Chapter 3
Risks and Capital Adequacy

In the course of their activity the banks are exposed to a wide range of risks, including credit risks, market risks, liquidity risk, operational risks and legal risks. In this section, we will focus on credit risks, markets risk and liquidity risks. We will analyze the changes that have occurred in capital adequacy, which acts as a cushion for absorbing unexpected losses which the banks could incur if those risks actually materialize, we will calculate the Risk Adjusted Return on Capital (RAROC), and we will describe the development of the Robustness Index for examining the resilience of the Israeli banking system over time.

The banking system's aggregate credit risk exposure continued to decline in 2006. The growth in the economy, sustained for the third consecutive year following the recession years of 2001 and 2002, appears to have led to an improvement in borrowers' repayment ability and as a result, to a decline in credit risk. The improvement of the quality of credit was apparent in most principal industries, as well as among individuals,[1] as was reflected in all the indices of credit quality. Nevertheless, credit falling under the classification of problem loans is still high in Israel compared with developed western countries. A slight increase in market risk, expressed by a small increase in value at interest-rate risk and indexation-base risk, was recorded in 2006. The capital adequacy of the entire banking system, denoting the extent of the ability to absorb unexpected losses, rose slightly in 2006 due to a growth in Tier-I (core) capital. However, excess capital adequacy (that exceeding the minimum required ratio) remained low compared with western countries. The upturn in the Robustness Index, which reflects the robustness and resilience of the Israeli banking system, continued, following the improvement recorded in recent years, and fell from a peak of 2.97 in the worst recession year, 2001, to 2.47 in 2006.

1. CREDIT RISK

Credit risk is the principal financial risk to which a bank is exposed in the course of its activity. In this section we will analyze exposure to credit risk in terms of the size, quality and concentration of the credit portfolio. We will also examine the development of loan activity and risk in the principal industries.

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[1] The household segment and the private banking segment.

a. The size of the credit portfolio

The balance-sheet credit to the public of the five banking groups, which accounts for 94 percent of total balance-sheet credit risk,[2] rose slightly in 2006, by 1.6 percent to NIS 583 billion. However, off-balance-sheet credit risk[3] (which is expressed by means of off-balance-sheet items weighted by credit conversion coefficients of off-balance-sheet items) increased by 14 percent and amounted to NIS 342 billion at the end of 2006. Overall credit risk to the public, which reflects both balance-sheet and off-balance-sheet, rose by 7 percent to NIS 967 billion at the end of 2006. Although credit risk itself increased, relative to the capital base designated for absorbing the banks' losses, including losses on credit activity this risk actually decreased slightly.

b. The quality of the credit portfolio[4]

The improvement in the quality of the credit portfolio, which began in 2005,[5] continued in 2006 and was reflected by all the portfolio quality indices.[6] This improvement, which encompassed most of the principal industries, results from the continued improvement in borrowers' repayment ability that was expressed, inter alia, by a decline in the risk premium of business firms during 2006.[7] The improvement in borrowers' repayment ability derived from the continued growth in the Israeli economy, global growth, the decline in the unemployment rate, the increase in real wages and the continued buoyant level of activity in the capital market. The credit portfolio quality index is described below.

The proportion of problem credit[8] to total credit at the five largest groups' responsibility decreased by one percentage point, continuing a downtrend that became

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[2] Credit to the public, investments in bonds of the public and others assets in respect of derivative financial instruments representing transactions of the public.

[3] Off-balance-sheet credit risk as calculated for the purpose of restricting single-borrower indebtedness is the total of the following amounts: guarantees, proceeds from notes, secondary discounting of notes, L/Cs and liabilities for the payment of money on another person's account, futures transactions, the amounts of a banking corporation's liabilities to the Maof Clearing House in respect of the amounts of sureties pledged by customers; a banking corporation's liabilities for the granting of credit or the issue of guarantees, and total liabilities as an underwriter.

[4] The analysis of the credit quality indices in this section relates solely to balance-sheet items.

[5] Although the rebound in the economy began in 2003, a major improvement in the credit portfolio quality indices only became apparent during 2005.

[6]   The credit quality indices reflect the probability that a borrower or group of borrowers will not repay part of their liabilities (principal and/or interest) to the banks on time.

[7] See Box 3.1 in this section for further details.

[8] Problem credit is subdivided into 5 categories as defined in Proper Conduct of Banking Business Regulation 314: non-performing loans, rescheduled credit, credit requiring renewed approval, credit in temporary arrears and credit under special supervision.

apparent in 2005, and reached 8.4 percent (Table 3.1). However, this ratio is still higher than the level of 7.0 percent recorded in the year 2000.

The decline was not uniform among all the banks and at the Leumi group this ratio actually rose. Concurrent with the decrease in the ratio of problem loans to total credit at the groups' responsibility, outstanding problem loans fell by NIS 5 billion (Table 3.2, Figure 3.1). The decrease encompassed most of the banking groups and most of the components of these loans (Table 3.2, Figure 3.2).

Non-performing loans,[9] the most problematic form of credit, decreased by 13 percent (Table 3.2, Figure 3.2), with the result that their ratio to total credit at the group's responsibility fell by 0.4 percentage points to 1.9 percent in 2006. Despite the improvement in the proportion of problem credit to total credit, the ratio of non-performing loans plus loans in temporary arrears to total credit in Israel is still higher than

Figure 3.1
Problem Loans as a Proportion of Total Credit vis-à-vis Problem Loan Balance in the Five Major Banking Groups, 2000-06
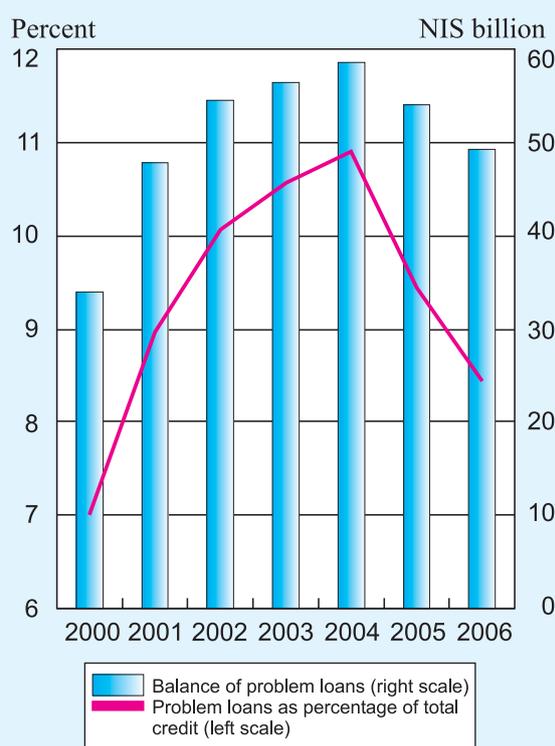
SOURCE: Based on published financial reports.

Figure 3.2
Distribution of Problem Loans in the Banking System by Type, 2003-06
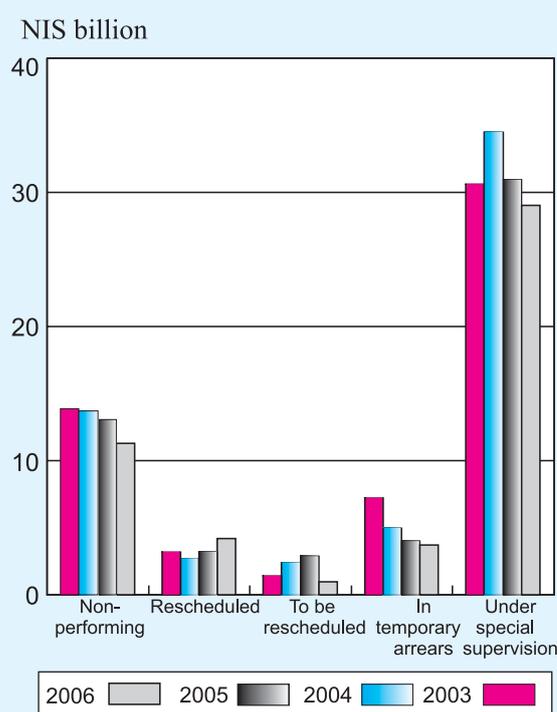
SOURCE: Published financial statements.

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[9] A non-performing loan can be a debt on which the interest is not charged to the profit and loss statement, a rescheduled loan, and its balance (including accrued interest) which before the time of the new arrangement exceeds the amount of receipts expected under the arrangement, a debt in arrears, or a debt on which the accrued interest is not expected to be collected even if the debt itself is not defined as doubtful.

Table 3.1
Indices of Credit Portfolio Quality,[a] The Five Major Banking Groups, 2001-06

|	Year	Hapoalim	Leumi	Discount	Mizrahi–Tefahot	First Intl.	The five groups
Ratio of risk-weighted assets to total assets[b]	2001	0.727	0.692	0.580	0.631	0.631	0.673
	2002	0.715	0.701	0.571	0.653	0.656	0.675
	2003	0.711	0.685	0.581	0.645	0.654	0.669
	2004	0.714	0.674	0.588	0.670	0.617	0.667
	2005	0.719	0.679	0.600	0.673	0.614	0.673
	2006	0.720	0.670	0.598	0.668	0.613	0.669
Share of problem loans in total credit at group's responsibility (percent)	2001	8.4	10.0	10.9	7.6	6.6	9.0
	2002	10.4	9.8	12.4	7.5	9.1	10.1
	2003	11.3	9.8	11.9	7.6	12.3	10.6
	2004	11.9	11.0	10.7	6.6	12.9	10.9
	2005	9.9	9.6	9.0	6.8	11.9	9.4
	2006	8.5	9.8	7.8	6.1	7.6	8.4
Share of non-performing loans in total credit at group's responsibility (percent)	2001	1.3	1.4	3.8	0.9	1.4	1.7
	2002	2.1	2.3	3.9	1.7	2.9	2.5
	2003	2.9	2.3	3.8	1.3	2.5	2.6
	2004	3.3	1.5	3.7	1.5	3.4	2.6
	2005	2.9	1.3	3.1	1.5	2.7	2.3
	2006	2.4	1.4	2.8	1.4	1.6	1.9
Ratio of annual loan-loss provision to total credit (multiplied by 100)	2001	0.68	0.93	1.33	0.53	0.91	0.85
	2002	1.68	1.10	1.19	0.52	1.73	1.31
	2003	1.28	1.11	1.11	0.50	1.34	1.12
	2004	0.97	0.89	1.14	0.56	1.01	0.92
	2005	0.66	0.78	0.79	0.45	0.62	0.69
	2006	0.53	0.51	0.63	0.44	0.42	0.52
Share of the balance of the loan-loss provision in total problem debts plus the balance of the loan-loss provision (percent)	2001	28.5	25.4	33.3	27.9	24.2	28.0
	2002	29.9	28.6	32.8	29.5	28.5	29.9
	2003	33.3	31.7	36.3	31.9	25.6	32.5
	2004	34.7	30.8	40.5	37.1	29.9	34.2
	2005	38.2	34.6	42.8	37.4	30.8	37.1
	2006	41.0	33.6	46.4	40.3	41.2	39.3

[a] Refers to balance sheet credit only.
[b] Total risk assets are total assets (balance sheet and off-balance-sheet assets translated into balance sheet equivalent value), weighted by risk. Total assets are balance sheet and off-balance-sheet assets translated into balance sheet equivalent value, without risk weighting.
SOURCE: Based on published financial reports.

that usual in developed countries (Figure 3.3). There is a substantial difference between the term 'problem loan' as defined in Israel and the terms 'NPL' (non-performing loans) and 'impaired loans' as these are used in different countries. The Israeli product closest to NPLs and impaired loans is 'total non-performing loans plus loans in temporary arrears' (which are defined in Proper Conduct of Banking Business Regulation 314).

The net **loan-loss provision** at the five large banking groups fell by NIS 940 million to around NIS 3 billion in 2006, an amount equivalent to 0.52 percent of balance-sheet credit at the banks' responsibility (Table 2.4). This large decrease is attributed to an improvement in gross provisions during the year concurrent with an increased reduction in provisions and the collection of debts that were written-off in previous years (Table 2.4). The decrease in the total provision was reflected by a drop in the specific provision, which the banks' management determine according to repayment ability and the quality of borrowers' collateral, and by a decrease in the general and supplementary provision, which is determined on the basis of the Supervisor of Banks' directives concerning the risk inherent in the credit portfolio and the extent of that risk. The improvement in the overall loan-loss provision was achieved despite a 70 percent increase in the amount of the specific provision in respect of housing loans, which derived from the application of new Bank of Israel directives concerning the manner of calculating the loan-loss provision for housing credit, and encompassed all the banking groups except for Mizrahi-Tefahot, which increased its provision by 4 percent. Because

Figure 3.3
Ratio of Non-Performing Loans to Total Loans[a] in Selected Banking Systems, 2005
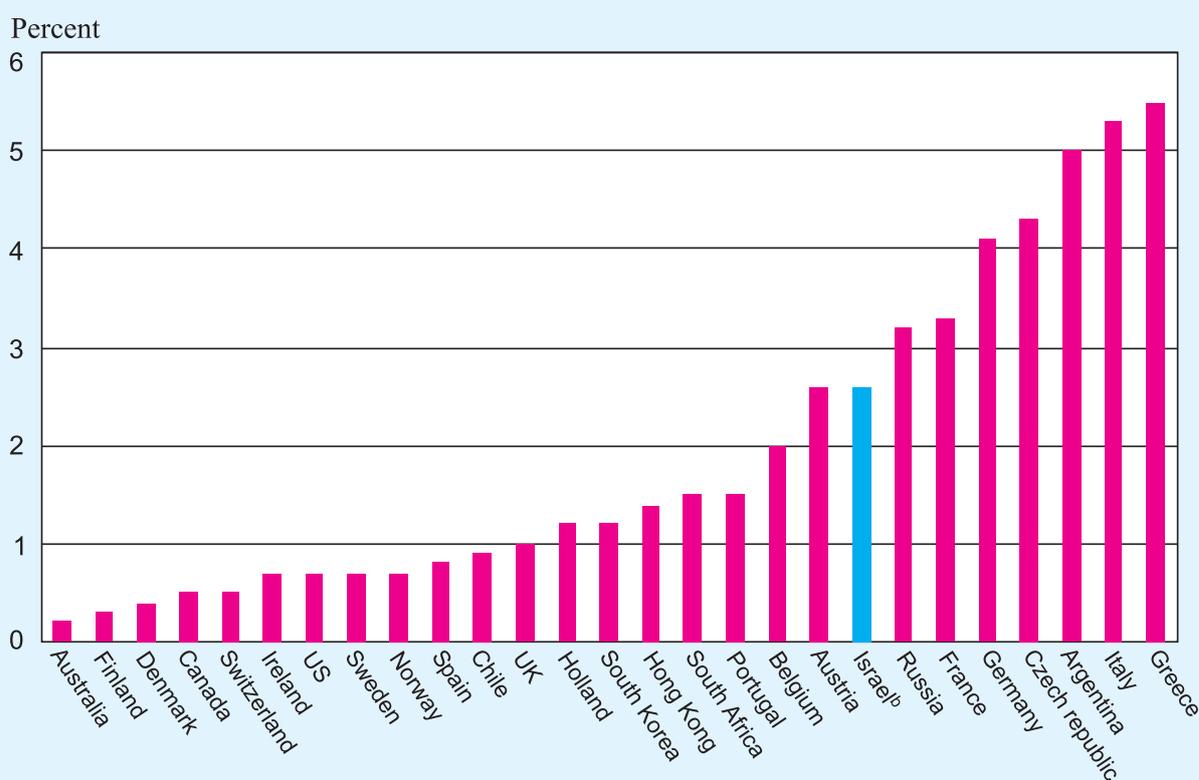
a In the definition of problem loans there are significant differences between countries. By the Israeli definition, according to Directive 314 of the Proper Conduct of Banking Business Regulations, 'non-performing loans plus loans in temporary arrears' is the closest definition to the internationally accepted definition of 'non-performing loans'.
b For Israel, the data are the latest as of December 2006.
SOURCE: Based on data from the International Monetary Fund.

