Chapter 5
Risks and Capital Adequacy

The continued recession in the Israeli economy during 2002, which resulted from the global economic recession and the security situation in Israel, increased the banks' exposure to credit risks and market risks in the course of the year. Exposure to credit risks increased considerably due to the decline in borrowers' repayment ability and the serious deterioration in the quality of the credit portfolio. The ratio between non-performing loans and equity rose at all of the banking groups. The ratio of problem loans to outstanding credit, and the ratio between the annual expense on loan losses and outstanding credit increased at most of the banking groups. The ratio of risk assets to total assets (before risk weighting), which reflects the extent of risk in the asset mix, and the ratio between credit and business sector product, which reflects borrowers' repayment ability, did not change to any major extent compared with 2001, although they were higher than in previous years. The deterioration in the quality of the credit portfolio encompassed most sectors of the economy and particularly the high-tech industries, and the communications and computer services, construction and real estate, and hotels and catering industries.

The rapid expansion of the credit portfolio typical of previous years ceased in 2002, mainly due to the materialization of credit risks and the decrease in capital ratios towards the minimum required level in 2001.

As in previous years, the credit portfolio by borrower size was notable for relatively high concentration and for variability between the banking groups.

The banks' exposure to interest-rate risks (as estimated by Value at Risk) increased in the three indexation segments at all five banking groups in 2002, and all the groups were exposed to an unexpected rise in the interest rate. However, exposure to indexation-basis risk (inflation and exchange-rate risks) fell slightly at most of the banking groups, and most of the groups were exposed to an unexpected rise in the consumer price index and to an unexpected decrease in the real shekel-dollar exchange rate.

In April 2002, the embezzlement by an employee of the Trade Bank to the amount of NIS 254 million—five times the bank's equity—was revealed. As

a result, the Bank of Israel had to seize the bank immediately, and sent it for liquidation. This event served to highlight the significance of operational risk, and the damage that can be caused when this risk materializes.

At the end of the first half of 2002, liquidity risk materialized at the Industrial Development Bank. This was reflected by massive withdrawals of deposits from the public that resulted from the incompetent management of credit risks, the materialization of the bank's image risk, and depositors' sensitivity following the collapse of the Trade Bank.

Capital adequacy, the principal function of which is to enable the banks to absorb losses that could be caused due to risk materialization, increased in 2002, due mainly to the halt in the growth of credit to the public, but is still lower than in most Western countries. The increase in Tier 2 capital, whose characteristics are less stable than those of Tier 1 capital, continued in 2002. The ratio of deferred notes to Tier 1 capital rose, and at most of the group's came very close to the restriction imposed by the Supervisor of Banks.

1. INTRODUCTION

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

Of all the financial risks to which a bank is exposed in the course of its activity, credit risk is the principal form of risk. The rapid expansion of the credit portfolio of the five banking groups that was typical of the previous years ceased in 2002. Outstanding credit grew by only 1.6 percent, and totaled NIS 552 billion, compared with an increase of 9.8 percent in 2001 and a multi-year average growth of 11.2 percent during the years 1994 to 2001. Since the growth in credit to the public ceased in 2002, the increase in the ratio of this credit to the groups' equity[2] also ceased and amounted to 13.6, similar to the ratio in 2001. The halt in growth in credit to the public primarily resulted from supply factors, and is attributed to the banks' response to the growth in the risk and to the increased level of uncertainty.

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

[2] *Plus* minority interests.

Although the expansion of the credit portfolio ceased in 2002, its proportion to total assets rose from 68.3 percent in 2001 to 69.6 percent in 2002. The rise in the proportion of credit to the public during 2002 was part of a multi-year trend apparent since the end of the 1980s, which mainly resulted from the liberalization of the financial markets, the structural changes in the Israeli economy and in recent years, also apparently derived from decisions to increase credit that were not fully based on a sophisticated analysis of the relevant criteria. This trend was reflected by the banks' expansion of activity that involved relatively high credit risk.

Off-balance-sheet activity in the banking system is notable for credit risk due to the possibility of customers failing to fulfill their liabilities to the bank. The banking groups' outstanding guarantees and other liabilities fell by 5.5 percent and totaled NIS 242.2 billion, while activity in derivative financial instruments increased: Futures transactions increased by 23.3 percent in notional value terms in 2002 and totaled NIS 789.3 billion. The increase resulted from an expansion in currency contracts activity, due to the need of the banks and their customers to hedge against unexpected changes in the exchange rate of the shekel against the dollar; changes that did indeed occur in 2002.

The indices of *credit portfolio quality,* which reflect the possibility that a borrower or borrower group will not repay part of their liabilities to the banks and are mainly affected by borrowers' repayment ability,[3] reveal a substantial deterioration in the quality of the credit portfolio at the five banking groups in 2002, even in comparison with 2001. This deterioration encompassed most sectors of the economy, and particularly high-tech industry and the telecommunications and computer services industry, the construction and real estate industry, and the hotels and catering industry. The decline in borrowers' repayment ability led to a large rise in the ratio between the expense on the provision for loan losses and outstanding credit to the public – from 0.5 percent and 0.85 percent in 2000 and 2001 respectively, to 1.32 percent in 2002. This compares with a ratio of 0.5 percent in a peer group of countries in 2001. The large growth in this ratio resulted from a substantial NIS 2.7 billion increase in the loan loss provision in 2002, mainly at the Hapoalim group (NIS 2 billion).

The proportion of problem loans to outstanding credit at the group's risk rose by 1 percentage point to 10 percent in 2002. Total problem loans excluding debts under special monitoring increased by NIS 6.4 billion in 2002. The ratio of non-performing debts to equity[4] grew considerably, from 22.2 percent in 2001 to 33.6 percent in 2002. Despite the substantial growth in the current loan-loss provision, the ratio between the balance of the loan-loss provision and problem loans (plus the balance of the loan-loss provision) at the five largest banking groups rose by only 2.2 percentage points and amounted to 30.2 percent in 2002, due to the large increase in loans classified as problem loans.

The values of other indices of the quality of the credit portfolio remained similar to those obtained in 2001, but were higher than in previous years: The ratio between risk

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

[4] *Plus* minority interests.

assets and total assets (before weighting), which reflects the extent of the risk in the asset mix, amounted to 67.6 percent in 2002, and the ratio of credit to gross domestic product, which reflects the repayment ability of borrowers in the economy, amounted to 1.13 compared with 1.0 in 2000. Foreign-currency credit risk also increased in 2002, for three main reasons: (1) A 5.1 percent growth in foreign-currency credit to the public, which was apparently used for financing shekel activity since borrowers' activity abroad did not increase; (2) The depreciation of the shekel against the dollar and the currency basket and an unexpected depreciation of the shekel against the dollar had the effect of increasing foreign-currency credit borrowers' exposure to market risks, and the banks' exposure to credit risk as a result; (3) Outstanding 'open' foreign-currency credit (i.e., excluding foreign-currency collateral and surplus local-currency collateral) grew by NIS 1.2 billion to NIS 53.3 billion. 'Open' foreign-currency credit excluding credit to exporters expanded by NIS 4.3 billion.

The main reasons for the deterioration in the quality of the credit portfolio in 2002 were as follows: (1) The worldwide economic slowdown, worldwide terrorism, the slump in the capital markets and further adverse security-related developments in Israel, which aggravated the economic recession in Israel during 2002. These developments led to a large number of cases of firms' defaulting on credit repayments, and a deterioration in the repayment ability of other borrowers; (2) The continued recession in the local and international capital markets (as reflected by the fall in leading share indices and the decrease in stock issues), reduced the value of equity-based credit collateral, and compelled firms with less extensive means at their disposal to resort to the banking system for their financing requirements. The supply of these firms' demand for credit, particularly in 2001, reduced the quality of credit in 2002; (3) Deficiencies in the banks' credit management in previous years, including an under-assessment of risk factors, especially in transactions involving the acquisition of means of control and in the financing of projects in the construction industry, the extension of credit at prices that did not reflect the risk inherent in them without confirming that cash flows were adequate for debt servicing purposes, and sometimes without the right of recourse to the borrower (See Box 5.1.)

The concentration of the credit portfolio by economic sector (H-index) and by borrower size (Gini index) remained relatively stable at the five banking groups. However, the credit portfolio was again characterized by relatively high concentration and large differences between the banking groups. Credit concentration was relatively high at the First International group, but relatively low at the Mizrahi group although this did not necessarily reflect less concentration among large borrowers, and resulted from a relatively high proportion (50.2 percent) of credit to households at that group. The proportion of credit to the construction and real estate industry in the banks' credit portfolio (16.7 percent) still created a high level of concentration in the portfolio, as it did in the previous year.

Total value subject to *interest-rate risk* in the three indexation segments – unindexed shekel, CPI-indexed and foreign currency – rose at the five largest banking groups in

2002 and on the basis of a historical simulation, amounted to NIS 2.7 billion compared with NIS 2.2 billion in 2001. All the banking groups were exposed to a rise in interest rates in the three indexation segments.

Total value subject to *indexation-basis risk* (exchange rate and inflation risk) fell slightly at most of the large banking groups, and under an historical simulation amounted to no more than 0.2 percent of equity at all the banking groups except for the Leumi group (0.6 percent). Most of the banking groups were exposed to an unexpected rise in the consumer price index, and to an unexpected fall in the real exchange rate of the shekel against the dollar.

In April 2002, the embezzlement by an employee of the Trade Bank to the amount of NIS 254 billion—more than five times the bank's equity—was revealed. As a result, the Bank of Israel had to seize the bank immediately and send it for liquidation. This episode is further proof of the nature of *operational risk* and the great damage by its realization. (See Box 5.3).

At the end of the first half of 2002, *liquidity risk* materialized at the Industrial Development Bank, as reflected by the massive withdrawal of deposits of the public. This resulted from the faulty management of credit risks, the materialization of image risk at the Bank, and depositors' sensitivity following the collapse of the Trade Bank. As a result, the government and the Bank of Israel took immediate action in order to stabilize the Bank and to subsequently sell it. For this purpose, the Bank of Israel extended a special credit line for bridging the bank's liquidity requirements. (See Box 5.2).

The *ratio of capital to risk-weighted assets* at the five banking groups rose from 9.38 percent at the end of 2001 to 9.91 percent in 2002. The increase encompassed all five groups and was particularly apparent at the Hapoalim group. The highest ratio was obtained at the Leumi group (10.3 percent), and the lowest ratio was obtained at the Discount group (9.35 percent). The increase in the ratio of capital to risk-weighted assets at the five banking groups resulted from the concurrent effect of two factors: (1) The stop to the expansion of risk assets (which actually decreased by 0.4 percent) due to the halt in the growth of credit to the public; (2) A relatively slight increase in capital (5.1 percent), mainly due to the 9.7 percent growth in Tier 2 capital. The increase in the ratio of capital to risk-weighted assets was encouraged by the Supervisor of Banks, in order to enable the banks to more easily cope with the future realization of risks, and also resulted from the banks' desire to increase their rating by international rating companies and to obtain a license from the supervisory authorities in the USA to operate as financial holding companies there.

For the first time in several years, the halt in the growth of total risk assets led to a rise in the ratio of Tier 1 capital to risk assets, from 6.41 in 2001 to 6.55 in 2002. The increase encompassed all the banking groups. The ratio of Tier 2 capital, which reflects the less stable portion of capital, rose again, from 3.16 percent in 2001 to 3.48 percent in 2002. Tier 1 capital expanded by only NIS 0.7 billion at the five banking groups in 2002 – approximately half the increase in 2001 – because the banking groups' profits fell by NIS 1.1 billion compared with 2001 and due to the preference of the banks' managements

for raising Tier 2 capital for the purpose of adhering to the capital adequacy requirements. In recent years, this preference has been reflected by relatively large issues of deferred notes.[5] The issue of these notes, which is quicker and easier, provides the issuing corporation with leverage, offers tax advantages, and increases profitability. However, the closer a bank is to the Supervisor of Banks' restriction, whereby deferred notes must not exceed 50 percent of total Tier 1 capital, the fewer are its opportunities for using this capital instrument in order to adhere to the capital adequacy requirements.

The ratio of deferred notes (which are recognized for calculating Tier 2 capital) to Tier 1 capital at the five banking groups rose by 2.1 percentage points to 46.6 percent in 2002. At the Hapoalim group, this ratio rose considerably, by 7.6 percentage points, following an increase of 14.5 percentage points in 2001. At the Hapoalim group and at the Discount group, the proportion of deferred notes to total Tier 1 capital amounted to 49.3 percent and 49.2 respectively – very close to the Supervisor of Banks' restriction (of up to 50 percent of total Tier 1 capital). The proximity of the ratio to the permitted ceiling is reducing the banks' ability to use this capital instrument for the purpose of adhering to the capital adequacy requirements, and is also reducing their ability to expand their capital in the future in order to cope with situations of financial distress.

In 2001, the Supervisor of Banks approved for the first time the issue of deferred notes, which are regarded as "sophisticated capital instruments." These notes have numerous advantages over the other components of Tier 2 capital, because they can be used for loss-absorption purposes, even when the banking corporation has not ceased to operate, and can be used to postpone the payment of dividend or interest when the banking corporation's profitability is inadequate for the payment. Since the notes can be converted to Tier 1 capital under certain conditions, they enable the bank to cope with a loss-absorption scenario. The Hapoalim group raised NIS 328 million in 2001 and NIS 751 million in 2002 (9 percent of Tier 2 capital) and the Leumi group raised NIS 410 million (6 percent of Tier 2 capital) from its first issue of these notes in 2002.

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

2. CREDIT RISK

Among the range of financial risks to which a bank is exposed in the course of its activity, credit risk is the principal risk factor. Credit risk derives from the possibility that a borrower

[5] Deferred notes account for the majority of Tier 2 capital in that period.

or borrower group will fail to adhere to their obligations on time, adversely affecting the banks' income and capital. Exposure to credit risk can be divided into two components: (1) Exposure in respect of credit (balance-sheet activity). The proportion of credit to the public to the total balance sheet at the five banking groups rose from 68.3 percent at the end of 2001 to 69.6 percent at the end of 2002; (2) Exposure in respect of off-balance-sheet activity, which derives from customers' liabilities relating to guarantees and transactions.

In this chapter we will analyze exposure to credit risk according to three main criteria that are accepted in the literature: (1) The quality of credit; (2) The amount of credit relative to the bank's capital; (3) The concentration of credit or the lack of dispersal in the credit portfolio from various aspects (economic sector, borrowers). Exposure to credit risk will be higher if the quality of the credit portfolio is low and the amount and concentration of the credit is high. Exposure to credit risk at the five largest banking groups will be analyzed on an aggregate basis for the total system, and at the level of the banking group.[6]

A. The quality of the credit portfolio

The quality of the credit portfolio reflects the probability that borrowers or groups of borrowers will fail to repay part of their liabilities to the banks, and is mainly affected by borrowers' repayment ability and the value of the collateral provided against the receipt of credit. We will analyze this quality in three parts: (1) An analysis of the main risks to the credit portfolio deriving from macroeconomic developments and from capital market variables, developments that adversely affected borrowers' repayment ability in 2002 and therefore reduced the quality of the credit portfolio; (2) An analysis of the credit portfolio at the banking groups on the basis of accepted indices; (3) An analysis of the quality of the credit portfolio by principal industries and the households sector.

1. The main risks to the quality of the credit portfolio in Israel's banking system

(a) Macroeconomic variables

Since 1997 (with the exception of the first 9 months of 2002), the Israeli economy has been in recession, as reflected by low rates of increase in GDP, business sector GDP and the combined state of the economy index. In 2001 and more notably in 2002, the recession

[6] Although it is the principal risk to which the banks are exposed, the measurement of credit risk, unlike the measurement of market risks, is not based on any widely accepted and sophisticated approach. Advanced models for measuring credit risk have been developed in recent years, but have yet to be applied extensively. (See Box 4.2 in our 1998 review). In its new directives on capital adequacy (2003), the Basle Committee emphasizes the importance of developing advanced models for the measurement of credit risk.

deepened, leading to a decline in these indices and to a decrease in exports of goods and services. Developments in the Israeli economy were also affected by exogenous global factors, such as the worldwide economic slowdown, worldwide terrorism (especially the September 11 terror attacks in the USA) and the slump in the world's capital markets, as well as by local exogenous factors, primarily the continuation of adverse security-related developments in Israel.

The deepening economic recession in 2002 led to a large number of cases when firms defaulted on credit repayments – the number of companies and businesses that closed during the year increased by 33% to approximately 45,000[7] – and adversely affected the credit repayment ability of active firms. These developments, together with the large rise in the unemployment rate (principally in 2001) to 10.4 percent and the fall in the average real wage per employee post, which adversely affected households' repayment ability, led to a deterioration in the quality of the credit portfolio in the banking system.

(b) Capital-market variables

The recession prevailing in the local and international capital markets since March 2000 continued in 2002, and was reflected by decreases in the share indices (29.8 percent in the NASDAQ index and 25 percent in the General Share Index) and in stock issues in the capital market (Table 2.2). The decreases in the share indices harmed the quality of the credit portfolio by reducing the value of equities-backed collateral. The decrease in corporate financing by means of the capital market and other substitute sources for local bank credit (direct credit from abroad, credit from institutional investors and venture capital funds' stock issues) detracts from the quality of credit portfolios, because the manner in which credit is allotted from non-banking sources makes it possible only for good firms to raise credit from these sources. Companies that do not have a preferred status in the market have to look for credit from the banking system, and if their requirements are actually met, the proportion of credit to companies with inferior status to total bank credit thereby increases. This behavior was particularly apparent in 2001, when credit from non-banking sources plummeted by 52.4 percent (Table 2.2) – a response to the deepening economic recession and the bursting of "the high-tech bubble." Concurrently, bank credit at the five banking groups expanded by 9.8 percent, slightly less than the multi-year average of 11.2 percent between 1994 and 2001. Only in 2002 did the banks manage to respond to the growth in credit risks and halted the expansion of credit to the public (1.6 percent). But deficiencies in the banks' credit management during previous years (Box 5.1) combined with exogenous effects led to a major deterioration in the quality of the credit portfolio, as will be discussed later.

[7] Source: the BDI Company, January 2003, "Situation of Companies in the Economy, BDI Globes index – special edition for the end of 2002."

