Chapter 5
Risks and Capital Adequacy

In the last few years liberalization and globalization have made Israel's economy more sensitive to shocks and changes in the international financial markets. In 2000 banks' exposure to credit risk and market risk rose. Capital adequacy, the purpose of which is to enable banks to absorb losses which may arise following the realization of some of the risks, declined. The marked upward trend in the five major banking groups' Tier 2 capital, which is characteristically less stable than Tier 1, persisted.

Exposure to credit risk rose in 2000 due to the continued marked increase in bank credit, which exceeded the rise in GDP. Credit to the construction and real estate industry rose considerably despite the slowdown in activity which has endured for four years. The increase in foreign-currency credit continued, but more slowly than in 1999. In most banking groups the ratio of loan loss provision to outstanding credit to the public went up, and concentration of the bank credit portfolio by borrower rose, as did the ratio of risk-weighted assets to total assets.

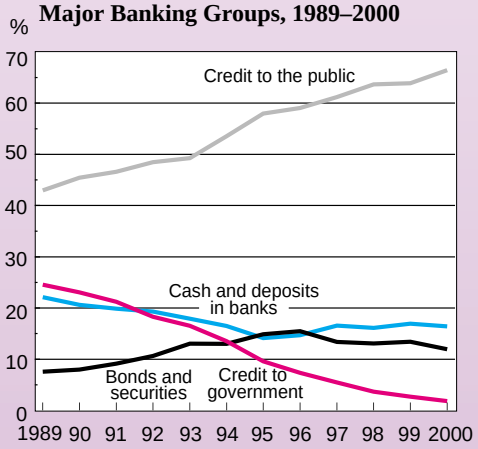
In the first quarter of 2001 economic activity remained at a low level, similar to that in the last quarter of 2000. Against the background of the significant slowdown in economic activity and the uncertainty as to the future caused by the security-related events and world wide economic trends, banks' credit risk rose in the first half of 2001. Most of the slowdown seems to be in the high-tech industries, construction and real estate, and tourism and related industries, all of which showed signs that they were encountering difficulties in the last quarter of 2000.

Banks' exposure to market risks also rose in 2000, mainly due to the increase in interest risk in most of the banking groups, although the risk level is still fairly low. Indexation-base risk (exposure to changes in the inflation and exchange rates) did not follow a uniform path in the large banking groups.

1. INTRODUCTION

The range of risks to which a bank is exposed in the course of its activity is diverse, and includes financial risks—credit risk, market risks and liquidity risk—and non-financial risks: operational risk, legal risk and risk of fraud and embezzlement. The data in this chapter[1] focus on the main financial risks and the banks' capital adequacy to face the totality of these risks.[2]

Figure 5.1
Shares of the Main Items in the Total Balance Sheet, the Five Major Banking Groups, 1989–2000



SOURCE: Published financial statements.

The banking system's exposure to credit risk rose in 2000. Bank credit grew by some NIS 51 billion, about 12.5 percent, and its share in the total balance sheet increased from 63.8 percent in 1999 to 66.4 percent in 2000. The total credit/equity ratio of the five major groups also went up notably, from 12.7 percent at the end of 1999 to 13.4 at the end of 2000. The increase in the share of credit to the public continues a long-term trend which is due mainly to the liberalization of the financial markets and from structural changes in Israel's economy. As part of this trend, banks expanded activities with relatively high credit risk, at the expense of less risky activity such as granting credit to the government (Figure 5.1). The higher credit-risk exposure of the banking system was the result of several changes in banking activity in the last few years, the main ones being credit on a significant scale being advanced to finance takeovers, a rise in banks' financing ratio, and a contraction of companies' working capital (see Chapter 2).

The rise in exposure to credit risk in 2000 derived in part from the marked increase in credit, which exceeded the growth of GDP. As GDP growth in 2000 was led by start-ups, which are generally financed by non-banking sources, the risk inherent in the rapid expansion of credit in 2000 was higher than that obtained from a comparison of the growth of business-sector product (7.7 percent)[3] with the rise in credit. In most banking groups the ratio of annual loan-loss provision to outstanding credit to the public rose, there was greater concentration of the credit portfolio by borrower, and the ratio of risk-weighted assets to total assets (including balance-sheet assets and the credit equivalent of off-balance-sheet items) rose too. Nevertheless, the rise in credit risk was not reflected

[1] The data presented in this section are based on the published financial statements of the five major banking groups, unless stated otherwise.
[2] For a reference to operational risk, see Box 5.1. Chapter 4 contains a reference to suspicions that an employee of Bank Leumi in Switzerland had performed unauthorized activities in customers' accounts.
[3] Business-sector product excluding start-ups grew by only 4.6 percent.

in the share of problem loans in total credit,[4] an index which in 2000 pointed to the stability of the quality of the credit portfolio.[5] In the light of Israel's economic recession, the sharp fall in share prices in the capital market in Israel and world wide, and the security-related events in Israel, it is doubtful whether the rate of annual loan-loss provision and the extent of problem loans in 2000 reflected the total credit risk of banks' credit portfolios.

In the first quarter of 2001 economic activity continued at a low level, similar to that in the previous quarter: business-sector product increased by only 1.4 percent in annual terms from its level in the equivalent quarter in 2000. The marked slowdown in economic activity and uncertainty regarding the security-related events, and economic trends world wide, increased banks' credit risk in the first half of 2001. The main effect seemed to be focused on the high-tech industries, construction, and tourism (and its related industries), all of which showed signs of difficulties in the last quarter of 2000.

An analysis of the components of credit in the five major banking groups by principal industry shows that credit risk in construction and real estate rose considerably: the industry's balance-sheet credit balance and off-balance-sheet credit equivalent surged by 10.8 percent, despite the slowdown in activity—reflected in a 4.7 percent reduction in output in 2000—that has persisted for four year. The credit/output ratio reached 5.47 at the end of 2000, far higher than that in all other principal industries (1.3 average). One explanation for the rise in credit in the industry despite the slowdown is that borrowers' demand for credit increased to finance their working capital (including debt restructuring), thereby raising banks' exposure to credit risk. The 90 percent increase in "open" foreign-currency credit (credit *less* collateral) to construction and real estate, which raised credit risk in this industry even further, is also worth noting. The relatively large share of credit to this industry in total credit, 17.6 percent, makes the bank credit portfolio highly concentrated. The realization of credit risk in the industry was reflected by a 30 percent rise in the specific loan-loss provision, and an increase in its share of total credit. Problem loans accounted for a significant share, 7.8 percent, of total credit in construction and real estate; this was mainly due to insolvencies and the erosion of collateral of borrowers who had run into difficulties as a result of the continued slowdown. The uncertainty regarding the future in the region in the light of the security-related and political events—which has a marked effect on the supply of labor in the industry—and the continuation of the slowdown into 2001 emphasize the rise in credit risk in the industry.

The upward trend in outstanding foreign-currency credit continued in 2000, but at a slower rate than in 1999. Non-dollar credit, however, surged by 20.3 percent, and consisted of credit in currencies with relatively low rates of interest, particularly the yen. Foreign-currency credit accounted for 33.3 percent of total credit to the public in 2000.

[4] Excluding indebtedness under special supervision and credit to borrowers not in agriculture which has been settled by the transfer of ownership of assets.

[5] This index may not reflect the quality of credit appropriately in a period of very rapid expansion of credit, such as in the last few years, due to the time lag between the granting of the credit and its being defined as a problem loan.

Banks' exposure to market risks also rose in 2000, due mainly to the rise in interest-rate risk (in all three indexation segments) in most banking groups.[6] Indexation basis risks (inflation and exchange rate) did not change uniformly in the major banking groups. Exposure to indexation basis risk also changed markedly from quarter to quarter in most of the groups, due to changes in the positions held by the banks in the unindexed and foreign-currency segments. The regulations of the Supervisor of Banks imposed a requirement on banks to hold capital against exposure to market risks too, with effect from the third quarter of 2000.

As banks' exposure to financial risks rose in 2000, the risk-based capital ratio of the five major banking groups declined from 9.4 percent in 1999 to 9.2 percent in 2000,[7] the result of changes in opposite directions in several components: the Tier 1 ratio fell in all banking groups in 2000, with part of the decline offset by a rise in the somewhat less stable Tier 2 capital. Tier 2 capital of the five major groups rose by 25 percent during the year, after rising by 47 percent in 1999.

This change in the composition of capital in 2000 is in line with changes which have taken place in the last few years in the capital mix. In the smaller banking groups the share of subordinated notes (which form part of Tier 2 capital) in Tier 1 capital was close to the 50 percent limit imposed by the Supervisor of Banks.

The increase in the share of Tier 2 capital is the result of the decision by banks' management to improve their capital adequacy by issuing subordinated notes. This step affords the issuer tax benefits, thus increasing profitability. A rise in Tier 2 capital also affords the opportunity to pay higher dividends from profit, and is an easier procedure than raising Tier 1 capital. However, the closer a bank is to the Banking Supervision limit, the more limited its ability to use this instrument to meet its capital requirement. Another disadvantage of subordinated notes is that they are somewhat less stable than Tier 1 capital, because they are accumulative, are issued for a limited period, do not participate in the current losses of the issuing corporation, and there is no certainty regarding the availability and cost of their renewals.

This chapter examines the financial risks banks are exposed to, focusing on the five major banking groups. It is difficult to quantify the overall level of risk because banks are exposed to a variety of risks that sometimes develop in opposite directions, and the tools used for measuring risks are neither uniform nor comprehensive. We nevertheless relate to several indices which reflect the various risks and the way they have been managed in the last few years.

[6] Nevertheless, exposure to market risks in all groups is lower than exposure to credit risks.

[7] The inclusion of the exposure to market risks component raised the minimum capital ratio by 0.15 percentage points in the five major banking groups.

2. CREDIT RISK

Since most of a bank's financial activity involves extending credit, credit risk is the main one of the range of financial risks to which a bank is exposed in the course of its activities. Credit risk derives from the possibility that a borrower or group of borrowers will not meet their liabilities on time, thereby adversely affecting the banks' income and capital. Exposure to credit risk can be divided into two components: (1) exposure due to credit given (balance-sheet activity), which rose from 63.8 percent of the total balance sheet of the five major banking groups at the end of 1999 to 66.4 percent at the end of 2000, and (2) exposure due to off-balance-sheet activity, i.e., customers' liabilities in respect of guarantees and transactions. The credit equivalent[8] of off-balance-sheet financial instruments increased slightly during 2000, reaching 14.7 percent of the total balance sheet at the end of the year, indicating the considerable credit risk inherent in this activity.

Credit risk exposure consists of three main elements: (1) the extent of credit, which is positively correlated with the degree of exposure; (2) the quality of credit, which is negatively correlated with it; and (3) the concentration of credit, measured by various parameters (industry, borrowers), which is positively correlated with it. Below we analyze exposure to credit risk, both in the banking system as a whole and at the level of the individual banking group, by examining developments in the three risk components.[9]

a. The size of the credit portfolio

The steep upward trend of the size of the credit portfolio of the five major banking groups—outstanding credit and the credit equivalent of off-balance-sheet items[10] — continued in 2000, and the portfolio grew faster than did GDP.[11] Outstanding credit to the public in the five groups rose by 12.5 percent to NIS 458 billion,[12] following a rise of 12.1 percent in 1999 (Table 5.1). All five groups showed an increase, with Hapoalim and Mizrahi heading the list.

Demand for credit of all types—unindexed, CPI-indexed, and foreign currency—rose during 2000, with unindexed credit showing the largest increase, 33.6 percent (Table 5.1). All components of unindexed credit experienced a rapid rise, the most notable

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

[9] Unlike the measurement of market risks, there is no generally accepted comprehensive approach to the measurement of credit risk, despite the fact that it constitutes the primary risk to banks. Sophisticated models for measuring credit risk have been developed in the last few years (see Box 4.2 in the 1998 Survey of Israel's Banking System, pp. 135–7), but they are not yet widely used. The Basel Committee on Banking Supervision in its new recommendations regarding capital adequacy (2001) emphasizes the importance of developing advanced models for measuring credit risk.

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

[11] For a detailed discussion of the rise in demand for credit, see Chapter 2.

[12] The ratio of credit to shareholders' equity at the five major banking groups also rose considerably in 2000.

