percent of the distribution of actual changes in the position with a planning horizon of one month based on the historical distribution of actual changes in the previous two years, at the 99% significance level. This value is multiplied by 2. The balance of liquid liabilities (the position) in the foreign currency segment includes residents' and nonresidents' demand deposits.

[d] Including cash and deposits in the Bank of Israel in foreign currency *minus* the foreign currency reserve requirement and foreign currency bonds.

SOURCE: Returns to the Supervisor of Banks and the Bank of Israel Monetary Department.

to (net) withdrawals of liquid liabilities in forex, including the withdrawal of resident and nonresident demand deposits. Below we define the totality of the items mentioned above, which are susceptible to the realization of a liquidity risk, as a "position" in the forex activity segment. Due to data limitations, we calculated the Value at Risk, VaR(1%), i.e., the value that truncates 1 percent from the distribution of changes in the position in forex activity—on the basis of the historical distribution during the past two years. We multiplied this value by 2 because a back test for VaR in the 12/2002–4/2004 period showed that it is smaller than the net withdrawals that several banks actually recorded in recent years (much like the results obtained for the unindexed segment). This multiple, which we defined as the Liquidity Value at Risk (LaR(1%)=VaR(1%)x2), reflects the bank's exposure to net withdrawals of its liquid liabilities in the forex segment. In 2003, this value ranged, on average, from NIS 231 million at United Mizrahi Bank to NIS 1.3 billion at Bank Leumi (Table 4.14) and its performance varied among the five large banks in 2003—rising at Bank Leumi and First International and declining at Bank Hapoalim and United Mizrahi (Table 4.14).

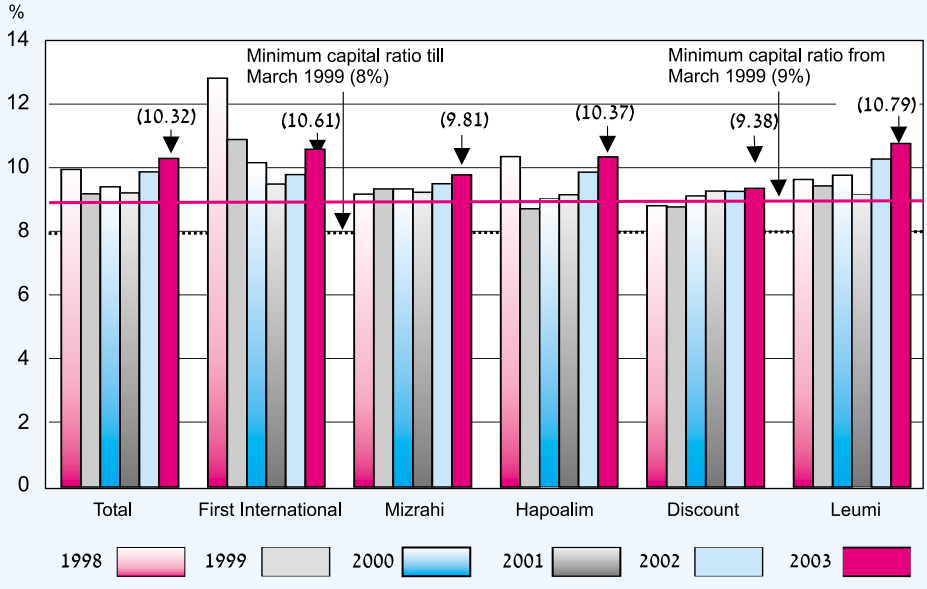
The liquid assets that were used to test the banks' ability to cope with the realization of a liquidity risk at the aforementioned levels in the forex sector include cash on hand and forex deposits with the Bank of Israel, less the forex reserve requirement and forex bonds.

All banks reported total liquid assets in forex that far exceeded the LaR values shown above (Table 4.14), indicating that they are relatively well able to cope with liquidity risk in forex activity by means of active asset management. Importantly, the use of surplus liquid sources from the unindexed NIS sector to contend with the realization of a liquidity risk in the forex sector may be expensive because such sources are susceptible to a market risk (currency depreciation).