Table 3.2
Distribution of Problem Loans, the Five Major Banking Groups, 2002-06

	Year	Hapoalim	Leumi	Discount	Mizrahi–Tefahot	First Intl.	The five groups
		(NIS million)[a]					
Non-performing	2002	4,041	3,999	2,925	989	1,387	13,341
	2003	5,290	3,845	2,872	807	1,119	13,933
	2004	5,961	2,602	2,820	926	1,454	13,763
	2005	5,639	2,431	2,740	996	1,188	12,994
	2006	4,496	2,519	2,529	1,003	815	11,362
Rescheduled	2002	1,376	831	539	101	31	2,878
	2003	1,857	525	556	111	173	3,222
	2004	1,307	838	360	110	85	2,700
	2005	1,473	985	457	131	221	3,267
	2006	2,339	1,179	286	172	236	4,212
Due to be rescheduled	2002	1,040	74	80	24	296	1,514
	2003	935	81	39	21	399	1,475
	2004	883	1,210	84	23	201	2,401
	2005	1,479	1,070	92	1	277	2,919
	2006	369	134	143	15	348	1,009
In temporary arrears	2002	3,190	1,306	714	1,281	837	7,328
	2003	2,923	931	644	1,281	1,416	7,195
	2004	1,237	753	591	1,290	1,115	4,986
	2005	1,147	698	555	1,424	261	4,085
	2006	970	658	327	1,475	224	3,654
Under special supervision	2002	9,931	10,655	4,932	2,065	1,859	29,442
	2003	9,760	11,120	4,850	2,329	2,513	30,572
	2004	12,331	13,231	4,466	1,766	2,744	34,538
	2005	9,319	12,404	4,034	1,897	3,305	30,959
	2006	7,727	13,548	3,771	1,579	2,349	28,974
Total balance-sheet credit to problem borrowers	**2002**	**19,578**	**16,865**	**9,190**	**4,460**	**4,410**	**54,503**
	2003	**20,765**	**16,502**	**8,961**	**4,549**	**5,620**	**56,397**
	2004	**21,719**	**18,634**	**8,321**	**4,115**	**5,599**	**58,388**
	2005	**19,057**	**17,588**	**7,878**	**4,449**	**5,252**	**54,224**
	2006	**15,901**	**18,038**	**7,056**	**4,244**	**3,972**	**49,211**

[a] Data up to 2003 are shown at December 2003 prices, and from 2004 at current prices.
SOURCE: Based on published financial reports.

Table 3.3
Ratio of Credit[a] to Output, by Industry, 1997-2006

| Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Agriculture	1.53	1.25	1.46	1.41	0.77	0.71	0.69	0.67	0.61	0.67
Manufacturing	0.84	1.04	1.27	1.20	1.55	1.59	1.53	1.38	1.40	1.37
Construction and real estate	2.83	3.07	3.66	4.13	4.53	4.39	4.17	4.04	3.83	3.67
Construction	2.73	3.08	3.63	4.09	4.35	4.06	3.62	3.57	3.40	3.31
Real estate	3.38	3.00	3.75	4.26	5.18	5.54	6.25	5.62	5.29	4.74
Water and electricity	0.65	0.61	0.77	0.85	1.01	1.01	0.75	0.75	0.61	0.65
Commerce and services	0.61	0.75	0.96	0.96	1.03	1.05	1.02	1.04	1.04	0.98
Commerce	0.89	1.08	1.19	1.27	1.36	1.40	1.27	1.24	1.22	1.11
Services	0.49	0.62	0.85	0.85	0.90	0.92	0.92	0.96	0.97	0.93
Hotels and catering	1.33	1.60	1.84	1.74	2.39	2.44	2.38	2.15	1.84	1.66
Financial services	0.75	1.17	2.40	2.55	2.77	2.45	2.58	2.52	2.68	2.82
Communications and computer services	0.49	0.88	1.14	1.38	1.45	1.17	0.90	0.74	0.67	0.55
Transport and storage	0.41	0.49	0.82	0.80	0.84	0.91	0.83	0.80	0.80	0.74
Total	**1.02**	**1.15**	**1.38**	**1.36**	**1.50**	**1.59**	**1.43**	**1.36**	**1.34**	**1.27**

[a] Credit is calculated for lending activity in Israel only and includes balance-sheet credit (credit to the public, investment in bonds and other assets in respect of derivatives) and off-balance-sheet credit risk weighted by conversion coefficients for balance-sheet credit (guarantees and other liabilities on behalf of customers, and futures transactions).

SOURCE: Based on reports to the Supervisor of Banks, the Central Bureau of Statistics, and other Bank of Israel data.

of Mizrahi-Tefahot's large proportion of housing loans to total credit (39 percent), the group appears to have been heavily affected by the implementation of the new directives. Due to the improvement in total provisions, the ratio of the annual expense on the loan-loss provision to total credit reached 0.5 percent, similar to its level in 2000, prior to the recession in the economy (Table 3.1, Figure 3.4).

The ratio of risk-weighted assets to total assets,[10] which expresses the part of credit risk in the exposure to credit, also fell slightly, in contrast to the previous year (Table 3.1). Another indication of the improvement in borrowers' repayment ability is the continued decline in the **ratio of credit to GDP** (Table 3.3). This implies that the GDP growth rate, which is a source of credit repayment, exceeds

Figure 3.4
Loan-Loss Provision in the Five Major Banking Groups, 1990-06
(Percent)

SOURCE: Published financial statements.

the rate of growth in credit[11]. The decline in this ratio, to 1.27 in 2006, encompassed all the principal industries except agriculture, electricity and water, and financial services.
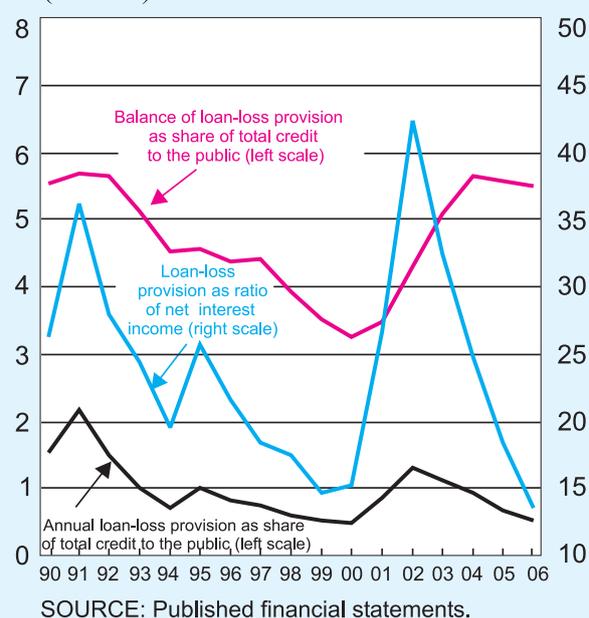
Box 3.1: The risk premium of corporate credit

One way of determining the risk premium for credit to companies is to use the market's assessment of the risk premium inherent in the time structure of the interest rates on corporate bonds. The risk premium is estimated on the basis of the difference between the yields-to-maturity on corporate bonds and those on government bonds (which are regarded as risk-free) with the same term-to-maturity.

Based on data relating to 40 rated corporate bonds, the risk premium of these firms declined in 2006. The decline continued during all the months of the year,
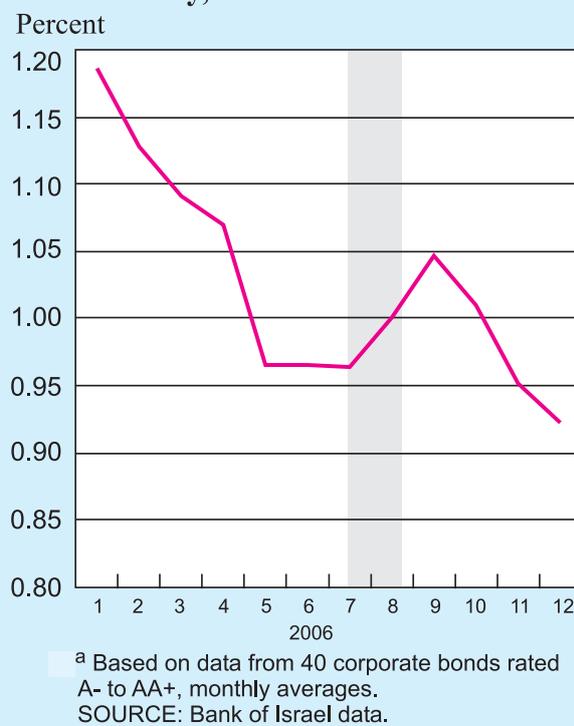
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[10] The ratio of on- and off-balance-sheet risk-weighted credit, calculated in accordance with the Supervisor of Banks' directives concerning the minimum capital ratio, to outstanding on- and off-balance-sheet credit.

[11] This result should be qualified, because it does not include off-balance-sheet credit, which is also financed from GDP.

except for the period of the Second Lebanon War,[1] when the risk premium rose. However, the impact of the war passed and the premium fell again after the ceasefire (see figure).

An analysis of the market prices of bonds issued during 2006 shows that the firms which issued during the year were companies with a higher average level of risk than those issuing in previous years. The increase is apparent both from weighting the price by issued capital and when the same weight is attributed to each bond. Bonds issued in large quantities were found to be of lower risk than those issued in small quantities. This appears to be because large issues are mainly floated by big, strong companies.

Average Gap Between Yield on Corporate Bonds[a] and Yield on Galil Bonds of the Same Term to Maturity, 2006

Percent

[a] Based on data from 40 corporate bonds rated A- to AA+, monthly averages.
SOURCE: Bank of Israel data.

[1] The Second Lebanon War lasted from July 12, 2006 until the ceasefire on August 14, 2006.

c. The concentration of the credit portfolio[12]

A high concentration of a credit portfolio reflects a bank's inability to suitably diversify the risk inherent in its portfolio among its customers. In this survey, the concentration of a bank's credit portfolio is estimated in two ways: (1) by principal industries[13]—the more diversified the credit portfolio among the principal industries, the lower the credit risk deriving from concentration; and (2) by size of borrower—the more widely diversified the credit portfolio among the different borrowers, the smaller the exposure to credit risk and vice versa. This is detailed below.

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[12] The analysis of the concentration of the credit portfolio is based on both on- and off-balance-sheet items.

[13] The concentration by principal industries is examined on the assumption that there is no full correlation between the volumes of activity and the financial results of borrowers from different industries.

(1) The concentration of the credit portfolio by principal industries[14]

The Herfindahl business credit portfolio concentration index by principal industries (except for credit to individuals)[15] in respect of borrowers in Israel and abroad rose slightly during 2006, from 0.166 to 0.169 (Table 3.4). The rise in the index during the year conformed to the upturn that began in 2001, and mainly resulted from the continued growth in proportion of credit to the financial services industry from 13 percent in December 2000 to 21 percent in December 2006. Most of the increase to the financial services industry derived from the expansion of financial intermediation activity, principally financial leasing, financial market management, securities trading and auxiliary financial intermediation activity[16]. In contrast to the increase in the proportion to total credit of credit to the financial services industry, the proportions of credit to the other principal industries decreased (Table 3.5).

Concurrent with the rise in the Herfindahl index for the business portfolio, credit to individuals as a share of overall credit portfolio increased from 26 percent at the end of 2002 to 32 percent at the end of 2006 (Table 3.4). The substantial increase in credit to individuals relative to the credit granted to the other principal industries derived from the expansion of non-bank credit substitutes for firms concurrent with the lack of credit substitutes for individuals. This situation prompted the banks' management to adopt a policy of increasing their credit to individuals. Credit to individuals cannot be defined as an industry because it is notable for considerable heterogeneity (given the low correlation between the characteristics of individuals), while the correlation between this credit and total credit is high.[17] Although individuals are not defined as an industry, the calculation of the concentration of the overall credit portfolio, taking into account the principal industries and individuals as a single aggregate, can be justified

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[14] The principal industries are those detailed in Table 3.5, except for credit to individuals. The credit portfolio contains outstanding credit to the public, the public's investments in bonds, others assets in respect of derivatives and the credit value equivalent of off-balance-sheet items in respect of borrowers' activity in Israel and abroad. The by-industry classification of the Mizrahi-Tefahot group's outstanding credit in respect of borrowers' activity abroad is made on the assumption that the distribution of the group's credit for this activity is identical to the distribution at the other four groups. The by-industry classification of the First International group's outstanding credit in respect of borrowers' activity abroad for the years 2003 and 2004 is made on the assumption that the distribution of the group's credit for this activity in those years was the same as its distribution in 2005.

[15] The credit extended to individuals includes credit granted to the household segment and credit granted to the private banking segment as reported in the financial statements in Appendix F.

[16] Financial intermediation that deals with investment in securities (shares, bonds, bills etc.), trading in securities by security traders for themselves, mutual funds, investment in property for other financial intermediaries, discount, checks, money changing, financial investment and holding institutions that deal in holding and managing financial businesses of other companies through the investment of their own equity, such as workers' companies and industrial concerns, financial advisors, mortgage advisors and brokers, private bodies that deal in credit intermediation, construction projects and loans.

[17] H. Bar, A. Barnea, Y. Landskroner (1998), "Consumer Credit—Its Inherent Characteristics and Risks", Discussion Paper No. 98.03, Banking Supervision Department, Research Unit.