Table 5.1
Distribution of Credit by Indexation Base, the Five Major Banking Groups, 1999–2000

		End-year balances (NIS million)					Distribution (percent)			
		Unindexed	CPI-indexed	In US$	In other currencies	Total	Unindexed	CPI-indexed	In US$	In other currencies
Leumi	1999	33,717	45,324	36,396	10,385	125,822	26.8	36.0	28.9	8.3
	2000	44,377	47,790	37,893	11,517	141,577	31.3	33.8	26.8	8.1
Change (*percent*)		31.6	5.4	4.1	10.9	12.5				
Discount	1999	20,051	18,741	19,970	3,462	62,224	32.2	30.1	32.1	5.6
	2000	22,379	19,664	21,771	4,383	68,197	32.8	28.8	31.9	6.4
Change (*percent*)		11.6	4.9	9.0	26.6	9.6				
Hapoalim	1999	30,097	53,333	42,604	9,530	135,564	22.2	39.3	31.4	7.0
	2000	44,178	55,875	42,854	11,964	154,871	28.5	36.1	27.7	7.7
Change (*percent*)		46.8	4.8	0.6	25.5	14.2				
Mizrahi	1999	9,174	28,526	5,217	2,065	44,982	20.4	63.4	11.6	4.6
	2000	12,198	30,696	5,789	2,727	51,410	23.7	59.7	11.3	5.3
Change (*percent*)		33.0	7.6	11.0	32.1	14.3				
First International	1999	11,253	13,339	10,493	3,620	38,705	29.1	34.5	27.1	9.4
	2000	16,248	12,425	9,224	4,370	42,267	38.4	29.4	21.8	10.3
Change (*percent*)		44.4	-6.9	-12.1	20.7	9.2				
Total	1999	104,292	159,263	114,680	29,062	407,297	25.6	39.1	28.2	7.1
	2000	139,380	166,450	117,531	34,961	458,322	30.4	36.3	25.6	7.6
Change (*percent*)		33.6	4.5	2.5	20.3	12.5				

SOURCE: Published financial statements.

Table 5.2
Distribution of Guarantees and other Liabilities, the Five Major Banking Groups, 1999–2000

	End-year balances (NIS million)[a]		Change from previous year (percent)	Distribution (percent)	
	1999	2000	2000	1999	2000
Documentary credit	5,026	5,355	6.5	3.7	3.8
Credit guarantees	19,570	21,716	11.0	14.2	15.4
Guarantees for home-buyers	22,831	19,469	–14.7	16.6	13.8
Other guarantees and liabilities	19,479	19,315	–0.8	14.2	13.7
Irrevocable liabilities on authorized credit not taken up	45,346	46,183	1.8	33.0	32.7
Liabilities on guarantee expenses	16,471	16,237	–1.4	12.0	11.5
Liabilities on unsettled credit-card transactions	8,760	12,995	48.3	6.4	9.2
Total	**137,483**	**141,270**	**2.8**	**100.0**	**100.0**

[a] At December 2000 prices.
SOURCE: Published financial statements.

being on-call credit and term credit. The rise of credit in the unindexed local-currency segment, despite the fact that its real cost is higher than that in the other segments, derived from expectations that its nominal cost would continue to fall, as inflation and its volatility came down. Borrowers therefore preferred to take short-term credit, the cost of which was expected to fall, rather than burden themselves with long-term, fixed-cost liabilities such as credit in the indexed segment. On-call credit grew by about NIS 15.5 billion in 2000, an annual rate of increase of 53 percent, after rising by 39 percent in 1999 and 53 percent in 1998. The largest part of the rise, NIS 10.5 billion, took place in the two largest banking groups.

Despite the continued decline in local-currency interest, there was no move from foreign-currency credit to local-currency credit. Outstanding foreign-currency credit in the five groups went up by 6.1 percent in 2000, after rising by 11.5 percent in 1999. Non-dollar credit, however, surged by a significant 20.3 percent; this credit was taken in currencies with relatively low rates of interest, mostly in yen.[13] The share of foreign-currency credit in total credit declined slightly in 2000, reaching 33.3 percent at the end of the year (Table 5.1).

Total foreign-currency-credit exposure of high-risk borrowers fell by 19.5 percent in 2000 in the seven largest banks, and open foreign-currency credit to these borrowers went down by 7.3 percent.[14] The decline in foreign-currency-credit risk can also be seen

[13] The NIS/yen exchange rate is more volatile than the NIS/dollar rate, and this affects credit risk in yen.
[14] Balance-sheet and off-balance-sheet foreign-currency exposure, *minus* foreign-currency collateral and surplus local-currency collateral.

Table 5.3
Distribution of Balances (Notional Value) of Financial Derivatives, the Five Major Banking Groups, December 1999 and December 2000

(NIS million)[a]

	December 1999				December 2000			
	Interest-rate	Exchange-rate	Other[b]	Total	Interest-rate	Exchange-rate	Other[b]	Total
Leumi	36,720	51,270	10,531	98,521	39,120	67,807	4,321	111,248
Discount	11,850	24,739	7,722	44,311	7,377	27,943	5,277	40,597
Hapoalim	49,326	46,365	6,357	102,048	46,860	67,499	2,944	117,303
Mizrahi	348	19,647	14,600	34,595	596	18,522	4,262	23,380
First International	10,867	34,291	5,581	50,739	9,145	44,319	3,402	56,866
Total	**109,111**	**176,312**	**44,791**	**330,214**	**103,098**	**226,090**	**20,206**	**349,394**
Change from previous year (percent)					-5.5	28.2	-54.9	5.8
of which								
Traded on stock-exchanges	12.6	9.3	75.9	19.4	8.7	4.4	68.5	9.3
Over-the-counter	65.4	37.7	3.9	42.3	69.5	37.8	6.9	45.4
Other	21.9	53.0	20.2	38.3	21.8	57.8	24.5	45.3

[a] In terms of notional principal, at December 2000 prices.
[b] Contracts relating to shares, share indices, Treasury bill futures, and commodities.
SOURCE: Published financial statements.

in the reduction of total credit *less* collateral, excluding credit to exporters,[15] granted by the seven largest banking groups, and in the drop in the ratio of foreign-currency credit less collateral to the banks' capital base. This general development notwithstanding, the huge rise of 90 percent in outstanding foreign-currency credit to real estate should be noted, as it increases credit risk in the industry even further.

Banks' off-balance-sheet activity increased in 2000,[16] and the balance of guarantees and other liabilities of the five major banking groups totaled NIS 141.3 billion at the end of the year, a rise of 2.8 percent (Table 5.2). Among the various components of the balance, liabilities due to open credit-card transactions and credit guarantees rose,[17] a development consistent with the increase in the banks' outstanding credit. The item "Guarantees for house purchasers" (under the Sales Law) showed a drop of 14.7 percent, following its 5.8 percent decline in 1999; this reflects the slowdown in the construction industry and the entry of insurance companies into this field of activity.

Banks carry out transactions in futures on behalf of their customers and also on their own account within the framework of their market-risk and investment management. Continuing the long-term trend, futures transactions of the five major banking groups in nominal terms increased in 2000 by 5.8 percent, to NIS 349.4 billion (Table 5.3). The increase stemmed from a rise of 28.2 percent in foreign-currency derivatives, which may be explained by the need of banks and their customers to hedge the exchange-rate risk arising from the security situation, the instability in international financial markets, and the marked rise of Israel's foreign trade. The balance of other contracts (including *inter alia* shares contracts and share-indices contracts), on the other hand, fell sharply, apparently because of falling prices in stock exchanges world wide and in Israel and the general atmosphere of uncertainty in them. Most banks' futures are traded in stock exchanges in Israel and world wide or over the counter, and the share of these in the total declined.

b. The quality of the credit portfolio

The quality of the credit portfolio reflects the probability that borrowers or groups of borrowers will fail to repay part of their liabilities to the banks; it is affected mainly by borrowers' repayment ability and the amount of collateral provided against the receipt of the credit. We will present developments in the quality of the credit portfolio on the basis of six indices, but it must be stated at the outset that these indices do not take into account collateral provided against credit, or the correlations in the credit portfolio.

The credit/business-sector-product ratio rose in 2000 due to the fact that credit grew faster than did GDP, reflecting borrowers' repayment ability. The ratio rose by some

[15] In this context exporters are defined as those for whom exports represent more than 50 percent of their sales.

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

[17] Part if the rise was technical, i.e., the result of the merger between Visa Cal and the Discount group.

three percentage points to 146 percent, or 1.46,[18] continuing the upward trend evident in the last few years. As growth in 2000 was led by startup companies, which are generally financed by nonbanking sources, the risk inherent in the rapid expansion of credit is higher than would be obtained from a comparison of the rate of growth of business-sector product (7.7 percent)[19] with the increase in credit. The credit/output ratio varies from industry to industry, and in 2000 it ranged from 0.94 in the electricity and water industry to 5.47 in construction and real estate.

Total risk-weighted assets[20] (risk-weighted components) of the five major banking groups, calculated for purposes of the minimum capital ratio requirement,[21] increased by 12.5 percent in 2000, to NIS 517.5 billion. Balance-sheet and off-balance-sheet items both rose, reflecting in part the expansion of banks' activity. The ratio of risk-weighted assets to total (balance-sheet and off-balance-sheet) assets before weighting is an index of the quality of a bank's assets. In the five major banking groups this ratio rose by 2.3 percentage points to 65.3 percent (Table 5.4), indicating a rise in exposure to credit risk.

In the year 2000, for the first time since 1995, *the annual expenditure on loan-loss provision* of the five major banking groups rose, and came to NIS 2.3 billion, a rise of 11.9 percent. The situation differed from bank to bank: in Hapoalim it went down by about 6.5 percent, while in the others it rose considerably—by 32.6 percent in the First International, 29 percent in Mizrahi, 25.1 percent in Discount, and 14.7 percent in Leumi. Rises of such magnitude indicate the erosion of borrowers' repayment ability, against the background of the deepening recession in several key industries.

The loan-loss provision did not change evenly throughout the year: in the first two quarters it declined, rising in the third and fourth. The rate at which it went up in the second half of the year was higher than the rates in the last few years as a result of the security-related events and the general atmosphere of uncertainty prevailing at the end of the year.

The annual expenditure on loan-loss provision consists of the specific provision and the additional provision. The first of these, which is determined by banks' management on the basis of borrowers' expected repayment ability and the quality of their collateral, increased by 11.6 percent in 2000, and in each bank it followed the same path as the bank's annual loan-loss. The additional provision was also positive for the five major banking groups, and amounted to NIS 7 million. This provision is determined according to regulations issued by the Supervisor of Banks on the basis of the risk characteristics of the bank's credit portfolio.

[18] Preliminary estimate based on initial Research Department data.
[19] Excluding the effect of startups, business-sector product grew by only 4.6 percent.
[20] Excluding the component of exposure due to market risks, totaling NIS 8.7 billion.
[21] Under Regulation No. 311 of the Proper Conduct of Banking Business and in accordance with the guidelines of the Basle Committee, risk-weighted assets are calculated by weighting the balances of all assets and the credit equivalent of off-balance-sheet items on the basis of four risk coefficients: 100 percent, 50 percent, 20 percent and 0 percent. The credit equivalent of off-balance-sheet items is the balance of the item multiplied by the conversion coefficient that reflects the probability of customer indebtedness vis-à-vis the bank arising in respect of that item or in respect of a future transaction. The conversion coefficients in Israel range from 0 percent to 100 percent.