Box 5.1: Principal Findings from Credit Audits at the Banks

During recent years, the Banking Supervision Department has greatly increased its investigative activity in the area of bank credit and the management of this credit. Large-scale credit audits were conducted for this purpose, revealing various deficiencies in the management of credit. Although the deficiencies and their extent are obviously not uniform at all the banks, several types of deficiencies that were discovered in a considerable number of credit transactions were apparent:

An under-assessment of risk factors and the narrow margins that were left for the materialization of negative scenarios. This is particularly apparent from the extension of large amounts of credit for financing acquisitions of corporate means of control, as well as for projects in the construction industry and for other transactions.

The extension of credit while mainly relying on the values of assets that serve as security for the loan, without ascertaining whether cash flows were adequate for debt servicing purposes. The problem was particularly serious when the credit was granted without the right of recourse to the borrower.

An under-assessment of credit risks. In numerous cases, this led to distortions in the pricing of credit, that is, prices that did not reflect the risk inherent in the credit, and in some cases delayed the recognition of increased risk as the economic situation deteriorated in Israel and worldwide.

When the banking system became aware of the implications of these deficiencies, much stricter criteria were imposed for the extension of credit. As a result, changes in policies and procedures have become apparent. The banks must continue to propagate the lessons learned in this respect, and enhance the sophistication of their credit risk management systems.

2. Accepted indices of credit portfolio quality

The negative exogenous effects from home and abroad that were reviewed above, together with the deficiencies in the banks' credit management during previous years led to a considerable deterioration in the quality of the credit portfolio in 2001, and more notably in 2002. The fall in the quality of the credit portfolio during 2002 was clearly apparent in the financial statements of the five largest banking groups. We will analyze the development of credit portfolio quality by using six widely-accepted indices that are based on financial statements to the public. We have to mention that these indices do not take into account the collateral provided against credit, or the correlations in the credit

portfolio. Apart from that, the analysis of credit portfolio quality based on the banks' financial statements is partial, since it does not take market assessments into account. As a result, the ratio of the market value to the book value of the five banking groups decreased in 2002 and amounted to only 0.7 at the end of the year, due *inter alia* to the low market assessment of the quality of the credit portfolio. (See Chapter 1 for more details). Another market indicator of the deterioration in the quality of the credit portfolio is the reduction in the Israeli banks' rating by the large international rating companies (Standard & Poor's, Moody's and Fitch) in 2002 and at the beginning of 2003 (Table 5.15). This development reflected the growing risk that international entities attributed to the negative developments in the Israeli economy, and their expression in the banks' financial statements. (The changes in rating and their significance are presented in Appendix 5.1).

(a) The ratio between expenditure on loan-loss provision and outstanding credit to the public at the group's responsibility rose considerably, and amounted to 1.32 percent at the five banking groups compared with 0.85 percent in 2001 and 0.5 percent in 2000 (Table 5.1). This ratio is high in comparison with the peer group of countries, where it amounted to 0.5 percent in 2001 (Table 3.3). Large rises in this ratio were recorded at the Hapoalim and First International groups and a more moderate increase was recorded at the Leumi group, while the ratio fell slightly at the Discount group (although it remained high). The Mizrahi group maintained the lowest ratio in the banking system, 0.52 percent (Table 5.1). The large growth in the ratio derived from an increase *in the annual expenditure on loan-loss provision* from NIS 4.6 billion in 2001 to NIS 7.3 billion in 2002. Most of the increase was recorded at the Hapoalim group (NIS 2 billion), mainly due to a growth in the provision for credit to the high-tech industries, the telecommunications and computer services industry, the construction and real estate industry, and the hotels and catering industry. (For more details, see the section on analysis by economic sector). The annual loan-loss provision is comprised of the specific provision (which accounts for most of the annual provision) and the additional provision. The specific loan-loss provision, which is determined by the banks' management in accordance with borrowers' expected repayment ability and the nature of their collateral, grew from NIS 4.5 billion in 2001 to NIS 7.1 billion in 2002. The five groups also recorded an additional loan-loss provision of NIS 136 million, compared with NIS 117 million in 2001 and NIS 9 million in 2000. The additional provision is determined in accordance with the Supervisor of Banks' directives, on the basis of the risk criteria of the entire credit portfolio, and is affected by the amount of problem loans, which increased in both 2002 and 2001.

(b) The proportion of problem loans to total credit at the groups' responsibility rose by one percentage point to 10 percent (Table 5.1). Large rises in this ratio were recorded at the First International, Hapoalim and Discount groups, while the ratio fell at the other

Table 5.1
Indices of Credit Portfolio Quality, the Five Major Banking Groups, 2000–2002

(percent)

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Ratio of risk-weighted[a] assets to total assets						
2000	66.7	59.5	69.4	62.9	60.0	65.3
2001	69.2	58.0	72.7	63.1	63.1	67.3
2002	70.2	57.3	71.5	65.3	65.7	67.6
Share of problem loans in total credit at group's responsibility						
2000	6.8	9.2	7.7	6.1	2.9	7.0
2001	10.0	10.9	8.4	7.6	6.6	9.0
2002	9.7	12.4	10.4	7.5	9.1	10.0
Share of annual loan-loss provision in total credit						
2000	0.44	1.02	0.45	0.36	0.27	0.50
2001	0.93	1.33	0.68	0.53	0.91	0.85
2002	1.11	1.18	1.70	0.52	1.75	1.32
Ratio of balance of loan-loss provision to problem loans *plus* balance of loan-loss provision						
2000	31.8	32.7	31.0	30.7	34.0	31.7
2001	25.4	33.2	28.5	27.9	24.2	28.0
2002	29.2	32.9	30.2	29.7	28.8	30.2
Share of non-performing loans in group's equity[b]						
2000	16.4	42.4	14.8	16.6	9.1	19.3
2001	18.0	46.7	17.6	15.2	20.4	22.2
2002	29.5	53.1	29.9	26.6	40.7	33.6

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

[b] Including minority shareholders.

SOURCE: Published financial statements.

groups. *Total problem loans*[8] of the five banking groups, with the exception of debts under special supervision, increased by NIS 6.4 billion to NIS 25.3 billion in 2002 (Table 5.2). The increase encompassed all five banking groups, and ranged between NIS 453 million at the Mizrahi group to NIS 2.6 billion at the Hapoalim group. (The proportion

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

of problem loans to borrowers outside the agricultural sector to total credit and total equity rose considerably, and amounted to 4.2 percent and 57.4 percent respectively (Table 5.2).

(c) The ratio of risk assets to total assets[9] (before weighting) amounted to 67.6 percent in 2002, similar to the ratio in 2001 (Table 5.1). This value reflects opposing changes at the banking groups – increases at the First International, Mizrahi and Leumi groups, and decreases at the other groups. A growth in the ratio reflects a move to a more risk-oriented asset mix which in 2002 resulted from a decline in the balance of cash and deposits at the Bank of Israel and from the end to the expansion of credit to the public, which is regarded as a more risk-oriented asset. (The size of the credit portfolio is analyzed below).

(d) The ratio of credit to business-sector product, which reflects the repayment ability of borrowers in the economy, rose slightly in 2002 and amounted to 1.13 compared with 1.11 in 2001 and 1.0 in 2000, higher than in countries comparable to Israel.[10] The relatively small increase in 2002 (as compared to the larger rises during the past decade; Table 1.6) is attributed to the deepening recession in the economy, which was reflected by a one percent decrease in business-sector product, as a result of which credit to the public expanded by only 1.6 percent.

(e) The ratio of the balance of loan-loss provision to problem loans (plus the balance of loan-loss provision) rose at all five banking groups, from 28 percent at the end of 2001 to 30.2 percent at the end of 2002. The increase ranged between 28.8 percent at the First International group and 32.9 percent at the Discount group (Table 5.1). The higher this

[9] Under Regulation No. 311 in the Proper Conduct of Banking Business and in accordance with the directives of the Basle Committee, risk assets are calculating by weighting the balances of all assets and the credit value equivalent of off-balance-sheet items in accordance with four risk coefficients: 0 percent, 20 percent, 50 percent, 100 percent. As an example, for balance-sheet-assets, credit to the public is weighted at 100 percent, and cash in hand and loans to the government are weighted at 0 percent. The risk in respect of off-balance-sheet items is calculated in two stages: In the first stage, the credit value equivalent of the items is calculated by multiplying the balance of the item by the conversion coefficient, which reflects the probability that customer indebtedness to the bank will arise in respect of that item or in respect of a futures transaction. The conversion coefficient defined in Israel ranged between 0 percent, for liabilities for the granting of credit that can be cancelled unconditionally at any time, to 100 percent for guarantees for securing credit. In the second stage, the credit risk is calculated by weighting the balances of the credit value equivalent of off-balance-sheet items by risk coefficients. These are determined according to the type of customer or counter-party to the transaction: transactions with customers are weighted at 100 percent, and transactions with the government are weighted at 0 percent.

[10] See the annual review of the banking system for 2001, Figure 2.3.

Table 5.2
Distribution of Problem Loans,[a] the Five Major Banking Groups, 2001–02

	Leumi		Discount		Hapoalim		Mizrahi		First Intl.		Total	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
NIS million[b]												
Total problem loans	**4,670**	**6,050**	**3,797**	**4,340**	**7,229**	**9,832**	**1,991**	**2,444**	**1,181**	**2,601**	**18,868**	**25,267**
Non-performing	2,462	4,074	2,859	2,981	2,432	4,119	537	1,008	725	1,414	9,015	13,596
To agriculture	685	272	32	53	2,221	1,614	119	87	11	3	3,068	2,029
Other	3,985	5,778	3,765	4,287	5,008	8,218	1,872	2,357	1,170	2,598	15,800	23,238
Percent												
Share of problem loans in total credit at group's responsibility												
Total	**2.7**	**3.5**	**5.0**	**5.7**	**3.9**	**5.1**	**3.4**	**4.0**	**2.3**	**5.3**	**3.5**	**4.6**
Non-performing	1.4	2.3	3.8	3.9	1.3	2.1	0.9	1.7	1.4	2.9	1.7	2.5
To agriculture	0.4	0.2	0.0	0.1	1.2	0.8	0.2	0.1	0.0	0.0	0.6	0.4
Other	2.3	3.3	5.0	5.7	2.7	4.3	3.2	3.9	2.3	5.3	2.9	4.2
Percent												
Ratio of problem loans to group's equity												
Total	**34.1**	**43.8**	**62.0**	**77.2**	**52.4**	**71.3**	**56.4**	**64.5**	**33.2**	**74.9**	**46.4**	**62.4**
Non-performing	18.0	29.5	46.7	53.1	17.6	29.9	15.2	26.6	20.4	40.7	22.2	33.6
To agriculture	5.0	2.0	0.5	0.9	16.1	11.7	3.4	2.3	0.3	0.1	7.5	5.0
Other	29.1	41.8	61.5	76.3	36.3	59.6	53.0	62.2	32.9	74.8	38.8	57.4

[a] Including non-performing loans, rescheduled debts, and overdue loans (excluding debts under special supervision).
[b] At December 2002 prices.
SOURCE: Published financial statements.

ratio, the greater is the bank's ability to absorb losses that could be caused by the non-repayment of credit. Despite the large increase in the current loan-loss provision in 2002, this ratio rose by an average of only 2.2 percentage points due to the substantial growth in credit classified as problem loans.

(f) The ratio between non-performing loans and the group's equity[11] rose considerably at all five banking groups, from an average of 22.2 percent in 2001 to 33.6 percent in 2002 (Table 5.1), due to an NIS 4.6 billion increase in non-performing loans. At the First International group, the proportion of non-performing loans to equity doubled in 2002 and amounted to 40.7 percent. The highest proportion of non-performing loans was recorded at the Discount group (53.1 percent).

Apart from the development in these indices, foreign-currency credit risk increased in 2002. Foreign-currency credit exposes to exchange-rate risk banking customers who engage mainly in shekel activity, and thereby exposes the bank to credit risk, that is, to the possibility that a customer (who does not hedge himself against a depreciation) will fail to repay his liabilities in the event of a depreciation.

Foreign-currency credit expanded in 2002, for three main reasons: (1) The growth in foreign-currency credit to the public was not accompanied by a concurrent increase in credit extended for borrowers' activity abroad (Table 5.3), which would suggest that a greater amount of foreign-currency credit was being used to finance shekel activity in Israel; (2) The shekel depreciated by 9.8 percent against the dollar and by 14 percent against the currency basket. The depreciation against the dollar was unexpected and peaked in June 2002, when the shekel-dollar exchange rate was 16 percent higher than that implied a year previously by the forward rate (Figure 5.1).[12] Outstanding 'open'

[11] *Plus* minority interests.

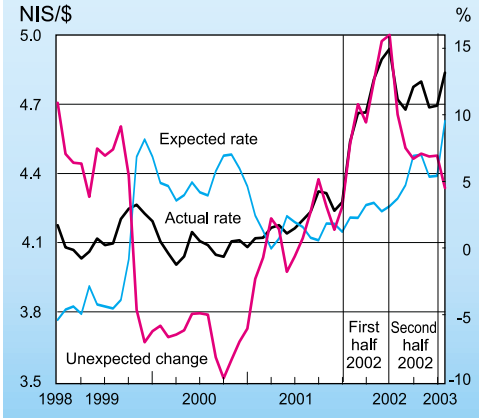
[12] An unexpected change in the exchange rate (β) is estimated by means of the difference between the exchange rate expected in the following period ($E(X_{t+1})$), which is estimated by the forward rate at the beginning of the period (F_t), and the actual (Spot) exchange rate in the following period (X_{t+1}). This difference is expressed in percentages of the forward rate as follows:

$\beta = \frac{X_{t+1} - E(X_{t+1})}{E(X_{t+1})} = \frac{X_{t+1} - F_t}{F_t}$. The forward rate is calculated according to the Interest Rate Parity theory as follows: $F_t = X_t \left[\frac{1 + r_{NIS}}{1 + r_{\$}} \right]$ where X_t is the rate at the beginning of the period, r_{NIS} is the interest rate on a local currency deposit for a single period, which is estimated by the rate of return on Treasury bills for a year and $r_{\$}$ is the interest rate on a foreign currency deposit (the Libor interest rate for a year). When β is positive, an unexpected depreciation in the exchange rate of the shekel against the dollar occurs; when β is negative, an unexpected appreciation occurs; and when $\beta = 0$, the change in the exchange rate is totally expected.

foreign-currency credit (excluding foreign currency collateral and surplus local currency collateral) at the Israeli banks increased slightly in 2002, by NIS 1.2 billion to NIS 53.3 billion. 'Open' foreign-currency credit excluding credit to exporters increased by NIS 4.3 billion to NIS 35.2 billion, while credit to high-risk borrowers grew by NIS 3 billion to NIS 6 billion.

To conclude, the deterioration in the quality of the credit portfolio in 2001, and more notably in 2002, was clearly reflected in the financial statements of the large banking groups. The quality of the credit portfolio at the Mizrahi group was the best, based on its financial statements, apparently due to its more extensive activity in credit to households (and especially credit for housing, which it extended via its Bank Tefahot subsidiary). The other banking groups operate mainly in the business sector, which is more risk-oriented. However, the loan-loss provisions for households may not fully reflect the extent of the risk implied in this sector, because the economic situation adversely affected their repayment ability as well. (See below for a detailed analysis).

Figure 5.1
Exchange-Rate Risk: Development of Actual and Expected NIS/$ Exchange Rate, and Unexpected 12-Month Change in Exchange Rate, December 1998–January 2003



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

3. Quality of the credit portfolio in the principal industries and in the household sector

The deepening economic recession in 2001 and especially in 2002, was reflected by a decline in activity in all the principal industries. The decline impaired borrowers' repayment ability, and led to a deterioration in the quality of the credit portfolios to the principal industries – manufacturing industry, particularly high-tech industry (the electrical and electronics machinery and equipment industry), the telecommunications and computer services industry, the construction and real estate industry, and the hotels and catering industry. The deepening economic recession was also reflected by a rise in the unemployment rate and a decrease in the average real wage per employee post. These impaired affected the repayment ability of the households sector. The decline in the

Table 5.3
Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2001–02

(NIS million, at December 2002 prices)

	Balance of credit to public[a]		Change in balance of credit	Distribution of credit balances[a] *(percent)*		Problem loans: Balance		Problem loans: Share in total credit *(percent)*		Annual specific loan-loss provision		Loan-loss provision/ total credit *(percent)*	
	2001	2002	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Agriculture	6,712	6,114	–598	0.8	0.7	1,863	1,059	27.8	17.3	119	53	1.77	0.87
Manufacturing	113,939	111,190	–2,749	13.8	13.6	7,807	10,274	6.9	9.2	565	1,474	0.50	1.33
Construction and real estate[b]	138,987	136,999	–1,988	16.9	16.7	14,615	16,403	10.5	12.0	1,133	1,283	0.82	0.94
Water and electricity[c]	8,628	9,347	719	1.0	1.1	153	138	1.8	1.5	7	6	0.08	0.06
Commerce	56,299	56,965	666	6.8	7.0	3,257	3,945	5.8	6.9	299	343	0.53	0.60
Hotels and catering	14,907	15,208	301	1.8	1.9	3,307	5,680	22.2	37.3	274	498	1.84	3.27
Transport and storage	18,217	19,190	973	2.2	2.3	537	406	2.9	2.1	58	85	0.32	0.44
Communications and computer services	36,770	34,486	–2,284	4.5	4.2	7,757	7,555	21.1	21.9	625	1.692	1.70	4.91
Financial services	61,704	63,170	1,466	7.5	7.7	1,711	3,342	2.8	5.3	165	367	0.27	0.58
Other business services	22,605	23,224	619	2.7	2.8	1,457	1,369	6.4	5.9	245	165	1.08	0.71
Public and community services	21,753	21,754	1	2.6	2.7	1,457	1,666	6.7	7.7	95	70	0.44	0.32
Individuals	203,535	201,721	–1,814	24.7	24.6	6,756	7,242	3.3	3.6	620	603	0.30	0.30
Borrowers abroad	119,923	119,270	–653	14.6	14.6	2,973	2,421	2.5	2.0	314	509	0.26	0.43
Total	**823,979**	**818,638**	**–5,341**	**100**	**100**	**53,650**	**61,500**	**6.51**	**7.51**	**4,519**	**7,148**	**0.55**	**0.87**

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

quality of the credit portfolio in the principal industries during 2002 was clearly apparent in the financial statements of the five largest banking groups. However, the impaired repayment ability of the households' sector and the decline in the quality of the credit portfolio to that sector, especially in non-housing loans, was not suitably reflected in the banking groups' financial statements. In this section, we will analyze the development of activity indices and indices of credit repayment ability in the principal industries[13] and in the household sector, and the banking groups' response to these developments as reflected in their published financial statements.