Table 3.4

Indices of Concentration in Public's Credit Portfolio, The Five Major Banking Groups, 2003–06[a]

	Year	Hapoalim	Leumi	Discount	Mizrahi–Tefahot	First Intl.	The five groups
Concentration by principal industry							
Herfindahl Index (H) of concentration in the total credit portfolio[b]	2003	0.157	0.161	0.147	0.344	0.165	0.165
	2004	0.179	0.163	0.146	0.327	0.170	0.172
	2005	0.190	0.162	0.147	0.346	0.156	0.175
	2006	0.195	0.166	0.151	0.349	0.167	0.181
Herfindahl Index (H) of concentration in the business credit portfolio[c]	2003	0.156	0.163	0.159	0.232	0.178	0.164
	2004	0.161	0.164	0.162	0.210	0.179	0.165
	2005	0.163	0.167	0.163	0.217	0.180	0.166
	2006	0.173	0.169	0.168	0.210	0.173	0.169
Herfindahl Index (H) of concentration in the total credit portfolio excluding credit to individuals[d]	2003	0.082	0.086	0.094	0.057	0.113	0.084
	2004	0.073	0.085	0.100	0.054	0.116	0.080
	2005	0.070	0.089	0.100	0.050	0.114	0.079
	2006	0.073	0.088	0.103	0.047	0.090	0.078
Credit to individuals as percentage of total credit	2003	27.3	27.5	23.0	52.9	20.9	28.5
	2004	32.4	27.9	21.5	51.7	20.4	30.2
	2005	34.6	27.0	21.8	54.0	20.4	30.9
	2006	34.9	28.1	22.0	54.6	27.6	32.0
Concentration by borrower size							
Gini index of credit diversification by borrower size[e]	2003	0.909	0.912	0.904	0.810	0.929	0.904
	2004	0.887	0.910	0.896	0.809	0.929	0.893
	2005	0.892	0.912	0.900	0.798	0.929	0.896
	2006	0.887	0.905	0.901	0.809	0.904	0.892
Share of credit given to borrowers whose indebtedness exceeds NIS 40 million in the group's total credit (percent)	2003	51.4	45.5	42.9	24.7	50.7	45.7
	2004	45.0	42.9	42.6	23.9	45.4	41.9
	2005	49.8	43.8	43.8	22.7	46.0	44.2
	2006	52.1	41.9	44.7	26.5	41.6	44.5
Share in total credit of borrowers whose indebtedness exceeds 5 percent of the group's equity[f] (percent)	2003	11.5	7.3	9.7	10.1	24.5	
	2004	6.2	4.7	8.7	8.6	20.7	
	2005	10.4	6.5	7.8	5.8	18.5	
	2006	9.5	5.0	8.6	6.6	14.1	

[a] On balance-sheet and off-balance-sheet basis.
[b] This index is the sum of the squares of the weights of the credit in an industry (including credit to individuals) in total credit to the public (including credit to individuals).
[c] This index is the sum of the squares of the weights of the credit in an industry (excluding credit to individuals) in total credit to the public (excluding credit to individuals).
[d] This index is the sum of the squares of the weights of the credit in an industry (excluding credit to individuals) in total credit to the public (including credit to individuals).
[e] The Gini index reflects the inequality of the distribution of credit by borrower.
[f] Plus minority shareholders' rights.
SOURCE: Based on published financial statements.

on economic grounds. This calculation was made by means of the **Herfindahl total credit portfolio concentration index,** which rose during the year from 0.175 to 0.181, continuing a long-term trend (Table 3.4). But since the rise in the index derived mainly from the large increase in the proportion of credit to individuals (Table 3.4)—a group containing a large number of individuals with a low degree of correlation between them—there are those who believe that the increase is not necessarily indicative of a higher level of risk in the portfolio.[18] We therefore calculated the **Herfindahl total credit portfolio concentration index excluding credit to individuals.** This index does indeed show a slight decrease in the concentration of the credit portfolio in 2006, from 0.079 to 0.078 (Table 3.4), in the continuation of a long-term trend.

(2) Credit concentration by borrower size

The Gini index of credit portfolio diversification by borrower size at the five largest banking groups fell slightly during the year, from 0.896 to 0.892 (Table 3.4), and is currently at its lowest level since 1997. Concurrent with the decline in this index, an increase was recorded in the proportion of credit extended to individuals, a relatively small, highly diversified borrower group (Figure 3.5). At the same time, the proportion of credit to large borrowers with outstanding indebtedness of over NIS 40 million rose slightly, by 0.3 percentage points.

d. Activity,[19] **financial results and credit quality[20] of the principal industries and individuals[21]**

In this section we will describe developments in the principal

Figure 3.5
The Gini Index of Credit[a] Distribution by Borrower Size and Credit Given to individuals Sector in Israel out of Total Credit Portfolio,[b] Five Major Banking Groups, 1997-2006

[a] On the basis of balance-sheet and off-balance-sheet credit.
[b] Credit portfolio includes overseas activity.

SOURCE: Based on published financial statements.

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[18] We lack the data necessary to examine this claim.

[19] The analysis of the activity indices of the principal industries is based on Central Bureau of Statistics data and the Bank of Israel Annual Report 2006.

[20] The analysis of the credit quality indices by principal industry relates to both on- and off-balance-sheet items.

[21] The credit extended to individuals includes credit to the household segment and to the private banking segment as reported in the financial statements in Appendix F.

Table 3.5
Distribution of Credit by Principal Industry, The Five Major Banking Groups, 2005-06

	Balance of credit to public[a]		Change in balance of credit	Distribution of credit balance		Problem loans				Annual specific loan-loss provision		Loan-loss provision/total credit	
						Balance		Share in total credit					
	2005	2006	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
	(NIS million)		(NIS million)	(percent)		(NIS million)		(percent)		(NIS million)		(percent)	
Agriculture	6,113	7,464	1,351	0.7	0.8	859	785	14.1	10.5	24	-13	0.39	-0.17
Manufacturing	133,655	137,387	3,732	14.7	14.2	11,530	10,407	8.6	7.6	901	395	0.67	0.29
Construction and real estate[b]	146,009	153,715	7,706	16.1	15.9	18,958	18,328	13.0	11.9	1,253	962	0.86	0.63
Water and electricity	11,888	12,670	782	1.3	1.3	196	59	1.6	0.5	25	-10	0.21	-0.08
Commerce	83,958	86,073	2,115	9.3	8.9	4,675	3,847	5.6	4.5	514	314	0.61	0.36
Tourism[c]	17,642	16,815	-827	1.9	1.7	5,089	4,648	28.8	27.6	36	-13	0.20	-0.08
Transport and storage	21,423	21,068	-355	2.4	2.2	715	1,039	3.3	4.9	6	64	0.03	0.30
Communications and computer services	25,325	23,568	-1,757	2.8	2.4	3,994	1,811	15.8	7.7	307	231	1.21	0.98
Financial services	123,480	138,992	15,512	13.6	14.4	2,505	3,180	2.0	2.3	55	122	0.04	0.09
Other business services	34,632	36,659	2,027	3.8	3.8	1,843	1,733	5.3	4.7	159	156	0.46	0.43
Public and community services	24,185	23,836	-348	2.7	2.5	1,667	1,623	6.9	6.8	86	54	0.36	0.23
Individuals	279,080	308,324	29,245	30.8	31.9	7,979	7,736	2.9	2.5	589	899	0.21	0.29
of which: housing loans	115,857	133,005	17,148	12.8	13.8	4,176	4,585	3.6	3.4	289	442	0.25	0.33
of which: non-housing loans	163,223	175,320	12,097	18.0	18.1	3,803	3,151	2.3	1.8	300	457	0.18	0.26
Total	**907,389**	**966,571**	**59,182**	**100.0**	**100.0**	**60,010**	**55,196**	**6.6**	**5.7**	**3,955**	**3,161**	**0.44**	**0.33**
Municipalities	9,148	8,605	-543	1.0	0.9	574	441	6.3	5.1	0	3	0.00	0.03

[a] Including outstanding credit to the public, the public's investment in bonds, other assets in respect of derivatives and the credit value equivalent of off-balance-sheet items in respect of borrowers' activity in Israel and abroad. Due to the lack of data relating to the Mizrahi-Tefahot group's outstanding by-industry credit in respect of borrowers' activity abroad, it is assumed that the distribution of the group's credit for this activity is identical to the distribution in the other four groups.
[b] The data for this industry are calculated without regard to the industry concentration limitation.
[c] Hotels, catering and accommodation.
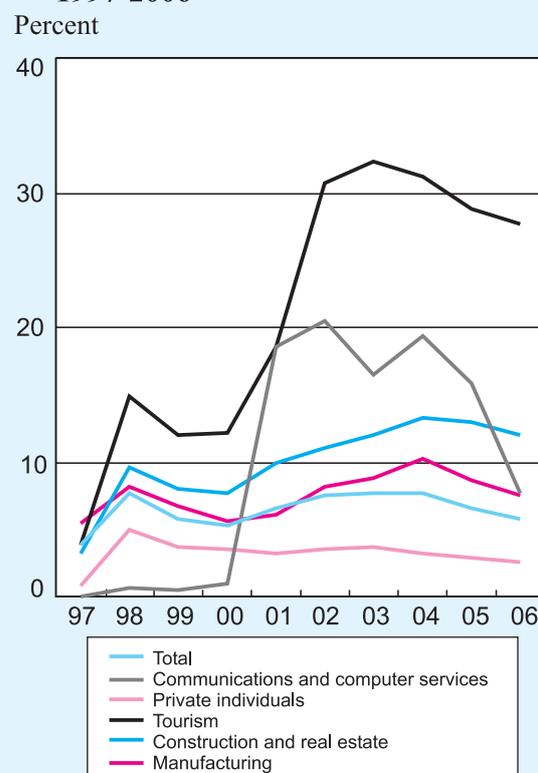SOURCE: Published financial statements.

industries to which the banking system is particularly exposed: construction and real estate, tourism,[22] manufacturing, and communications and computer services, as well as individuals. Total output of the principal industries continued to expand in 2006. A high rate of growth was recorded in the high-tech industry and the high-tech service industries in line with the worldwide expansion in these industries.

The activity of the **construction industry** (which accounts for 16 percent of the credit portfolio) remained relatively stable in 2006 and the industry's output increased by only 2.2 percent after decreasing or remaining stagnant for years. The increase in output reflects an increase in renovation work, partly due to repairing the damage caused by the Second Lebanon War in the north. The industry's remaining activity—residential and non-residential construction—did not expand despite the expectation of such an increase in view of the rapid growth in the economy and the rise in income from wages and private property. The financial results of publicly traded construction and real estate companies were also affected in 2006 by increased activity in international markets. Although the ROE of publicly traded companies in the industry fell compared with 2005, it was still high at 22 percent. Total outstanding credit in the construction and real estate industry rose by 5.3 percent in 2006 (Table 3.5), while the amount of problem loans and the annual expenditure on loan-loss provisions decreased. This development was indicative of a further improvement in the quality of the industry's credit portfolio, which began in 2002, and is partly connected with the consolidation of the industry's activity abroad. However, problem loans as a proportion of total outstanding credit to the construction and real estate industry is still higher than in other industries (Table 3.5, Figure 3.6).

The **tourism industry** (which accounts for only 2 percent of the credit portfolio but for 28 percent of problem loans) saw the number of tourist arrivals in the first half of the year rise by 20 percent compared with the first half of 2005. This increase was part of the recovery in the industry, which began in 2003, though as a result of the Second Lebanon War, which broke out in July 2006, the number of tourist arrivals in Israel plummeted by 30 percent. The industry has experienced an improvement since the end

Figure 3.6
Problem Credit as a Proportion of Balance of Credit, by Segment, 1997-2006

Percent

Legend:
— Total
— Communications and computer services
— Private individuals
— Tourism
— Construction and real estate
— Manufacturing

SOURCE: Based on published financial statements.

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[22] Hotels, catering and accommodation.

of the war, but the number of visitors remains 20 percent below that prior to the war. In contrast to incoming tourism, domestic tourism was not harmed on aggregate as a result of the war, as the period was marked by a shift in domestic tourism from the north of the country to the center and the south. Although the ROE of publicly-traded companies in the tourism industry rose appreciably—from 5 percent to 14 percent—the increase is attributed mainly to a large growth in the profit of just one company. Outstanding credit in the tourism industry decreased by 4.9 percent in 2006, and the proportion of problem loans to total credit in the industry continued to decline during the year, though it remained the highest among the principal industries (Table 3.5, Figure 3.6).

In the **manufacturing industry**[23] (the output of which constitutes one fifth of business-sector product, and which accounts for 14 percent of the credit portfolio and 8 percent of problem loans), output rose by 10.5 percent, more than the increase recorded in 2005. Most of the growth in manufacturing product derived from a considerable increase in industrial exports and in particular, exports of the electronics industry, which grew as a result of increased world demand. The level of risk in the industry fell for the second consecutive year: A decrease was recorded both in the ratio of problem loans to outstanding credit and in the ratio of loan-loss provisions to total credit risk (Table 3.5, Figure 3.6).

The **communications industry**, which is part of the communications and computer services industry (the output of which constitutes 4 percent of business-sector product, and which accounts for 2.5 percent of the credit portfolio and 8 percent of problem loans) expanded by 4 percent in 2006. Output of computer services, R&D and start-ups grew by 12 percent following a similar increase in previous years. Total credit risk in the communications and computer services industry improved considerably following an improvement in the previous year. The decline in risk was reflected by the ratio of problem loans to total credit in the industry and in the rate of loan-loss provisions. This improvement was also notable compared to the average decrease in risk in other principal industries (Table 3.5, Figure 3.6).

Among **individuals**[24] (accounting for 32 percent of the credit portfolio and 2.5 percent of problem loans) as in the principal industries, borrower's repayment ability was favorably affected by developments over the course of the year: the continued improvement in the labor market and the cut in rates of direct taxation led to an increase in disposable income from wages, and the disposable income of individuals from all sources rose by a substantial 6 percent. The value of the public's assets rose as well and especially the value of the public's financial asset portfolio. The improvement in individuals' repayment ability, which began at the end of 2004, was reflected in several indicators (Figure 3.7): the ratio of problem credit to total credit extended to individuals fell from 4 percent in 2004 to 2.7 percent in 2006 (Figure 3.6); the apartment-buyers index
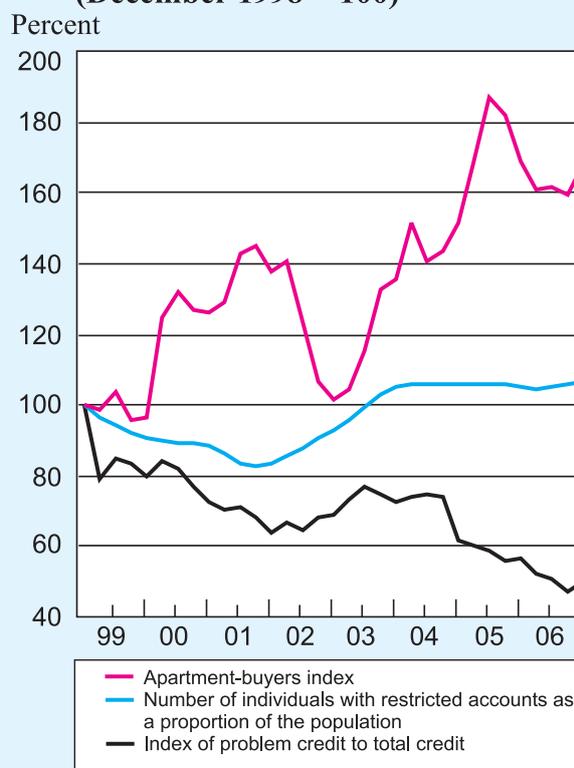
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[23] The manufacturing industry contains numerous sub-branches and is therefore highly heterogeneous.