Table 5.4
Indices of Credit Portfolio Quality, the Five Major Banking Groups, 1998–2000

(percent)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Ratio of risk-weighted[a] assets to total assets						
1998	62.4	58.6	66.3	63.1	59.3	62.9
1999	62.7	59.8	67.0	60.3	58.3	63.0
2000	66.7	59.5	69.4	62.7	60.0	65.3
Share of credit under special supervision in total credit						
1998	6.1	5.1	7.4	3.0	2.4	5.7
1999	6.4	4.8	4.0	3.3	1.5	4.5
2000	4.2	4.2	3.3	2.0	1.5	3.4
Share of annual loan-loss provision in total credit						
1998	0.64	1.14	0.47	0.47	0.27	0.61
1999	0.42	0.89	0.54	0.32	0.22	0.50
2000	0.43	1.02	0.44	0.36	0.27	0.50
Ratio of loan-loss provision to problem loans *plus* loan-loss provision						
1998	0.30	0.30	0.24	0.34	0.35	0.28
1999	0.28	0.30	0.29	0.30	0.35	0.29
2000	0.32	0.34	0.31	0.34	0.34	0.32
Ratio of total loan-loss provision to problem loans (excl. credit under special supervision and realized real-estate collateral) *plus* loan-loss provision						
1998	0.56	0.48	0.40	0.51	0.78	0.47
1999	0.55	0.47	0.41	0.46	0.55	0.47
2000	0.55	0.49	0.44	0.46	0.51	0.49
Index of credit distribution by principal industry weighted by loan-loss provision[b]						
1998	0.49	0.52	0.51	0.54	0.52	0.51
1999[c]	0.40	0.44	0.40	0.48	0.45	0.42
2000	0.37	0.37	0.35	0.43	0.38	0.37

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

[b] This index is $X_i * W_i$, where W_i is the share of credit to industry i in the bank's total credit, and X_i is the share of annual loan-loss provision for industry i in that industry's total credit from the five major banking groups.

[c] In 1999 the Supervisor of Banks' issued directives regarding the weighting of credit limits. The change had a technical effect on the increase of the credit-risk equivalent of off-balance sheet items. The calculation of the index is based on the credit-risk equivalent of off-balance-sheet items, so that the comparison between 1998 and 1999 must be treated with caution.

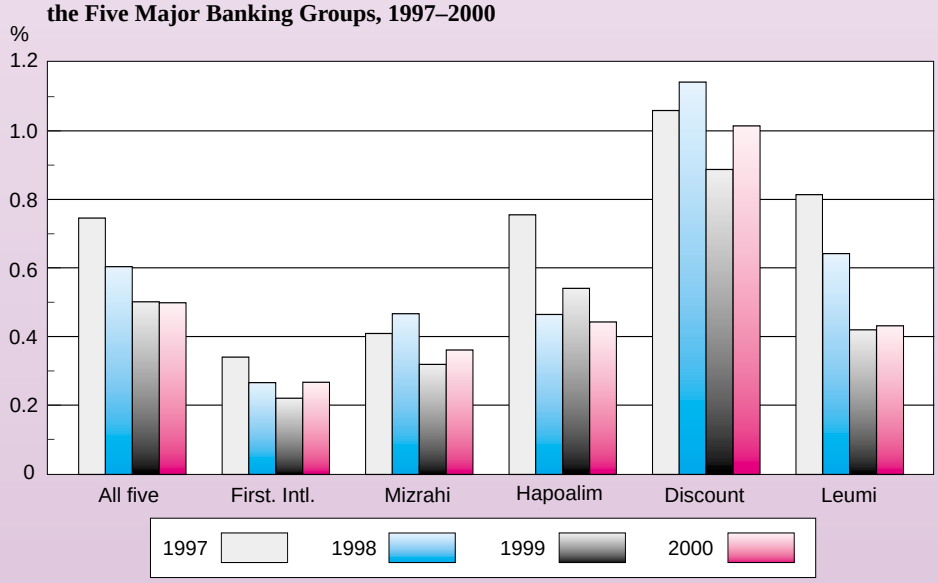
SOURCE: Published financial statements.

Table 5.5
Distribution of Problem Loans,[a] the Five Major Banking Groups, 1999–2000[b]

	Leumi		Discount		Hapoalim		Mizrahi		First Intl.		Total	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
NIS million[b]												
Total problem loans	**3,710**	**3,656**	**2,921**	**3,175**	**7,600**	**6,655**	**1,507**	**1,710**	**475**	**606**	**16,213**	**15,802**
Non-performing	1,996	1,892	2,288	2,393	1,317	1,879	335	499	206	285	6,142	6,948
To agriculture	375	322	66	47	3,871	2,365	180	126	0	11	4,492	2,871
Other	3,335	3,334	2,855	3,128	3,729	4,290	1,327	1,584	475	595	11,721	12,931
Percent												
Share of problem loans in total credit at group's responsibility												
Total	**2.9**	**2.6**	**4.7**	**4.6**	**5.6**	**4.3**	**3.3**	**3.3**	**1.2**	**1.7**	**4.0**	**3.4**
Non-performing	1.6	1.3	3.7	3.5	1.0	1.2	0.7	1.0	0.5	0.8	1.5	1.5
To agriculture	0.3	0.2	0.1	0.1	2.8	1.5	0.4	0.2	0.0	0.0	1.1	0.6
Other	2.6	2.3	4.6	4.6	2.7	2.7	2.9	3.1	1.2	1.7	2.9	2.8
Percent												
Ratio of problem loans to group's equity												
Total	**33.7**	**31.7**	**52.3**	**56.3**	**66.6**	**52.5**	**55.9**	**56.7**	**16.6**	**19.5**	**48.3**	**43.9**
Non-performing	18.1	16.4	41.0	42.4	11.5	14.8	12.4	16.5	7.2	9.1	18.3	19.3
To agriculture	3.4	2.8	1.2	0.8	33.9	18.6	6.7	4.2	0.0	0.4	13.4	8.0
Other	30.3	28.9	51.1	55.5	32.7	33.8	49.2	52.5	16.6	19.1	34.9	35.9

[a] Including non-performing loans, rescheduled debts, and overdue loans (not including debts under special supervision and realized real-estate collateral).
[b] At December 2000 prices.
SOURCE: Published financial statements.

Figure 5.2
Ratio of Annual Loan-Loss Provision to Credit to the Public,[a] the Five Major Banking Groups, 1997–2000



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

The ratio of annual loan-loss provision to outstanding credit to the public at the banks' responsibility remained at the same level as in 1999, 0.5 percent (Table 5.4). The overall stability was the result of a rise in the all banking groups apart from Hapoalim, and a steep fall in the latter. The ratio ranged from 0.27 in the Leumi group, to 1.02 in the Discount group, indicating significant variation in the quality of different banks' credit portfolios (Figure 5.2), and apparently also in their policy regarding the provision. The average ratio in a sample of banks abroad, about 0.67 percentage points, was higher than that of the large banks in Israel (Table 3.3). It is therefore doubtful whether the ratio in Israel fully reflects the credit risk of the banks' credit portfolios, especially in the light of the current economic recession.

An examination of annual expenditure on the specific loan-loss provision by industry reveals major differences in the quality of credit between them. The expenditure in the construction and real estate was the most marked in 2000, rising by 30.4 percent. The ratio of annual expenditure on the specific loan-loss provision to outstanding credit rose from 0.56 percent in 1999 to 0.66 in 2000, mainly due to insolvencies and erosion of collateral of borrowers who ran into difficulties as a result of the slowdown which has persisted for several years (Table 5.6). The Discount group had a particularly high ratio of about 2 percent.

In the hotels and catering services industry the ratio of annual expenditure on the specific loan-loss provision to outstanding credit at the end of the year was about 0.96

Table 5.6
Distribution of Credit by Principal Industry, the Five Major Banking Groups, 1999–2000

	Balance of credit to public[a] *(NIS million)*		Distribution of credit balances[a] *(percent)*		Problem credit				Annual specific loan-loss provision *(NIS million)*[b]		Loan-loss provision/ total credit *(percent)*	
					Balance *(NIS million)*		Share in total credit *(percent)*					
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Agriculture	9,772	9,854	1.5	1.4	5,886	4,160	60.2	42.2	45	48	0.46	0.49
Manufacturing	89,833	93,617	14.1	13.4	7,543	6,327	8.4	6.8	278	305	0.31	0.33
Construction and real estate[c]	110,850	122,832	17.4	17.6	10,309	9,542	9.3	7.8	620	808	0.56	0.66
Water & electricity[d]	5,786	6,395	0.9	0.9	71	136	1.2	2.1	9	29	0.16	0.45
Commerce	47,749	50,863	7.5	7.3	2,338	2,491	4.9	4.9	263	193	0.55	0.38
Hotels and restaurants	12,081	12,496	1.9	1.8	1,663	1,704	13.8	13.6	95	120	0.79	0.96
Transport and storage	14,144	16,765	2.2	2.4	469	432	3.3	2.6	34	31	0.24	0.18
Communications and computer services	24,719	31,646	3.9	4.5	124	309	0.5	1.0	10	24	0.04	0.08
Financial services	40,614	45,447	6.4	6.5	583	808	1.4	1.8	22	12	0.05	0.03
Other business services	16,314	21,508	2.6	3.1	1,316	1,314	8.1	6.1	102	118	0.62	0.55
Public and community services	19,175	19,719	3.0	2.8	1,784	1,503	9.3	7.6	24	31	0.12	0.16
Individuals	156,900	171,817	24.7	24.6	7,541	7,055	4.8	4.1	547	489	0.35	0.28
Borrowers abroad	87,560	95,412	13.8	13.7	842	1,277	1.0	1.3	18	87	0.02	0.09
Total	**635,495**	**698,371**	**100**	**100**	**40,468**	**37,056**	**6.4**	**5.3**	**2,065**	**2,294**	**0.32**	**0.33**

[a] Including credit to the public and the public's investment in bonds, and the credit-risk equivalent of off-balance-sheet items.
[b] At December 2000 prices.
[c] Data on this industry are not calculated in accordance with the industry concentration limitation.
[d] Data on credit to this industry have a downward bias as they do not include credit extended by the Industrial Development Bank of Israel.
SOURCE: Published financial statements.

percent, after rising significantly during the year, indicating a relatively low quality of credit, most of which is explained by the deepening recession in the industry due to the security situation. The ratio in the communications and computer services industry was only 0.08 percent at the end of the year, due to the marked increase in activity in the industry in the last few years. However, the change in economic trends and the capital market in the US and the sharp decline in the rate of growth of high-tech industries in Israel and world wide are likely to have a negative effect on the industry's repayment ability in the near future.

The *by-industry credit index which is obtained by weighting each industry's loan-loss provision*[22] went down slightly in 2000, and reached 0.37 at the end of the year. This index is an estimate of the expected share of the specific loan-loss provision in credit to the public at the end of the year under review based on the distribution of credit and loan-loss provision by industry in the last few years. At the end of 2000 the actual ratio of specific loan-loss provision to total credit to the public (including the credit-equivalent of off-balance-sheet items) in the five major banking groups was 0.33, lower than the expected by-industry credit index, indicating that provisions made during the year were inadequate.

Total problem loans[23] of the five banking groups, with the exception of debts under special supervision and credit repaid by the transfer of ownership, declined in 2000 to NIS 15.8 billion (Table 5.5). This was due to the reduction of problem loans in the Hapoalim group which ensued from the marked contraction of NIS 1.5 billion in problem loans to agriculture.

The reduction of problem loans to agriculture, a continuation of the long-term trend, occurred in most of the banking groups, and reflects the implementation of credit arrangements with the kibbutzim and the moshavim whereby part of their debts were written off. In contrast, there was a significant 10.3 percent rise in problem loans to borrowers who were not in the agriculture industry. All the banking groups apart from Leumi showed an increase, reflecting the rise in the number of borrowers who encountered repayment difficulties because of the slowdown in economic activity.

The share of non-agricultural problem loans in total credit[24] remained unchanged in 2000, and was 2.8 percent at the end of the year (Table 5.5). This index, however, may not be a good indicator of the quality of credit at times when the latter is expanding rapidly, as it did in the last few years, due to the lag between the time when the credit is advanced and the time it becomes a problem loan.

[22] The index is calculated as $X_i * W_i$, where W_i is the share of credit to industry *i* in total credit of the banking group, and X_i is the share of annual loan-loss provision (in percent) in total credit to that industry in the five major banking groups in 1998–2000.

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

[24] This index is preferable to the one which also includes agriculture, as it does not include the past credit arrangements with the *kibbutzim* and *moshavim*.

The rise in credit risk, expressed in the amount of bank credit relative to business-sector product and an increase in the share of loan-loss provision in total credit in the five major banking groups has not yet been reflected in the extent of credit under special supervision. Total credit under special supervision, which is based on assessments by banks' management of the quality of credit, went down by about 15.7 percent in 2000, to NIS 15.8 billion. The reduction encompassed most of the banking groups, with the most notable fall, NIS 2.4 billion or 27 percent, in Leumi.