4. CAPITAL ADEQUACY

Banks use their capital as a cushion to absorb losses that they may incur due to the realization of risks to which they are exposed. Capital adequacy, calculated on the basis of the recommendations of the Basel Committee, includes one capital allocation against credit risks (1988) and another against market risks (1996), as follows: **Basel I.** In June 2004, the Basel Committee released the final version of its new recommendations: **Basel II,** recommendations including considerable improvements in the method of computing the capital allocation for credit risks, reflected mainly in stronger correspondence of credit risks to the capital reserved on their account, and recommendations (for the first time) to allocate capital against operational risks. In regard to credit risks, Basel II recommends the use of one of two approaches toward capital allocation: (a) the standard approach, including a wider range of coefficients for the weighting of credit risks (from 0–100 percent, as under Basel I today, to 0–150 percent under the new Basel II guidelines, relying on credit ratings of business firms by outside rating agencies; (b) the Internal

Figure 4.20
Risk-Weighted Capital Ratio of the Major Banking Groups, 1998-2003



SOURCE: Published financial statements.

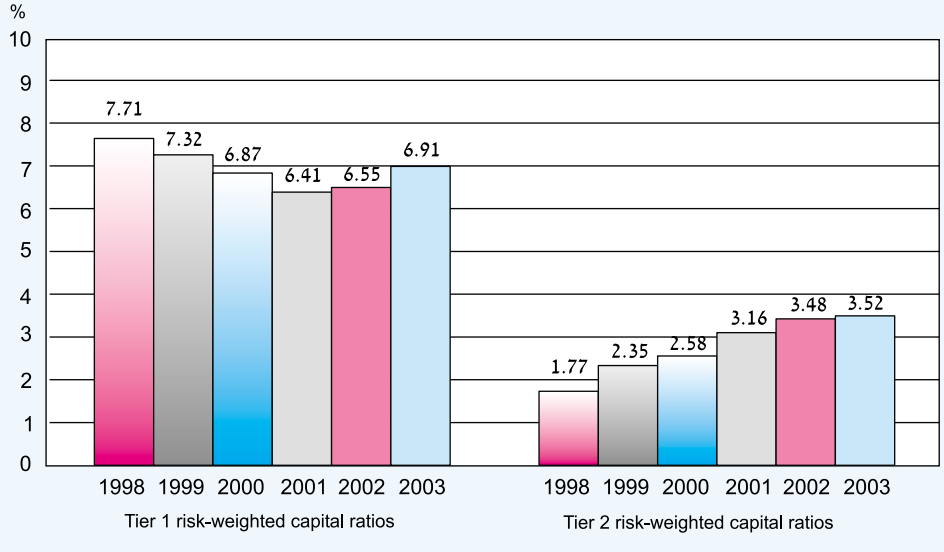
Rating Based Approach (IRB), in which banks estimate credit risks by means of internal credit ratings and advanced models. The new directives are expected to result in better and more professional risk management than in the past.

The aggregate risk-weighted capital ratio of the large banking groups climbed to 10.32 percent in 2003 after ending 2002 with an increase that resulted in a ratio of 9.9 percent at the end of the year (Table 4.15 and Figure 4.20). The capital ratios of all five banks increased and that of the First International group rose conspicuously. Bank Leumi had the highest ratio (10.79 percent); Israel Discount Bank had the lowest of (9.38 percent). The increase in the risk-weighted capital ratio of the five banking groups in 2003, as in 2002, was occasioned by a combination of two factors: (a) the absence of change in risk components (an increase of only 0.2 percent) due to a decline in credit to the public (1.3 percent), (b) an increase in the capital base (4.5 percent), and mainly, for the first time this year, an increase in Tier 1 capital (5.7 percent). The second factor, also in effect for the second straight year, reflected a declared policy on the part of the banks' managements, encouraged by the Supervisor of Banks, to improve capital adequacy. The purposes of the policy were to enable the banks to cope better with the realization of risks in the future and to improve the banks' status in the eyes of international rating companies so that the American regulatory authorities would license them as financial holding companies in the U.S. The expansion of the capital base was affected mainly, and for the first time this year, by an increase in Tier 1 capital (as against the increases in capital

base that were influenced in previous years by upturns in Tier 2 capital). The increase in Tier 1 capital occurred mainly due to an upturn in the groups' earnings.[43] Importantly, much of the improvement in earnings was abetted by factors external to the banking system that are cyclical in nature, such as activity in the capital market and changes in interest rates.