[24] Credit to individuals includes credit to the household segment and to the private banking segment as reported in the financial statements in Appendix F.

rose,[25] a development indicative of a substantial improvement in individuals' position since 2003, and this can be attributed to the continued decline in interest rates. From the second half of 2005 till the first half of 2006, the index worsened to some extent due to a rise in the real interest rate and apartment prices, but in the last quarter of the year, apartment-buyers' position improved as a result of the interest rate cuts in the economy. The index that estimates the number of customers with restricted accounts relative to the total population remained stable, as it has since 2004, after consistently deteriorating since 2001. (Although some worsening of this index was recorded in the second half of 2006, that can be attributed to Directive 325).[26]

As a result of the improvement in macroeconomic indicators in 2006, outstanding credit to individuals continued to grow, and such credit for borrowers' activity in Israel expanded by 9 percent: housing loans increased by 5 percent and non-housing loans by 12 percent[27] (Table 3.2). The ratio of expenses on loan-loss provisions to total credit rose in comparison with 2005 but was lower in comparison with previous years. Moreover, some of the provisions can be attributed to the application of new Bank of Israel directives concerning loan-loss provisions for housing credit.

Figure 3.7
Private Individuals, Comparison of Indices, 1999-2006
(December 1998 = 100)

Legend:
- Apartment-buyers index
- Number of individuals with restricted accounts as a proportion of the population
- Index of problem credit to total credit

SOURCE: Based on data from the Central Bureau of Statistics, the Bank of Israel, reports to the Supervisor of Banks and financial statements.

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[25] The apartment-buyers index is based on an index published by Bank Hapoalim and is comprised of four variables: apartment prices, the average wage in the economy, the mortgage interest rate and the unemployment rate, and is calculated as:

apartment-buyers index = [(the average wage in the economy) (1- (the unemployment rate))]
monthly mortgage payment

[26] See Chapter 1 for further details.

[27] In 2005 Bank Leumi transferred NIS 5.5 billion from 'other individuals' to 'housing loans'. These figures were not reclassified.

2. MARKET RISK

a. General

Market risk is defined as the risk of an erosion in a bank's net worth due to unexpected changes in market prices (interest rates, share prices, the exchange rate and inflation).

The analysis of market risks in this survey is based on Value at Risk (VaR). This value expresses the maximum loss to be expected on holding financial instruments that are sensitive to changes in market prices for a given planning horizon and a given confidence level at a particular point in time. In this section VaR is calculated in respect of the interest-rate risks in the three indexation segments (the unindexed local-currency segment, the CPI-indexed local-currency segment and the foreign-currency segment) and in respect of indexation base risks (exchange rates and inflation), by means of the historical scenarios approach, which is based on the following assumptions: (1) a planning horizon of one month;[28] (2) a confidence level of 99 percent; (3) no account is taken of correlations between changes in different market prices; (4) historical data for the previous five years are used;[29] and (5) the positions are based on the data presented in the bank's financial statements (including the effect of futures transactions).

b. Interest-rate risks

Interest-rate risk is the risk that unexpected changes in interest rates will adversely affect a bank's financial situation (or will erode its net worth).[30] This risk arises when the relative sensitivity of the bank's assets to unexpected changes in interest rates differs from that of its liabilities. The exposure to interest-rate risk, which is reflected by the

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[28] Since the data on the consumer price index are monthly, it was decided that the planning horizon in this survey will be one month.

[29] There are two other approaches for estimating VaR: the normal distribution approach and the Monte Carlo simulations approach. The first approach assumes a normal distribution of the portfolio yield and the second is based on a specific distribution. Since not all market variables are distributed normally, and there is a risk that the distribution selected for simulation under the Monte Carlo approach will not match the actual scenario, for the sake of uniformity and simplicity we have chosen the historical scenarios approach.

[30] The bank's net worth is calculated by means of the difference between the present value of assets and the present value of liabilities. The present value of assets and liabilities is obtained by discounting the future flow (principal and interest) by the market interest rate in accordance with the timing structure of the relevant interest rates for each segment.

VaR of the bank's positions,[31] is affected by three elements: (1) the difference between the present value of the assets and the present value of the liabilities plus the effect of futures transactions (hereinafter: the position); (2) the position's sensitivity to changes in interest rates, which is measured via duration (average term to maturity), or adjusted duration; and (3) the VaR of the change in the interest rate (in percentage points) during the planning period. The first two elements are dependent on the distribution of the assets and liabilities of each and every bank and their characteristics over time, while the third is uniform for all of them, since it is derived from the volatility in interest rates.

Total value exposed to interest-rate risk rose during the year at all the banking groups except First International, and amounted to NIS 2.8 billion compared with NIS 2.5 billion in 2005 (Table 3.6). The VaR ranged between 4.1 percent of net worth at the Hapoalim group to 22.6 percent at the Discount group. The increase in total value at interest-rate risk occurred in the unindexed segment, and at most of the banks resulted from the expansion of the duration gap—the gap between the average term to maturity of assets and the average term to maturity of liabilities—while the VaR of the change in the interest rate remained unchanged. It was higher than in the CPI-indexed segment and particularly higher than in the foreign-currency segment (Table 3.6, Figure 3.8). In the CPI-indexed segment, total VaR fell at most of the banking groups as a result of the reduced exposure in the segment (Table 3.6). The VaR in the foreign-currency segment remained lower than in the local-currency segments due to the policy of maintaining a small position in those segments and the low volatility of the interest rate in it.
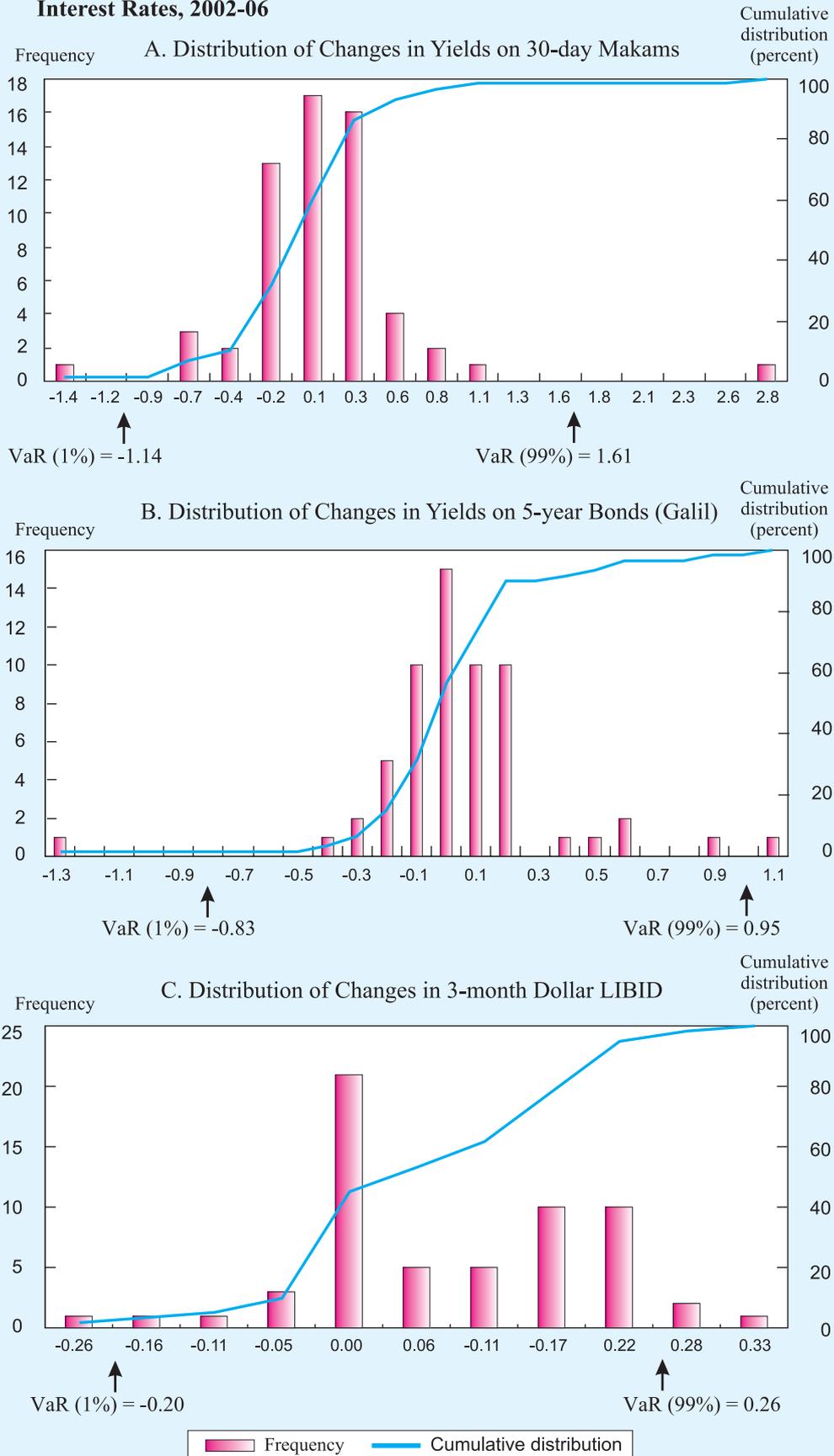
c. Indexation-base risks

Exposure to indexation-base risk is affected by two elements: One element is the quantity effect: the difference between the value of assets and the value of liabilities, plus the net effect of futures transactions (hereafter: the position). The other element, the price effect, is the unexpected change in the relative prices between the different indexation segments. The analysis in this survey is centered on the three indexation segments alone (without reference to diverse foreign currencies), on the assumption that financial capital is defined as unindexed. Accordingly, a bank is exposed to market risk in the CPI-indexed local-currency segment in the event of an unexpected decrease in prices (deflation) that erodes its assets (when the value of the assets is higher than the value of

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[31] This value is the change expected in the economic value of a position in the event of the maximum change expected in the interest rate, and is calculated by means of the following equation:

$$VaR_p = P \cdot \frac{D_k}{(1+i)} \cdot VaR_{(1+i)}$$

where P - the position, D_k - the duration of the bank's net worth , i - the discount interest rate and $Var_{(1+i)}$ - the value at interest-rate risk—the maximum change in the interest rate at a probability of 99 percent. The second term on the right-hand side of the equation is the adjusted duration of the capital. The longer the adjusted duration of an asset, the greater the change in the asset's present value resulting from an interest rate adjustment, thereby reflecting a higher interest-rate risk. See Table 3.6 for details.

Figure 3.8
**Frequency and Cumulative Distribution of Monthly Changes in Selected
Interest Rates, 2002-06**

A. Distribution of Changes in Yields on 30-day Makams

VaR (1%) = -1.14   VaR (99%) = 1.61

B. Distribution of Changes in Yields on 5-year Bonds (Galil)

VaR (1%) = -0.83   VaR (99%) = 0.95

C. Distribution of Changes in 3-month Dollar LIBID

VaR (1%) = -0.20   VaR (99%) = 0.26

Frequency   Cumulative distribution

SOURCE: Based on Bank of Israel data.

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Table 3.6

Exposure to Changes in Interest Rates, the Five Major Banking Groups, December 2005 and December 2006

	Hapoalim		Leumi		Discount		Mizrahi-Tefahot		First International	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Unindexed segment										
Total exposure[a] (NIS million)	1,426	2,841	8,321	5,613	965	1,493	763	1,996	1,685	792
Duration of assets (years)	0.46	0.60	0.48	0.55	0.75	0.77	0.42	0.38	0.69	0.55
Duration of liabilities (years)	0.33	0.28	0.32	0.27	0.25	0.22	0.32	0.22	0.16	0.19
Duration Gap[b] (Dgap) (years)	0.14	0.32	0.19	0.29	0.50	0.56	0.10	0.17	0.54	0.37
Modified duration of capital[c] (percent)	9.20	11.46	2.03	5.22	25.17	20.74	4.51	3.07	10.89	20.05
Maximum change of interest[d] (percentage points)	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Value at Risk[e] (VaR)	211	525	272	473	392	499	56	99	296	256
Indexed segment[f]										
Total exposure[a] (NIS million)	10,944	9,389	3,235	5,023	2,847	2,087	2,996	1,797	1,006	1,641
Duration of assets (years)	3.90	3.98	4.42	4.09	4.61	4.80	3.99	3.91	4.27	4.32
Duration of liabilities (years)	5.46	4.81	3.99	4.01	3.92	4.58	4.02	3.62	3.40	3.53
Duration Gap[b] (Dgap) (years)	-0.65	-0.07	0.65	0.41	1.18	0.65	0.29	0.47	1.10	1.14
Modified duration of capital[c] (percent)	-3.69	-0.44	11.47	4.77	9.17	6.74	3.53	9.32	15.62	11.34
Maximum change of interest[d] (percentage points)	-0.82	-0.82	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Value at Risk[e] (VaR)	332	34	352	227	247	133	100	159	149	176
Foreign-currency segment[g]										
Total exposure[a] (NIS million)	1,472	2,340	570	353	108	-335	-141	139	-315	-185
Duration of assets (years)	0.88	0.96	0.55	0.54	1.21	1.04	0.41	0.55	0.27	0.41
Duration of liabilities (years)	0.86	0.84	0.47	0.47	0.76	0.52	0.36	0.32	0.31	0.47
Duration Gap[b] (Dgap) (years)	0.03	0.13	0.08	0.07	0.45	0.52	0.05	0.23	-0.04	-0.06
Modified duration of capital[c] (percent)	2.40	7.05	17.92	25.51	309.90	115.03	8.20	41.46	-3.27	-8.37
Maximum change of interest[d] (percentage points)	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	-0.91	-0.20
Value at Risk[e] (VaR)	9	44	27	24	88	102	3	15	9	3

(cont'd.)

Table 3.6 (cont'd.)
Exposure to Changes in Interest Rates, the Five Major Banking Groups, December 2005 and December 2006

	Hapoalim		Leumi		Discount		Mizrahi-Tefahot		First International	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Net worth[h] (NIS million)	13,842	14,570	12,126	10,990	3,920	3,245	3,619	3,932	2,376	2,248
Total value at risk[i] (NIS million)	552	603	650	723	727	734	159	273	454	436
As percent of net worth	3.99	4.14	5.36	6.58	18.54	22.63	4.39	6.94	19.12	19.37

[a] Present value of assets less present value of liabilities including effect of futures and options. The present value of the assets and liabilities are obtained by discounting the future cash flow (principal and interest) at the market interest rate according to the time structure of the interest rate relevant in each segment.