A by-industry analysis of the share of problem loans in total credit (including loans under special supervision) clearly indicates the low quality of credit in industries in which special credit arrangements were made in the past with borrowers, i.e., agriculture, in which problem loans accounted for 42.2 percent of total credit, and public services, with 7.6 percent (Table 5.6). Two other industries where problem loans form a very high part of total credit are the hotel and catering services industry (13.6 percent) and construction and real estate (7.8 percent), indicating low credit quality, the result of the slowdown in activity in them.

Another measure of the quality of a bank's credit portfolio is provided by *the ratio of the balance of the loan-loss provision to problem loans (plus the balance of the loan-loss provision)*. The higher this ratio, the larger the bank's cushion against losses that could occur as a result of defaults on credit repayment. In the five major groups the ratio of the balance of loan-loss provision to problem loans rose from 29.2 percent at the end of 1999 to 32.2 percent at the end of 2000, and ranged from 34.4 percent in the First International group to 31.0 percent in Hapoalim (Table 5.4). Even if debts under special supervision and credit repaid by the transfer of ownership are not included, the ratio, 48.6 percent, is still relatively low.

c. The concentration of the credit portfolio

1. *Concentration of credit by industry*

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

The Herfindahl-Hirshman index (the H-index)[25] , serves as an estimate of concentration of the credit portfolio by industry. The H-index of the five major banking groups did not change in 2000 from its level in 1999, and was 0.143 at the end of the year (Table 5.7). The H-index excluding households, which is highly heterogeneous from the aspect of borrowers' financial position, also remained stable during 2000. The index varies considerably from one banking group to another, ranging from 0.127 in Discount to 0.287 in Mizrahi, in which 46.9 percent of credit is advanced to households (reflecting the large mortgage portfolio of Tefahot).

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

Table 5.7
Indices of Credit Concentration, the Five Major Banking Groups,[a] 1999–2000

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
H-Index[b] by principal industry						
1999	0.164	0.126	0.138	0.303	0.148	0.144
2000	0.155	0.127	0.139	0.287	0.137	0.143
H-Index[b] excluding households						
1999	0.087	0.100	0.090	0.067	0.113	0.083
2000	0.088	0.096	0.084	0.066	0.111	0.082
Concentration by size of borrower[c]						
1999	39.1	49.2	56.1	25.3	50.2	46.4
2000	41.8	49.1	54.0	28.5	54.0	47.2
Gini Index[d]						
1999	0.868	0.935	0.934	0.830	0.941	0.924
2000	0.903	0.929	0.924	0.826	0.935	0.913

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

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

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

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

SOURCE: Published financial statements.

The large share of credit to the construction industry creates a high level of concentration in the bank credit portfolio. Outstanding balance-sheet credit and the credit equivalent of off-balance-sheet items advanced to the construction industry by the five major banking groups rose by 10.8 percent in 2000 despite the continued slowdown in building activity, expressed by a 4.7 percent decline in output (Table 5.6). One explanation for the increase in credit in spite of the slowdown is that borrowers increased their demand for credit to finance their working capital (including debt restructuring), thereby raising banks' exposure to credit risk on loans to the construction industry. Technological advances in the industry in the last few years are another factor explaining the increased dependence on bank finance. In the years of the slowdown, the industry's capital stock increased by 37 percent, reflected in a rise of 55 percent in the capital/labor ratio. Such technological progress is naturally capital intensive, and contributes to a rise in the credit/output ratio.

Credit (including the credit equivalent of off-balance-sheet items) to the construction and real estate industry accounted for 17.6 percent of total credit in 2000, the same as in 1999 (Table 5.6). The share of credit excluding that to borrowers whose activity takes place abroad did not change either from 1999, and was 20.4 percent. This indicates the high level of exposure to credit risk, the result of the slowdown in activity in the industry,

Table 5.8
Distribution of Credit to the Public[a] by Single-Borrower Indebtedness, the Five Major Banking Groups,[b] 1999–2000

	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 (%)	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
(NIS thousand)[c]										
Up to 7	6,389	4,452	2,245,495	1,626,042	3	3	1.0	0.7	48.6	38.3
From 7 to 16	7,522	8,754	673,138	710,246	11	12	1.2	1.3	14.6	16.7
From 16 to 33	14,206	16,263	597,244	672,489	24	24	2.3	2.4	12.93	15.8
From 33 to 65	19,305	22,692	417,329	469,110	46	48	3.1	3.3	9.03	11.1
From 65 to 130	28,719	30,591	300,786	337,323	95	91	4.6	4.5	6.51	7.9
From 130 to 265	39,621	43,610	208,299	231,471	190	188	6.4	6.4	4.51	5.5
From 265 to 490	37,405	41,612	105,498	118,866	355	350	6.0	6.1	2.28	2.8
From 490 to 990	25,549	27,884	37,567	41,884	680	666	4.1	4.1	0.81	1.0
From 990 to 1,640	14,810	15,559	11,237	12,250	1,318	1,270	2.4	2.3	0.24	0.3
From 1,640 to 3,300	21,004	21,651	8,841	9,427	2,376	2,297	3.4	3.2	0.19	0.2
From 3,300 to 6,600	26,076	26,682	5,556	5,830	4,693	4,577	4.2	3.9	0.12	0.1
From 6,600 to 16,400	45,482	48,425	4,368	4,719	10,413	10,262	7.3	7.1	0.09	0.1
From 16,400 to 33,000	46,820	50,845	2,038	2,251	22,974	22,588	7.5	7.5	0.04	0.1
From 33,000 to 164,000	148,841	165,313	2,232	2,498	66,685	66,178	24.0	24.3	0.05	0.1
From 164,000 to 330,000	53,106	63,814	243	286	218,543	223,126	8.6	9.4	0.01	0.0
From 330,000 to 655,000	52,388	54,549	114	118	459,544	462,280	8.4	8.0	0.00	0.0
From 655,000 to 985,000	18,297	19,028	23	24	795,522	792,833	2.9	2.8	0.00	0.0
From 985,000 to 1,310,000	5,571	9,773	5	9	1,114,200	1,085,889	0.9	1.4	0.00	0.0
From 1,310,000 to 1,970,000	9,935	5,826	7	4	1,419,286	1,456,500	1.6	0.9	0.00	0.0
More than 1,970,000	0	2,215	0	1		2,215,000	0.0	0.3	0.00	0.0
Total	**621,046**	**679,538**	**4,620,020**	**4,244,848**	**134.4**	**160.1**	**100**	**100**	**100**	**100**

[a] Including outstanding credit to the public and credit-risk-equivalent of off-balance-sheet financial statements, calculated in accordance with the definitions relating to the calculation of the large-borrower limitation. Not including the public's investment in bonds.

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

[c] At December 2000 prices.

SOURCE: Published financial statements.

now in its fourth year. The share of credit to the industry in total credit ranged from 23.3 percent in the Mizrahi group to 16.8 percent in Hapoalim. The exposure was reflected by a rise in the specific loan-loss provision in the industry and a rise in its share of total credit. Banks which deviate from the industry concentration limitation, i.e., whose credit to a particular industry exceeds 20 percent of their total credit, must make an additional provision for loan loss as a result of their deviation, and in 2000 this was done by the Mizrahi group.

On the other hand the high share of credit to individuals (mainly households) in total credit (24.6 percent) does not necessarily indicate a high credit-risk level, because activity of households is not highly correlated with economic activity or with repayment ability, and it is doubtful whether they should be considered an economic segment.

2. *Concentration of credit by borrower size*

Another indicator of the concentration of the credit portfolio is the extent of its dispersal among different borrowers: the wider the dispersal the lower the risk, and vice versa. The banks' credit portfolio in Israel is notable for a high degree of concentration by borrower, reflecting the concentration of economic activity among large corporations. The high degree of concentration in the bank credit portfolio is apparent from the fact that 62 percent of the five groups' credit (including the credit equivalent of off-balance-sheet items) was granted to 9,910 borrowers,[26] who make up only 0.2 percent of the number of all borrowers.

Three indicators suggest that the concentration of credit by borrower in the five groups increased in 2000: (1) Average outstanding credit per borrower rose from NIS 134,400 at the end of 1999 to NIS 160,100 at the end of 2000 (Table 5.8); (2) The proportion of credit to borrowers whose indebtedness exceeded NIS 33 million rose during the year and reached 47.2 percent (Table 5.8); (3) Most (55 percent) of the rise in bank credit in 2000 derived from credit to borrowers whose indebtedness exceeded NIS 33 million. The increase in credit concentration encompassed all the banking groups due to the rise in outstanding credit to industries that are notable for large borrowers, and to the expansion of investment and exports, which are credit-intensive.[27]

Privatization also contributed to the rise in the demand for credit in the last few years, due to the need to finance the acquisition of privatized corporations. The large sums involved in takeovers, and the high financing ratios increase concentration of credit by borrower even further. In addition, such transactions entail a high credit risk, because the borrowers' repayment ability depends largely on the corporation purchased, sometimes without recourse to the borrower. This means that there is a very high correlation between

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

[27] Nevertheless, the Gini Index of inequality in the distribution of credit, which reflects the lack of uniformity in the distribution of the credit portfolio, declined to 0.913 in 2000, although this is still a very high level. The value of the index is the area between the distribution curve of the credit portfolio (the cumulative percentage of credit to the cumulative percentage of borrowers) and a 45 degree line, which represents a uniform distribution.

the borrowers' repayment ability and the collateral they have provided the banks, increasing the lender's exposure yet again.

3. MARKET RISKS

Market risks are defined as the probability that changes in market prices could harm a bank's financial position—its income, profitability, and even its capital. In a period of liberalization of financial markets, a rise in the volatility of market prices, and the development of new financial instruments (including derivatives), potential exposure of banks in Israel and abroad to market risks rose.

The analysis of market risks in this chapter is based on a highly simplistic model of Value at Risk (VaR). This value expresses the maximum loss expected on holding financial instruments in long or short position—which are sensitive to changes in market prices—at a given planning horizon and level of significance at a particular point in time. The value is calculated by means of historical data, and is based on the following assumptions: (1) a planning period (horizon) of a month; (2) a level of significance of 99 percent; (3) correlations between changes in different market prices are not taken into account; (4) positions are based on data published in banks' financial statements, and do not take into account the full effect of derivatives in general, and of options in particular.

Note that the Banking Supervision Department requires banks to estimate market risks using more complex and more sophisticated models. In 2000, all the banking groups operated systems for the current calculation of market risks using the VaR method, as specified in Regulation No. 339, although in most it was used only on the tradable portfolio and not on the entire banking portfolio.

a. Interest-rate risk

Interest-rate risk is the risk that changes in interest rates will lead to a deterioration in a bank's financial position (or reduce its net worth[28]). This risk arises when the relative sensitivity of the value of the bank's assets to changes in interest rates differs from that of its liabilities. The development of exposure to interest-rate risk[29] is presented separately for each of the three indexation segments (unindexed, CPI-indexed, and foreign currency), because the different types of interest rates among these segments constitute different risk factors. In this sub-section, we have referred to the rates of yield to maturity on Treasury bills and CPI-indexed bonds and to the Libor dollar interest rate as interest-rate

[28] The difference between the present value of assets and that of liabilities. This is not necessarily equal to the fair value of financial instruments as presented in the financial report to the public. Reporting on the fair value of financial instruments by indexation basis and by period to maturity would make it possible to calculate the value subject to market risks more accurately. In the course of the year under review, the fair value of net worth (the difference between the fair value of assets and of liabilities) rose in Leumi, Hapoalim, and Mizrahi, while it fell in the First International and in Discount. In the latter the fair value was actually negative at the end of 2000.

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

risk factors in the unindexed, CPI-indexed and foreign currency sectors respectively.[30]

Exposure to interest-rate risk, as reflected by Value at Risk,[31] is affected by three elements: (1) the difference between the present value of assets and the present value of liabilities plus the effect of futures transactions—henceforth, the positions; (2) the sensitivity of positions to changes in interest rates as measured by duration (average term to maturity);[32] (3) the change in the interest rate in percentage points during the planning period. The first two elements are dependent on the distribution of each bank's assets and liabilities over time, while the third element is common to all of them since it is derived from interest-rate fluctuations.