This development, coupled with the absence of change in risk assets, led to an improvement in capital quality as measured by the risk-weighted Tier 1 capital ratio, which climbed from 6.55 percent in 2002 to 6.91 percent in 2003 after an upturn in the previous year (Figure 4.21). The uptrend in the Tier 2 capital ratio, reflecting the less stable portion of capital, halted in 2003 for the first time. Thus, the ratio was maintained at the 2002 level of 3.52 percent (Figure 4.21). This was due to the halt, this year for the first time, of raising of deferred debt certificates.[44] The uptrend in the use of this capital

Figure 4.21
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 1998-2003



SOURCE: Published financial statements.

[43] None of the large banking groups issued shares in 2003 and the dividends distributed this year by the Leumi and Hapoalim groups, totaling NIS 792 million, had relatively little influence on the risk-weighted capital ratio (0.13 percentage point in minimum capital ratio terms).

[44] Deferred debt certificates account for most of Tier 2 capital and reflect capital that is less stable than Tier 1 from the bank's standpoint. This is because such certificates are cumulative (interest payments on them cannot be deferred), issued for a limited period of time, uncertain in terms of availability (beyond a specific term set forth in directives) and cost of renewal, and non-participatory in the losses of the issuing company on a regular basis.

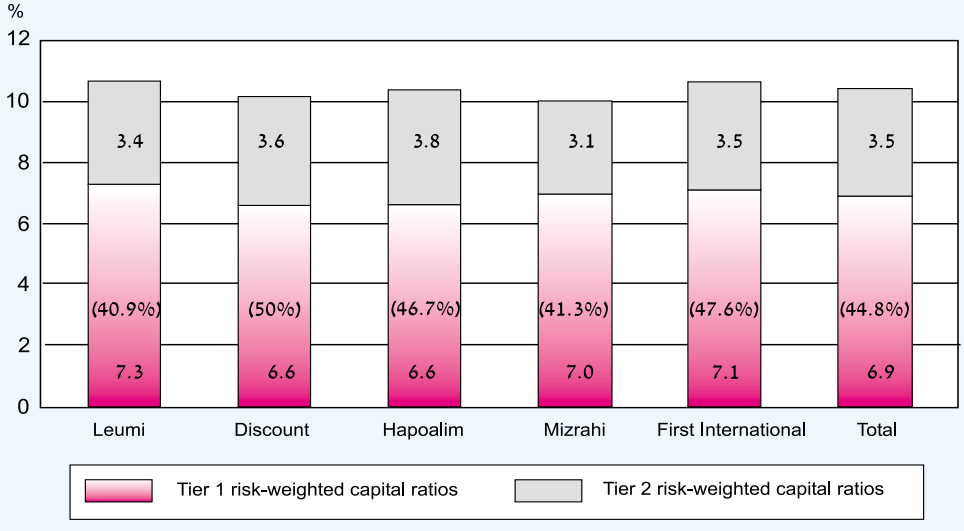
Table 4.15
Capital Ratios of the Five Major Banking Groups, 2002–2003