[b] The duration gap measures the elasticity/sensitivity of a bank's net worth to changes in the interest rate in terms of time, and thus enables it to calculate the average duration of the assets/liabilities that should be bought/sold to immunize itself against interest risk. It is calculated as Dgap= D_A–D_L·L/A, where D_A is the average duration of assets, D_L is the average duration of liabilities.

[c] The modified duration of capital is calculated as D_k/(1+i), where D_k=Dgap·A/L, the average duration of the bank's net worth, and i is the interest rate. The modified duration may also be taken as the rate of exposure of a position to a one-percentage-point change in the interest rate. When its sign is positive, an unexpected rise in the interest rate will reduce net worth, and a drop in the interest rate will increase net worth, and vice versa when the sign is negative.

[d] The maximum change in the yield to maturity on one-month makam in the unindexed segment, on five-year indexed bonds in the indexed segment, and on three-month Libor in the foreign currency segment. The maximum change in interest is derived from the distribution of the monthly changes over the past five years, with the probability of a change greater than that being less than 1%.

[e] The change in a bank's situation that would result from the maximum change in the interest rates, calculated from the VaR model: VaR=P·[D_k/(1+i)]·Δ(1+i), where, P is the position, Dk is the average duration of the bank's net worth, i is capitalization interest, and Δ(1+i) is the maximum change in the capitalization interest.

[f] Including the CPI/$ indexation option.

[g] Including foreign-currency-indexed.

[h] Total present value of assets less present value of liabilities including effect of futures and options for all segments.

[i] The total value subject to interest rate risk obtained by simply adding the adjusted value at risk in the three segments under the strong assumption of the worst scenario, from the bank's point of view, in all the segments.

SOURCE: Based on published financial statements.

the liabilities), or in the event of an unexpected increase in prices (inflation) that increases its liabilities (when the value of the liabilities is higher than the value of the assets). Similarly, market risk in the foreign-currency segment arises when an unexpected rise in the nominal exchange rate of the shekel against the dollar (a depreciation) increases the bank's liabilities (when the value of the liabilities exceeds the value of the assets)

Figure 3.9
Distribution and Cumulative Distribution of Monthly Changes in the Consumer Price Index and Shekel/Dollar Exchange Rate, 2002-06

A. Distribution of Changes in the Consumer Price Index

VaR (1%) = -0.84
VaR (99%) = 1.41
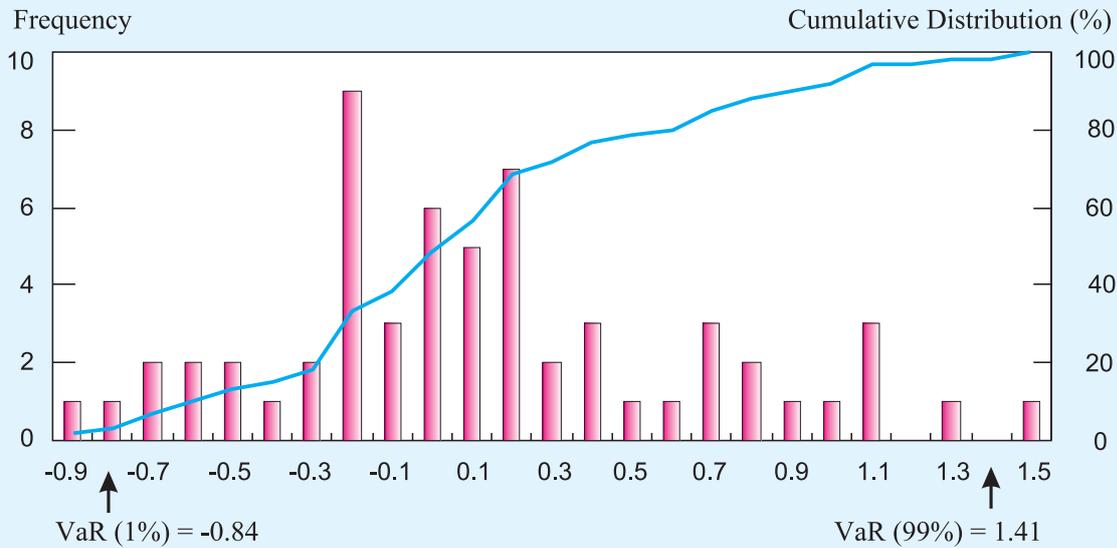
B. Frequency of Changes in the Nominal Shekel/Dollar Exchange Rate

VaR (1%) = -3.50
VaR (99%) = 4.65
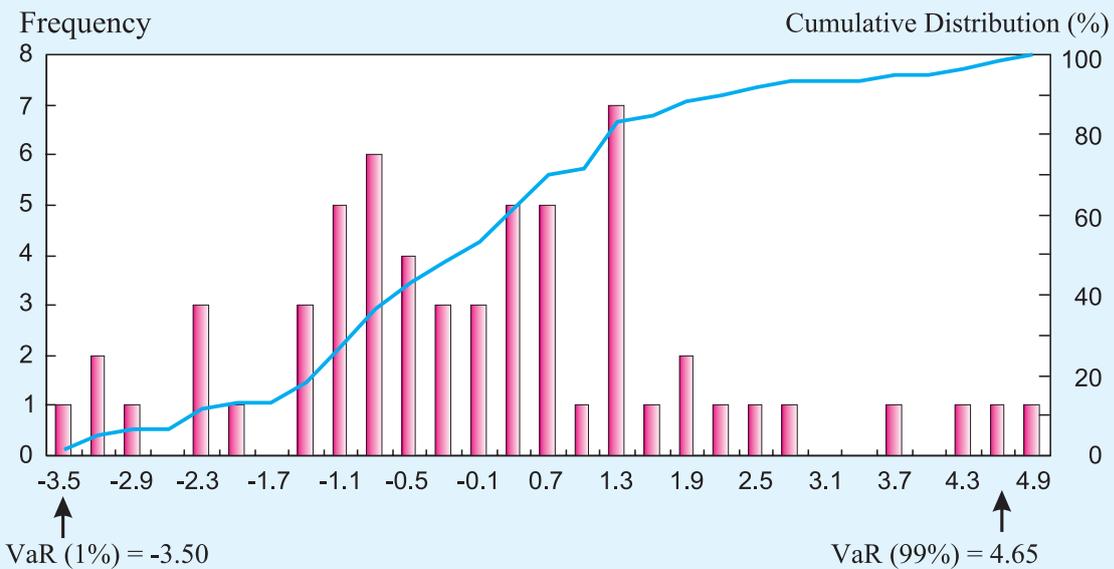
Frequency   Cumulative distribution

SOURCE: Based on Bank of Israel data.

Table 3.7
Exposure to Changes in CPI and the Exchange Rate, the Five Major Banking Groups, December 2005 and December 2006
NIS million

	Hapoalim		Leumi		Discount		Mizrahi-Tefahot		First International	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Unindexed segment										
Assets *minus* liabilities	-3,171	-11,366	-1,694	-7,025	-1,238	-1,028	-9,008	-8,167	-3,327	-5,198
Effect of futures and options	4,977	15,194	10,086	13,097	2,315	3,052	9,987	10,440	5,887	6,704
Net worth[a]	11,009	12,298	9,930	9,202	2,351	2,950	3,192	3,471	2,695	2,357
Total position in segment[b]	-9,203	-8,470	-1,538	-3,130	-1,274	-926	-2,213	-1,198	-135	-851
Indexed segment[c]										
Assets *minus* liabilities	12,795	14,067	4,624	8,088	2,324	1,936	5,401	6,431	2,891	4,100
Effect of futures and options	-3,816	-6,879	-3,362	-4,911	-642	-738	-3,190	-5,410	-2,410	-3,057
Total position in segment	8,979	7,188	1,262	3,177	1,682	1,198	2,211	1,021	481	1,043
Change in CPI[d] (percent)	-0.75	-0.84	-0.75	-0.84	-0.75	-0.84	-0.75	-0.84	-0.75	-0.84
Value at risk[e]	67	60	9	27	13	10	17	9	4	9
Foreign-currency segment[f]										
Assets minus liabilities	1,711	9,597	7,000	8,139	1,267	2,044	6,799	5,207	3,131	3,455
Effect of futures and options	-1,487	-8,315	-6,724	-8,186	-1,675	-2,316	-6,797	-5,030	-3,477	-3,647
Total position in segment	224	1,282	276	-47	-408	-272	2	177	-346	-192
Change in real exchange rate[g] (percent)	-3.38	-3.50	-3.38	4.65	4.65	4.65	-3.38	-3.50	4.65	4.65
Value at risk[e]	8	45	9	2	19	13	0	6	16	9
Total VaR from indexation-base risk[i]	74.7	105.1	18.8	28.8	31.5	22.7	16.6	14.8	19.7	17.7
As percent of net worth	0.68	0.85	0.19	0.31	1.34	0.77	0.52	0.42	0.73	0.75

[a] The bank's net worth is ascribed (by definition) to the unindexed segment, so that nominal exposure to indexation bases occurs in the indexed and foreign currency segments.
[b] The difference between the current value of assets and the current value of liabilities includes the effect of forward transactions minus the net worth of the bank.
[c] Including the CPI/$ indexation option.
[d] The maximum change in the CPI that was derived from the distribution of changes in that index during the last five years. The probability of a change greater than that is smaller than 1%.
[e] The change in the bank's situation as a result of the maximum change in the CPI and the foreign exchange rate calculated according to the VaR model.
[f] Including foreign currency indexed.
[g] The maximum change in the nominal foreign exchange rate of the dollar against the shekel which is derived from the distribution of changes in this index during the last five years. The probability of a change greater than that is smaller than 1%.
[i] The total VaR subject to indexation base risk obtained by the simple addition of the values subject to risk in the unindexed and foreign currency segments under the assumption that the worst scenario, from the bank's point of view, occurs in the two sectors.
SOURCE: Based on published financial statements and Central Bureau of Statistics data.

and when an unexpected fall in the exchange rate (an appreciation) erodes the bank's assets (when the value of the assets exceeds the value of the liabilities).

In 2006 the consumer price index fell by 0.1 percent, to below the lower limit of the level defined as price stability (1 percent to 3 percent). The deviation from the lower limit of price stability and from the inflation expectations derived from the capital market, which amounted to 2 percent at the beginning of the year, eroded the net worth of the five large banking groups, which had a surplus of assets over liabilities in the CPI-indexed segment (Table 3.7). The 8.2 percent strengthening of the shekel against the dollar during 2006 eroded the net worth of the banks with a liability surplus in the foreign-currency segment, although the impact was minor due to the small positions in that segment. No major changes occurred during 2006 in the standard deviation of the price changes in the Israeli economy and in the standard deviation of the exchange rate of the shekel against the dollar.

The value exposed to indexation-base risk increased slightly in 2006 and amounted to NIS 189 million, less than the value exposed to interest-rate risk.

No major change occurred during the year in price risk, a function of exposure to unexpected changes in the consumer price index and in the nominal exchange rate, and is estimated by the first and ninety-ninth percentiles in the distribution of the monthly changes in the last five years. Except for a 0.1 percentage point decrease in the 1st percentile of the distribution of the changes in inflation and in the 1st percentile of the distribution of changes in the exchange rate, the data relating to the 99th percentile are still affected by the changes that occurred in the year 2002 (Table 3.7, Figure 3.9). Since the positions in the CPI-indexed local-currency segment in December 2006 were positive at all the banks, they were exposed to an unexpected decrease in the consumer price index (Table 3.7). At the Hapoalim, Discount and Mizrahi-Tefahot groups however, the VaR in this segment fell despite a 0.1 percentage point decrease in price risk to a level of -0.84 percent due to a reduction in the position. The value exposed to inflation risk at the end of 2006 ranged between NIS 10 million at the Mizrahi-Tefahot, First International and Discount groups to NIS 60 million at the Hapoalim group. In the foreign-currency segment, the Hapoalim and Mizrahi-Tefahot groups were exposed to a strengthening of the shekel at the rate of 3.5 percent, an increase of 0.1 percentage point compared with 2005, because of the positive positions in the segment, and the size of these positions during 2006 also had the effect of increasing the VaR (Table 3.7). However, the Leumi, Discount and First International groups had negative positions in the segment, in which the VaR decreased due to the quantity effect alone (Table 3.7). This was because the extreme values of the risk of a depreciation remained unchanged. It should be noted that while the price risk of the exchange rate is considerably higher than the price risk of inflation, the banks maintain small positions in the foreign-currency segment, which reduces the VaR in that segment.

3. LIQUIDITY RISK

Liquidity risk derives from a banking corporation's uncertainty regarding the extent of the public's withdrawals from its deposits, from the expectation that deposits will not be renewed once their contractual redemption date is due, and from unexpected demand for credit. The materialization of this risk could cause a shortage of liquid assets for the bank, as the result of which it will have to liquefy assets at less than the market price and/or raise sources in the secondary market, such as interbank loans and loans from the Bank of Israel (monetary loans) at more than the market price. Accordingly, liquidity risk, which is a short-term risk, is mainly apparent in Israel in the unindexed local-currency segment and in the foreign-currency segment, where banking items without a predetermined contractual redemption date exist. (Examples are demand deposits and SROs on the one hand, and overdraft accounts and current loan accounts on the other.)

Although the banks are able to apply a standard model or an internal model (in accordance with Bank of Israel directives), liquidity risk in the Israeli banking system is measured and managed by means of internal models for monitoring the liquidity position via indices and simulations. The internal models developed by the banks differ with respect to the working assumptions and calculation methods employed, and are derived from the basic criteria of their customers. These models take account of additional elements, such as the extent of the bank's reliance on large depositors (depositor concentration) the bank's ability to obtain credit lines from foreign banks and its parent bank, and the bank's goodwill. The banks use these internal models to obtain a statistical indication of the rate at which deposits will be rolled over, and of the extent of their ability to liquefy specific assets and calculate their liquidity indices daily. These indices are the liquidity gap by periods to redemption (a day, up to a week, up to a month, up to 3 months, up to 6 months, up to a year, over a year) and the ratio of liquid assets to liabilities for a redemption period of up to a month. The banks also examine cash flows by means of different simulations relating to a crisis situation at the bank or to a general crisis, such as war, a political shock, and a shock in the financial markets. These simulations make it possible to assess at a reasonable cost the bank's continued activity in a crisis situation lasting a month. The flow estimate is based on an analysis of historical data in accordance with the specific criteria of each bank and/or in accordance with VaR[32] or LaR (Liquidity at Risk).