(1) All segments

The total value at interest-rate risk (in all three indexation segments) rose at all the five major banking groups during 2000 (Table 5.9), with the exception of Hapoalim, and ranged from 4.5 percent of net worth in Hapoalim (NIS 116 million, or 0.97 percent of its equity), to 78.8 percent of net worth in Discount (NIS 205 million, or 3.91 percent of equity). Total VaR was calculated as the sum of the VaRs in each segment, on the conservative assumption that the worst case scenarios would occur in each segment simultaneously, ignoring the correlations between changes in the different interest rates. The calculation of the total VaR related to interest-rate risk taking these correlations into account using the covariance matrix method is given in the appendix to this chapter.

(2) The unindexed local-currency segment

Assets and liabilities in this segment are less sensitive to interest-rate shifts than in the other intermediation segments due to their short term to maturity, as well as to the fact that they are usually priced on the basis of floating rates of interest. However, interest rates in this segment, which are generally adjusted to the yield to maturity on Treasury bills, are highly volatile compared with those in other segments. As a result, the standard

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

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

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

Table 5.9
Exposure to Changes in Interest Rates, the Five Major Banks, December 1999 and December 2000

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Unindexed segment										
Total exposure[a] (NIS million)	–760	–1,392	–1,042	–1,308	–1,696	–386	341	255	–785	–631
Duration of assets (*years*)	0.25	0.32	0.22	0.33	0.10	0.28	0.14	0.18	0.13	0.17
Duration of liabilities (*years*)	0.17	0.18	0.19	0.19	0.17	0.22	0.10	0.12	0.11	0.12
Duration of net worth[b] (*percent*)	6.35	7.04	0.53	3.17	–2.51	10.54	2.50	5.36	0.29	1.66
Modified duration[c] (*percent*)	5.77	6.54	0.48	2.95	–2.28	9.79	2.27	4.97	0.26	1.54
VaR[d] (*NIS million*)	83.4	173.1	9.6	73.2	73.6	71.9	14.7	24.1	3.9	18.5
Indexed segment[e]										
Total exposure (NIS million)	5,349	6,575	5,090	3,165	2,572	3,395	195	367	2,604	2,574
Duration of assets (*years*)	2.86	2.89	3.89	3.85	3.17	2.96	3.15	3.33	3.30	3.29
Duration of liabilities (*years*)	2.41	2.64	3.20	3.41	3.48	3.22	2.63	2.66	2.51	2.74
Duration of net worth (*percent*)	6.49	4.37	5.90	5.95	–2.89	–0.43	27.98	22.17	6.93	5.76
Rate of exposure (*percent*)	6.15	4.12	5.58	5.61	–2.73	–0.40	26.48	20.91	6.56	5.43
VaR (*NIS million*)	205.8	186.0	177.9	122.0	44.0	9.4	32.3	52.7	106.9	96.1

Table 5.9 (continued)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Foreign-currency segment[f]										
Total exposure (NIS million)	–2,289	–1,930	–2,575	–1,597	975	–441	–105	–241	–276	–488
Duration of assets (*years*)	0.38	0.54	0.35	0.40	0.43	0.46	0.21	0.31	0.24	0.29
Duration of liabilities (*years*)	0.39	0.49	0.36	0.31	0.38	0.36	0.24	0.25	0.34	0.23
Duration of net worth (*percent*)	–0.82	1.27	–0.45	1.42	4.56	18.79	–3.94	3.88	–8.36	2.72
Modified duration (*percent*)	–0.78	1.20	–0.42	1.34	4.30	17.71	–3.71	3.66	–7.87	2.56
VaR (*NIS million*)	7.3	10.3	4.4	9.5	17.1	34.7	1.6	3.9	8.9	5.6
Total value at risk[g] (NIS million)	**296.4**	**369.3**	**191.9**	**204.7**	**134.7**	**116.0**	**48.6**	**80.7**	**119.8**	**120.1**
Total position[h] (NIS million)	2,300	3,254	1,473	260	1,851	2,567	431	380	1,543	1,455
VaR as percent of net worth	12.89	11.35	13.03	78.75	7.28	4.52	11.29	21.24	7.76	8.26
VaR as percent of equity	2.82	3.31	3.60	3.91	1.24	0.97	1.95	2.87	4.37	4.04

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

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

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

[d] The change (in NIS million) in a bank's situation resulting from the maximum change in the interest rate. In 1999, these were 1.9 percentage points in unindexed interest, 0.63 percentage points in real interest, and 0.4 percentage points in dollar interest. In 2000 these were 1.9, 0.69 and 0.44 percentage points respectively; based on changes in interest rates over the last 5 years; the probability of changes greater than these is less than 1 percent.

[e] Including the CPI/dollar indexation option.

[f] Including foreign-currency-indexed.

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

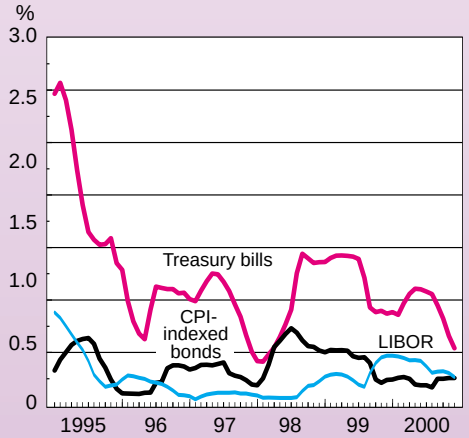
[h] The difference between the present values of financial assets and financial liabilities in each segment.

SOURCE: Published financial statements and Bank of Israel.

deviation of the Treasury bill yield is greater than that of CPI-indexed bonds and the standard deviation of the dollar Libor interest rate (Figure 5.3).

The value at interest-rate risk in this segment is obtained by multiplying the position by the standard average duration of capital and by the maximum expected change in the rate of interest. The latter is derived from the distribution of the monthly changes in the yield to maturity on Treasury bills during the previous five years. The maximum change is estimated from the 99th percentile[33] in this distribution, and at the end of 2000 this was 1.9 percentage points, almost the same as at the end of 1999.

Figure 5.3
Standard Deviation of Selected Interest Rates,[a] 1995–2000



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

Among the five largest banking groups, the value at interest-rate risk in this segment ranged from NIS 18.5 million in the First International group to NIS 173.1 million in Leumi (Table 5.9). This means that a 1.9 percentage-point change in the unindexed rate of interest within a period of one month (the probability of a change larger than that being less than 1 percent) would heve eroded those banks' net worth deriving from the segment by the amounts quoted. At the end of 2000 all banks were exposed to a rise in the rate of interest, meaning that such a rise would have eroded the net worth deriving from the segment. The value at interest-rate risk in this segment rose in 2000 in all the major banks except for Hapoalim.

(3) The CPI-indexed segment

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

At the end of 2000 the large banks, with the exception of Hapoalim, were exposed to a rise in the real rate of interest, because the relative sensitivity of the value of their assets to a change in interest rates was higher than that of their liabilities (Table 5.9). In other words, a rise in interest would have eroded their net worth derived from this segment.

The value at interest-rate risk in this segment reflects the deterioration in a bank's financial position likely to occur as a result of the maximum change in the real rate of

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

interest. Within the five major groups this ranged from NIS 9.4 million in Hapoalim to NIS 186.0 million in Leumi (Table 5.9). This means that the maximum expected change in the course of a month (0.69 percentage points) would erode those banks' net worth derived from the segment by the amounts mentioned. In the course of 2000 exposure to interest-rate risk in this segment declined in all the major banks except for Mizrahi.

(4) The foreign-currency segment

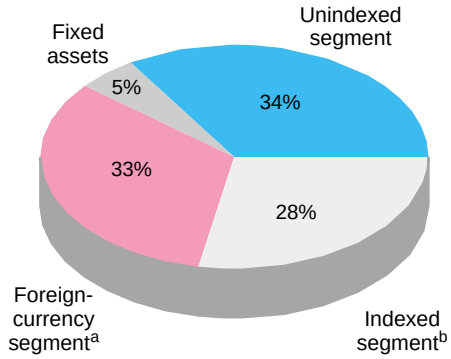
Exposure to interest-rate risk is lower in this segment than in the local-currency segments for two reasons: (1) the banks maintain low positions in this segment, partly because the assets and liabilities are priced at a floating rate of interest (usually Libor), and are short term and medium term. In this segment the banks also use derivatives—swap contracts on interest rates—to reduce their exposure to interest-rate risk. These instruments, which are traded in the leading markets throughout the world, are less developed in the local-currency segment. (2) Interest rates in this segment are less volatile, as is evidenced by the standard deviation of Libor dollar interest rate (Figure 5.3).

The value at interest-rate risk in this segment was calculated for the maximum monthly change expected in Libor dollar interest rates from 1996 to 2000. Among the five largest banking groups this ranged from NIS 3.9 million in Mizrahi to NIS 34.7 million in Hapoalim (Table 5.9). The maximum monthly change expected to occur within a month (0.44 percentage points) would have eroded the net worth of those banks deriving from this segment by the above amounts.

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

A bank is exposed to indexation basis risks when in the framework of its financial intermediation activities it obtains sources with one indexation basis for uses with a different one. Changes in the relative prices of the different indexation bases could therefore have an adverse effect the banks' profits. Financial intermediation activity in Israel is carried out in three main segments of similar size: unindexed, CPI-indexed, and foreign currency; in the latter, most activity is in US dollars (Figure 5.4). These segments developed as a result of a) Israel's high rate of inflation compared with other industrialized countries, (b) a system of mechanisms for linkage to price indices, and (c) the large volume of foreign trade conducted by both the public and the private sectors.

Figure 5.4
Share of Intermediation Segments in Total Assets of the Five Major Banking Groups, December 2000

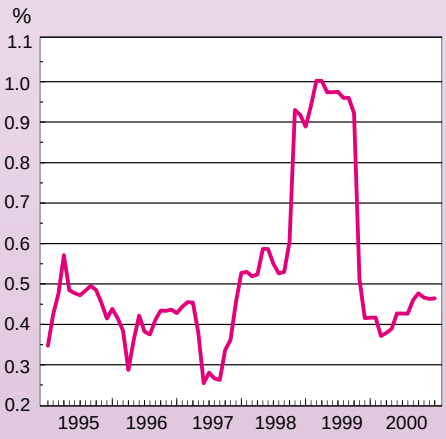


[a] Including foreign-currency-indexed.
SOURCE: Published financial statements.

Exposure to indexation basis risks is affected by two factors: 1) the position, i.e., the difference between the value of assets and that of liabilities *plus* the net effect of futures transactions (the quantitative factor) and 2) the price factor, i.e., the effect of a change in relative prices in the various indexation segments. The analysis of exposure to indexation basis risks presented here focuses on measuring the banks' financial results and the development of their capital in real terms. The analysis focuses on the three indexation segments alone, without reference to the wide range of foreign currencies. Accordingly, price risks are derived from the difference in relative prices in the unindexed and foreign currency segments, on the one hand, and the CPI-indexed segment[34] on the other, i.e., inflation and the real NIS/$ exchange rate.

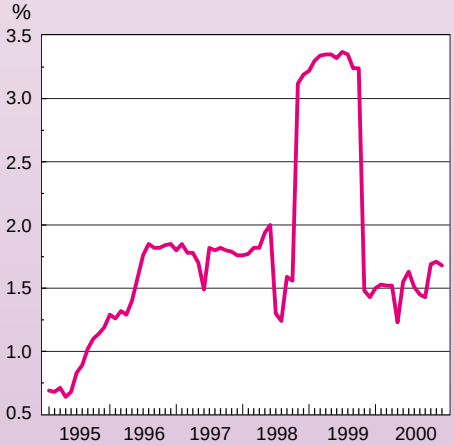
Price risk, which is used for calculating VaR, remained unchanged in 2000. The calculation of VaR is based on the risk of a maximum change in price as estimated by the 99th percentile of the distribution of the monthly changes in the risk factor during the previous five years. Events occurring during the measurement period therefore have a strong effect on the maximum change in price risk during the year reviewed. As a result, the level of the 99th percentile of the distribution of the changes in the inflation rate and the real exchange rate in 1999 and 2000 is directly affected by the sharp local-currency depreciation of August and October 1998 (Figures 5.5 and 5.6).