(a) Manufacturing industry was affected by the continued recession in economic activity at home and abroad. Worst affected was *high-tech industry* (electrical and electronic machinery and equipment),[14] whose product accounts for a quarter of industrial product. Product and exports in this industry fell heavily, by 12.8 percent in 2001 and by 18.4 percent in 2002 due to the drop in world demand for high-tech products following the bursting of the "high-tech bubble" and the price slide on the Nasdaq from March 2000. The market segment of Israeli exports also decreased. The serious contraction in industrial activity as a whole and in the high-tech industries in particular is indicative of an adverse effect on borrowers' repayment ability and as a result, of a deterioration in the quality of credit. In *manufacturing industry,* the ratio of the loan-loss provision to outstanding credit at the five banking groups rose from 0.5 percent in 2001 to 1.33 percent in 2002 (Table 5.3) as the result of an NIS 909 million growth in loan-loss provisions (of which NIS 763 million was recorded at the Hapoalim group). The proportion of problem loans to total credit increased from 6.9 percent in 2001 to 9.2 percent in 2002. The ratio of credit to product,[15] which reflects the repayment ability of borrowers in the industry, amounted to 1.7 percent in 2002, similar to the ratio in 2001 (Table 5.4) due to similar decreases in product and credit in the industry. The deterioration in the quality of the credit portfolio resulted from a serious decline in the quality of the credit portfolio in *high-tech industry:* the ratio of loan-loss provision to outstanding credit at the five banking groups rose from 0.38 percent in 2001 to 3.2 percent in 2002 (Figure 5.2A) due to an NIS 816 million increase in loan-loss provisions (of which NIS 680 million was recorded at the Hapoalim group alone). The proportion of problem loans to total credit rose from 2.8 percent in 2001 to 7.4 percent in 2002. As a result of the deterioration in the quality of the credit portfolio, the banks imposed stricter terms for the extension of credit. Together with the decline in the industry's activity, this had the effect of ending the expansion of

[13] The sources for the analysis of these indices are: Bank of Israel Research Department reports and data – Annual Report for 2002 (product per industry) and Recent Economic Developments, January 2002; the Central Bureau of Statistics, and the Banking Supervision Department Research Unit.

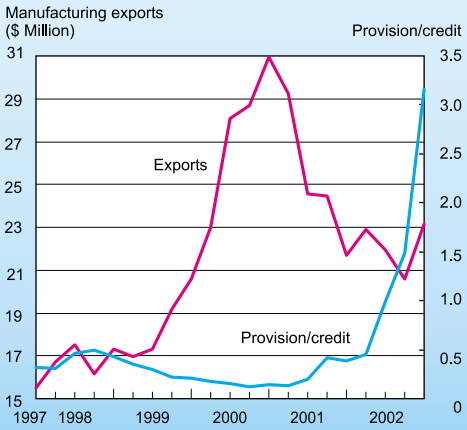
[14] This industry includes electronics components, industrial equipment for control and supervision, and medical and scientific equipment.

[15] Credit-product ratio data in this industry and in the other industries relate to credit in the entire commercial banking system.

credit. The proportion of this credit at the five banking groups thereby fell to 11.9 percent in 2002, following a continued average increase of 28.7 percent during the past four years.

(b) The telecommunications and computer services industry was mainly affected by the world crisis in the high-tech industries resulting from the bursting of the high-tech bubble and the price slide on the Nasdaq. These adverse developments led to a 9 percent decrease in the industry's product, to a decline in the repayment ability of borrowers in the industry, especially that of several large borrowers, and to an erosion

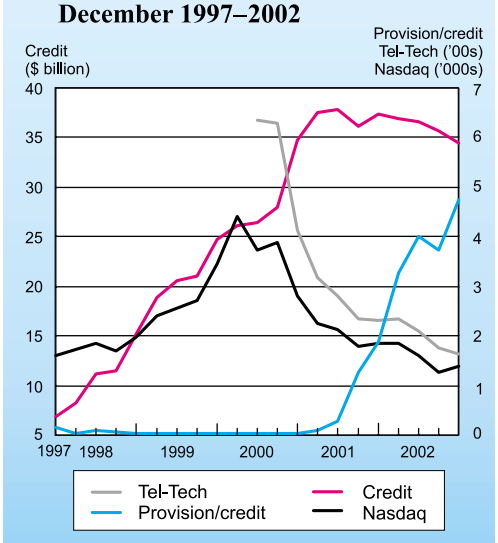
Figure 5.2a
Ratio of Specific Loan-Loss Provision to Outstanding Credit[a] and Exports of Advanced Industries, December 1997–2002



[a] In the five major banking groups.

SOURCE: Central Bureau of Statistics and returns to Supervisor of Banks.

Figure 5.2b
Tel-Tech and Nasdaq Indices, Outstanding Credit (incl. Off-balance-sheet), and Ratio of Loan-Loss Provision to Outstanding Credit[a] in Communications and Computer Services Industry, December 1997–2002



[a] In the five major banking groups.

SOURCE: Central Bureau of Statistics and returns to Supervisor of Banks.

in the value of the equities-backed collateral of borrowers that obtained credit for the purpose of acquiring corporate means of control. (23 percent of the credit for the acquisition of means of control was extended in this industry). Although the growth in credit to the industry was stopped for the first time in 2002 (credit to the industry followed by 6.2 percent), the growth in this credit during previous years, even after the fall on the Nasdaq and the bursting of the high-tech bubble (Figure 5.2B) is indicative of flaws in the banks' credit decisions in those years. These erroneous decisions and the previously-mentioned exogenous affects made it necessary to increase loan-loss provisions to a considerable extent, by a billion shekels (half of this at the Hapoalim group) and to classify more credit as problem loans. The ratio of loan-loss provision to outstanding credit at the five banking groups

Table 5.4
Ratio of Credit[a] to Output, by Industry, 1997–2002

	1997	1998	1999	2000	2001	2002
Agriculture	1.73	1.44	1.63	1.43	0.83	0.75
Manufacturing	0.94	1.14	1.48	1.38	1.68	1.66
Construction and real estate	2.95	3.09	3.86	4.40	5.05	5.06
Construction	2.86	3.12	3.89	4.47	5.02	4.93
Real estate	3.45	2.95	3.76	4.19	5.13	5.41
Water and electricity	1.48	1..48	1.61	1.59	1.84	1.85
Commerce and services	0.63	0.77	0.97	0.94	1.02	1.08
Commerce	0.95	1.11	1.29	1.28	1.39	1.43
Services	0.51	0.64	0.86	0.82	0.89	0.95
Hotels and catering	1.31	1.53	1.80	1.82	2.26	2.29
Financial services	0.72	1.02	1.70	1.57	1.69	1.81
Communications and computer services	0.35	0.62	0.90	0.93	1.07	1.09
Transport and storage	0.44	0.52	0.85	0.80	0.82	0.91
Total	**1.10**	**1.28**	**1.62**	**1.63**	**1.80**	**1.84**

[a] Including off-balance-sheet credit, based on the whole commercial banking system. Bank credit is attributed to different industries according to the composition of GDP by industry, so that the data in this table may be incompatible with the data in other tables.

SOURCE: Based on returns to Supervisor of Banks and Central Bureau of Statistics data.

rose from 0.08 percent in 2000 to 1.7 percent in 2001 (due also to the Supervisor of Banks' directives of September 2001 concerning a special provision for loan losses)[16] and to 4.91 percent in 2002 (Table 5.3). High ratios were recorded at all the banking groups in 2002, particularly at the Hapoalim group (6.47 percent) and the First International group (9.11 percent). Although the latter group's exposure to credit risk in the industry is low (only 6 percent of total credit of the group), the proportion of loan-loss provisions for the industry to total provisions at the group reached 60 percent. The proportion of problem loans to total credit at the five banking groups in 2002 amounted to 21.9 percent, similar to that in 2001 (Table 5.3). The ratio of credit to product in the industry in 2002 and 2001 amounted to 1.1, compared with 0.35 in 1997 (Table 5.4). The growth in the ratio at the end of the 1990s derived from the expansion of credit to the industry that resulted from the development of the "high-tech bubble."

(c) The hotels and catering industry was mainly affected by security-related developments in Israel, which led to a large drop in the number of tourists and overnight stays at hotels. The problems in this industry adversely affected the activity of other industries as well, such as transportation, commerce and business services. The serious decline in the

[16] See the Annual Survey of Israel's Banking System for 2001.

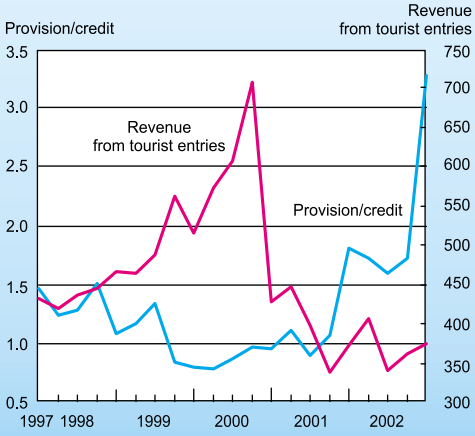
industry's activity was reflected by a fall in revenue (Figure 5.3A) and to a deterioration in a number of financial ratios that are used for analyzing publicly-traded companies in the industry: financial solidity (a decrease in the ratio of equity to the total balance sheet, and an increase in the ratio of long-term liabilities to equity), profitability (a decrease in the ratio of profit before taxes to income, and in return on equity) and in corporate liquidity (a decrease in the ratio of current assets to current liabilities).
Despite the low level of exposure to credit risk in this industry (only 2 percent of outstanding credit), these data show a serious deterioration in the repayment ability of borrowers in the industry. This made it necessary to increase loan-loss provisions by NIS 224 million. The ratio of loan-loss provision to outstanding credit at the five banking groups rose from 1.84 percent in 2001 to 3.27 percent in 2002 (Figure 5.3A and Table 5.3). The proportion of problem loans to total credit increased considerably, from 22.2 percent in 2001 to 37.3 percent in 2002 (the highest ratio among the principal industries) due to an NIS 2.4 billion growth in problem loans, namely at the Hapoalim and Discount groups. The ratio of credit to product in the industry in 2002 was relatively high at 2.3, similar to the ratio in 2001, and compared with 1.8 in 2000 (Table 5.4).

(d) The construction and real estate industry has been in recession for the past five years. During the last two years, it has been mainly affected by security-related developments in Israel, which led to a decrease in the number of workers (supply restriction). In 2002, housing construction was also affected by the reduced demand for apartments resulting from the decline in permanent income, the rise in unemployment, the reduced feasibility of purchasing apartments in the local market for investment purposes due to the rise in the interest rate on mortgages, and the slower pace of immigration to Israel. These developments led to a decrease in the industry's product and its proportion in business-sector product, and to an increasing reliance on bank credit. The ratio of credit-to-product in the industry rose from 3 in 1997 to 5.1 in 2002 (Table 5.4). These adverse developments in the industry's activity harmed borrowers' repayment ability, and increased the proportion of problem loans to outstanding credit to 12 percent, and the ratio of loan-loss provision to outstanding credit to 0.94 percent in 2000 (Table 5.3).

(e) Other industries were harmed by the continuing recession. This included the *commerce* industry, which suffered from decreases in retail trade and revenue due to the increasing erosion of real wages and the adverse effect of higher inflation on the public's purchasing power. *The financial services industry,* which in recent years supplied credit for the acquisition of corporate means of control (29 percent of total credit for this purpose), was hit by the drop in share prices because equities serve as collateral for much of this credit. (See Chapter 2 for more details). For these industries as well, increases, albeit relatively slight, were recorded in the proportion of problem loans and loan-loss provisions to outstanding credit (Table 5.3) and the ratio of credit to product (Table 5.4).

(f) The household sector is notable for a broad dispersal of borrowers and a relatively low correlation between them. It might be expected therefore that credit risk in this

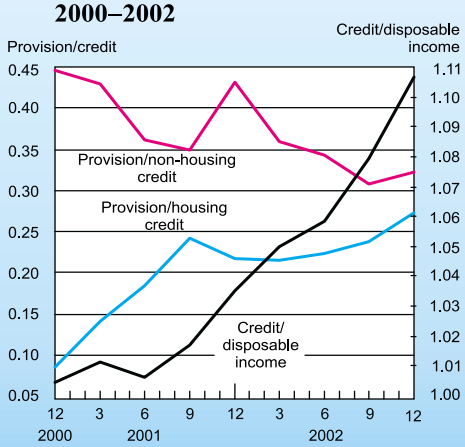
Figure 5.3a
Ratio of Specific Loan-Loss Provision to Outstanding Credit[a] and Revenue from Tourist Entries in Hotel and Catering Industry, December 1997–2002



[a] In the five major banking groups.

SOURCE: Published Financial Statements, Bank of Israel Research Department, and Central Bureau of Statistics.

Figure 5.3b
Ratio of Credit to Disposable Income, and Ratio of Specific Loan-Loss Provision to Outstanding Credit[a] in Household Sector, December 2000–2002



[a] In the five major banking groups.

SOURCE: Published Financial Statements, Bank of Israel Research Department, and Central Bureau of Statistics.

sector would be low relative to other sectors of the economy. However, the continuation of the recession in 2002 and negative developments in money-market variables adversely affected repayment ability in the sector: the rise in the unemployment rate and the decline in the real wage per employee post, the unexpected rise in the consumer price index, which increased the value of CPI-indexed liabilities (principally mortgages), the unexpected depreciation of the shekel against the dollar, which harmed borrowers' (net) repayment ability in foreign currency, and the rise in the real interest rate on shekel credit, mainly during the second half of the year. The decline in households' repayment ability was reflected by adverse changes in a number of indices during 2002: a rise in the ratio of credit to households to disposable income (Figure 5.3A). An increase in arrears in housing loan repayments and their proportion to outstanding credit (principally arrears of over 180 days), an increase in the number of customers whose accounts were restricted, mainly due to Execution Office procedures, increased arrears in payments by means of credit cards at the company's responsibility, and an increase in excess (unauthorized) debit balances in overdraft accounts (Figure 2.8). These adverse developments in households' repayment ability were not suitably reflected in the banking groups' financial statements for 2002, especially in the indices of the quality of non-housing loans that were extended to households. The ratio of loan-loss provisions to outstanding non-housing credit to households fell from 0.43 percent in 2001 to 0.32 percent in 2002 (Figure 5.3B). The proportion of problem loans to total non-housing credit fell slightly and amounted to only 3.8 percent in 2002. These decreases are puzzling in view of the deterioration in

the indices of borrower strength that were described above; even more so when it is considered that loan-loss provisions in respect of housing loans rose only slightly (Figure 5.3B). (The increases in the provisions mainly derived from the provisions that were determined according to the extent of arrears, and that were not subject to the discretion of the banks' management).

Another index of the quality of the credit ratios in the households sector is *the ratio between the proportion of the specific loan-loss provision in the sector to the total loan-loss provision and the proportion of credit to the sector to total credit*.[17] In the manufacturing, construction and real estate, hotels and catering, and telecommunications and computer services industries, this ratio in 2001 was greater than 1, a finding reflecting a relatively low quality of credit in those industries in that year (Table 5.5). The highest ratio was obtained in the telecommunications and computer services industry (5.6 in 2002 compared with 3.1 in 2001).

Similarly, *the ratio between the proportion of problem loans in the sector to total problem loans and the proportion of credit in the sector to total credit* in 2002 was considerably greater than 1 in the hotels and catering, telecommunications and computer services, and agricultural industries, and was greater than 1 in the construction and real estate industry and manufacturing industry (Table 5.5).

B. The size of the credit portfolio

1. Balance-sheet activity

The rapid expansion of the five banking groups' credit portfolio that was typical of the previous years ceased in 2002. Outstanding credit rose by only 1.6 percent during the year (and totaled NIS 552 billion) compared with 9.8 percent in 2001, and a multi-year average of 11.2 percent during the years 1994 to 2001. This development encompassed all the banking groups. The changes in credit ranged between a 3.2 percent decrease at the First International group to an increase of only 2.9 percent at the Leumi group.

Since credit to the public stopped growing in 2002, the increase in its ratio to the groups' equity also ceased:[18] This ratio amounted to 13.6 percent in 2002, similar to the ratio in 2001 (Table 5.6) and compared with a multi-year average of 11.1 during the years 1994 to 2001.

The end to the growth in credit to the public in 2002 primarily resulted from supply factors, and is attributed to the banks' response to the increased level of uncertainty.

The distribution of credit by indexation segments showed that the expansion of credit ceased in the unindexed segment and in the CPI-indexed segment, while foreign-currency credit rose by 5.1 percent (Table 5.6). (See Chapter 2 for more details on the latter two subjects).

[17] When the ratio exceeds 1, this means that the proportion of the specific loan-loss provision in the sector to the total loan-loss provision is greater than the proportion of credit in the sector to total credit. In such a case, the quality of credit in the sector is relatively low, and *vice versa*.

[18] *Plus* minority interests.