The monetary base contracted by NIS 1.2 billion in 2006 due to government absorption and continued absorption by means of makam (short-term bills issued by the Bank of Israel). The economy thereby entered a state of negative liquidity, with the result that the Bank of Israel has been offering loan tenders since November 2006. This is in contrast to the previous situation, where the banks were in a basic liquidity surplus and the Bank of Israel received deposits from them. The central bank's practice of determining the interest rate in the economy by means of loans rather than deposits is the accepted method for managing monetary policy in developed countries. This policy is apparent

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[32] See section 2 in this part (market risks) for further details.

from the decrease in the proportion of deposits at the Bank of Israel[33] to total assets from 20 percent at the end of 2002 to the extent of a move to the uptake of loans at the end of 2006, and led to a decline in the liquidity ratios in the unindexed local-currency segment.

4. CAPITAL ADEQUACY

a. Introduction

Capital adequacy expresses the amount of capital that enables a bank to absorb the unexpected losses likely to be caused as a result of the materialization of the range of risks to which it is exposed. Although the minimum capital ratio currently required worldwide is 8 percent, in March 1999 the Supervisor of Banks increased the minimum ratio required of the banks in Israel to 9 percent. In June 2006 the Basel Committee issued a final version of its recommendations concerning the allocation of capital in respect of credit risk, market risk and operational risk. In this section we will detail the recommendations of the Basel II Committee and their implications for the Israeli banking system. We will also analyze the capital adequacy in the banking system as it is estimated at present.

b. The recommendations of the Basel II Committee and the implications for the Israeli banking system

(1) Background

The Supervisor of Banks has determined that with effect from December 2009, every Israeli banking corporation will have to apply the Basel II agreement in its updated version of June 2006. In the new accord, the Basel Committee aspires to capital requirements that are more sensitive to risk, and its implementation will provide the Israeli banking system with the opportunity for enhancing its risk management and raising it to the level practiced in the world's leading banking systems. Under the Supervisor of Banks' directives concerning credit risk and operational risk, every banking corporation has the opportunity of applying one of the approaches suggested by the Basel Committee. Two approaches exist with respect to credit risk: (1) the Standardized Approach; and (2) the Internal Ratings-Based Approach (IRB). Three approaches exist with respect to operational risk: (1) BIA—Basic Indicator Approach; (2) TSA—The Standardized Approach; and (3) AMA—Advanced Measurement Approach.

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[33] Deposits at the Bank of Israel that are not against the liquidity requirement.

In accordance with the possibilities available to the banks, in July 2007 the Supervisor of Banks issued a comprehensive draft directive of the Basel II accord containing all the aspects of the framework. The Basel accord contains three pillars: (1) minimum capital requirements; (2) supervisory review of capital adequacy; and (3) market discipline. In this survey we will focus on the first pillar, on the credit risk management directives (an improved version of the directives existing since 1988) and on the operational risk management directives, which appear in the capital requirements for the first time. The capital requirements in respect of market risks (a component of the capital requirement under the first pillar) have not changed to any appreciable extent since the update of the Basel I accord on the subject of market risk in 1996.

(2) The different approaches to the management of credit risk in accordance with Basel II

The Standardized Approach—This approach expands the present range of credit risk weighting from the range of 0 percent to 100 percent (under the 1988 Basel I accord), to 0 percent to 150 percent,[34] while relying on external credit ratings of sovereigns, banks and corporates that are determined by external credit assessment institutions.[35] In the case of a non-rated company, its risk weighting will be 100 percent, implying that the capital requirement in respect of it will be the same currently practiced under Basel I of 1988. The Committee stipulated that each country's banking supervision department will be responsible for approving the external credit assessment institutions on the basis of their adherence to a number of criteria, most particularly objectivity, independence, transparency and credibility.

The Internal Ratings-Based Approach—This approach is a substantial improvement over the Basel I accord and is notable for its greater sensitivity to risk, with the result that all the banks applying it need to change their credit management to a major extent. The internal ratings-based approach created an internal organizational basis for the bank for managing and calculating credit risk. Under the internal ratings-based approach, the

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[34] Under the Standardized Approach, exposures are divided into 13 types and the individual reference to the customer's level of risk applies only to corporations, sovereigns, public-sector entities and banks. With respect to the latter, the customer's risk weighting is determined in accordance with the customer's rating by a rating company. A fixed risk weighting of 75 percent has been determined for retail customers, and fixed risk weighting of 35 percent has been determined for mortgage exposure. The other stipulations—for multilateral development banks, securities firmes, claims secured by commercial real estate, past due loans, assets included in higher risk categories, other assets and off-balance-sheet items is determined on an individual basis in accordance with the Basel II agreement.

[35] See paragraphs 53, 63 and 66 in the Basel II directives for details of risk weightings by credit assessments.

required capital is calculated directly and individually for each exposure in accordance with the customer's criteria and the criteria of the transaction (exposure).[36]

The allocation of capital as a percentage of Exposure at Default (EAD) is calculated by the following equation:

$$K(\%) = \left[LGD \cdot N \left(\frac{N^{-1}(PD) + \rho^{\frac{1}{2}} \cdot N^{-1}(0.999)}{\sqrt{1-\rho}} \right) - [PD \cdot LGD] \right] \cdot A^{*} \quad [37]$$

and in monetary terms, the capital is presented as $K^{*} = K(\%) \cdot EAD$

It should be noted that the capital which a bank must allocate is calculated on the unexpected part of risk/loss (UL), while on the expected part (EL) the bank is required to make suitable loan-loss provisions (Figure 3.10).[38]

(3) Different approaches for the management of operational risk under Basel II

Under the Basel II directives, operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk. The Basel II directives for calculating the amount of capital necessary for cushioning losses against operational risks include three possible calculation approaches: (1) BIA—Basic Indicator Approach; (2) TSA—The Standardized Approach; and (3) AMA—Advanced

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[36] The customer's criteria are expressed by the Probability of Default (PD), and the transaction (exposure) criteria are expressed by Loss Given Default (LGD) and Exposure at Default (EAD). Banks applying the Foundation Internal Ratings-Based (FIRB) approach calculate the customer's criteria (PDs) and the transaction criteria (LGDs) for retail customers and the customer's criteria alone (PDs). For corporates, the LGD is determined by the Supervisor of Banks and is 0.45. However, banks applying the Advanced Internal Ratings-Based (AIRB) approach calculate customer criteria and transaction criteria both for retail customers and for corporates. Exposures relating to sovereigns are processed similarly to exposure to corporates, and the exposure to shares is processed on a specific basis, as detailed in the Basel II accord.

[37] Where: PD—probability of default; LGD—Loss Given Default; M—the effective maturity; EAD—the bank's exposure at default. In addition, $b = ((0.11852) - 0.05478 \cdot \log(PD))^2$

and for corporates, sovereigns and banks

$$\rho(PD) = 0.12 \cdot \lambda + 0.24 \cdot (1-\lambda) \qquad A^{*} = [1 - 1.5b(PD)]^{-1} \cdot (1 + (M - 2.5) \cdot b(PD))$$

where the correlation between the different exposures $\lambda = \left(\frac{1 - e^{(-50 \cdot PD)}}{1 - e^{(-50)}} \right)$

For retail exposure however A*=1, (that is, the retail exposures are short were the maturity is equal to one year, M=1), $\lambda = \left(\frac{1 - e^{(-35 \cdot PD)}}{1 - e^{(-35)}} \right)$, $\rho = 0.03 \cdot \lambda + 0.16(1-\lambda)$

[38] The Committee recognizes collateral, on-balance sheet netting, guarantees and credit derivatives for Credit Risk Mitigation purposes, in accordance with the two above-mentioned approaches.

Figure 3.10
Theoretical Capital Requirements by Internal Ratings-Based Approach

Percent

Total losses (TL)

Expected losses (EL)

Unexpected losses (UL)

PD (Percent)
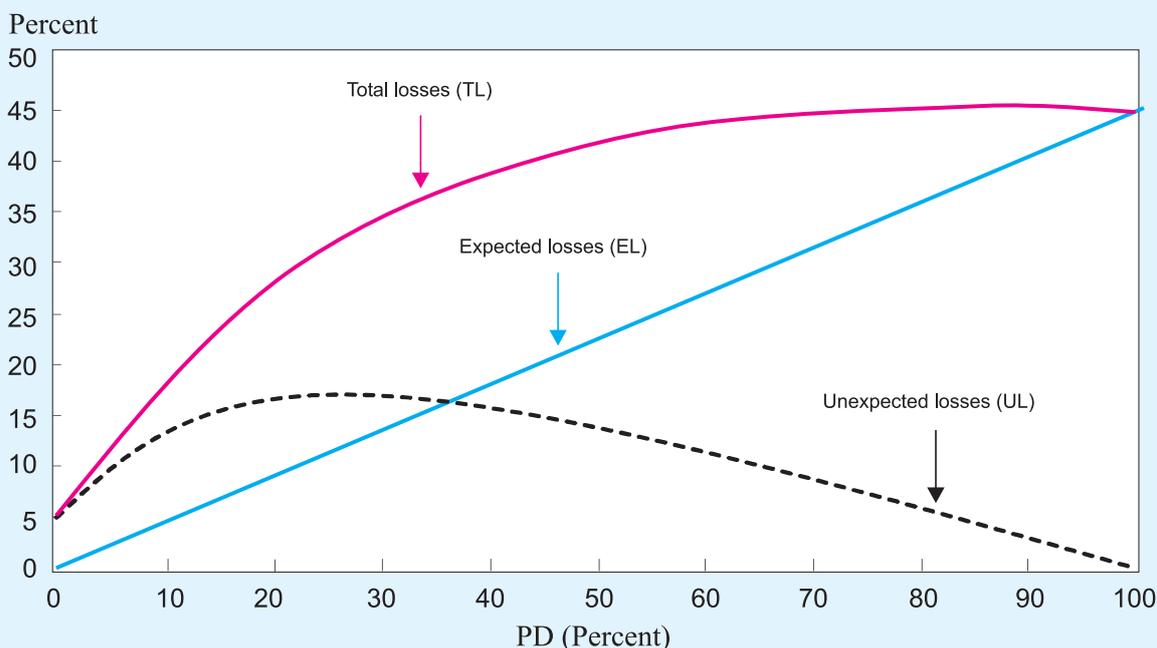
SOURCE: Illing and Pavlin (2004), Ruthenberg and Landskroner (2007).

Measurement Approaches. In view of the assessment that the Israeli banking system is not yet prepared for the use of the advanced approaches, we will focus on the Standardized Approach. Under this approach, the bank's activity is divided into eight business lines:[39] corporate finance, trading and sales, retail banking, commercial banking, payment and settlement, agency services, asset management, and retail brokerage. The risk exposure in each business line is represented by gross average annual income (GI) during the last three years of activity, and the general allocation of capital in respect of operational risks (K_{TSA}) is calculated by the amount of the gross income multipliers from each business line with fixed weightings (β), according to the following equation:[40]

$$K_{TSA} = \frac{\left\{ \sum_{year\,1-3} \max\left[\sum (GI_{1-8} \cdot \beta_{1-8}),0 \right] \right\}}{3}$$

_____

[39] The classification into business lines under Basel II was based on the classification of activities and not by types of customer as practiced in Israel. According to published financial statements, the segments of activity are: households, private banking, small businesses, the commercial segment, the corporate segment, financial management and other.

[40] Where: K_{TSA} = the capital requirement under the Standardized Approach, GI_{1-8} = gross annual income in a given year for each of the eight business lines, β_{1-8} = a fixed percentage determined by the Basel Committee, which connects the level of capital required to the level of gross income for each of the eight business lines.

The following table describes the business lines and the β rates for each business line:

Business line	Rates (percent) β
Corporate finance	$\beta_1 = 18$
Trading and sales	$\beta_2 = 18$
Retail banking	$\beta_3 = 12$
Commercial banking	$\beta_4 = 15$
Payment and settlement	$\beta_5 = 18$
Agency services	$\beta_6 = 15$
Asset management	$\beta_7 = 12$
Retail brokerage	$\beta_8 = 12$

QIS-5[41] data on the change in the capital requirements for banks of different sizes and from different countries show that the incremental capital in respect of operational risks as a percentage of the minimum required capital ranges between 4 percent and 7.9 percent, and in capital adequacy terms, between 0.36 percent and 0.711 percent of the currently required minimum.

(4) Potential effects on the Israeli banking system of the implementation of the Basel II credit risk directives

1. **Capital requirement**— QIS-5 data and calculations by the Banking Supervision Department in Israel show that banks applying the Basel II directives will reduce their capital requirement,[42] and that this reduction at the banks adopting the Internal Ratings-Based approach will be greater than at the banks adopting the Standardized Approach.[43]

2. **Amount of credit,** the pricing of credit and the quality of credit—Based on studies in Israel and abroad, the amount of credit can be expected to increase during periods of vibrant activity in the economy and to decrease in recession

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[41] Quantitative Impact Study (QIS)—a questionnaire sent by the Bank for International Settlements (BIS) to 381 banks in 31 countries in order to obtain information on the changes expected at banks worldwide that have applied the Basel II directives.

[42] After weighting all risk elements (credit risk, market risks and operational risks).

[43] Since there is no transition period for banks adopting the Basel II directives' Standardized Approach, the capital allocation under this approach can be calculated immediately. Under the Internal Ratings-Based approach however, there is a transition period of three years, and the capital requirement will be in accordance with the restrictions specified in Basel II.

periods[44] as a direct result of the effect of business cycles on credit risk (credit quality) and on capital adequacy. Another effect of the implementation of the Basel II accord on the Israeli banking system is apparent abroad, and can also be found from Ruthenberg and Landskroner's studies[45] of data from the Israeli banking system, which is indicative of the direct effect of the adoption of the Basel II accord on the level of the interest rate. According to these studies, corporate customers will benefit from a larger interest rate discount than retail customers. Moreover, implementation of the Basel II accord will lead to a lower interest rate for high-quality customers and to a higher interest rate for low-quality customers. These studies also found that higher-quality customers at banks applying the Internal Rating-Based approach can expect a larger interest rate discount than at banks applying the Standardized Approach. The authors therefore expect many quality customers to move to banks that apply the Internal Ratings-Based approach. Accordingly, implementation of the Basel II directives is likely to affect the distribution of risks among the banks, with the result that banks which retain the IRB approach may become less exposed to risk than those applying the Standardized Approach.

c. Capital adequacy in 2006

During 2006 the five banking groups' ratio of capital to risk-weighted assets rose from 10.67 percent to 10.82 percent (Figure 3.11), reaching its highest level since the beginning of the 1990s.

This increase derived from a 6 percent expansion in the capital base compared with a growth of only 5 percent in risk-weighted assets (Table 3.8). Although the ratio of capital to risk-weighted assets increased, its development was not uniform among all of the banks: At Bank Hapoalim and Bank Leumi, there was no major change; at Bank Discount and Bank Mizrahi-Tefahot, the ratio increased by 1 percentage point; and at First International, the ratio fell by 1.6 percentage points due to the acquisition of Bank Otsar Hahayal[46] and the purchase of additional shares in ICC-CAL.[47] Despite the

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[44] For a detailed discussion of the effects of the business cycle on the amount and quality of credit in light of Basel II see D. Ruthenberg and Y. Hecht, "The Link between the Business Cycle and the Amount and Quality of Bank Credit in light of Basel II, the Case in Israel," Banking Supervision Working Paper 05.03, Bank of Israel, December 2005 (Hebrew).