Figure 5.5
Standard Deviation[a] of Monthly Changes in CPI, 1995–2000



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

Figure 5.6
Standard Deviation[a] of Monthly Changes in Real NIS/$ Exchange Rate, 1995–2000



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

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

Table 5.10
Difference Between Assets and Liabilities and the Effect of Derivatives, by Indexation Base, the Five Major Banking Groups, 1998–2000

(NIS million, December 2000 prices)

	Un-indexed	CPI-indexed[a]	Foreign currency: US dollar	Foreign currency: Other currencies	Financial capital	Non-financial items	Total
1998							
Assets less liabilities	–5,339	12,548	7,366	4,520	19,095	12,871	31,966
Effect of derivatives	10,011	1,251	–8,315	–2,947			
Total position in segment	4,672	13,799	–949	1,573			
1999							
Assets less liabilities	–18,020	18,875	13,193	5,324	19,372	14,186	33,558
Effect of derivatives	17,011	1,485	–14,016	–4,480			
Total position in segment	–1,009	20,360	–823	844			
2000							
Assets less liabilities	–25,865	26,035	10,077	10,846	21,093	14,911	36,004
Effect of derivatives	22,231	–1,888	–9,714	–10,629			
Total position in segment	–3,634	24,147	363	217			

[a] Including the CPI/dollar indexation option.

SOURCE: Published financial statements.

(1) *All segments*

Total value at indexation-basis risk (inflation and exchange-rate risk) rose in 2000 in Leumi and the First International, did not change in Mizrahi, and declined considerably in the other groups. The VaR ranged from 0.22 percent of net worth in Mizrahi (NIS 4.6 million, or 0.16 percent of equity), to 1.06 percent of net worth in of the First International (NIS 23.1 million, or 0.78 percent of equity) (Table 5.11). Exposure to indexation-basis risk varied significantly from quarter to quarter in most of the banking groups due to changes in the their positions in the unindexed and foreign-currency segments (Table 5.12). In the Discount group, the value at market risk over the year was much higher than at the end of the year, and in Leumi exposure to market risks was higher in the first half of the year than in the second.

The total value at indexation-basis risk is calculated as the sum of the value at inflation risk and the value at exchange-rate risk under the conservative assumption of the worst case scenario for each of the risk factors, ignoring the correlations between changes in inflation and changes in the real exchange rate. The calculation of the total VaR related to indexation-basis risk taking these correlations into account using the covariance matrix method is given in the appendix to this chapter.

Table 5.11
Exposure to Changes in Inflation and the Exchange Rate, the Five Major Banking Groups, December 1999 and December 2000

(NIS million)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Unindexed segment										
Assets *less* liabilities	–5886	–8681	–3716	–2980	–3177	–7508	–1558	–3941	–3683	–2755
Effect of futures and options	5,482	7,311	2,834	2,118	4,002	6,815	1,758	3,865	2,935	2,122
Total position in segment	–404	–1370	–882	–862	825	–693	200	–76	–748	–633
Change in inflation rate[a] (%)	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Value at risk[b]	6.40	21.72	13.98	13.67	13.08	10.99	3.17	1.20	11.86	10.03
Indexed segment[c]										
Assets *less* liabilities	5,780	9,283	4,814	3,553	3,436	7,857	1,662	2,440	3,183	2,902
Effect of futures and options	1,262	–695	428	–82	204	–996	–43	–254	–366	139
Financial capital	6,431	7,169	3,106	2,567	6,012	7,128	1,846	2,051	1,977	2,178
Total position in segment	611	1,419	2,136	904	–2372	–267	–227	135	840	863
Foreign-currency segment[d]										
Assets *less* liabilities	6,537	6,567	2,008	1,994	5,753	6,779	1,742	3,552	2,477	2,031
Effect of futures and options	–6744	–6616	–3262	–2036	–4206	–5819	–1715	–3611	–2569	–2261
Total position in segment	–207	–49	–1254	–42	1,547	960	27	–59	–92	–230
Change in real exchange rate[e]	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68
Value at risk[b]	11.77	2.79	71.27	2.39	87.93	54.56	1.53	3.35	5.23	13.07
Total value at risk[f]	**18.17**	**24.50**	**85.26**	**16.05**	**101.01**	**65.55**	**4.71**	**4.56**	**17.09**	**23.11**
As percentage of financial capital	0.28	0.34	2.74	0.63	1.68	0.92	0.25	0.22	0.86	1.06
As percentage of equity	0.17	0.22	1.60	0.31	0.93	0.55	0.19	0.16	0.62	0.78

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

[b] The change (in NIS million) in a bank's situation which would arise from the maximum change in inflation and the exchange rate.

[c] Including the CPI/dollar indexation option.

[d] Including foreign-currency indexation.

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

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

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

(2) *The unindexed local-currency segment*

The position of the five major banking groups in this segment totaled minus NIS 3.6 billion, the deficit occurring as a result of developments in both components, balance sheet and off-balance-sheet (Table 5.10). In the former, the difference between assets and liabilities increased from minus NIS 18.0 billion at the end of 1999 to minus NIS 25.9 billion at the end of 2000, due mainly to a rise in the positions of the two largest banking groups.

The rise in the balance-sheet deficit in the segment (the surplus of liabilities over assets) derived from several developments. On the assets side, demand for unindexed credit rose, particularly for on-call credit and term credit. Deposits in the Bank of Israel also increased, due to the relatively high risk-free interest on them. On the liabilities side, deposits of the public rose sharply, both in relation to their growth in 1999 and also in relation to the increase in credit in 2000. This was mainly the result of the decline in inflation expectations and of the higher real return yielded by these deposits than by deposits in the other intermediation segments.

In 2000, too, the banks tried to reduce their total positions in the segment by off-balance-sheet activity. The effect of the NIS 22 billion of futures transactions was to reduce the total position in the segment to minus NIS 3.6 billion (Table 5.11). A considerable part (NIS 6 billion) of these transactions were swaps,[35] in which the Bank of Israel sells dollars to the banks and undertakes to repurchase them at a fixed price one month later.

The value at inflation risk reflects the maximum deterioration in a bank's financial position that could result from a change in the inflation rate. This value is obtained by multiplying the total position by the maximum monthly changes expected in the inflation rate. The value at inflation risk at the end of 2000 ranged from NIS 1.2 million in the Mizrahi group to NIS 21.7 million in the Leumi group (Table 5.11). This means that the maximum expected change in inflation (1.6 percentage points) would erode the value of the position deriving from activity in this segment by those amounts. The greatest change in the value at inflation risk in 2000 occurred in Leumi, and was due to the increase in the group's position.

(3) *The CPI-indexed segment*

Price risk in this segment is zero by definition, because the total position in the segment in real terms is not affected by changes in relative prices, that is, by changes in inflation or by changes in the exchange rates of foreign currencies against the NIS. Nevertheless, positions in this segment are significant as they are closed by opposite positions in the other two indexation segments (the unindexed and foreign-currency segments).

The total position of the five major banking groups in this segment amounted to NIS 3.1 billion in 2000, taking financial capital as a source in this segment, compared with NIS 1.0 billion in 1999 (Table 5.10). The sign and size of the position in the CPI-indexed

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

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

(NIS million, December 2000 prices)

	Leumi				Discount				Hapoalim			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Unindexed segment												
Total position in segment	–961	–1,836	214	–1,369	–1,781	–1,713	–1,321	–863	2,603	–488	776	–693
Change in inflation rate[a] (%)	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Value at risk[b]	15.23	29.10	3.39	21.70	28.24	27.15	20.95	13.68	41.27	7.74	12.30	10.99
Indexed segment[c]												
Total position in segment	82	1,583	–201	1,417	2,889	2,725	2,161	905	–2,831	–109	–983	–267
Foreign-currency segment[d]												
Total position in segment	879	252	–12.51	–48.31	–1,108	–1,013	–840	–42	228	597	207	960
Change in real exchange rate[e]	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68
Value at risk[b]	49.94	14.35	0.71	2.75	62.96	57.56	47.74	2.39	12.96	33.93	11.77	54.56
Financial capital	7,230	7,529	7,822	7,169	2,809	2,829	2,646	2,566	6,480	6,874	6,547	7,128
Total value at risk[f]	**65.17**	**43.45**	**4.10**	**24.44**	**91.19**	**84.71**	**68.68**	**16.06**	**54.22**	**41.67**	**24.07**	**65.55**
As percentage of financial capital	0.90	0.58	0.05	0.34	3.25	2.99	2.60	0.63	0.84	0.61	0.37	0.92

Table 5.12 (continued)

(NIS million, December 2000 prices)

	Mizrahi				First International			
	I	II	III	IV	I	II	III	IV
Unindexed segment								
Total position in segment	540	–507	671	–77	–205	–983	–697	–633
Change in inflation rate[a] (%)	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Value at risk[b]	8.55	8.03	10.63	1.23	3.24	15.59	11.05	10.03
Indexed segment[c]								
Total position in segment	–505	491	–650	137	–45	819	940	863
Foreign-currency segment[d]								
Total position in segment	–35	16	–21	–60	249	164	–242	–230
Change in real exchange ratee	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68
Value at risk[b]	1.97	0.88	1.19	3.40	14.18	9.34	13.78	13.07
Financial capital	1,900	2,011	2,045	2,051	2,047	2,192	2,246	2,178
Total value at risk[f]	**10.53**	**8.92**	**11.82**	**4.62**	**17.42**	**24.94**	**24.83**	**23.11**
As percentage of financial capital	0.55	0.44	0.58	0.23	0.85	1.14	1.11	1.06

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

[b] The change (in NIS million) in a bank's situation which would arise from the maximum change in inflation and the exchange rate.

[c] Including the CPI/dollar indexation option.

[d] Including foreign-currency indexation.

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

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

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

segment varies between groups. The variation results from the different emphases in the management of assets and liabilities due to differing assessments of prices and relative risks, as well as to different degrees of risk aversion.

(4) *The foreign-currency segment*

The position of the five banking groups in this segment amounted to only NIS 580 million, and derived from a balance-sheet position of NIS 20.9 billion and from a reverse off-balance-sheet position of minus NIS 20.3 billion (Table 5.10). The surplus of balance-sheet assets over balance-sheet liabilities in the segment in the five major banking groups rose by NIS 2.4 billion in 2000 (Table 5.10). The growth in the balance-sheet surplus in the segment resulted from the following developments: (1) on the assets side, the demand by residents for foreign-currency credit persisted, and the balance of the banks' foreign-currency securities and other assets increased markedly; (2) on the liabilities side, the rise in deposits of the public, of both nonresidents and residents (after deducting the decline in the banks' and the government's deposits), was smaller than that in foreign-currency assets.

In a mirror-image of activity in the unindexed segment, the banks' reduced their exposure to exchange-rate risk by means of off-balance-sheet activity. The effect of this was to offset the surplus of balance-sheet assets by NIS 20.3 billion, and to reduce the total position in the segment to only NIS 580 million (Table 5.10).

Since risk is measured in real terms, the position in this segment is exposed to changes in the exchange rate of the NIS as well as to changes in the exchange rate and in inflation. In other words, the position is exposed to changes in the real exchange rate. The value at exchange-rate risk ranged from NIS 2.4 million in the Discount group to NIS 54.6 million in the Hapoalim group. This means that the maximum expected change in the real NIS/$ exchange rate in the course of a month (5.7 percentage points) would have eroded the groups' positions in the segment by those amounts (Table 5.11). The value at real-exchange-rate risk declined considerably in Discount and Hapoalim, due to the reduction of their positions in the segment. The different level of exposure of each of the groups to exchange-rate risk, in terms of sign and size, reflects *inter alia* their managements' assessments regarding the development of the exchange rate and the nature of each group's risk-management practices.

4. LIQUIDITY RISKS

Liquidity risk derives from uncertainty regarding the supply and composition both of the deposits of the public (the sources), and of the demand for credit (the uses). The risk is created by unexpected withdrawals, which could cause a temporary shortage of liquidity and compel a bank to sell assets at prices below market prices. One aspect of the reform and liberalization of the money and capital markets in the past decade has been the considerable reduction of the Bank of Israel's requirements regarding the reserve ratio

(liquidity for monetary purposes). As a result, the banks have had to manage their liquidity risk in a dynamic manner ("prudent liquidity management").