Table 5.5
Distribution of Problem Loans and Specific Loan-Loss Provision Relative to Distribution of Credit by Principal Industry, the Five Major Banking Groups, 2001–02

(percent)

	Distribution of:									
	Outstanding credit[a]		Problem credit		Specific loan-loss provision		Problem credit/ outstanding credit		Specific loan-loss provision/ outstanding credit	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Agriculture	0.8	0.7	3.5	1.7	2.6	0.7	4.3	2.3	3.2	1.0
Manufacturing	13.8	13.6	14.6	16.7	12.5	20.6	1.1	1.2	0.9	1.5
Construction and real estate[b]	16.9	16.7	27.2	26.7	25.1	17.9	1.6	1.6	1.5	1.1
Water and electricity[c]	1.0	1.1	0.3	0.2	0.2	0.1	0.3	0.2	0.1	0.1
Commerce	6.8	7.0	6.1	6.4	6.6	4.8	0.9	0.9	1.0	0.7
Hotels and catering	1.8	1.9	6.2	9.2	6.1	7.0	3.4	5.0	3.4	3.8
Transport and storage	2.2	2.3	1.0	0.7	1.3	1.2	0.5	0.3	0.6	0.5
Communications and computer services	4.5	4.2	14.5	12.3	13.8	23.7	3.2	2.9	3.1	5.6
Financial services	7.5	7.7	3.2	5.4	3.7	5.1	0.4	0.7	0.5	0.7
Other business services	2.7	2.8	2.7	2.2	5.4	2.3	1.0	0.8	2.0	0.8
Public and community services	2.6	2.7	2.7	2.7	2.1	1.0	1.0	1.0	0.8	0.4
Individuals	24.7	24.6	12.6	11.8	13.7	8.4	0.5	0.5	0.6	0.3
Borrowers abroad	14.6	14.6	5.5	3.9	6.9	7.1	0.4	0.3	0.5	0.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**1.0**	**1.0**	**1.0**	**1.0**

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

Table 5.6
Distribution of Credit by Indexation Base, the Five Major Banking Groups, 2001–02

		End-year balances *(NIS million)*						Distribution *(percent)*			
		Unindexed	CPI-indexed	In $	In other currencies	Total	Share of equity[a]	Unindexed	CPI-indexed	In $	In other currencies
Leumi	2001	53,423	54,735	49,975	12,022	170,155	12.4	31.4	32.2	29.4	7.1
	2002	51,096	56,093	53,760	14,114	175,063	12.7	29.2	32.0	30.7	8.1
Change (*percent*)		–4.4	2.5	7.6	17.4	2.9					
Discount	2001	24,637	21,544	25,863	3,491	75,535	12.3	32.6	28.5	34.2	4.6
	2002	25,036	20,239	26,339	4,149	75,763	13.5	33.0	26.7	34.8	5.5
Change (*percent*)		1.6	–6.1	1.8	18.8	0.3					
Hapoalim	2001	53,803	63,070	58,454	12,278	187,605	13.6	28.7	33.6	31.2	6.5
	2002	55,574	62,903	59,897	13,328	191,702	13.9	29.0	32.8	31.2	7.0
Change (*percent*)		3.3	–0.3	2.5	8.6	2.2					
Mizrahi	2001	14,715	34,015	7,608	2,948	59,286	16.8	24.8	57.4	12.8	5.0
	2002	15,622	32,973	8,521	3,299	60,415	15.9	25.9	54.6	14.1	5.5
Change (*percent*)		6.2	–3.1	12.0	11.9	1.9					
First International	2001	18,473	16,696	12,538	5,155	50,862	14.3	36.3	28.9	24.7	10.1
	2002	17,534	14,982	11,496	5,219	49,231	14.2	35.6	30.4	23.4	10.6
Change (*percent*)		–5.1	1.9	–8.3	1.2	–3.2					
Total	2001	165,051	188,060	154,438	35,894	543,433	13.4	30.4	34.6	28.4	6.6
	2002	164,862	187,190	160,013	40,109	552,174	13.6	29.9	33.9	29.0	7.3
Change (*percent*)		–0.1	–0.5	3.6	11.7	1.6					

[a] Including minority shareholders.
SOURCE: Published financial statements.

2. Off-balance-sheet activity

Off-balance-sheet activity is risk-oriented due to customers' liabilities to the bank. This activity includes two main types of transactions:

(a) The banks' extension of guarantees and liabilities.[19] The five banking groups' outstanding guarantees and other liabilities fell by 5.5 percent to NIS 242.2 billion in 2002 (Table 5.7). This decrease resulted from opposing changes in the guarantees and liabilities items, and were mainly affected by a decrease in "irrevocable liabilities for the extension of a credit that was approved but not granted."

Table 5.7
Distribution of Guarantees and Other Liabilities, the Five Major Banking Groups, 2001–02

	End-year balances *(NIS million)*[a]		Change from previous year *(percent)*	Distribution *(percent)*	
	2001	2002	2002	2001	2002
Documentary credit	5186	7,120	37.3	2.0	2.9
Credit guarantees	23,270	21,464	–7.8	9.1	8.9
Guarantees for home-buyers	21,431	22,249	3.8	8.4	9.2
Other guarantees and liabilities	19,375	19,310	–0.3	7.6	8.0
Irrevocable liabilities on authorized credit not taken up	60,791	51,735	–14.9	23.7	21.4
Liabilities on guarantee expenses	14,968	13,591	–9.2	5.8	5.6
Liabilities on unsettled credit-card transactions	16,874	15,679	–7.1	6.6	6.5
Overdraft facilities and other unutilized credit frameworks	47,005	51,471	9.5	18.3	21.3
Unutilized credit card frameworks	47,515	39,590	–16.7	18.5	16.3
Total	**256,415**	**242,209**	**–5.5**	**100.0**	**100.0**

[a] At December 2002 prices.
SOURCE: Published financial statements.

[19] Activity in which the notional balance represents credit risk. These transactions are L/C's, guarantees for securing credit, guarantees for apartment-buyers under the Sale Guarantee Law, other guarantees and liabilities, irrevocable liabilities for the extension of credit that has been approved by not granted, liabilities for the issue of guarantees, overdraft accounts, other credit lines, and unutilized credit card credit lines.

(b) Activity in derivative financial instruments.[20] These transactions involve exposure to credit risk due to the possibility that the counter-party to the transaction will not fulfill his liabilities in respect of those future transactions.[21] The amount of the five banking groups' futures transactions in notional value terms increased by 23.3 percent to NIS 789.3 billion in 2002 (Table 5.8).

This development was accompanied by opposing changes in the different types of contracts: a 39 percent increase in currency contracts, as compared to respective decreases of 4.9 percent and 17.4 percent in interest-rate contracts and other contracts[22] (Table 5.8). The increase in currency contracts during 2002 is attributed to the banks' and their customers' need to hedge against the increasingly uncertain course of the exchange rate, which was apparent from the large number of unexpected changes in the exchange rate of the shekel against the dollar during the year (Figure 5.1), and to developments in derivative instruments: awareness of the need for financial hedging against changes in the prices of different assets and the internalization of strategies for this purpose increased, especially in view of the uncertainty in the financial markets and security-related developments in Israel and abroad. (See Chapter 2 for more details).

The growth in the notional balance of these transactions was not reflected by overall credit risk from derivative activity at the five largest banks[23] (present and potential credit risk after weighting in respect of the counter party to the transaction): This risk increased by only 1.4 percent and totaled NIS 23.7 billion.

C. The concentration of the credit portfolio

1. Concentration of credit by principal industries

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

[20] Activity in which the credit risk is not represented by the notional balance: forwards, futures, swaps, and options on exchange rates, interest rates, indices and commodities.

[21] In such a case, the bank will have to return to the market and convert the failed contracts to substitute contracts, at inferior terms from its viewpoint. This situation exposes the bank to market risks, which materialize when the prices of the derived asset differ because of an unexpected change in the prices of the underlying asset are due to an unexpected fluctuation in interest rates, exchange rates, share indices and the consumer price index, for example.

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

[23] The reference is to the parent banks alone.

Table 5.8
Distribution of Balances (Notional Value) of Financial Derivatives, the Five Major Banking Groups, December 2001 and December 2002

(NIS million)[a]

	December 2001				December 2002				
	Interest-rate contracts	Exchange-rate contracts	Other[b]	Total	Interest-rate contracts	Exchange-rate contracts	Other[b]	Total	Rate of change in total derivatives (%)
Leumi	63,458	96,501	11,005	170,964	60,801	146,967	4,587	212,355	24.2
Discount	9,377	47,383	5,016	61,776	11,247	52,681	2,968	66,896	8.3
Hapoalim	96,416	160,399	4,206	261,021	88,998	188,958	11,070	289,026	10.7
Mizrahi	2,620	37,067	8,785	48,472	2,818	115,626	8,174	126,618	161.2
First International	6,223	81,212	10,465	97,900	5,574	83,043	5,802	94,419	–3.6
Total	178,094	422,562	39,477	640,133	169,438	587,275	32,601	789,314	23.3
Change from previous year (percent)					–4.9	39.0	–17.4	23.3	
of which Traded on									
stock exchanges	5.8	8.4	45.3	9.9	6.1	4.7	44.7	6.6	–17.58
Over-the-counter	70.3	36.7	19.4	45.0	72.1	48.8	22.0	52.7	44.40
Other	23.9	54.9	35.4	45.1	21.8	46.5	33.3	40.7	11.25

[a] In terms of notional principal, at December 2002 prices.
[b] Contracts relating to shares, share indices, Treasury-bill futures, and commodities.
SOURCE: Published financial statements.

The Herfindahl-Hirschmann index (the H-index)[24] of concentration of the credit portfolio by principal industries excluding private individuals (households)[25] remained stable at the five groups in 2002 and amounted to 0.083 at the end of the year, the same as in 2001 (Table 5.9). Large differences were apparent in the level of the index between the banking groups, from 0.058 at the Mizrahi group to 0.12 at the First International group. The relatively low concentration in the credit portfolio at the Mizrahi group derives from the high proportion of credit to households in the portfolio (50.2 percent). However, the concentration of the group's business portfolio[26] is the highest, and amounted to 0.212 in 2002 (Table 5.9).

The proportion of credit to the construction and real estate industry is creating a high degree of concentration in the bank credit portfolio. This is despite the fact that the ratio in question fell slightly, to 16.7 percent of outstanding credit in 2002 (Table 5.3).

2. Concentration of credit by borrower size

Another indicator of the concentration of the credit portfolio is the extent of its dispersal among different borrowers: The greater the level of dispersal, the lower the level of exposure to credit risk, and *vice versa*. The credit portfolio of the banks in Israel is notable for a high degree of concentration by borrower, with a small number of large borrowers accounting for the majority of activity in the economy and obtaining credit from a relatively small number of banks. In 2002, for example, one percent of borrowers obtained 71.3 percent of credit in the banking system. The high degree of concentration in the bank credit portfolio is reflected by several indices: (1) The Gini index of inequality in the distribution of credit, which reflects non-uniformity in the distribution of the credit portfolio. The value of this index is the area between the credit portfolio distribution curve (the cumulative percentage of credit to the cumulative percentage of borrowers) and the 45-degree line that reflects egalitarian distribution. The values of the Gini index range between 0 (fully egalitarian distribution and 1 (maximum inequality). The Gini

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

[25] Households, whose share of total credit at the five banking groups amounted to 24.6 percent in 2002, are highly heterogeneous from the aspect of borrowers' financial position. The correlation between them is therefore insubstantial, both in their economic activity and in their repayment ability, and it is doubtful whether they can be regarded as an industry in this respect. Accordingly, the H-index was calculated as the sum of the squares of the proportions of credit in a particular industry (excluding the households sector) to total credit to the public (including the households sector).

[26] The concentration of the business portfolio is measured by the H-index, which is calculated as the sum of the squares of the proportions of credit in a particular industry (excluding the households sector) to total credit to the public (excluding the households sector).

Table 5.9
Indices of Credit Concentration, the Five Major Banking Groups,[a] 2001–02

	Leumi	Discount	Hapoalim	Mizrahi	First Intl.	Total
Concentration by principal industry						
H-Index by principal industry (excluding households)[b]						
2001	0.084	0.095	0.092	0.064	0.111	0.083
2002	0.085	0.091	0.090	0.058	0.118	0.083
Share of credit to households in total credit						
2001	31.3	22.0	27.5	50.1	17.7	24.7
2002	29.7	24.6	27.7	50.2	17.1	24.6
H-Index by principal industry (concentration of business portfolio)[c]						
2001	0.155	0.143	0.153	0.234	0.161	0.147
2002	0.151	0.145	0.151	0.212	0.170	0.146
Concentration by size of borrower						
Share of credit to borrowers whose credit balance is more than NIS 35 million (percent)						
2001	42.9	47.2	55.8	25.7	53.2	47.5
2002	46.8	42.2	55.0	26.0	56.2	48.0
Gini Index[d]						
2001	0.902	0.920	0.927	0.816	0.943	0.913
2002	0.914	0.916	0.928	0.822	0.946	0.917
Share of credit to large single borrowers (percent)[e]						
2001	7.4	14.8	11.4	8.2	25.1	
2002	7.5	10.9	11.8	9.8	29.9	

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

index amounted to 0.92 in 2002 (Table 5.9), similar to the multi-year average for the years 1997 to 2002. High concentration is therefore a structural feature of the Israeli banking system, rather than a recent phenomenon. For the sake of comparison, the index of income (wage) inequality in the Israeli economy amounted to 0.35 in 2002; (2) The distribution of credit to borrowers whose outstanding indebtedness exceeded NIS 35 million amounted to 48 percent of the credit portfolio (including credit value equivalent

Table 5.10
Distribution of Credit to the Public[a] by Single-Borrower Indebtedness, the Five Major Banking Groups,[b] 2001–02

	Balance of credit to public, and credit risk (*NIS million*)[c]		Number of borrowers		Average credit balance (*NIS thousand*)[c]		Proportion of credit balance (%)		Proportion of borrowers (%)	
	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001
(NIS thousand) [c]										
Up to 7	4,091	4,490	1,740,786	1,628,109	2	3	0.52	0.56	38.77	37.52
From 7 to 18	9,901	8,102	767,898	645,708	13	13	1.25	1.02	17.10	14.88
From 18 to 35	15,580	16,955	600,070	666,212	26	25	1.96	2.12	13.36	15.35
From 35 to 70	26,924	26,604	539,279	533,708	50	50	3.39	3.33	12.01	12.30
From 70 to 140	35,734	37,088	363,027	379,322	98	98	4.50	4.65	8.09	8.74
From 140 to 285	51,981	52,478	258,998	263,991	201	199	6.55	6.58	5.77	6.08
From 285 to 530	50,818	50,147	134,871	134,875	377	372	6.40	6.28	3.00	3.11
From 530 to 1,060	32,708	33,281	45,904	47,047	713	707	4.12	4.17	1.02	1.08
From 1,060 to 1,770	17,405	17,578	12,930	13,175	1,346	1,334	2.19	2.20	0.29	0.30
From 1,770 to 3,500	24,179	24,580	9,763	10,191	2,477	2,412	3.05	3.08	0.22	0.23
From 3,500 to 7,100	32,062	30,746	6,297	6,277	5,092	4,898	4.04	3.85	0.14	0.14
From 7,100 to 17,700	53,582	56,045	4,845	5,027	11,059	11,149	6.75	7.02	0.11	0.12
From 17,700 to 35,000	58,185	61,047	2,370	2,479	24,551	24,626	7.33	7.65	0.05	0.06
From 35,000 to 177,000	182,704	185,189	2,589	2,547	70,569	72,709	23.01	23.21	0.06	0.06
From 177,000 to 355,000	71,195	72,760	303	313	234,967	232,460	8.97	9.12	0.01	0.01
From 355,000 to 710,000	73,053	64,972	149	130	490,289	499,785	9.20	8.14	0.00	0.00
From 710,000 to 1,065,000	25,590	29,742	31	36	825,484	826,167	3.22	3.73	0.00	0.00
From 1,065,000 to 1,420,000	8,533	12,424	7	10	1,219,000	1,242,400	1.07	1.56	0.00	0.00
From 1,420,000 to 1,770,000	12,385	8,952	8	6	1,548,125	1,492,000	1.56	1.12	0.00	0.00
From 1,770,000 to 2,130,000	0	1,948	0	1		1,948,000	0.00	0.24	0.00	0.00
From 2,130,000 to 5,096,000	7,378	2,894	3	1	2,459,333	2,894,000	0.93	0.36	0.00	0.00
Total	**793,988**	**798,022**	**4,490,128**	**4,339,165**	**177**	**184**	**100.0**	**100.0**	**100.0**	**100.0**

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

[b] The data in the categories up to NIS 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 2002 prices.

SOURCE: Published financial statements.

in off-balance-sheet items), while the proportion to the total number of borrowers amounted to only 0.07 percent[27] or 3,090 borrowers (Table 5.10).

A comparison between the banking groups shows a relatively high concentration of credit at the First International group (a Gini index of 0.95), while the concentration of credit at the Mizrahi group is relatively low (0.82). These high values are similar to the multi-year average for the years 1997 to 2002 (Table 5.9). The lower level of the Gini index at the Mizrahi group does not necessarily reflect less concentration among large borrowers, and derives from the relatively high 50.2 percent proportion of credit to households (and especially housing loans extended by the Bank Tefahot subsidiary), compared with 17.1 percent at the First International group and an average of 27.9 percent at the three other banking groups. Concentration as measured among large borrowers reveals high concentration at the First International group: The proportion of credit extended at that group to borrowers with outstanding credit of over 5 percent of the group's equity[28] amounted to 29.9 percent in 2002, compared with 7.5 percent at the Leumi group (Table 5.9).

3. MARKET RISKS

Market risks are defined as the erosion of a bank's net worth as the result of unexpected changes in market prices (interest rates, shares and other securities, the exchange rate and inflation) During a period of liberalization in the financial markets, an increase in the volatility of market prices and the development of innovative financial instruments (including derivatives), local and worldwide banks' potential exposure to market risks increases.

The analysis of market risks in this chapter relates to interest-rate risks and indexation basis (inflation and exchange rate) risks, and is based on a model of Value at Risk (VaR). This value reflects the maximum loss expected on the holding of financial instruments in a long or short position – positions that are sensitive to changes in market prices – at a given planning horizon and level of significance at a particular point in time. VaR is calculated by three main methods: (1) the historical simulation approach; (2) the covariance matrix approach; (3) and the Monte Carlo simulation approach. The analysis of VaR in this chapter will be presented using the first approach based on the following assumptions: (1) a planning period (horizon) of a month; (2) a confidence level of 99 percent; (3) positions are based on data published in banks' financial statements (including the affect of futures transactions), but do not take into account the full effect of derivatives

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

[28] *Plus* minority interests.

in general and of options in particular; (4) the impact of changes in risk factors on the value of a 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 other derivatives is ignored. (The larger the changes in the risk factors, the greater is the validity of this assumption, although it weakens as the asset portfolio expands and becomes more diversified.

The calculation of VaR was also examined with the second method. This method, which integrates a covariance matrix between the risk factors,[29] is based on the assumption that the distribution of the changes in all the risk factors is normal and that the distribution of the return on the entire portfolio is therefore normal, with the average changes in the risk factors tending to zero. The results obtained with 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. An analysis of the actual distributions of the changes in the risk factors shows that these distributions are not normal, since they are characterized by skewness $\neq 0$ and kurtosis > 3. In addition, a Jarque-Bera examination of the normality of the different distributions rejected the zero hypothesis whereby the distribution of the variables is normal. Despite this result, the calculation of the VaR with the second approach shows that the correlations between the changes in the risk facts affects the total VaR. It should be noted in this respect that the Banking Supervision Department stipulates that market risks be estimated by means of more complex and more sophisticated models.