[45] Repullo R. and J. Suarez, 2004, "Loan Pricing under Basel Capital Requirements", Journal of Financial Intermediation, 13(4), pp. 496-521.

Ruthenberg D. and Landskroner Y., "Loan Pricing Under Basel II in an Imperfectly Competitive Banking Market", May 2007, working paper July 2005.

[46] On January 24 2006, the First International Bank purchased Bank Hapoalim's entire holdings in Bank Otsar Hahayal—68 percent of capital and 66 percent of voting rights—for NIS 702 million.

[47] On December 10 2006, the First International Bank purchased 6.76 percent of the share capital and 5 percent of the voting rights in Israel Credit Cards from the Fishman group.

Figure 3.11
Risk-Weighted Capital Ratio of the Major Banking Groups, 2000-06

Percent

Minimum capital ratio
from march 1999 (9%)

2000		2004	
2001		2005	
2002		2006	
2003			
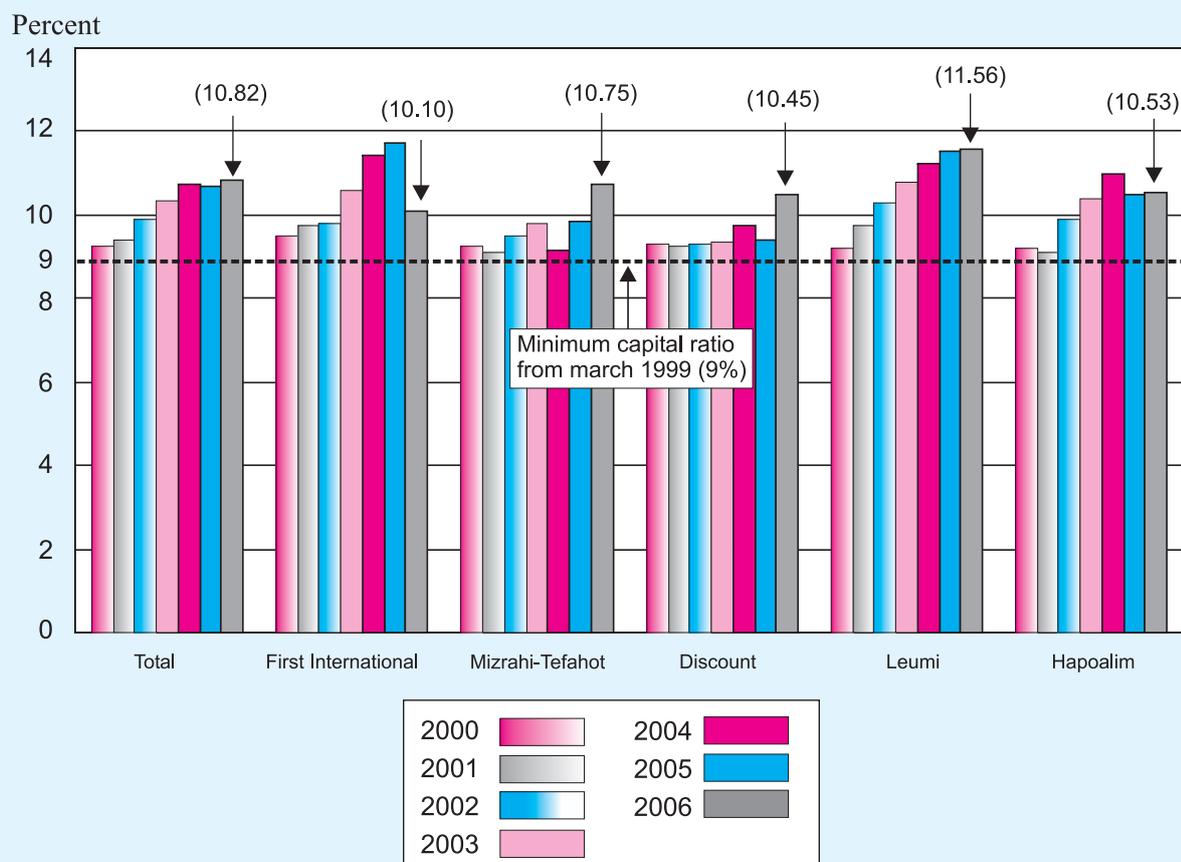
SOURCE: Published financial statements.

improvement in the capital adequacy of the Israeli banking system, Israel is still among the countries with very low relative excess capital adequacy (Figure 3.12).[48]

It can therefore be assumed that in a situation of repayment default or other form of instability, the banks will have difficulty in absorbing unexpected losses. Accordingly, they must increase their capital adequacy ratios in order to prepare for the eventuality of recession periods in which the banks are exposed to greater risks.

Tier I capital,[49] which is the largest and most stable part of capital, expanded by 10 percent in 2006 (Table 3.8) due to the growth in the banks' profits. As a result, the ratio

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[48] Relative excess capital adequacy is calculated as the percentage of excess capital over the amount of minimum capital required in every country. The calculation of relative excess capital adequacy makes it possible to convert the minimum capital requirement in Israel (9 percent) to the worldwide minimum capital requirement (8 percent), and thereby create a basis for international comparison.

[49] The components of Tier I capital are: paid-up share capital (except for cumulative or redeemable preference shares), funds (derived from premiums paid when shares are issued, and others), surpluses (minus losses), receipts on account of shares and minority interests in consolidated companies.

Table 3.8
**The Distribution of Capital, and the Capital Ratios in the Five Major Banking Groups, 2005–06**

	Hapoalim		Leumi		Discount		Mizrahi–Tefahot		First International		Total	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
	(NIS million)											
Equity[a]	16,784	18,926	16,205	17,643	7,185	8,367	4,682	5,067	4,278	5,036	49,134	55,039
Tier 1 capital[b]	16,996	18,948	16,277	16,864	7,092	8,637	4,606	4,969	4,217	4,557	49,188	53,975
Tier 2 capital[b]	8,762	8,012	8,876	9,062	3,796	4,036	2,385	3,043	1,893	1,892	25,712	26,045
of which: Hybrid capital investment	758	752	517	511	46	46	0	451	1,807	1,791	3,128	3,551
Tier 3 capital	0	0	198	41	37	10	0	0	0	0	235	51
Investment in shares and subordinated notes of consolidated companies	-30	-44	-142	-83	-947	-1,271	-51	0	-32	-248	-1,202	-1,646
Total capital for risk-weighted capital ratio calculation	25,728	26,916	25,209	25,884	9,978	11,412	6,940	8,012	6,078	6,201	73,933	78,425
					(NIS million)							
Total balance sheet	281,617	283,571	278,190	289,673	158,931	162,750	87,346	90,818	72,831	86,639	878,915	913,451
Balance of off-balance-sheet instruments (notional value)	409,583	451,898	223,624	215,146	112,643	113,590	88,721	120,527	84,191	96,789	918,763	997,950
Credit value of off-balance-sheet items	54,067	64,337	36,361	36,828	15,831	17,133	14,655	17,936	9,959	11,388	130,873	147,622
Weighted balance-sheet balances of credit risk	202,585	203,676	188,630	192,509	94,100	95,027	56,324	59,420	44,124	52,913	585,763	603,545
Weighted off-balance-sheet balances of credit risk	38,809	46,986	24,989	26,145	10,730	12,487	12,316	13,277	6,725	7,133	93,569	106,028
Market risk	4,222	4,967	4,585	5,184	1,521	1,649	1,966	1,791	963	1,355	13,257	14,946
Total weighted items	245,616	255,629	218,204	223,838	106,351	109,163	70,606	74,488	51,812	61,401	692,589	724,519
					(percent)							
Capital/balance-sheet ratio	5.96	6.67	5.83	6.09	4.52	5.14	5.36	5.58	5.87	5.81	5.59	6.03
Tier 1 risk-weighted capital ratio	6.92	7.41	7.46	7.53	6.67	7.91	6.52	6.67	8.14	7.42	7.10	7.45
Tier 2 risk-weighted capital ratio	3.57	3.13	4.07	4.05	3.57	3.70	3.38	4.09	3.65	3.08	3.71	3.59
Total risk-weighted capital ratio	10.47	10.53	11.55	11.56	9.38	10.45	9.83	10.75	11.73	10.10	10.67	10.82

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

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Figure 3.12
Relative Excess Capital Adequacy Ratios[a] in Selected Banking Systems,[b]
an International Comparison, 2006
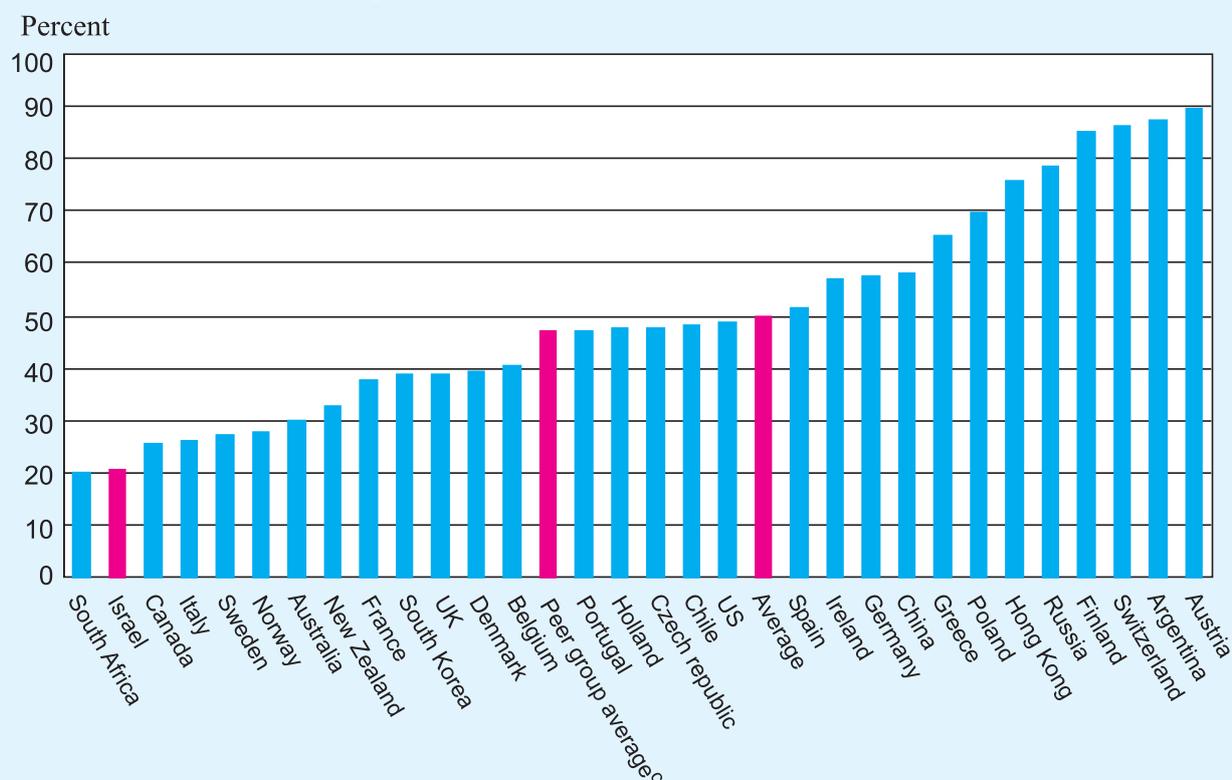
Percent

[a] The relative excess capital adequacy ratio is calculated as the percentage deviation of the actual capital ratio from the minimum required. The minimum capital adequacy ratio required in each country is 8 percent, except for Israel where the minimum required is 9 percent and South Africa where the minimum required is 10 percent.
[b] In general, values were based on the 10 largest banking groups, except for: the US, which was based on the 50 largest banking groups; Chile, Portugal, and South Korea, on the seven largest banking groups; South Africa, on the six largest; Israel, Belgium and the Czech Republic, on the five largest banking groups; and New Zealand, on the four largest banking groups.
[c] Israel's peer group consists of eight similar countries in terms of size of GDP and banking system: Belgium, Denmark, Ireland, Greece, Norway, Portugal, Finland and South Africa.
SOURCE: Based on Bankscope data.

of Tier I capital to risk-weighed assets rose to 7.5 percent, its highest level since 1999 (Figure 3.13). In contrast to the increase in the Tier I ratio, the ratio of Tier II capital to risk-weighted assets fell for the first time since 1994, to 3.6 percent (Figure 3.13).

The changes in Tier II capital were not uniform: Upper-Tier II capital,[50] which comprises 12 percent of Tier II capital, fell by 16 percent compared with a half percentage point decrease in the ratio of subordinated notes, which derived from the repayment of these notes. As a result, the ratio of subordinated notes to Tier I capital not allocated against market risks at the five banking groups dropped to 42.3 percent, far from the limit of 50 percent specified in Directive 311. Despite the changes in the composition

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[50] Upper-Tier-II capital consists of complex debt instruments, cumulative or redeemable preference shares and general loan-loss provisions.

Figure 3.13
Tier 1 and Tier 2 Risk-Weighted Capital Ratios, 2000-06
Percent

Tier 1 risk-weighted capital ratios   Tier 2 risk-weighted capital ratios

SOURCE: Published financial statements.
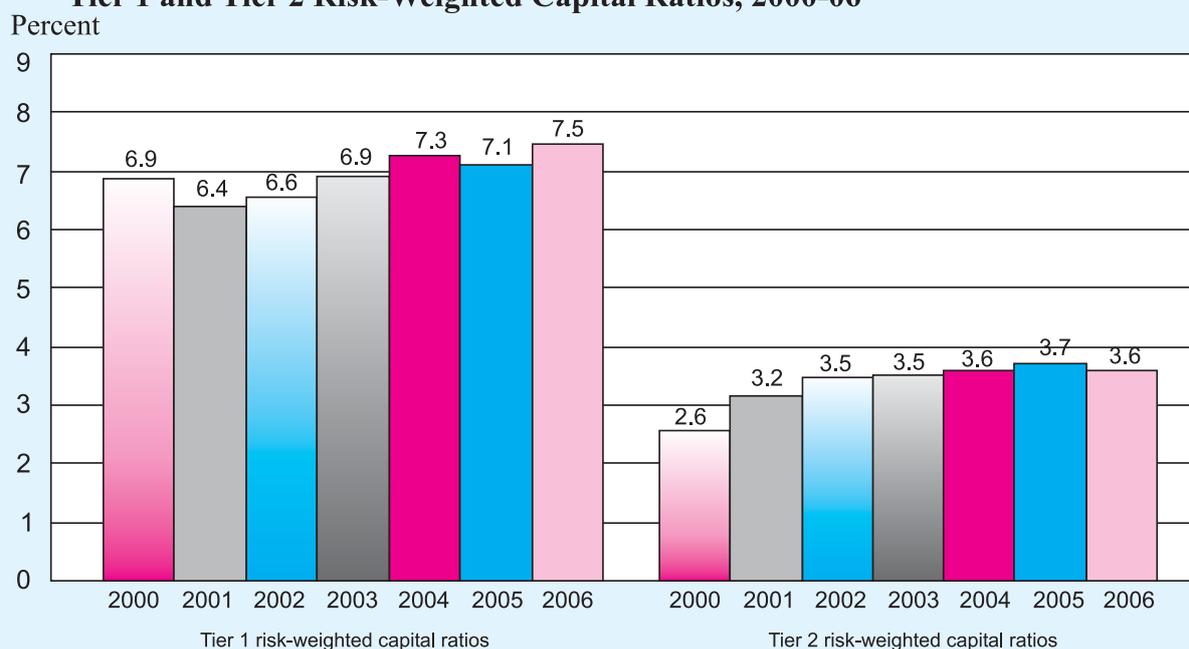
of the capital base, the ratio of Tier I capital is lower than that in other countries with a rating of less than AAA. The banks should therefore increase this ratio (that is, the proportion of Tier I capital in the capital base).