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

The banks' time deposits at the Bank of Israel served as a major instrument in the management of current liquidity during 2000, as they had in 1999. The relatively high interest rate offered by the Bank of Israel led to the faster rise in the supply of unindexed deposits than in the demand for unindexed local-currency credit; this created liquidity surpluses at the banks, which they deposited with the Bank of Israel, earning risk-free interest. The average real effective rate of interest on the banks' deposits at the Bank of Israel reached 8.3 percent in 2000. The commercial banks' total balance of these deposits rose from NIS 53.9 billion in December 1999 to NIS 56.7 billion in December 2000, an increase of 5.2 percent, following a rise of 18.7 percent in 1999.

As with non-financial firms, one way of measuring the banks' level of business liquidity risk is to examine the ratio between their current assets and their current liabilities. When a bank's stock of liquid assets exceeds its stock of liquid liabilities the probability that it will encounter problems of liquidity is low. The ratio of the large banks' total current assets to total current liabilities[36] amounted to 1.6 at the end of 2000, compared with 1.7 at the end of 1999. The ratio ranged from 1.4 in Bank Leumi to 2.1 in the First International Bank. A ratio greater than one indicates a low level of exposure to liquidity risk, in other words a very high probability that the bank will be able to meet its liabilities in the short term. Although the narrow liquidity ratio[37] of the seven largest banking groups went down by 0.1 from the year 1999 to 2000, mainly due to the decline in banks' holdings of unindexed government bonds, it remained reasonably high, at 0.6.

Demand for foreign-currency credit continued to expand, and in December 2000 the outstanding foreign-currency credit balance of all the commercial banks was $ 2.4 billion (8.3 percent) higher than in December 1999. As in 1998 and 1999, the rise in this credit was financed in its entirety by the rise of $ 3 billion in foreign-currency deposits of residents and nonresidents. This differed from the situation in 1996 and 1997, when a large part of the of foreign-currency credit was financed by a reduction in the banks' deposits at banks abroad. Total cash and deposits in foreign currency in the five banking groups did not change significantly during 2000; in other words, the banks' foreign-currency business liquidity remained at the same level as in 1999, as occurred with local-currency liquidity.

[36] The ratio between cash in the bank, its deposits at the central bank and at commercial banks, and its investment in unindexed government bonds, on the one hand, to the public's demand deposits, SROs, and deposits of the central bank and other commercial banks in the bank, on the other.

[37] The ratio between the reserve ratio which the Bank of Israel requires the bank to hold and its investment in unindexed government bonds, on the one hand, to the public's and other banks' demand deposits in the bank.

Table 5.13
Capital Ratio of the Five Major Banking Groups, 1999–2000

(NIS million, December 2000 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International		Total	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Capital[a]	11,004	11,546	5,584	5,638	11,417	12,687	2,697	3,018	2,856	3,115	33,558	36,004
Tier 1 capital[b]	10,960	11,638	5,695	5,703	11,492	12,711	2,674	3,037	2,840	3,096	33,681	36,185
Tier 2 capital[b]	2,924	3,668	1,918	2,891	3,215	4,126	1,438	1,608	1,330	1,286	10,825	13,579
Investment in shares and subordinated notes of consolidated companies	–68	–123	–873	–884	–102	–6	–79	–85	–40	–37	–1,162	–1,135
Total capital for risk-weighted capital ratio calculation	**13,816**	**15,183**	**6,740**	**7,710**	**14,605**	**16,831**	**4,033**	**4,560**	**4,150**	**4,345**	**43,344**	**48,629**
Total balance sheet	199,350	214,210	110,530	119,904	206,735	223,741	61,839	68,859	60,220	64,121	638,674	690,835
Balance of off-balance-sheet instruments (nominal value)	25,583	27,876	59,445	17,257	154,232	170,474	9,604	8,816	9,702	11,114	258,567	235,537
Weighted balance-sheet balances of credit risk	121,609	139,276	63,363	69,207	134,457	151,943	34,020	40,612	33,866	37,071	387,315	438,109
Weighted off-balance-sheet balances of credit risk	19,436	22,188	10,369	12,397	26,783	28,656	9,063	8,059	6,884	8,090	72,535	79,390
Market risks		3,751		1,333		2,633		501		484		8,702
Total weighted items	**141,045**	**165,215**	**73,732**	**82,937**	**161,240**	**183,232**	**43,083**	**49,172**	**40,750**	**45,645**	**459,850**	**526,201**
Percent												
Capital/balance-sheet ratio	5.52	5.39	5.05	4.70	5.52	5.67	4.36	4.38	4.74	4.86	5.25	5.21
Tier 1 risk-weighted capital ratio[c]	7.72	6.97	6.54	5.81	7.06	6.93	6.02	6.00	6.92	6.70	7.07	6.66
Tier 2 risk-weighted capital ratio	2.07	2.22	2.60	3.49	1.99	2.25	3.34	3.27	3.26	2.82	2.35	2.58
Total risk-weighted capital ratio	9.80	9.19	9.14	9.30	9.06	9.19	9.36	9.27	10.18	9.52	9.43	9.24

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

5. CAPITAL ADEQUACY

The capital held by a bank serves as a cushion against losses that could occur if the risks to which it is exposed materialized. A supplementary analysis of banking risks presented in this chapter (credit, market and liquidity risks) is an analysis of the development of the banks' capital and capital ratios because the level of risk at a bank rises if its risk exposure increases without an appropriate increase in its capital. In practice, the bank's management determines both the limitations on the exposure to the different forms of risk and the amount of capital that must be held against such exposure. This is within the framework of the banks' risk management policy, and is subject to the Supervisor of Banks' regulations with respect to the minimum capital ratio.

The Supervisor of Banks, who is responsible for maintaining the stability of the banking system, requires the banks to hold a suitable minimum of capital. The capital requirement for banks in Israel was 8 percent until March 1999, in accordance with the recommendations of the Basel Committee on Banking Supervision. In March 1999 the Supervisor of Banks raised the minimum required capital ratio to 9 percent. In January 2001 the Basle Committee approved a revised proposal to issue new regulations on capital adequacy (following an initial proposal published in June 1999) and the committee intends to publish the final version in the year 2002 (for further details see Box 5.1).

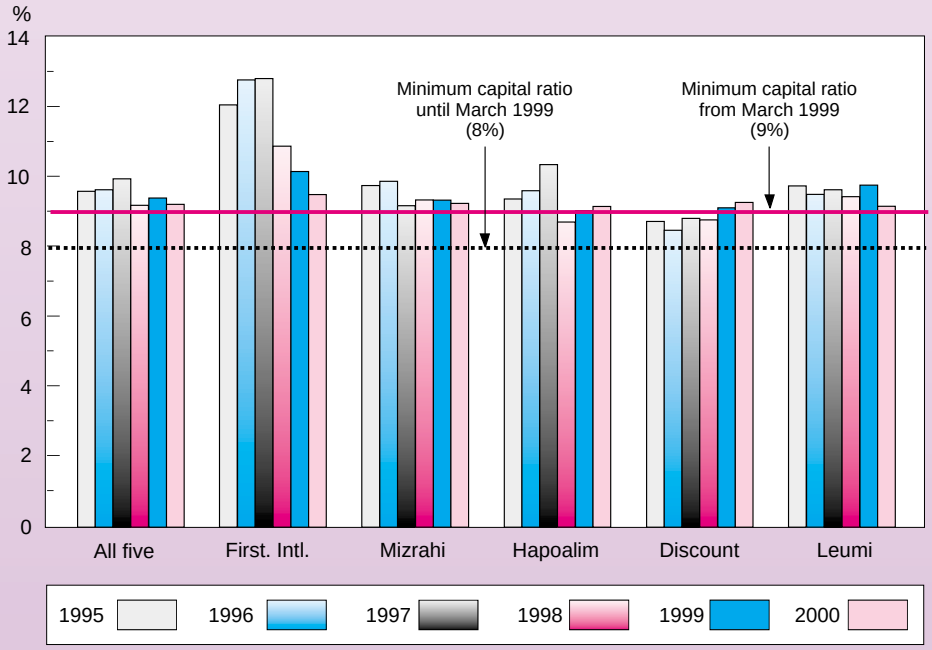
The formal capital requirement in Israel is currently based on credit risk and market risks, and does not take into account other risks such as operational risks and legal risks. Note in this respect that the Basle Committee's previous recommendations concerning holding additional capital against exposure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

The ratio of capital to risk-weighted assets of the five banking groups went down from 9.4 percent at the end of 1999 to 9.2 percent at the end of 2000 (Table 5.13). The ratio declined in the Mizrahi, Leumi, and the First International groups, while it rose slightly in Discount and Hapoalim. The inclusion of the element of exposure to market risks added 0.15 percentage points to the minimum capital ratio in the five major banking groups.

The fall in the ratio of capital to risk-weighted assets resulted from opposing changes in its components. The ratio of Tier 1 capital, which comprises the more stable part of the banks' capital, fell from 7.1 percent in 1999 to 6.7 percent in 2000, following a 0.4 percentage-point decline in 1999. The decrease in the ratio of Tier 1 capital encompassed all the banking groups, and was offset in part by a 0.2 percentage-point increase in the ratio of Tier 2 capital, which is less stable than Tier 1 capital. The ratio of capital to risk-weighted assets at the end of 2000 ranged from 9.19 percent in both the Hapoalim and Leumi groups to 9.52 percent in the First International group (Figure 5.7).

The ratio of capital to risk-weighted assets in a sample of banks abroad was higher than those in the major banks in Israel, and averaged 11.91 percent (Table 3.2). This suggests that banks abroad have a more conservative risk-management policy, part of

Figure 5.7
Risk-Weighted Capital Ratio, by Banking Group, 1995–2000



SOURCE: Published financial statements.

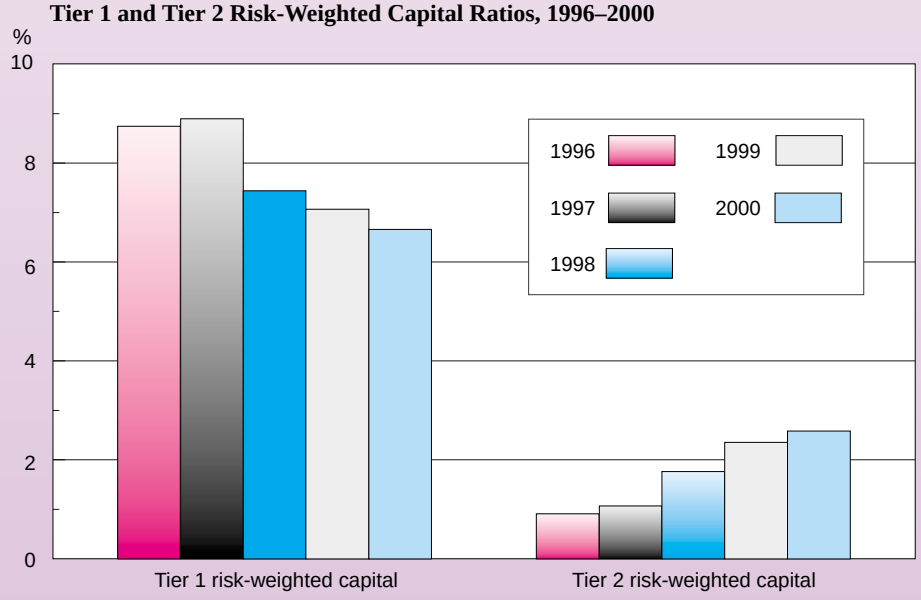
which may be dictated by the supervisory authorities. Although the ratio of Tier 2 capital at banks abroad is higher than that of banks in Israel, the difference between them has been declining for several years.

Since the capital ratio is obtained by dividing total capital by total risk-weighted assets, the development of the ratio is a function of the development of these two elements. Total capital for the purpose of calculating the ratio of capital to risk-weighted assets (which consists of Tier 1 capital and Tier 2 capital less investment in companies included on an equity basis) increased by NIS 5.3 billion or 12.2 percent during 2000 and totaled NIS 48.6 billion (Table 5.12). The rise derived mainly from similar increases in Tier 1 capital and Tier 2 capital in the five banking groups.

Tier 1 capital of the five groups, which includes equity and minority rights increased in 2000 by NIS 2.5 billion (Table 5.13). The total profit of the five groups in 2000 increased their capital by NIS 3.8 billion, against which they distributed dividends totaling NIS 1.5 billion.