A. The historical simulation approach

1. Interest-rate risks

Interest-rate risk is the risk that unexpected changes in interest rates will lead to a deterioration in a bank's financial position (or reduce its net worth).[30] 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[31] is presented separately for each of the three indexation segments (unindexed, CPI-indexed

[29] The risk factors examined are: purchasing power (the opposite of the monthly changes in the consumer price index), the monthly changes in the exchange rate of the shekel against the dollar, the monthly changes in the nominal interest rate (monthly changes in the yields-to-maturity on Treasury bills with a month to maturity), the monthly changes in the real interest rate (monthly changes in the yields-to-maturity on CPI-indexed bonds with a term-to-maturity of five years), and the monthly changes in the dollar interest rate (the monthly changes in the yields-to-maturity of dollar-indexed bonds with a term-to-maturity of three months).

[30] The difference between the present value of assets and liabilities. The interest rate used for capitalization is detailed in the footnotes to table 5.11.

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

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 changes in the yield-to-maturity on Treasury bills and CPI-indexed bonds and in the Libor dollar interest rate as interest-rate risk factors (changes in market prices) in the unindexed, CPI-indexed and foreign-currency segments respectively.[32]

(a) All segments

The total value at interest-rate risk[33] (in all three indexation segments) rose at all of the five banking groups in 2002 and totaled NIS 2.7 billion compared with NIS 2.2 billion in 2001 (Table 5.11).[34]

The VaR ranged between 4.1 percent of net worth (3.6 percent of equity) at the Hapoalim Group (NIS 491 million) and 17.7 percent of net worth (11.5 percent of equity) at the Discount Group (NIS 644.3 million) (Table 5.11). The highest VaR was recorded at the Leumi Group and amounted to NIS 1,066.5 million or 10.1 percent of net worth (7.7 percent of equity). This situation was similar to that in 2001, because VaR is relatively high in the unindexed segment. Total VaR was calculated as the sum of the VaR's in each segment, on the conservative assumption that the worst case scenarios would occur in each segment simultaneously, ignoring the correlations between changes in the different interest rates.

(b) The unindexed local-currency segment

Assets and liabilities in this segment are less sensitive to interest-rate adjustments than in the other intermediation segments, due to their short term-to-maturity and the fact that they are usually priced on the basis of floating-rate interest. However, interest rates in this segment, which are usually adjusted to the yield-to-maturity on Treasury bills, are highly volatile compared with those in other segments. As a result, the standard deviation of the Treasury bill yield during the last eight years was greater than that of CPI-indexed bonds and the standard deviation of the dollar Libor interest rate, except for the last three quarters of 2001[35] (Figure 5.4). The standard deviation of Treasury bill yields increased considerably in 2002, due to the opposing adjustments in the Bank of Israel's interest rate in two different periods: the 2 percentage point cut in January and the 4.5 percent cumulative increase in June and July.

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

[33] The calculation of VaR with the historical simulation approach is presented in Appendix 5.2.

[34] The VaR is presented on aggregate, because in 2002 all the groups were exposed to a rise in interest rates in all three segments.

[35] The high standard deviation of the Libor interest rate in that period derived from the gradual decrease in the dollar Libor interest rate from 6.27 percent in 2000 to 1.76 percent at the end of 2001. The decrease was correlated with the gradual, 4.75 percent cumulative reduction in US central bank's interest rate on interbank loans.

Table 5.11
Exposure to Changes in Interest Rates Using the Historical Scenario Method, the Five Major Banking Groups, December 2001 and December 2002

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Unindexed segment										
Total exposure[a] *(NIS million)*	596	1,377	–911	–688	–2,683	866	–456	–628	–2,593	–177
Duration of assets (*years*)	0.51	0.48	0.47	0.40	0.27	0.31	0.30	0.20	0.24	0.22
Duration of liabilities (*years*)	0.18	0.20	0.23	0.21	0.28	0.28	0.17	0.11	0.17	0.17
Duration of net worth[b] (*percent*)	49.71	16.35	12.07	12.15	–0.37	2.67	7.47	3.45	0.69	7.47
Modified duration[c] (*percent*)	47.21	14.90	11.46	11.07	–0.36	2.44	7.09	3.14	0.66	6.81
Duration gap (Dgap) *(years)*	0.34	0.28	0.23	0.19	–0.01	0.03	0.12	0.08	0.06	0.05
Maximum change in interest *(percentage points)*	1.82	2.51	1.82	2.51	–1.16	2.51	1.82	2.51	1.82	2.51
VaR[d] (*NIS million*)	512.8	514.1	190.4	191.1	11.1	52.9	59.0	49.5	31.1	30.3
Indexed segment[e]										
Total exposure *(NIS million)*	10,687	7,628	4,243	3,062	12,257	10,272	3,742	3,596	4,571	2,678
Duration of assets *(years)*	4.10	3.91	4.21	3.93	3.94	3.69	4.28	4.06	3.87	3.57
Duration of liabilities (*percent*)	3.35	3.37	3.69	3.33	3.99	3.70	3.96	3.67	3.14	2.78
Duration of net worth (*percent*)	7.89	7.80	7.11	8.58	3.69	3.63	7.17	7.57	6.20	7.99
Modified duration (*percent*)	7.56	7.39	6.81	8.12	3.53	3.44	6.87	7.17	5.94	7.56
Duration gap (Dgap) *(years)*	1.31	0.96	1.08	0.97	0.61	0.53	0.71	0.77	1.47	1.21
Maximum change in interest *(percentage points)*	0.52	0.95	0.52	0.95	0.52	0.95	0.52	0.95	0.52	0.95
VaR *(NIS million)*	420.6	534.0	150.4	235.5	225.4	334.5	133.8	244.3	141.4	191.9

Table 5.11 (continued)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Foreign-currency segment[f]										
Total exposure *(NIS million)*	–498	1,503	–40	1,272	2,338	862	10	69	1,151	231
Duration of assets (*years*)	0.56	0.53	1.16	1.65	0.53	0.63	0.36	0.42	0.29	0.29
Duration of liabilities (*years*)	0.53	0.50	0.55	0.94	0.33	0.43	0.37	0.41	0.24	0.28
Duration of net worth (*percent*)	5.68	2.85	942.39	39.63	9.82	27.81	–7.54	3.24	1.58	1.19
Modified duration (*percent*)	5.46	2.77	906.63	38.59	9.45	27.08	–7.26	3.15	1.52	1.15
Duration gap (Dgap) *(years)*	0.03	0.04	0.61	0.73	0.21	0.21	0.00	0.01	0.07	0.01
Maximum change in interest *(percentage points)*	0.44	0.44	0.44	0.44	0.44	0.44	–0.91	0.44	0.44	0.44
VaR (*NIS million*)	12.1	18.5	161.6	217.7	97.9	103.5	0.6	1.0	7.7	1.2
Total value at risk[g] *(NIS million)*	945.5	1,066.5	502.3	644.3	334.4	491.0	193.4	294.8	180.2	223.4
Total position[h] *(NIS million)*	10,785	10,508	3,291	3,646	11,912	12,001	3,295	3,037	3,129	2,732
VaR as percent of net worth	8.8	10.1	15.3	17.7	2.8	4.1	5.9	9.7	5.8	8.2
VaR as percent of equity	6.9	7.7	8.2	11.5	2.4	3.6	5.5	7.8	5.1	6.4

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

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

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

[d] The change, in NIS million, that will occur in the state of the bank due to the maximum change in interest rates: a rise of 2.51 or a fall of 1.47 percentage points in unindexed interest in 2002; a rise of 1.82 or a fall of 1.16 percentage points in unindexed interest in 2001; a rise of 0.95 or a fall of 1.1 percentage points in real interest in 2002; a rise of 0.52 or a fall of 0.69 percentage points in real interest in 2001, and a rise of 0.44 or a fall of 0.91 percentage points in dollar interest in 2001 and 2002. According to the distribution of changes in the interest rates in the last five years, the probability of changes greater than those cited is less than one percent.

[e] Including the CPI/dollar indexation option.

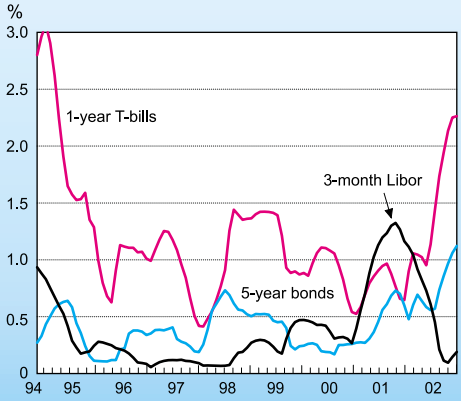
[f] Including foreign-currency-indexed.

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

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

SOURCE: Published financial statements (Appendix 4 in the Management Review set out in accordance with the Guidelines for Preparing Reports to the Public) and Bank of Israel.

Figure 5.4
Standard Deviation[a] of Selected Interest Rates, December 1994–December 2002



[a] Calculated over 12 preceding months.
SOURCE: Monetary Department, Bank of Israel.

At the end of 2002, all the banking groups were exposed to a rise in the interest rate by a maximum rate of 2.51 percentage points, compared with 1.82 percentage points in 2001 (Figure 5.5 and Table 5.11). The groups' increased exposure to the price effect did not lead to a rise in VaR at the banking groups in 2002 (except for the Hapoalim group). This was due to the decrease in the duration gap – the difference between the duration of assets and the duration of liabilities[36] (Table 5.11). The highest VaR in this segment was obtained at the Leumi group – NIS 514.1 million, similar to that in 2001 – and relatively high values were also obtained for 2001 and 2002 at the Discount group. The relatively high values at these groups during the past two years resulted from relatively large duration gaps (Table 5.11).

The significance of the results is that a 2.5 percentage point increase in the unindexed interest rate in the course of a month (when the probability of larger changes is less than 1 percent) would erode the net worth of the groups deriving from this segment by the amounts denominated in the table (which are Values at Risk).

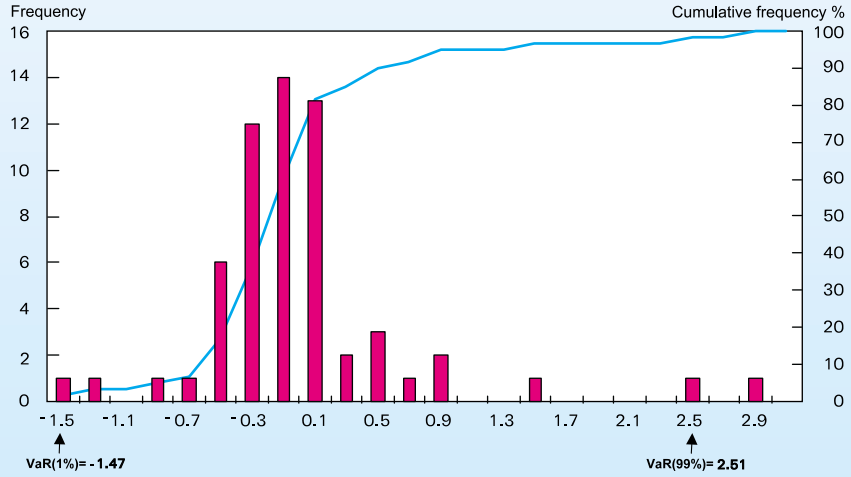
(c) The CPI-indexed segment

Assets and liabilities in this segment are more sensitive to changes in interest rates than 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 the segment are usually adjusted to the yield-to-maturity on CPI-indexed bonds and their volatility is relatively low. These features helped to reduce the potential exposure to interest-rate risk, as expressed by the standard deviation of the yields-to-maturity on CPI-indexed

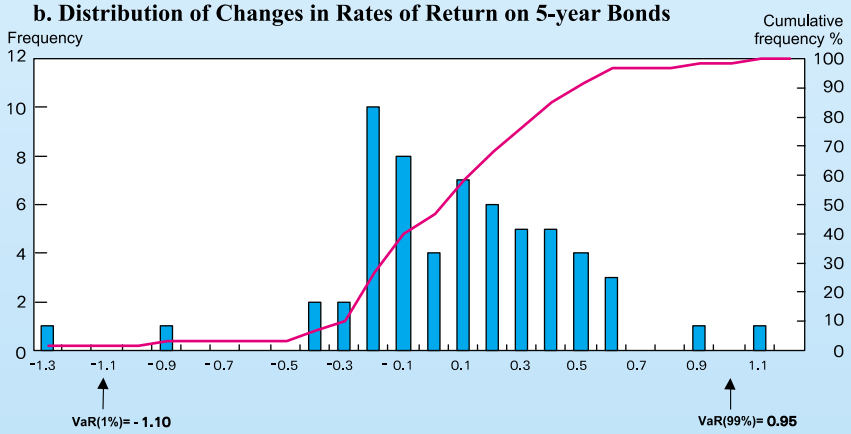
[36] The duration gap was presented for the first time by Bierwag and Kaufman in 1985. Since it reflects the sensitivity of a bank's net worth to interest rate adjustments in term of time (months, years etc.), it makes it possible to assess the duration of the assets/liabilities that must be bought/sold in order to protect the bank's net worth from interest-rate risks. The duration gap is calculation as follows: $D_{gap} = D_A - D_L \cdot \frac{L}{A}$ where D_A is the duration of assets, D_L is the duration of liabilities, A is the present value of assets, *and* L is the present value of liabilities.

Figure 5.5
Distribution and Cumulative Distribution of Month-on-Month Changes in Selected Interest Rates, 1998–2002

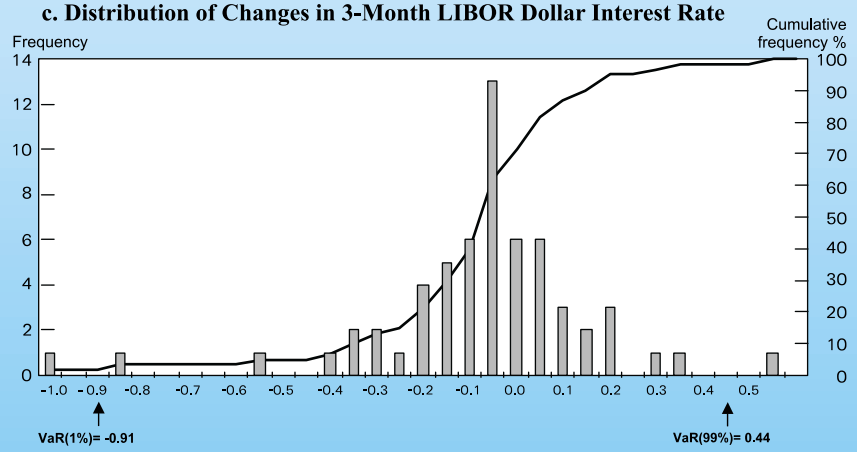
a. Distribution of Changes in Rates of Return on 30-Day Treasury Bills



b. Distribution of Changes in Rates of Return on 5-year Bonds



c. Distribution of Changes in 3-Month LIBOR Dollar Interest Rate



SOURCE: Monetary Department, Bank of Israel.

bonds during the years 1996 to 2000. However, in 2001 and more notably in 2002, the volatility of yields-to-maturity increased (Figure 5.4). The increased volatility in 2002 resulted from the rise in yields-to-maturity, principally in the second half of the year, which derived from two main reasons: (1) three changes in the targeted level of the budget deficit in the course of the year (from 1.5 percent of GDP to 3.9 percent), which were financed by increasing the proportion of CPI-indexed debt instruments; (2) the adjustment of yields-to-maturity in the CPI-indexed segment to the higher yields-to-maturity in the unindexed segment, as detailed above.

At the end of 2002, all five banking groups were exposed to a rise in the real interest rate by a maximum rate of 0.95 percentage points, compared with 0.52 percentage points in 2001 (Figure 5.5 and Table 5.11). The groups' increased exposure to the price effect led to a rise in VaR at all the banking groups, although the growth in the price effect was offset slightly, but inadequately, by a decrease in the duration gap at the group (except for the Mizrahi group). The VaR in this segment ranged between NIS 191.9 million at the First International group to NIS 534 million at the Leumi group.

The significance of the results obtained is that a 0.95 percentage point increase in the CPI-indexed interest rate in the course of a month (when the probability of larger changes is less than 1 percent) would erode the net worth of the groups deriving from this segment by the amounts denominated in the table (which are Values at Risk).

(d) The foreign-currency segment

Interest-rate VaR in this segment is calculated for the maximum monthly increase expected in the 3-month dollar Libor interest rate during the next five years at a confidence level of 99 percent. Exposure to interest-rate risk is lower in the segment than in the local-currency segments for two reasons: (1) The banks maintain low positions in this segment, partly because assets and liabilities in the segment are priced at a floating rate of interest (usually Libor), and are short-term and medium-term. The banks also use derivatives in this segment – swap contracts on interest rates – to reduce their exposure to interest-rate risk. These instruments, which are traded in the world's markets, are less developed in the local-currency segments; (2) Interest rates in the foreign-currency segment are less volatile, as is apparent from the standard deviation of the Libor dollar interest rate during the years 1996 to 2000. The growth in interest-rate volatility in 2001 compared with previous years (Figure 5.4) resulted, as stated, from the decline in Libor dollar interest rates in that year. The cuts in the Libor rate and the US central bank's half percentage point reduction in the interest rate on interbank loans in November 2002 were not reflected in the VaR, because all five banking groups maintained a positive capital duration and were therefore exposed to a rise in interest rates.

At the end of 2002, all the banking groups were exposed to a rise in the Libor dollar interest rate by a maximum of 0.44 percentage points, similar to their exposure in 2001 and 2000 (Figure 5.5 and Table 5.11). The highest VaR in this segment was obtained at the Discount group (NIS 217.7 million, compared with NIS 161.6 million in 2001) and the Hapoalim group (NIS 103.5 million, similar to this value in 2001). The relatively

high values at these groups in the past two years (Table 5.11) resulted solely from the relatively high duration gap (since the price effect did not change in the last two years).