(NIS million, December 2003 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International		Total	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Equity[a]	13,560	14,471	5,513	6,453	13,527	14,757	3,718	4,158	3,407	3,682	39,725	43,521
Tier 1 capital[b]	13,675	14,345	5,921	6,112	13,667	14,567	3,751	4,133	3,423	3,584	40,437	42,741
Tier 2 capital[b]	6,737	6,649	3,163	3,302	8,182	8,251	1,784	1,811	1,625	1,785	21,491	21,798
Of which: Hybrid capital investment	402	402	0	0	737	735	0	0	0	0	1,139	1,137
Tier 3 capital	296	257	30	41	0	0	0	0	0	0	326	298
Investment in shares and subordinated notes of consolidated companies	–84	–26	–866	–763	–25	–38	–110	–129	–43	–22	–1,128	–978
Total capital for risk-weighted capital ratio calculation	20,624	21,225	8,248	8,692	21,824	22,780	5,425	5,815	5,005	5,347	61,126	63,859
Total balance sheet	243,861	246,921	137,490	139,898	258,166	259,572	75,977	79,019	64,529	64,662	780,023	90,072
Balance of off-balance-sheet instruments (notional value)	191,476	191,273	82,652	82,437	277,635	276,783	43,728	56,954	90,785	77,907	686,276	685,354
Credit value of off-balance-sheet items	35,169	34,453	16,497	16,921	47,562	44,564	10,646	11,973	11,856	11,389	121,730	119,300
Weighted balance-sheet balances of credit risk	168,360	167,860	77,365	79,569	185,181	185,482	46,980	48,398	41,504	41,438	519,390	522,747
Weighted off-balance-sheet balances of credit risk	27,174	24,799	10,616	11,449	33,444	30,631	9,555	10,332	8,599	8,328	89,388	85,539
Market risks	4,616	3,996	589	1,617	2,115	3,656	448	567	905	642	8,943	10,478
Total weighted items	200,150	196,655	88,840	92,635	220,740	219,769	56,983	59,297	51,008	50,408	617,721	618,764
						percent						
Capital/balance-sheet ratio	5.56	5.86	4.01	4.46	5.24	5.69	4.89					
Tier 1 risk-weighted capital ratio	6.83	7.29	6.66	6.60	6.19	6.63	6.58	6.97	6.71	7.11	6.55	6.91
Tier 2 risk-weighted capital ratio	3.37	3.38	3.56	3.56	3.71	3.75	3.13	3.05	3.19	3.54	3.48	3.52
Total risk-weighted capital ratio	10.30	10.79	9.28	9.38	9.89	10.37	9.52	9.81	9.81	10.61	9.90	10.32

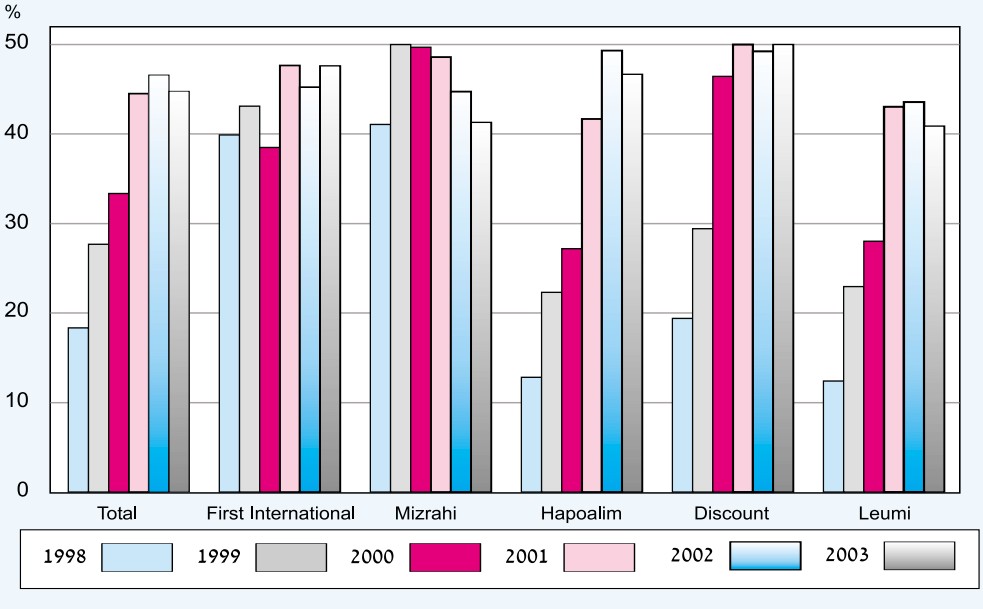
[a] Equity and minority interests, according to groups' balance sheets.
[b] In accordance with the minimum capital ratio requirement.
SOURCE: Published financial statements.