Tier 2 capital of the five groups increased by NIS 2.8 billion in 2000, a rise of 25 percent. This followed a 47 percent jump in 1999 and 104 percent in 1998. Tier 2 capital rose in all the banking groups except for the First International, with Discount showing the largest increase, 51 percent.

Figure 5.8
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 1996–2000



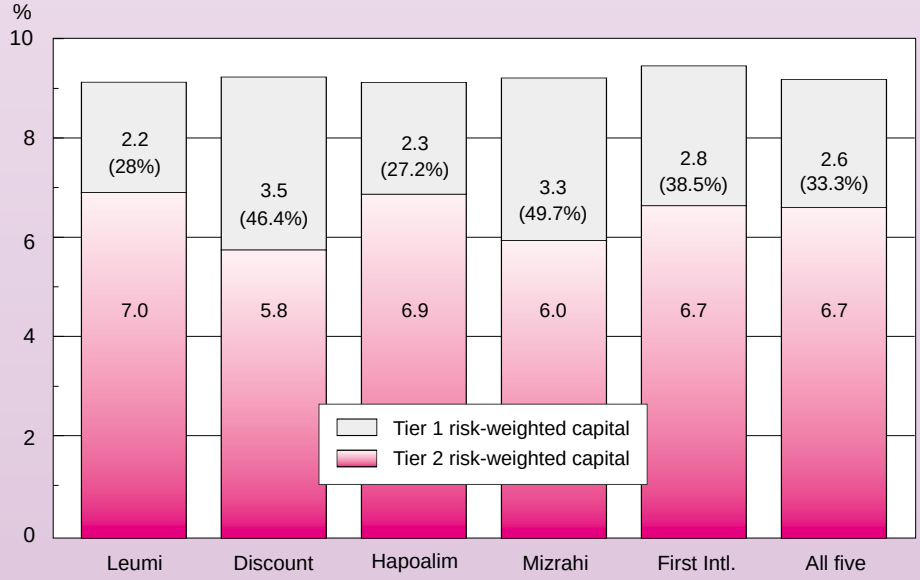
SOURCE: Published financial statements.

The ratio of Tier 2 capital has grown in recent years at the expense of the ratio of Tier 1 capital, and in the Mizrahi and Discount groups the proportion of subordinated notes to total Tier 1 capital is close to reaching the Supervisor of Banks' upper limit of 50 percent (Figures 5.8 and 5.9).

The increased proportion represented by Tier 2 capital is the result of decisions by banks' management to improve their capital adequacy by issuing subordinated notes. This is much faster and easier than raising Tier 1 capital (ordinary shares and preferred stock authorized by the Supervisor of Banks), especially in times of recession and uncertainty in the financial markets. It also affords tax benefits to the issuer, as interest expenses on capital notes are tax deductible, as opposed to payments of dividends, which are not. Thus the issue of subordinated notes increases the issuer's profitability. However, the closer the bank is to the limit imposed by the Supervisor of Banks, the more restricted its chances of using this capital instrument to complete its capital requirements. Furthermore, subordinated notes are less stable than Tier 1 capital as they are cumulative (payments of interest on them cannot be deferred), they are issued for a limited period, they do not participate in the current losses of the issuing corporation, and there is no certainty regarding their availability and the cost of their renewal.

The significant increase in Tier 2 capital in the last few years, particularly in Leumi and Hapoalim, derives among other things from the increase in dividends paid as a result of the privatization of banks. All groups apart from Discount and Mizrahi distributed

Figure 5.9
Total Risk-Weighted Capital Ratio and its Division into Tier 1 and Tier 2 Capital in the Five Major Banking Groups, 2000



Figures in parentheses are the ratios of subordinated notes (which are recognized for calculating Tier 2 capital) to Tier 1 capital.
SOURCE: Published financial statements.

dividends amounting to NIS 1.5 billion in 2000 (following a distribution of NIS 2.0 billion in 1999). Hapoalim and Leumi paid handsome dividends again in 2000 of 37 percent and 50 percent respectively, continuing the policy followed in the last few years.

Total risk-weighted assets of the five major banking groups increased by 14.4 percent in 2000, after rising by 10.6 percent in 1999, and totaled NIS 526 billion, NIS 8.7 billion of which represents exposure to market risks (Table 5.13). This increase reflects the rise in financial intermediation activity by the banks, and derived mainly from the combination of the rise in balance-sheet credit risk and a smaller rise in the off-balance-sheet risk.

Box 5.1
Proposal for a Framework of New Capital Adequacy Regulations

In January 2001 the Basle Committee circulated a revised draft of its proposals for new regulations concerning capital adequacy, and intends to publish the final version during 2002. The new regulations are meant to come into effect in 2005, replacing the current regulations which have been in effect since 1988.

Comments made by banking supervisors, bankers, and others active in the

banking industry on the proposals issued in June 1999 helped the Committee develop approaches more sensitive to risks in the matter of measuring capital adequacy. The new regulations are intended to assess the required level of capital adequacy so that it will reflect the main elements of banking risks and encourage banks to improve their measurement of risks and their ability to manage them.

The Committee re-emphasizes the importance of the three main pillars of the new regulations: minimum capital requirements, supervision of capital adequacy, and market discipline. The Committee is of the opinion that these three are interdependent and act in concert to achieve stability in the financial system, and intends to cooperate with banking supervisors to instill awareness of these three pillars into banks.

The new regulations reflect the developments which banking has undergone in the last few years. Hence, they emphasize internal processes of measurement, the estimation of banks' exposure, and minimum capital requirements. The regulations require capital adequacy to be based on a standard model, although they welcome banks' advanced internal models appropriate to the degree of complexity of their banking activity. The regulations also relate to risks other than credit risks, including operational risk. The Committee stresses the importance of applying the regulations on a consolidated basis, and in order to ensure that all banking risks are taken into account, the definitions of consolidation have been extended, and apply to holding companies of the banking groups.

The new regulations adopt a standard approach to calculating capital adequacy in most banks, according to which weighting of the portfolio risks is based mainly on an assessment of credit risk by external assessors. To ensure that this assessment reflects banks' risk as accurately as possible, the new regulations expanded the weighting of the risk of loans to ordinary corporations: the weight ascribed to loans to corporations with high ratings (A+/-) was reduced, and that of loans to corporations with low ratings (B+/-) was increased. The new weightings are shown in the following table.

	Credit assesment (rating)						
	AAA to AA–	A+ to A–	BBB+ to BBB–	BB+ to BB–	B+ to B–	Below B–	Not rated
Entity taking a loan or owner of deposit							
Sovereignty	0	20	50	100	100	150	100
Banks							
Option 1	20	50	100	100	100	150	100
Option 2	20	50	50	100	100	150	50
Corporations	20	50	100	100	150	150	100

In the past the Committee set a minimum country weighting for banks and corporations so that their risk weighting could not be lower than that of the country in which they operate. The committee no longer sets that limitation, but banks and corporations with a higher credit rating than their country rating cannot have a risk weighting lower than 20 percent.

Although the regulations deal at length with a standard approach to estimation of risks, the Committee considers it important to that banks adopt internal rating methods for this purpose and encourages the development of advanced internal models in the future appropriate to the degree of complexity of banks' activity. The Committee's recommendations will enable banks which satisfy strict supervisory criteria to use internal assessments of the probability of borrowers' insolvency by implementing internal rating systems to assess risk.

In addition to the capital requirements related to financial risks, the Committee proposes three basic approaches to the calculation of capital requirement for operational risk: basic, standard, and internal. Banks which prefer to use more advanced methods will have to demonstrate that they operate strict management of their operational risk. In each method, the capital requirement will be determined on the basis of several indicators of the bank's operational risk. The Committee considers further discussions with the banking industry necessary to adjust the minimum capital requirements to the degree of exposure to operational risk.

Supervision is another major component complementing minimum capital requirements and market discipline. Supervisory authorities must ensure that banks have a proper internal system for calculating capital adequacy appropriate to the risk profile of both the bank and the supervising environment. The Committee considers supervisory authorities to be responsible for examining banks' internal assessments of capital adequacy in relation to the various risks, taking into account the interrelationship between different types of risk. The Committee also stresses the need for supervisory intervention in cases where it is not satisfied with the bank's own process of risk assessment and capital allocation.

The Committee believes that market discipline will raise the soundness and stability of financial systems in general and banking systems in particular. It is of the opinion that the disclosure requirements it recommends in the new version will improve market discipline, as greater disclosure will enable those active in the market to assess central information in various areas—capital requirements, exposure to risks, and processes of measurement and management.

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

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

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

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

In order to simplify the process of calculating the VaR and make it possible to compare it to the calculations that were made within the body of this chapter (Tables 5.9 and 5.11), we selected only five risk factors: (1) Purchasing power (the inverse of inflation), which affects the value of the position in both the unindexed and the foreign currency segments; (2) The NIS/$ exchange rate, which affects the value of the position in the foreign currency segment; (3) The yield to maturity on Treasury bills; (4) The yield to maturity on CPI-indexed bonds; (5) The dollar Libor interest rate. Interest rates affect the relevant position according to the indexation basis in question. The database is identical to that used for calculating the VaR in the body of the chapter, and includes the monthly developments in the risk factors for the period between 1996 and 2000.

As stated, the calculation of the VaR by this method takes into account the correlations between the changes in the different risk factors. According to the covariance matrix of the changes in the five different risk factors mentioned above there is, as expected, a

high degree of correlation between the changes in purchasing power in Israel and those in the NIS/$ exchange rate. The VaR is obtained as a multiplier of the positions vector (P), which reflects the quantitative exposure to each market risk, by the covariance matrix of changes in the risk factors (S), according to the following equation:

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

Table 5.A.1
Matrix of the Covariance and Correlation Coefficients[a] of Changes in the Five Risk Factors, January 1996–December 2000

(percent)

	Purchasing power	Exchange rate	Nominal interest	Real interest	Dollar interest
Purchasing power[b]	0.431 (1)				
Exchange rate[c]	–0.897 (–0.625)	4.774 (1)			
Nominal interest[d]	–0.128 (–0.308)	0.008 (0.006)	0.402 (1)		
Real interest[e]	0.042 (0.214)	–0.265 (–0.410)	0.070 (0.370)	0.088 (1)	
Dollar interest[f]	0.004 (0.045)	–0.002 (–0.006)	0.018 (0.192)	0.003 (0.076)	0.022 (1)

[a] Correlation coefficients are in parentheses.

[b] The inverse of changes in the CPI.

[c] Monthly changes in the NIS/$ exchange rate. Two risk fators were used to obtain an estimate of the value at risk in the foreign-currency segment—purchasing power and the exchange rate—thereby expressing the correlation between them. Tables 5.9 and 5.11 show this estimate based on changes in the real exchange rate.

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

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

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

Table 5.A.2
Values at Market Risk in the Five Major Banks,[a] December 2000

(NIS million)

	Leumi	Discount	Hapoalim	Mizrahi	First International
Indexation-base risks					
Unindexed segment	23.0	13.6	4.9	5.2	9.9
Foreign-currency segment	88.7	79.2	28.8	9.2	24.6
Correlation effect[b]	–29.1	–17.7	–2.7	–2.2	–11.8
Indexation-base risk 2000	82.7	75.1	31.0	12.1	22.7
Indexation-base risk 1999	97.3	109.1	33.3	7.0	16.6
Interest-rate risks					
Unindexed segment	134.4	56.9	55.9	18.7	14.4
CPI-indexed segment	186.9	122.6	9.5	52.9	96.5
Foreign-currency segment	7.9	7.3	26.7	3.0	4.3
Correlation effect[c]	–60.3	–32.6	–28.3	–11.9	–11.9
Interest-rate risk 2000	268.9	154.2	63.8	62.8	103.2
Interest-rate risk 1999	250.3	192.4	88.0	40.0	114.5
Total market risks					
Correlation effect[d]	–100.3	–85.0	–23.3	–14.9	–28.5
Total market risk 2000	251.2	144.2	71.5	60.0	97.4
Total market risk 1999	233.9	184.0	87.6	38.3	112.3

[a] Values at indexation-base risk are calculated from the banking corporations' position, to enable them to be added to values at interest risk. These data are therefore not comparable to those of indexation-base risk given in the text, which are based on positions on a consolidated basis.

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

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

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

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