The significance of the results obtained is that a 0.44 percentage point increase in the Libor dollar interest rate in the course of a month (when the probability of larger changes is less than 1 percent) would erode the net worth of the groups deriving from this segment by the amounts denominated in the table (which are Values at Risk).

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

A bank is exposed to indexation-basis risks when in the course of its financial intermediation activities, it raises sources with one indexation basis for uses with a different basis. Changes in the relative prices of the different indexation bases could therefore have an adverse effect on a bank's income. Financial intermediation activity in Israel is carried out in three principal segments: unindexed, CPI-indexed and foreign currency. In the latter segment, the majority of activity is denominated in US dollars. These segments developed as a result of the high rates of inflation prevailing in Israel compared with other Western countries, the system of CPI-indexation mechanisms, and the large volume of foreign trade conducted by both the public and private sectors. The proportion of the foreign-currency segment to the five largest banking groups' total assets rose by 2 percentage points during 2002 and amounted to 41 percent at the end of the year.[37]

Exposure to indexation basis risks is affected by two factors: (1) The quantitative effect (position), which is the difference between the value of assets and the value of liabilities *plus* the net affect of futures transactions; and (2) the price factor, which is the effect of a change in relative prices in the different indexation segments. The analysis of exposure to indexation-basis risks in this chapter is based on a measurement of the banks' financial results and the development of their capital in real terms. The analysis is centered on the three indexation segments alone, without reference to the wide range of foreign currencies. Accordingly, price risks are derived from the difference in relative prices in the unindexed and foreign-currency segments, and the CPI-indexed segment[38] – inflation and the real NIS/$ exchange rate.

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

[37] The 7.3 percent depreciation in 2002 contributed to half the increase (one percentage point) in the foreign currency segment's weight in total assets.

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

exchange rate with respect to exposure to a decline in the exchange rate (when the position in the foreign-currency segment is positive) and the 99th percentile in the distribution was selected with respect to exposure to a rise in the exchange rate (when the position in the segment is negative).

Price risk, which relates to exposure to a rise in the CPI and in the real exchange rate, remained largely unchanged in 2002. As stated, this risk is calculated on the basis of the maximum change in price risk as estimated in accordance with the 99th percentile in the distribution of monthly changes in the risk factor during the previous five years. Developments during the five measurement years therefore have a major impact on the maximum change in price risk during the year under review. Accordingly, the level of the 99th percentile in the distribution of changes in the inflation rate and the real exchange rate during the last five years was directly affected by the rapid depreciation in the exchange rate of the shekel during the months of August and October 1998.

The price risk relating to exposure to a decline in the CPI and the real exchange rate deteriorated slightly in 2002, due to the 4.2 percent real appreciation of the exchange rate in June and the 0.8 percent decrease in the consumer price index in November.

Table 5.12
Difference Between Assets and Liabilities, and the Effect of Derivatives, by Indexation Base, the Five Major Banking Groups, 2000–02

(NIS million, December 2002 prices)

			Foreign currency			Non-	
	Un-indexed	CPI-indexed[a]	$	Other currencies	Financial capital	financial items	Total
2000							
Assets *less* liabilities	–27,926	28,114	11,322	11,125	22,634	16,251	38,885
Effect of derivatives	24,008	–2,039	–10,492	–11,477			
Total position in segment	–3,918	26,075	830	-353			
2001							
Assets *less* liabilities	33,519	30,513	20,714	6,326	24,034	16,652	40,686
Effect of derivatives	30,210	–2,961	–20,907	–6,342			
Total position in segment	–3,309	27,552	–193	–16			
2002							
Assets *less* liabilities	–20,836	22,588	21,217	1,813	24,782	15,707	40,489
Effect of derivatives	23,195	–1,831	–19,334	–2,030			
Total position in segment	2,359	20,757	1,883	–217			

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

Table 5.13
Exposure to Changes in Inflation and the Real Exchange Rate, the Five Major Banking Groups, December 2001 and December 2002

(NIS million, December 2002 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Unindexed segment										
Assets *less* liabilities	–9,077	–7,427	–1,494	–2,701	–15,523	–7,373	–1,820	–2,606	–5,605	–729
Effect of futures and options	10,193	9,711	1,109	2,320	12,627	7,751	1,665	2,295	4,616	1,118
Total position in segment[a]	1,116	2,284	–385	–381	–2,896	378	–155	–311	–989	389
Change in inflation rate[b] (%)	2.06	2.14	–0.66	–0.79	–0.66	2.14	–0.66	–0.79	-0.66	2.14
Value at risk[c]	23.0	48.9	2.5	3.0	19.1	8.1	1.0	2.5	6.5	8.3
Indexed segment[d]										
Assets *less* liabilities	9,727	6,550	2,600	1,842	11,495	9,553	2,734	2,364	3,957	2,279
Effect of futures and options	–1,345	–700	255	123	–1,685	–1,406	–133	375	–53	–223
Financial capital	8,391	8,986	2,326	1,716	8,367	9,061	2,424	2,580	2,526	2,439
Total position in segment	–9	–3,136	529	249	1,443	–914	177	159	1,378	–383
Foreign-currency segment[e]										
Assets *less* liabilities	7,741	9,863	1,220	2,575	12,395	6,881	1,510	2,822	4,174	889
Effect of futures and options	–8,848	–9,011	–1,364	–2,443	–10,942	–6,345	–1,532	2,670	–4,563	–895
Total position in segment[f]	–1,107	852	–144	132	1.453	536	–22	152	–389	–6
Change in real exchange rate[g] (%)	5.68	–3.39	5.68	–3.39	–2.43	–3.39	5.68	–3.39	5.68	5.60
Value at risk[c]	62.9	28.9	8.2	4.5	35.3	18.2	1.3	5.2	22.1	0.3
Total value at risk[h]	**85.9**	**77.9**	**10.7**	**7.5**	**54.4**	**26.3**	**2.3**	**7.6**	**28.6**	**8.7**
As percentage of financial capital	1.0	0.9	0.5	0.4	0.7	0.3	0.1	0.3	1.1	0.4
As percentage of equity	0.6	0.6	0.2	0.1	0.4	0.2	0.1	0.2	0.8	0.2

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

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

[c] The change (in NIS million) in a bank's situation which would arise from the maximum change in inflation and the exchange rate. A 2.14 percent rise or 0.79 percent fall in 2002, 2.06 percent rise or 0.66 percent fall in 2001 for changes in inflation, and a 5.6 percent rise or 3.39 percent fall in 2002, and a 5.68 percent rise or 2.43 percent fall in 2001 for changes in the real exchange rate.

[d] Including the CPI/dollar indexation option.

[e] Including foreign-currency indexation.

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

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

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

SOURCE: Based on published financial statements.

(a) All segments

Total value at indexation basis risk (inflation and exchange-rate risk) fell slightly in 2002 at the Leumi and First International groups. The largest decrease was recorded at the Hapoalim and First International groups, while a small increase was recorded at the Mizrahi group (Table 5.13). The lowest VaR was recorded at the Discount and Mizrahi group (NIS 7.5 million), while the highest VaR (NIS 77.9 million or 0.9 percent of net worth and 0.6 percent of equity) was recorded at the Leumi group.

The total value at indexation basis VaR is calculated as the sum of the value at inflation risk, and the value at real 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.

(b) The unindexed local-currency segment

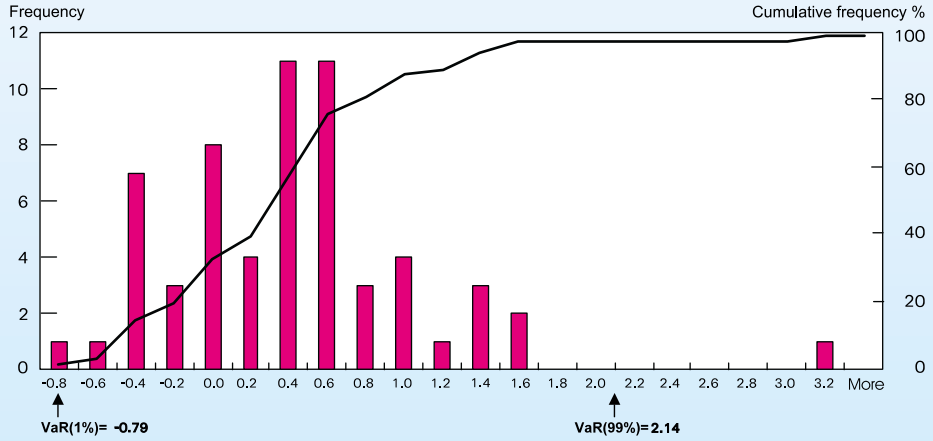
The position of the five major banking groups in this segment totaled NIS 2.4 billion in 2002, compared with a negative position of NIS 3.3 billion in 2001. This amount resulted from developments in both of its components – balance-sheet and off-balance-sheet (Table 5.12). In the former, the difference between assets and liabilities in the segment decreased from a negative NIS 33.5 billion at the end of 2001 to a negative NIS 20.8 billion at the end of 2002, mainly due to the diversion of deposits of the public from the unindexed segment (a decrease of NIS 6 billion) to the CPI-indexed segment and the foreign-currency segment at the Hapoalim group, and a large NIS 6.4 billion drop in deposits of the public in the unindexed segment at the First International group.

In 2002 as previously, the banking groups attempted to reduce their exposure to inflation risk by means of off-balance-sheet activity. However, the large decrease in the difference between assets and liabilities required less off-balance-sheet activity, which dropped from NIS 30.2 billion in 2001 to NIS 23.2 billion in 2002. Most of the decrease, in a mirror image of balance-sheet activity, was recorded at the Hapoalim and First International groups (Table 5.13).

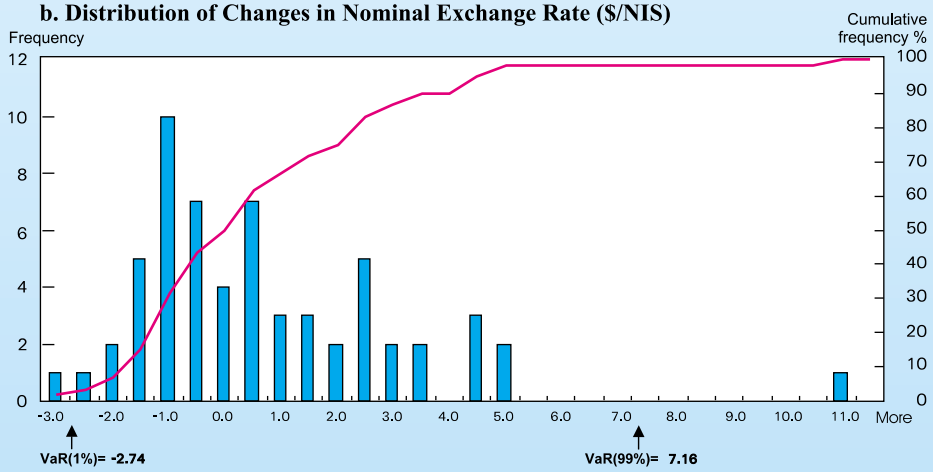
The value at inflation risk reflects the maximum deterioration in a bank's financial position that could result from the change in the CPI. This value is obtained by multiplying the total position by the maximum monthly changes in the CPI according to the direction of exposure (a rise or fall in the index). The direction of the exposure differed between the banking groups: The Leumi, Hapoalim and First International groups were exposed to a maximum increase in the CPI of 2.14 percent due to the positive position in the segment; the Discount and Mizrahi groups were exposed to a maximum decrease of 0.79 percent because of the negative position in the segment (Table 5.13 and Figure 5.6). The highest VaR in the segment was obtained at the Leumi group (NIS 48.9 million) as a result of the doubling of the position in the segment. This means that the maximum expected rise in the CPI (2.14 percent) would erode the value of the position deriving from this segment by the said amount. At the other groups, relatively low values were obtained (Table 5.13).

Figure 5.6
Distribution and Cumulative Distribution of Month-on-Month Changes in CPI and Exchange Rate ($/NIS), 1998–2002

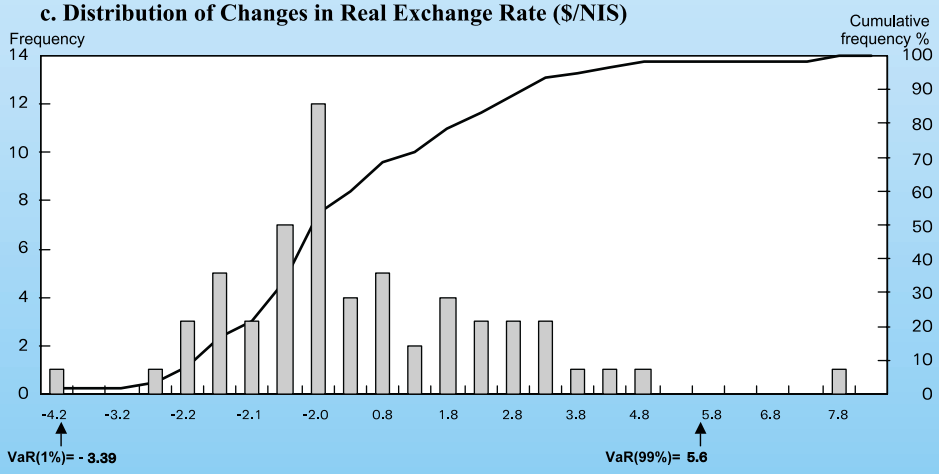
a. Distribution of Changes in CPI



b. Distribution of Changes in Nominal Exchange Rate ($/NIS)



c. Distribution of Changes in Real Exchange Rate ($/NIS)



SOURCE: Monetary Department, Bank of Israel.

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

The total position of the five banking groups in this segment amounted to NIS 4 billion in 2002, taking financial capital as a source in this segment, compared with a positive position of NIS 3.5 billion in 2001 (Table 5.12).

(d) The foreign-currency segment

The position of the five banking groups in this segment amounted to NIS 1,666 million compared with a negative position of only NIS 209 million in 2001. This amount resulted from the development of its two components – balance-sheet and off-balance-sheet (Table 5.12). In balance-sheet activity, the difference between assets and liabilities in the segment contracted from NIS 27 billion at the end of 2001 to NIS 23 billion at the end of 2002 (the opposite of the situation in the unindexed segment), mainly due to the decrease at the Hapoalim group that resulted from a large NIS 9.5 billion growth in deposits of the public, and the decrease at the First International group that resulted from the NIS 3.8 billion reduction in cash and deposits in banks. These decreases in the difference between assets and liabilities were partly offset by increases at the other groups (Table 5.13).

In 2002 as previously, the banking groups attempted to reduce their exposure to exchange-rate risk by means of off-balance-sheet activity. However, the large decrease in the difference between assets and liabilities required less off-balance-sheet activity, which dropped from NIS 27.2 billion in 2001 to NIS 21.4 billion in 2002. Most of the decrease, in a mirror image of balance-sheet activity, was recorded at the Hapoalim and First International groups (Table 5.13).

The groups' exposure to exchange-rate risk, from both the directional and quantitative aspects, reflects *inter alia* their managements' assessments regarding the development of the exchange rate and the nature of risk management practiced at the group. Since risk is measured in real terms, the position in this segment is exposed to exchange rate adjustments as well as changes in the CPI, that is, to changes in the real exchange rate. All the groups, except for the First International group, were exposed to a rise in the real exchange rate by a maximum of 3.39 percent due to the positive position in the segment (Table 5.13 and Figure 5.6). The First International group hedged itself almost completely against real exchange-rate risk by maintaining a relatively small position in the segment. The exchange rate VaR in the segment at that group amounted to only NIS 300 thousand. At the other groups, VaR in the segment amounted to only NIS 56.8 million, due to decreases at the Leumi and Hapoalim groups (Table 5.13). This means that the maximum expected change in the real NIS/$ exchange rate in the course of a month (3.39 percent) would have eroded the groups' position in the segment by those amounts (Table 5.13).

4. LIQUIDITY RISKS

Liquidity risk derives from uncertainty regarding changes in the supply of deposits from the public (sources) and changes in demand for credit (uses). This risk results from unexpected withdrawals, which could cause a monetary and business liquidity shortage, and compel a bank to sell assets at less than their market price (active management of assets), or raise sources in the secondary market (interbank loans or Bank of Israel loans) at a cost above the market price (active management of liabilities). This definition applies mainly to balance-sheet items (credit and deposits) that do not have contractual redemption date, such as demand deposits and the utilization of overdraft credit lines. The definition also relates to the non-renewal or early redemption of balance-sheet items with redemption dates that are known in advance, such as time deposits and loans.

One aspect of the reform and liberalization of the money and capital markets during the past decade has been the considerable reduction in the Bank of Israel's requirements regarding the reserve ratio (liquidity for monetary purposes). Today, these ratios are similar to those that the banks hold for pure business motives.

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

During recent years, the banks' time deposits at the Bank of Israel served as an important instrument in the management of current liquidity. The relatively high interest rates prevailing in the unindexed local-currency segment during previous years led to a large growth in the supply of unindexed deposits of the public concurrent with reduced demand for unindexed local-currency credit, and created surpluses of liquid sources at the banks, which they deposited at risk-free interest at the Bank of Israel in deposit tenders. The decrease in capital imports to the economy in 2002 reduced the need for this capital absorption, leading to a large decrease in monetary deposits at the Bank of Israel.

One of the indices used to measure the banks' exposure to liquidity risk is the short ratio, which reflects the ratio between highly liquid assets and liabilities with no contractual redemption date, and which can therefore be redeemed immediately. At the five major banking groups, this ratio[39] amounted to 0.95 at the end of 2002 compared with 0.62 at the end 2001, and ranged between 0.63 at the Hapoalim group and 1.75 at the Discount group. A ratio greater than one is indicative of a low level of exposure to liquidity risk that is, a high probability that the bank will be able to fulfill its liabilities in the short run.

Demand for credit in the foreign-currency segment continued to expand due to Israeli firms' difficulty in raising funds abroad as a result of the uncertain economic and security situation, and due to the increased feasibility of taking foreign-currency credit in view of the expansion of the interest rate gap between Israel and abroad in the course of the year.

[39] Assets in this calculation are cash in hand, demand deposits at the Bank of Israel, and time deposits at the Bank of Israel as in daily and weekly monetary tenders. Liabilities in the calculation are demand deposits, the public's drafts for payment on demand and SROs.