Figure 4.22
Risk-Weighted Capital Ratio, Tier 1 vis-à-vis Tier 2 Capital in the Five Major Banking Groups, 2003



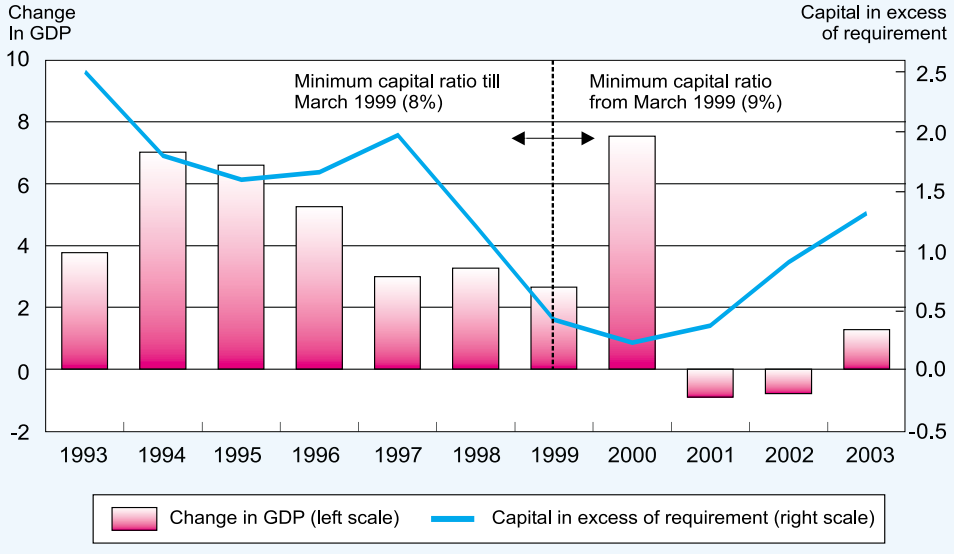
SOURCE: Published financial statements.

Figure 4.23
Ratio of Subordinated Notes to Tier 1 Capital Not Allocated Against Market Risks, the Five Major Banking Groups, 1998-2003



SOURCE: Published financial statements.

Figure 4.24
Annual Rates of Change in GDP and Capital in Excess of the Minimum Capital Ratio in the Five Major Banking Groups, 1998-2003 (percent)



SOURCE: Published financial statements.

instrument stopped because the banks were approaching the limit, set by the Supervisor of Banks in recent years, of a 50 percent share of deferred certificates of debt in Tier 1 capital (capital not allocated against market risks). The banks were able to stop the uptrend because they were able to increase their risk-weighted capital ratio by other means this year, as described above. In fact, the share of deferred certificates of debt in Tier 1 capital at the five large banking groups ended 2003 at 44.8 percent, down 1.8 percentage point (Figure 4.22). However, the banking groups did not perform identically in this respect. The First International and Discount groups increased their ratios and the latter group exceeded the limit set by the Supervisor of Banks (Figure 4.23).

In sum, the increase in capital ratios in 2003, against the background of the gentle recovery of economic activity that occurred during this time, points to a change in the correlation of business cycles to capital surpluses beyond the minimum that the Israeli banking system was required to maintain (Figure 4.24). In other words, the increase in the banks' capital ratios amidst a relative economic upturn boosted the margin of safety created by the ratios to a level exceeding the compulsory minimum. This will allow the banks to increase their lending to the public in the future and, thereby, to help the economy to continue emerging from the recession.[45]

[45] For a broader discussion of the correspondence between business cycles and capital surpluses beyond the compulsory minimum, see Box 1.1 on p. 31 of the 2002 survey of the Banking Supervision Department.