5. RISK-ADJUSTED RETURN ON CAPITAL

The improvement in risk-adjusted return on capital (RAROC) recorded since 2003 continued in 2006. The improvement in 2006 largely derived from an increase in profit from extraordinary transactions, principally non-recurring profits which the banks charged due to the sale of the ownership and management rights of provident funds and mutual funds resulting from the implementation of the Bachar Reform (Table 3.9). Without these non-recurring profits, RAROC in 2006 was essentially similar to that recorded in the previous two years, implying an improvement compared with 2003, the year when the economy and the banking system managed to emerge from the recession of 2001-2002. An analysis of the results of the five large banking groups reveals differences, sometimes substantial differences, in the groups' performance (Figure 3.14).

A breakdown by activity segment and by banks shows that the commercial banking segment again presented the highest RAROC in 2006.

Table 3.9
Risk Adjusted Return on Capital (RAROC), the Variance–Covariance Approach,[a] by Banking Group and by Activity,[b] 2006

	Hapoalim	Leumi	Discount	Mizrahi –Tefahot	First International[c]	Total
A Commercial banking	1.70 (26.29)	1.59 (34.13)	0.83 (34.82)	0.73 (78.53)	0.81 (62.02)	1.55 (38.34)
Mortgage banks	0.00 (0.00)	-0.11 (11.78)	0.05 (7.84)	1.16 (4.64)	0.00 (17.13)	-0.01 (5.49)
Overseas offices	-0.04 (19.35)	-0.13 (25.20)	-0.48 (38.85)	-0.22 (5.22)	0.16 (15.04)	-0.20 (22.29)
Financial companies[d]	0.15 (36.58)	0.41 (19.04)	0.03 (6.48)	0.41 (5.26)	-0.12 (3.49)	0.39 (20.53)
Credit card companies	0.96 (4.84)	0.08 (1.69)	0.55 (3.68)	0.00 (0.00)	1.10 (0.07)	0.62 (2.73)
Real companies and insurance companies	0.25 (2.13)	0.03 (5.31)	0.28 (6.40)	0.00 (3.08)	0.00 (0.00)	0.28 (3.70)
Other subsidiaries	0.00 (10.81)	0.55 (2.86)	0.10 (1.94)	-0.23 (3.27)	0.01 (2.25)	0.02 (5.42)
B Total activity of the banking group						
Rf (2003)=4.89%	0.42	0.22	-0.11	0.49	-0.01	0.31
Rf (2004)=3.76%	0.83	0.72	0.35	0.60	0.25	0.82
Rf (2005)=2.98%	1.03	0.84	0.23	0.88	0.69	0.98
Rf (2006)=3.74%	0.93	1.01	0.40	0.77	0.60	1.03

[a] RAROC is calculated by the variance-covariance method: $RAROC_i = (ROE_i - R_f)/(2.33 * \sigma_{ROE_i})$
where

ROE = return on equity in the last year (profit at end of year to investment at beginning of the year).
R_f = risk-free interest: yield to maturity on 5-year CPI-indexed government bonds (Galil).
σ_{ROE} = standard deviation of ROE, calculated from quarterly observations ROEs over seven years (section B of table). Standard deviation of ROE of individual areas of activity is calculated from annual observations of ROEs over ten years (section A of table).
2.33 = the value of Z at the 99% significance level.

[b] If there was no banking activity in a particular segment in 2006, RAROC is recorded as 0.
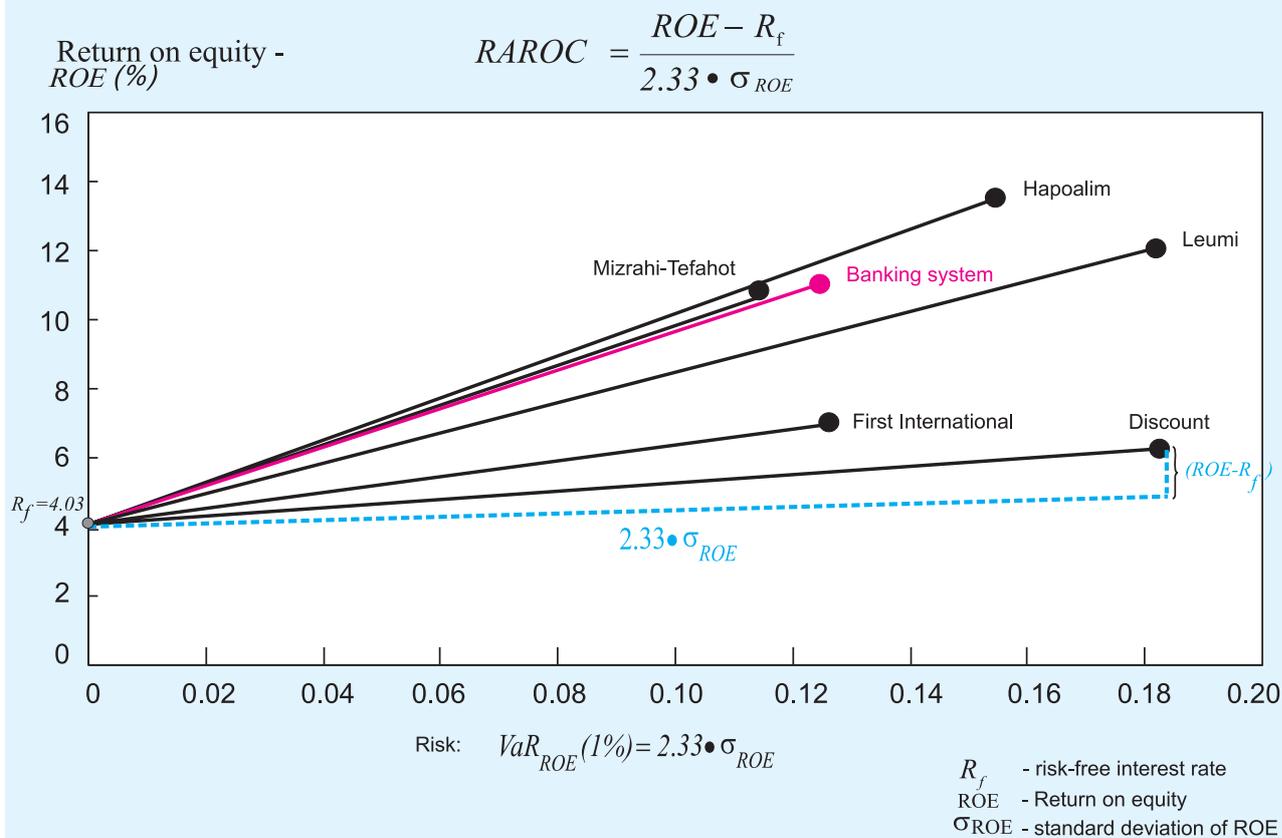
[c] The merger of the First International Bank, First International Mortgage Bank and Atzmauth Mortgage and Development Bank caused some distortion in the group's RAROC data when their activities were divided into the above categories. This was due to the fact that capital was calculated as of the end of 2005 (the year before the merger) and profit was calculated as of the end of 2006 (after the merger).

[d] Including holding and investment companies, leasing companies, and financial holding companies.

[e] Figures in parentheses are the average ratios (percent) of investment in the activity to the equity of the banking group in 2006.

SOURCE: Published financial statements.

Figure 3.14
Risk-Adjusted Return on Capital, Comparison of Five Major Banking Groups and Banking System, Average 2002-06

Return on equity - ROE (%)

$$RAROC = \frac{ROE - R_{\mathrm{f}}}{2.33 \bullet \sigma_{ROE}}$$

Risk: $VaR_{ROE}(1\%) = 2.33 \bullet \sigma_{ROE}$

R_f - risk-free interest rate
ROE - Return on equity
σ_{ROE} - standard deviation of ROE

SOURCE: Based on published financial statements.

6. THE ROBUSTNESS OF THE BANKING SYSTEM ACCORDING TO THE ROBUSTNESS INDEX[51]

The overall score of the Robustness Index improved by 0.1 percentage point, from 2.57 to 2.47 in 2006, continuing the improvement that began in 2003 when the economy exited the recession of 2001-2002 (Table 3.10). This decline (improvement) in the Robustness Index, which weights the scores of 14 banks on the basis of 25 financial ratios relating to

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[51] This index was developed by the Banking Supervision Department. The index is based on six primary criteria (capital adequacy; asset quality; management quality; profits and profitability; exposure to liquidity risk; and exposure to market risk), and varies between 1 (the highest grade, indicative of financial resilience from every aspect) and 5 (the lowest grade, indicative of extreme financial instability). See a detailed explanation of the index and its components, see Box 1.1 (pp. 32–33) in the Annual Survey of Israel's Banking System for 2003 as well as Y. Fishman and D. Ruthenberg, "Hosen—an Index for Examining the Resilience and Robustness of the Banks in Israel," Banking Issues 17.

six principal criteria, encompassed all the large groups in the system[52] and was reflected by three criteria: capital adequacy, asset quality, and profit and profitability. The improvement in capital adequacy derives from a growth in Tier I capital at most of the banks in the system.[53] The decrease in the overall score of asset quality resulted mostly from the improvement in credit quality.[54] The improvement in profits and profitability derived from an increase in ROE that resulted from a rise in non-recurring income.[55]

Table 3.10
Grades for the Robustness ("Hosen") Index of Banking Institutions in Israel; Weighted Average for the Entire System, 2000 to 2006

Year	2000	2001	2002	2003	2004	2005	2006
Overall grade	2.78	2.97	2.93	2.74	2.60	2.57	2.47

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[52] The analysis of the Robustness Index is partly based on dividing the banks by size of group in terms of asset volume: up to NIS 4 billion, between NIS 8-35 billion and over NIS 90 billion.

[53] See section 4 in this part for further details.

[54] See section 1 in this part for further details.

[55] See Chapter 2 for further details.

Table A.3.1
Distribution of Credit to the Public^a by Single Borrower Indebtedness, the Five Major Banking Groups,^b 2005-06

Credit per borrower	Outstanding credit to public, and off-balance-sheet credit risk		Number of borrowers		Average outstanding credit		Cumulative proportion of outstanding credit		Cumulative proportion of borrowers	
(NIS thousand)	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
	(NIS million)				(NIS thousand)		(%)		(%)	
Up to 10	8,823	9,866	1,964,157	1,924,037	4	5	100.0	100.0	100.00	100.00
10 to 20	8,987	9,256	610,812	599,197	15	15	99.0	99.0	60.14	61.37
20 to 40	20,252	20,900	670,616	688,908	30	30	98.0	98.0	47.74	49.34
40 to 80	37,658	40,570	669,794	695,656	56	58	95.8	95.8	34.13	35.51
80 to 150	51,094	54,029	481,957	504,517	106	107	91.6	91.6	20.53	21.54
150 to 300	60,851	65,795	284,368	311,257	214	211	85.9	85.9	10.75	11.41
300 to 600	65,033	68,940	159,662	165,741	407	416	79.1	79.0	4.98	5.17
600 to 1,200	36,953	40,502	46,131	49,836	801	813	71.9	71.8	1.74	1.84
1,200 to 2,000	19,358	20,646	12,816	13,761	1,510	1,500	67.7	67.6	0.80	0.84
2,000 to 4,000	27,627	28,704	10,078	10,439	2,741	2,750	65.6	65.4	0.54	0.56
4,000 to 8,000	35,267	35,618	6,264	6,383	5,630	5,580	62.5	62.4	0.34	0.35
8,000 to 20,000	62,517	64,842	5,021	5,287	12,451	12,264	58.6	58.7	0.21	0.22
20,000 to 40,000	67,074	70,518	2,459	2,623	27,277	26,884	51.6	51.9	0.11	0.12
40,000 to 200,000	201,977	221,826	2,529	2,740	79,864	80,958	44.2	44.5	0.06	0.06
200,000 to 400,000	76,575	83,126	279	311	274,462	267,286	21.7	21.3	0.01	0.01
400,000 to 800,000	63,594	60,188	118	113	538,932	532,637	13.1	12.6	0.00	0.00
800,000 to 1,200,000	20,561	29,699	22	31	934,591	958,032	6.1	6.3	0.00	0.00
1,200,000 to 1,600,000	7,885	8,195	6	6	1,314,167	1,365,833	3.8	3.2	0.00	0.00
1,600,000 to 2,000,000	5,417	8,706	3	5	1,805,667	1,741,200	2.9	2.4	0.00	0.00
2,000,000 to 2,400,000	2,332	4,309	1	2	2,332,000	2,154,500	2.3	1.4	0.00	0.00
2,400,000 to 2,800,000	-	5,120	-	2	-	2,560,000	2.0	1.0	0.00	0.00
2,800,000 to 3,200,000	14,347	-	5	-	2,869,400	-	2.0	0.5	0.00	0.00
Higher than 3,200,000^c	3,844	4,366	-	-	-	-	0.4	0.5	0.00	0.00
Total	**898,026**	**955,721**	**4,927,098**	**4,980,852**	**182**	**192**	**100.0**	**100.0**	**100.00**	**100.00**

^a Includes the balance of credit to the public and credit-risk equivalent of off-balance-sheet financial instruments, calculated according to the definitions used for calculating the single borrower limitation. Excludes the public's investment in bonds.
^b The data in the "up to 8,000 shekels" category are the summation of the figures for each consolidated company (consolidation on the basis of layers) in the credit categories, while for over 8,000 shekels, the credit data and the number of borrowers were
^c This credit is classified as "Other credit card charges," and was given by Bank Hapoalim as part of its balance sheet credit that was not subdivided according to the size of the loan.
SOURCE: Published financial statements.