The commercial banks' outstanding foreign-currency credit increased by $0.8 billion or 3.0 percent in 2002 (Table 2.5). During the first half of the year, the growth in foreign-currency credit was financed by Israeli banks' withdrawals of deposits abroad and by a growth in deposits from foreign banks. The latter development resulted from the 15.5 percent depreciation of the exchange rate of the shekel against the dollar in the first half of 2002, which together with the expansion of the interest rate gap increased the feasibility of investing in banks in Israel. In addition, in July 2002 the Bank of Israel announced that the secondary liquidity requirement would be lowered and then gradually abolished with effect from August 1, 2002. Following this amendment to the liquidity requirements, foreign currency deposits of the public will be subject to the same primary liquidity requirement as all other deposits of the public.

The relaxation of the liquidity requirements enabled the banks to reduce their compulsory deposits at the Bank of Israel by $200 million within 10 months, and thereby increased the unrestricted sources available to them for expanding their credit portfolio. In practice, the banks used these unrestricted sources to increase their deposits abroad once again.

The growth in foreign banks' deposits in Israel, the decrease in Israeli banks' deposits abroad for the purpose of financing an expansion of foreign-currency credit in the first half of 2002, the decrease in the banks' deposits at the Bank of Israel and the investment of the funds withdrawn in deposits at banks abroad in the second half of the year reduced the ratio between current assets and current liabilities[40] in the foreign-currency segment from 0.31 at the end of 2001 to 0.28 at the end of 2002. The annual average ratio fell from 0.34 to 0.26. The decrease reflects a rise in liquidity risk in the foreign-currency segment in the entire commercial banking system.

At the end of the first half of 2002, liquidity risk materialized at the Industrial Development Bank as the result of a massive withdrawal of deposits of the public. (See Box. 5.2).

Box 5.2: The Liquidity Crisis at the Industrial Development Bank

The Industrial Development Bank was the seventh largest bank in the banking system until 2001. On June 30, 2001, its balance sheet totaled NIS 15 billion, credit to the public NIS 12.6 billion, deposits of the public NIS 4.6 billion and its capital adequacy amounted to 15.4 percent.

In the third quarter of 2001, due *inter alia* to a credit audit conducted by the Supervisor of Banks, the bank recorded large loan-loss provisions that led to the recording of a loss in its financial statements. These losses increased

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

during the following quarters, and its capital ratio fell below the 15 percent level required of it by the Supervisor of Banks. During the initial months of 2002, the bank's image was further damaged by media reports on its financial position, its problems in the area of capital ratios and credit, and the resignation of the Chairman of the Board of Directors of the bank and its CEO. The embezzlement at the Trade Bank at the end of April 2002 increased the apprehension of depositors at the Industrial Development Bank. All these factors adversely affected the bank's business liquidity due to the non-renewal or withdrawal of deposits of the public. The result was that the Industrial Development Bank, which in the past enjoyed a very good liquidity position and was a net lender in daily interbank trading (until May 2002), became a net borrower.

Following the development of these problems at the bank, the Supervisor of Banks ordered the Bank and its owners to take immediate measures in order to improve its capital adequacy and subsequently, to improve its business liquidity. Despite the bank's partial success in repaying creditors and rolling-over deposits of the public, its position deteriorated further.

In August 2002, following the bank's publication of a profit warning with respect to its half-yearly financial statements and due to misleading media reports alleging that the Governor of the Bank of Israel intended to appoint an authorized manager of the bank, its depositors began to panic.

As a result, the government and the Bank of Israel decided to take action in order to stabilize the bank immediately and to subsequently sell its banking assets and liabilities. Accordingly, the Bank of Israel extended a special credit line for bridging the bank's liquidity requirements. At the end of 2002, this credit line amounted to NIS 2.1 billion. The credit was used to repay deposits of the public, which fell to NIS 1.3 billion at the end of the year compared with NIS 4.1 billion in March 2002.

Since then, the bank has taken action to collect credit and reduce its expenses and personnel, in order to ensure that it will be able to close while assuring depositors' money and minimizing the damage to its owners.

5. OPERATIONAL RISKS

Operational risks cannot be defined in a precise manner. According to the Basle Committee, operational risk is the risk of a loss deriving from deficiencies or failures in internal processes, from the human factor, and from external systems or events. This definition includes legal risks, but does not include strategic risks and image risks. In financial institutions, these risks relate to a wide range of potential failures in a firm's activity: embezzlement and fraud, human errors, damage to the operational ability of computer systems, loss of information, robbery and fire (events that are not directly related to credit or market risks).

The materialization of operational risk was exposed in 2002, with the discovery of the massive embezzlement by an employee of the Trade Bank (Box 5.3).

Box 5.3: The Embezzlement at the Trade Bank

The act of embezzlement by an employee of the Trade Bank that led to the liquidation of the bank was exposed in April 2002. A special audit that was conducted by the Banking Supervision Department at the bank's offices as a result of the liquidity distress that the bank had encountered revealed a group of credit accounts in exception. After the auditors had asked to see these customers' portfolios, the embezzler confessed to police that she had stolen a very large sum of money. The Bank of Israel had to seize the bank immediately and send it for liquidation. The employee was convicted of stealing NIS 254 million, five times more than the bank's equity.

Investigations showed that two main methods had been used to carry out the embezzlement:

1. The withdrawal of customers' deposits by the technique of breaking a deposit, and canceling it or preventing it from being renewed.

2. The implementation of back-to-back loans in fictitious accounts that the employee opened by forging documents, against (genuine) deposits of customers.

The flaws and deficient control procedures that made the embezzlement possible relate to different areas of management: account opening procedures, the input of customer details to the computer system, regulations and procedures for transferring information to the customer, balance verification procedures in customers' accounts, and loan extension procedures. Deficiencies were also found in the control and supervision mechanisms from all aspects relating to the procedures for the authorization of loans, concurrent with the exceeding of authority and the non-maintenance of separation between different functions, and deficiencies in the authorizations system, which made it possible for the employee who carried out the embezzlement to obtain blanket authorizations.

The prevention of embezzlement or its early discovery needs to be based on the daily function of management systems, and the bank's internal control and auditing systems. The Supervisor of Banks' directives in these areas and the specific directives that have been issued to the banks over the years are intended to support the construction of such control systems.

As a result of the embezzlement at the Trade Bank, the State Comptroller conducted a special investigation regarding the function of the Banking Supervision Department. In the summary of his report, the State Comptroller noted: "The (Bank of Israel's Banking Supervision Department's) conceptual attitude concerning the division of functions and responsibilities between itself

and the management of the Bank and its control and auditing systems in all matters relating to embezzlement risks appears reasonable to the State Comptroller. The State Comptroller's Office did not discover any deficiencies in the Banking Supervision Departments' activity in connection with the embezzlement at the bank that indicate a directive causative relationship between it and the non-prevention or non-discovery of the fraud at an earlier date."

The Banking Supervision Department duly examined the State Comptroller's remarks and recommendations and part of them were already implemented in the course of the State Comptroller's examination. Others are being examined, with the intention of applying and adapting them to the other action that the Banking Supervision Department is taking in the relevant areas of risk.

Professional teams appointed by the Supervisor on the day that the embezzlement was discovered accompanied the investigation of the bank, and provided continual assistance to those involved in the investigation, in analyzing the event, in determining its extent, and in identify the methods that were used in the embezzlement. This was prior to the indictment of those who were found to be involved in the episode.

The Banking Supervision Department has appointed a special team for dealing with the matters relating to the liquidation of the bank, including supervision of the implementation of a Bank of Israel guarantee that was signed by the Governor on July 4, 2002. The special administrative units that were established for the purpose are using this guarantee in order to make payments to customers of the Bank who had credit balances at the bank, or who would have had credit balances in the accounts if it were not for the illegalities that occurred.

We will mention a number of other acts of embezzlement and fraud that occurred during recent years.[41]

In 2000, an embezzlement at Bank Mishkan's main branch was discovered that resulted from collusion between a contractor and the manager of the bank's main branch for the extension of loans to fictitious customers by means of forged documents. The loans granted in this manner totaled NIS 96 million, of which NIS 69 million were not covered by any form of collateral. Most of the loss to the bank was covered by insurance against events of this type.

At Bank Mizrahi, an investment official at the Bnei Brak branch embezzled $2.8 million by transferring money between customers of the branch from August 1993 to February 1999. At Bank Leumi Switzerland, an embezzlement by a senior manager was discovered after he had conducted transactions in customers' accounts without authorization, including the transfer of assets between accounts and investments in foreign

[41] The amounts embezzled are presented at current prices.

currency. As a result of this event, the Bank recorded provisions of 186 million Swiss francs in 2000 and 2001. The bank obtained compensation of 83.4 million Swiss francs ($60 million) from its insurance company. In January 2001, an act of fraud was carried out at Investec Bank in Tel Aviv. Within the space of just a few hours, a customer of the bank purchased—by means of a home banking communications system that he had received from the bank—NIS 20 million of put options on the Maof index at prices higher than the market prices, and the options expired without any proceeds being received from them. The surety provided against this exceptional activity was a deposit from the customer of only NIS 20,000. The bank identified this exceptional operation and took action to stop it and sell the options that had been purchased in order to minimize the damage to the bank. The bank eventually had to record a provision of NIS 15 million in respect of this event.

The Banking Supervision Department has issued a number of directives that are intended to support internal control systems and enhance the banks' methods for dealing with operational risk. These directives included: a requirement that the banks re-examine their procedures for identifying (mapping) embezzlement and fraud risk centers and the related audit system since November 2002;[42] a directive concerning risk management,[43] which includes: a requirement that the banking corporation apply clear principles and regulations for the identification, measurement, management and control of risks, including operational risk and measures for minimizing this risk; and a specific directive concerning embezzlement and fraud by the banks' employees,[44] which require the banking corporation to report to the Banking Supervision Department on the discovery of embezzlement, fraud or theft exceeding the amount of NIS 15,000, and any event where there are reasonable grounds for suspecting that one or more employees are involved. This report includes a full description of the event and of the deficiencies in the internal control system that made it possible (if any such deficiencies are found). The banking corporation is also required to report immediately to the Supervisor of Banks himself if a material event involving large amounts occurs in which senior office-holders are involved together with a number of employees (collusion).

Due to the growing importance of information technology systems in the proper management of a banking corporation, a new draft regulation for the Proper Conduct of Banking Business concerning information technology was distributed to the banking corporations.[45] Under this directive, a banking corporation's board of directors are required to determine an information technology management policy within the framework of their computerization policy. This policy must include reference to information security, back-up and recovery procedures in the event of system failures and disaster situations, and the use of innovative technologies in on-line banking.

The Basle Committee has also issued new recommendations concerning the calculation of the amount of capital required to cushion against losses resulting from operational risks.[46] Three approaches for this calculation were presented: (1) BIA – Basic Indicator

[42] Further to previous requirements in March 1990 and December 1996.

[43] Regulation 339–1 in the Proper Conduct of Banking Business.

[44] Regulation 351–1 in the Proper Conduct of Banking Business.

Approach – whereby the capital requirement is calculated by multiplying total exposure to operational risks by a fixed percentage (15 percent). The estimate of total exposure is gross average annual (operating and financing) income during the last three years; (2) TSA – The Standardized Approach – whereby the bank's activity is divided into eight segments of activity, and the exposure to risk in each segment is represented by the gross average annual income during the last three year from that activity (business credit, securities trading, retail banking, payments system etc.). The capital requirement is calculated by adding the gross income from each activity multiplied by a fixed percentage; (3) AMA – Advanced Measurement Approaches, whereby the capital required against operational risks is calculated by means of the bank's internal models. The manner of implementing these approaches in their present format in the recommendations is not final, and is subject to international examination. In the USA for example, the application of the AMA alone is being considered at a limited number of large banks.

6. CAPITAL ADEQUACY

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

The Supervisor of Banks requires the banks to maintain a suitable minimum capital ratio in order to preserve the stability of the banks and the entire banking system. The minimum capital ratio required from the banks in Israel amounted to 8 percent until March 1999, in accordance with the recommendations of the Basle Committee on Banking Supervision, and in March 1999 the Supervisor of Banks increased this ratio to 9 percent due to the increased risks in the banking system.

The capital requirement in Israel is currently based on credit risks and market risk, and does not take into account other risks such as operational risks and legal risks. The Basle Committee's recommendations concerning the holding of additional capital against exposure to market risks (interest-rate risks and linkage basis risk – exchange rate and inflation) were applied in Israel in September 2000. The capital requirement is in respect of exposure to the risks deriving from changes in interest rates and from changes in securities prices that are inherent in the bank's tradable portfolio, and in respect of exposure to the risks deriving from changes in exchange rates and inflation rate that are inherent in all banking activity.

The ratio of capital to risk-weighted assets at the five banking groups rose to 9.91 percent in 2002, compared with 9.38 percent at the end of 2001 (Table 5.14) and an

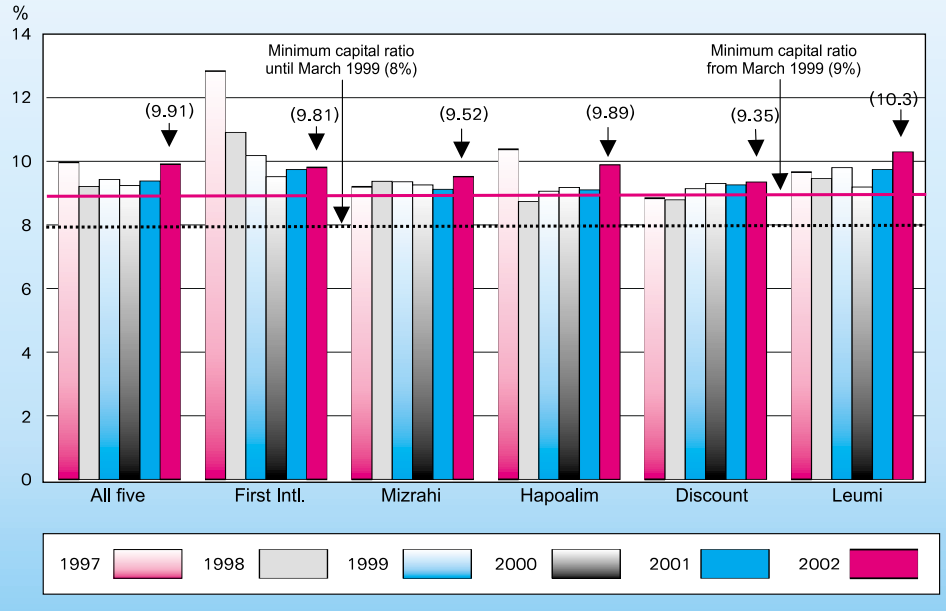
[45] Regulation 357 in the Proper Conduct of Banking Business.

[46] A recent draft of April 2002.

average of 11.6 percent in most Western countries in 2001 (Table 3.3). The increase encompassed all five banking groups. The largest increase was recorded at the Hapoalim group, from 9.1 percent at the end of 2001 to 9.89 percent at the end of 2002. The highest ratio, 10.3 percent, was obtained at the Leumi group and the lowest, 9.35 percent, at the Discount group ((Figure 5.7). The increase in the ratio of capital to risk-weighted assets at the five banking groups resulted from two concurrent factors: (1) the halt in the growth of risk assets that resulted from the stop in the growth of credit to the public (an increase of only 1.6 percent); (2) a relatively slight increase in the capital base compared with previous years, mainly due to the expansion of Tier 2 capital. The increase in the ratio of capital to risk-weighted assets was encouraged by the Supervisor of Banks in order to enable the banks to more easily cope with the materialization of risks in the future, and also resulted from the banks' desire to improve their rating by the international rating companies and to obtain licenses from the supervisory authorities in the USA to operate as financial holding companies there.

Total capital for the purpose of calculating the ratio of capital to risk-weighted assets (which includes Tier 1, Tier 2 and Tier 3 capital *minus* investments in companies included under an equity method) rose by NIS 3 billion or 5.1 percent in 2002 and totaled NIS 62.3 billion at the five banking groups (Table 5.14). An increase in the capital base was recorded at the Leumi and Hapoalim group, while a slight decrease was recorded at the Discount and First International groups.

Figure 5.7
Risk-Weighted Capital Ratio, by Banking Group, 1997–2002



SOURCE: Published financial statements.

Table 5.14
Capital Ratio of the Five Major Banking Groups, 2001–02

(NIS million, December 2002 prices)

	Leumi		Discount		Hapoalim		Mizrahi		First International		Total	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Equity[a]	13,678	13,821	6,126	5,619	13,787	13,793	3,533	3,789	3,556	3,473	40,680	40,495
Tier 1 capital[b]	13,578	13,938	6,067	6,053	13,790	13,930	5,531	3,823	3,538	3,489	40,504	41,215
Tier 2 capital[b]	6,285	6,867	3,292	3,224	6,796	8,340	1,823	1,818	1,763	1,656	19,959	21,905
Of which: Hybrid capital investment	0	410	0	0	328	751	0	0	0	0	328	1,161
Tier 3 capital	0	302	11	31	0	0	0	0	0	0	11	333
Investment in shares and subordinated notes of consolidated companies	–135	–86	–908	–883	–6	–25	–101	–112	–52	–44	–1,202	–1,150
Total capital for risk-weighted capital ratio calculation	19,728	21,021	8.462	8,407	20,580	22,245	5,253	5,529	5,249	5,101	59,272	62,303
Total balance sheet	249,478	248,202	138,614	139,689	256,579	263,129	80,042	77,438	72,001	65,622	796,714	794,080
Balance of off-balance-sheet instruments (notional value)	180,633	195,157	79,867	84,241	273,397	282,972	43,307	44,568	83,386	92,530	660,591	699,469
Credit value of off-balance-sheet items	33,905	35,846	17.515	15,839	49,998	48,476	10,601	10,851	11,921	12,084	123,940	123,096
Weighted balance-sheet balances of credit risk	169,124	171,596	78,013	78,400	185,776	188,741	47,862	47,883	44,075	42,301	524,850	528,921
Weighted off-balance-sheet balances of credit risk	26,987	27,696	12,484	10,650	37,150	34,087	9,365	9,739	8,871	8,765	94,857	90,937
Market risks	6,478	4,705	895	876	3,278	2,156	403	457	935	922	11,989	9,116
Total weighted items	202,589	203,997	91,392	89,926	226,204	224,984	57,630	58,079	53,881	51,988	631,696	628,974
Percent												
Capital/balance-sheet ratio	5.48	5.57	4.42	4.02	5.37	5.24	4.41	4.89	4.94	5.29	5.11	5.10
Tier 1 risk-weighted capital ratio[c]	6.70	6.83	6.64	6.71	6.10	6.19	6.13	6.58	6.57	6.71	6.41	6.55
Tier 2 risk-weighted capital ratio	3.10	3.37	3.60	3.59	3.00	3.71	3.16	3.13	3.27	3.19	3.16	3.48
Total risk-weighted capital ratio	9.74	10.30	9.26	9.35	9.10	9.89	9.12	9.52	9.74	9.81	9.38	9.91

[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.

The growth in Tier 2 capital amounted to NIS 1.9 billion or 9.7 percent, compared with large increases of 36 percent in 2001, 25 percent in 2000, 47 percent in 1999 and 104 percent in 1998. Most of the increase in Tier 2 capital in 2002 was recorded at the Hapoalim group (NIS 1.5 billion). Tier 1 capital rose by only NIS 0.7 billion in 2002, half the increase in 2001, due to an NIS 1.1 billion decrease in the banks' profits compared with 2001, and the preference of the banks' managements for raising Tier 2 rather than Tier 1 capital for the purpose of adhering to the capital adequacy requirements. This preference has been apparent from the large issues of deferred notes[47] in recent years.

Issuing deferred notes is quicker and much easier than raising Tier 1 capital (ordinary shares and preference shares that have been approved by the Supervisor of Banks), particularly during periods of uncertainty in the financial markets, as in 2002. The issue of shares in the equities market during a period of recession is not remunerative for the shareholders due to the low prices of the shares, and because they reduce their portion of equity (assuming that they do not buy their share). The five banking groups did not issue any shares in 2002. The issue of deferred notes provides the issuer with leverage, increases the issuer's capital base for the purpose of calculating the minimum capital ratio, and confers the issuer with tax advantages since interest expenses on capital notes are recognized for tax purposes, while dividend payments on shares are not. The issue of deferred notes thereby increases the issuer's profitability. However, the closer a bank reaches the Supervisor of Banks' restriction whereby deferred notes must not exceed 50 percent of total Tier 1 capital, the fewer are its opportunities for using this capital instrument in order to adhere to the capital adequacy requirements. Apart from that, the features of deferred notes are less stable than those of Tier 1 capital because they are cumulative (interest payments on them cannot be postponed), they are issued for a limited period, there is no certainty regarding their availability (beyond a specific period determined in the directives) and the cost of their renewal, and they do not participate in the issuing corporation's losses on a current basis.

The ratio of deferred notes recognized as Tier 1 capital at the five banking groups rose by 2.1 percentage points to 46.6 percent in 2002. At the Hapoalim group, a large 7.6 percentage point increase was recorded in this ratio, following an increase of 14.5 percentage points in 2001. At the Hapoalim and Discount groups, the proportion of deferred notes to total Tier 1 capital amounted to 49.3 percent and 49.2 percent respectively, very close to the Banking Supervision Department's restriction of 50 percent of total Tier 1 capital not allocated against market risks (Figure 5.8). The proximity to the restriction reduces these banks' opportunities for using this capital instrument in order to adhere to the capital adequacy requirements, and also reduces their ability to increase their capital base in the future in order to more easily cope with situations of financial distress.

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

Figure 5.8
Total Risk-Weighted Tier 1 and Tier 2 Capital and Ratio of Subordinated Notes to Tier 1 Capital,[a] the Five Major Banking Groups, 2002

[a] Figures in perentheses denote ratio of subordinated notes (recognized for calculation of Tier 2 capital) to Tier 1 capital.

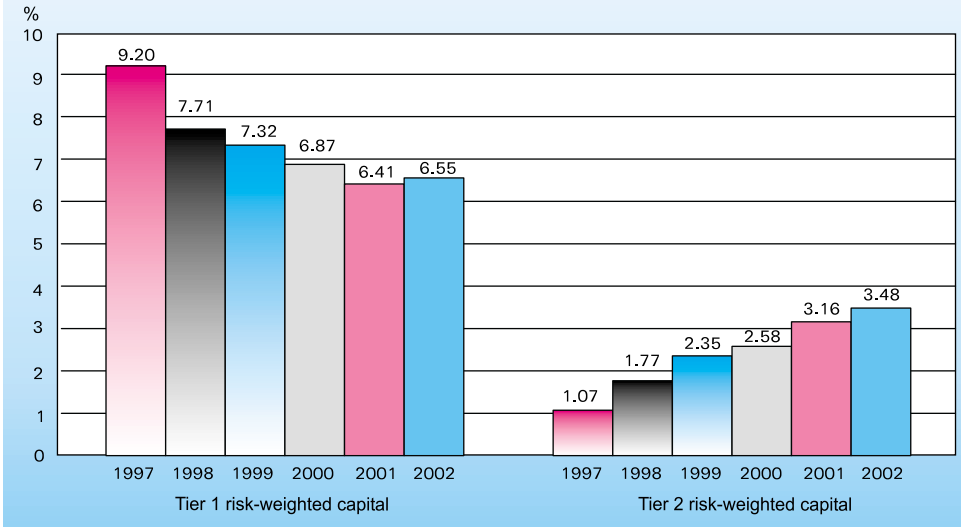
SOURCE: Published financial statements.

The total risk-weighted assets (for the purpose of calculating the minimum capital ratio) of the five groups fell by a mere 0.4 percent in 2002 and amounted to NIS 629 billion. A slight increase was recorded at the Leumi and Mizrahi groups (Table 5.14). The decrease in total risk-weighted assets followed a double-digit growth in this variable in previous years, and resulted as stated from the halt in the expansion of credit to the public (1.6 percent), which led to an increase of only 0.8 percent in weighted outstanding balance-sheet credit risk (which accounts for 84.1 percent of total risk assets). Outstanding weighted off-balance-sheet credit risk fell by 4.1 percent due to a 5.5 percent decrease in outstanding guarantees and other liabilities and a relatively slight 1.4 percent increase in overall credit risk from derivatives activity.

Exposure in respect of market risks (which accounts for only 1.4 percent of total risk assets) fell from NIS 12 billion in 2001 to NIS 9.1 billion in 2002, as the result of a decrease in respect of the risks implied in options activity, mainly at the Leumi group.

For the first time in several years, the halt in the growth of total risk-weighted assets led to an increase in the ratio of Tier 1 capital to risk-weighted assets, from 6.41 in 2001 to 6.55 in 2002. The increase encompassed all the banking groups (Figure 5.9).

Figure 5.9
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 1997–2002



SOURCE: Published financial statements.

Continuing a trend of the last five years, the ratio of Tier 2 capital, which reflects the less stable part of capital, rose, from 3.16 percent in 2001 to 3.48 percent in 2002 (Figure 5.9). This resulted from an increase at the two largest banking groups, which was offset by a slight decrease at the three medium-sized groups. The reason for the latter development was that in 2001, the ratio of deferred notes to Tier 1 capital approached the 50 percent restriction, and at the Discount group actually reached the level of the restriction. The proximity of the ratio to the restriction at the three medium-sized groups in 2001, and the decrease in Tier 1 capital at the Discount and First International groups in 2002 made it difficult for these groups to raise deferred notes in order to increase their capital base. The actual increase in the ratio of capital to risk-weighted assets at these groups resulted from a decrease in their total risk-weighted assets.

In 2001, the Supervisor of Banks authorized the issue of deferred capital notes, which are regarded as "complex capital instruments." These capital notes have numerous advantages compared with Tier 2 capital. Apart from being deferred notes, they participate in losses even if the banking corporation has not ceased to operate, and the dividend or interest on them can be postponed if the banking corporation's profitability is inadequate for this purpose.[48] These capital notes, which are included in "Upper Tier 2 capital" (together with the general loan-loss provision) enable a bank to absorb losses because they can be converted to Tier 1 capital under certain conditions. The Hapoalim group used this instrument to raise NIS 328 million in 2001 and NIS 751 million in 2002 (9 percent of Tier 2 capital). The Leumi group first used it in 2002 to raise NIS 410 million (6 percent of Tier 2 capital).

[48] According to Regulation 311–5 in the Proper Conduct of Banking Business.

Appendix 5.1: Israel's Banks' International Rating

Market forces now play a much greater role in fashioning normative modes of behavior as a result of the growing pace of globalization and consolidation of the financial markets. The increased availability of information and the increased accessibility of the markets have created an environment in which financial sources around the world rapidly gravitate to investments that yield the highest return at a given level of risk. These processes have been accompanied by the greatly increased usage of the services of international rating companies (Standard & Poor's, Moody's, and Fitch-IBCA) for the purpose of analyzing and appraising national economies and business firms.

Rating is an essential means for the development of the financial markets, since the rating companies enjoy access to information that is unavailable to both large and small investors. These companies thereby enable investors to reduce the costs of their transactions, and provide them with criteria for comparing the various elements of a transaction. As a result, investors are able to instill market discipline, which leads to greater competition in the markets.

The rating process includes research, analysis and monitoring procedures, in which two main types of risk are examined:[49]

- Business risk: Business risk is affected by the features of the business environment in which the issuing company operates. The analysis relates to a wide range of exogenous macroeconomic indicators (GDP, interest rates, inflation) and endogenous indicators (the extent of competition in the industry in which the company operates, operational efficiency, the quality of the company's management, and the business strategy that it employs).
- Financial risk: Financial risk relates to the company's financial criteria, including profitability, capital structure, the sources of finance available to the company, its financial elasticity and its forecast cash flow.

During recent years and particularly after the crisis in the financial systems of South East Asian countries at the end of the 1990's, an increasing emphasis has been placed on the rating of financial institutions. This development is attributed to the major extent to which financial institutions affect the economic system, since the activity and stability of the banks are prerequisites for economic growth. The banks' rating is therefore closely connected with country rating, and reflects the situation in the local economy. The banks' rating cannot usually be higher than the country rating. The rating helps financial institutions to raise credit lines and work with parallel local and foreign institutions, and to raise capital sources and deposits (principally from institutional investors).

The rating of a financial institution's/bank's liabilities relates to an assessment of its financial ability to repay its liabilities on time relative to other financial institutions/

[49] When analyzing an issuing company, the rating companies also relate to structural and legal risks, such as the structure of the series issued, the collateral provided, orders of priority and the possibility of early redemption.

banks worldwide. Due to the importance of the banks' financial solidity, certain rating companies (Moody's and Fitch) also rate the extent of their financial stability.

The Israeli banks have been rated by the international rating companies since the mid-1990's, following the liberalization of the Israeli economy and currency exchange market. In view of the banking system's large share of financial intermediation activity in Israel, the extent and quality of the supervision of the system is one of the elements on which the international rating companies base Israel's country rating.

During the last two years, the international rating companies have reduced their credit rating for the Israeli banks.[50] This development reflects the change in the Israeli economy's status worldwide and especially the status of the banking system. The principal changes in the rating and their significance are presented in Tables 5.15 and 5.16 respectively.

The reduction in rating resulted from the adverse developments in the economy, and their expression in the banks' financial statements. The decrease in the banks' rating reflects the increased risk that international organizations attribute to the Israeli economy as a result of the serious economic and geopolitical situation, and the assessment that this situation will not improve in the short run. The resumption of a growth pattern in the Israeli economy concurrent with an increase in the financial solidity of the Israeli banking system could lead to an improvement in the rating of the Israeli banks.

Appendix 5.2: Calculation of Interest-Rate VaR Under the Historical Simulation Approach

Exposure to interest-rate risk as reflected by VaR[51] is affected by three elements: (1) The difference between the present value of assets and liabilities *plus* the effect of futures transactions-hereafter-the position; (2) The position's sensitivity to changes in interest rates, which is measured by means of the duration index;[52] (3) The change in the interest

[50] The local rating company, Ma'alot, also reduced its rating of the banks. Unlike the international rating, the local rating does not relate to country risk.

[51] This value is the expected change in the economic value of the position for the maximum expected change in the interest rate, and is calculated according to the equation: $\Delta K = K \cdot \frac{D}{1+i} \cdot \Delta(1+i)$ where K is the position, D is the duration and i is the discounted interest rate. The second term on the right-hand side of the equation is the adjusted duration. The larger the adjusted duration of any asset, the greater will be the change in its present value caused by a change in the interest rate, and hence it reflects a higher risk.

[52] The duration (average-term-to-maturity) index is calculated as:

$$D = \frac{\sum_{t=1}^{n} \frac{t \cdot C_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+i)^t}} = \frac{\sum_{t=1}^{n} \frac{t \cdot C_t}{(1+i)^t}}{V}$$

where C_t is the cash flow in the period t; n is the period to redemption; i is the discounted interest rate; V is the present value of the cash flow.

Table 5.15
International Rating of Israel's Five Largest Banks, June 2003

		Fitch-IBCA				Moody's			Standard & Poor's	
		Long term	Short term	Support	Individual	Long term	Short term	Financial strength	Long term	Short term
Hapoalim	Rating	BBB+	F2	2	C	A2	P-1	C[b]	BBB+	A-2
	Date of rating	(04/03)	(04/03)	(10/95)	(09/01)	(08/00)	(08/00)	(08/00)	(09/02)	(09/97)
Leumi	Rating	BBB+	F2	2	C	A2	P-1	C[b]	BBB+	A-2
	Date of rating	(04/03)	(04/03)	(02/97)	(09/01)	(08/00)	(08/00)	(08/00)	(09/02)	(02/99)
Discount	Rating	Not rated by this company				A2	P-1	D+[b]	BB	
	Date of rating					(08/00)	(08/00)	(12/01)	(09/02)	
Mizrahi	Rating	Not rated by this company				A2	P-1	C-[b]	BBB	
	Date of rating					(08/00)	(08/00)	(05/01)	(04/97)	
First International	Rating	BBB	F3	4	D	A2	P-1	C-[b]	BBB	
	Date of rating	(12/02)	(12/02)	(10/01)	(12/02)	(08/00)	(08/00)	(11/02)	(04/02)	
State of Israel	**Rating**	**A-[d]**	**F1[d]**			**A2[a]**	**P-1[a]**		**A-[c]**	**A-1[c]**
	Date of rating	**(12/95)**	**(12/95)**			**(08/00)**	**(08/00)**		**(12/95)**	**(12/95)**

[a] In February 2001 Moody's announced a change in Israel's credit rating outlook from positive to stable.
[b] In March 2002 Moody's announced a change in the financial strength rating outlook of Israel's banks from stable to negative.
[c] In April 2002 S&P announced a change in Israel's credit rating outlook from stable to negative.
[d] In May 2002 Fitch announced the continuation of Israels' negative credit rating outlook.
SOURCE: Internet sites of MOODY'S, S&P and Fitch-IBCA, and the companies' press releases.

Table 5.16
The Rating Symbols

a. Scale of long-term ratings	*Highest*											
Fitch-IBCA (long-term ratings)	AAA	AA	A	BBB	BB	B	CCC	CC	C	DDD	DD	D
Moody's (long-term ratings)	Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C			
Standard & Poor's (long-term ratings)	AAA	AA	A	BBB	BB	B	CCC	CC	C	D		

The long-term rating, based mainly on business and financial risks of the financial entity, rates its ability to repay debt in the long-term.
The (+) and (–) signs in Fitch and S&P ratings and the numbers 1, 2, or 3 in Moody's indicate the ratings within each category.

b. Scale of short-term ratings	*Highest*					
Fitch-IBCA (long-term ratings)	F1	F2	F3	B	C	D
Moody's (long-term ratings)	P-1	P-2	P-3	not-prime		
Standard & Poor's (long-term ratings)	A-1	A-2	A-3	B	C	D

The short-term rating, based mainly on the state of financial liquidity, rates the ability of the financial entity to repay a debt in the short term.

c. Scale of rating financial strength	*Highest*				
Fitch-IBCA (individual ratings)	A	B	C	D	E

The individual rating reflects the rating company's assesment of a bank's ability to meet its commitments without recieving external support.
For example, from government authorities or its owners. The signs A/B, B/C, C/D, D/E indicate the ratings within each category.

Moody's (bank financial strength ratings)	A	B	C	D	E

A bank's financial strength rating measures the probability that the bank will require support from a third party, e.g., its owners, or other banks in the industry, or official institutions. The (+) and (–) signs indicate the ratings within each category.

d. Scale of support rating	*Highest*					
Fitch-IBCA (support ratings)	1	2	3	4	5	T

The support rating measures the support that the different banks are likely to receive, according to the probability of their receiving it and the quality of the supporting entity.

SOURCE: Internet sites of Moody's, S&P, and Fitch-IBCA.

rate (in percentage points) during the planning period. The first two elements are dependent on the asset and liability distribution of each and every bank over time. The third element is uniform for all the banks, since it is derived from interest rate volatility. The maximum expected change in the interest rate for which the VaR is calculated is derived from the cumulative distribution of the monthly changes in yields-to-maturity on Treasury bills and CPI-indexed bonds, and in the Libor dollar interest rate in the unindexed, CPI-indexed and foreign-currency segments respectively during the previous five years. The 99th percentile[53] was chosen as an estimate of the maximum change in this distribution for exposure to a rise in the interest rate, and the first percentile[54] was chosen for exposure to a decline in the interest rate. Since the exposure to changes in interest rates is determined by the sign of the adjusted duration of capital, the banking corporation will be exposed to a rise in the interest rate in the relative segment if the duration of capital is positive, and to a decline in the interest rate if the duration of capital is negative. The interest-rate VaR in the relevant segment is obtained by multiplying the position in the adjusted capital duration and the maximum expected change by the interest rate in the segment.

As a result of the relatively large changes in the interest rates in the unindexed and CPI-indexed segments during the year (over one percentage point), a convexity estimate (derived from the second order sensitivity of the bank's net worth to changes in interest rates) was calculated and its effect on VaR in these segments was examined. The effect of convexity on the VaR was found to be negligible despite the relatively large changes in interest rates. This was apparently due to the large number of components in the bank's assets and liability portfolio. In this situation, the effect of changes in interest rates on the bank's net worth is approximately linear.

[53] The 99th percentile is the cut-off value of 99 percent of the cumulative distribution. This means that on the basis of the distribution, the probability that a change greater than this value will occur is less than 1 percent.

[54] The first percentile is the cut-off value of 99 percent of the cumulative distribution. This means that on the basis of the distribution, the probability that a change smaller than this value will occur is less than 1 percent.