Chapter 1

Israel's Banking System: A Long-Term View

The total profit of the five major banking groups (including minority interests) rose from NIS 3,580 million in 1999 to NIS 3,836 million in 2000. This increase reflects a growth in the average return on equity, from 11.2 percent in 1999 to 11.7 percent in 2000, even exceeding the average of the last four years (11.2 percent).

In the last decade there have been changes in the environment in which Israel's banking system operates: years of economic growth have been followed by years of economic slowdown; periods of boom in the money and capital markets have been interspersed by periods of slump; at times the process of economic liberalization proceeded apace, leading to intensified competition but also to heightened risks to the banking system; at times there were sharp shifts in the various exchange and interest rates, as well as a persistent decline in actual and expected inflation. The process of globalization has augmented international capital flows, making the markets more efficient but also increasing the banking system's exposure to risks deriving from international crises.

The two main reasons for the rise in the return on equity in 2000 are the expansion of banking activity, as expressed in the continued increase in the demand for credit, and the growth in income from capital market activities.

Bank credit expanded by 12 percent in 2000, similar to its rate in the two previous years (13 percent). This year, too, the expansion of credit outstripped GDP growth, although in contrast with the last three years, in 2000 economic activity surged (mainly in the first three quarters).

Additional causes of the increased demand for credit in recent years have been the need to finance purchases of corporations in the framework of the privatization process, the accelerated growth of capital stock, structural economic changes expressed in the rapid expansion of the services and high-tech industries, and a rise in firms' financing needs due to the economic slowdown.

Note, however, that alongside the increased return on equity in recent years, in our opinion, there has been an increase in the various risks to which the banks

are exposed, primarily credit risk. This assessment is based on the persistently steep rise in the total credit/GDP ratio that has characterized most industries (and real-estate in particular), the growth in the problem loans/capital ratio (adjusting for agriculture), the increase in the risk-based capital ratio, and the greater concentration of credit by borrowers.

Since 1991 the banking groups' capital adequacy has been declining, alongside an increase in the share of Tier 2 capital. These developments, together with the rise in risks, diminishes banks' ability to contend with the realization of risks in the future.

1. THE ACTIVITIES AND PERFORMANCE OF ISRAEL'S BANKING SYSTEM: A LONG-TERM VIEW

a. The commercial banks

The activities of the commercial banks continued to expand in 2000, albeit more moderately than in the previous two years (Figure 2.1). The average balance sheet grew by 8 percent (compared with an annual increase of about 11 percent in 1999), and the average balance was about NIS 586 billion (Table 1.1). The level of commercial banking activity remained high despite the moderation of its growth rate. The balance-sheet/GDP ratio stabilized at 1.32 in 2000, similar to its 1999 level. This ratio fell from about 1.62 percent in 1988 to some 1.23 in 1996, after which it rose in each consecutive year, and stabilized, as stated, in 2000 (Figure 1.1). In the last few years banks have accrued surplus sources, which they have directed primarily to deposits at the Bank of Israel. These deposits rose by only NIS 3 billion in 2000, compared with NIS 8 billion in 1999, and their end-year balance was NIS 57 billion (a 5 percent increase). Since these deposits are not used to finance economic activity there is justification for deducting them from the total balance sheet when undertaking a long-term analysis of the balance-sheet/GDP ratio. Thus, after making this adjustment we find that the ratio stabilized at 1.2 percent in 1996–2000, compared with 1.3 percent without the adjustment.

Another index of the activity (output) of the banking system is the ratio of the industry's value added to GDP. Since 1996 this index has remained stable, ranging from 3.4 to 3.7 percent (Figure 1.1), similar to the rates prevailing in the banking systems in the western countries which are in Israel's peer group.

It would seem that in 2000, too, as in the four previous years, the public's demand for credit was the main cause of the growth in banking activity. Credit to the public as a share of total assets rose from 55 percent in 1999 to 58 percent in 2000.

The expansion of credit in 2000 continued the trend evident in the last three years.

Table 1.1
Activities of the Commercial Banks,[a] 1995–2000

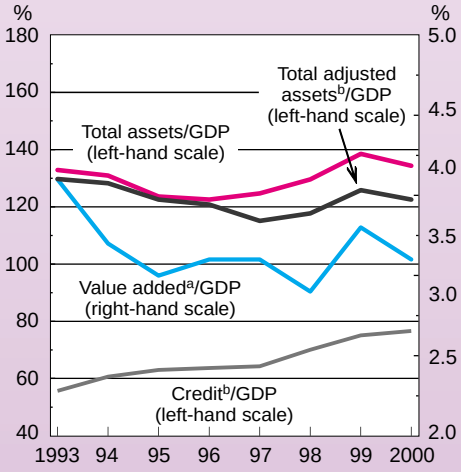
(percent)

	2000	1995	1996	1997	1998	1999	2000
	(*NIS million, Dec. 2000 prices*[b])						
Rate of change[b]							
Total balance sheet							
Total assets	585,887	2.3	4.9	6.1	8.5	10.9	8.1
Total credit to public	334,181	16.4	7.7	7.3	10.5	12.0	13.7
Total deposits of public	481,601	15.4	13.0	12.6	15.5	12.3	10.1
Monetary loans from Bank of Israel	740	–67.1	–56.4	–45.7	–60.0	–1.8	–9.8
Deposits in Bank of Israel[c]	51,729				48.4	13.4	3.2
Share of segment in balance sheet[d]							
Unindexed	201,948	25.8	26.9	30.0	31.8	32.0	34.5
Indexed	158,433	37.2	35.5	34.1	30.9	29.3	27.0
Foreign currency[e]	193,453	31.4	31.9	30.5	31.8	33.1	33.0
Net interest margins (N.I.M.) by segment							
Unindexed		5.5	5.1	4.2	3.3	3.2	2.8
Indexed		1.1	1.1	1.2	0.9	0.8	1.2
Foreign currency		1.3	1.3	2.0	2.8	2.2	1.8
Total N.I.M.		2.9	2.7	2.5	2.0	2.1	2.0

[a] The tables in this survey, which are based on returns to the Supervisor of Banks since 1998, including comparative data, are adjusted according to the description of assets and liabilities in the published financial statements. The tables do not include transactions at the banks' responsibility.
[b] Average balances and their rates of change.
[c] Including liquid assets in the Bank of Israel arising from the reserve requirement.
[d] Not including buildings and equipment and nonfinancial assets included in the balance sheet. Hence the figures do not total 100 percent.
[e] Indexed to and denominated in foreign currency.
SOURCE: Returns to Supervisor of Banks.

Nevertheless, in contrast with those years (1997–99), which were characterized by an economic slowdown (average annual GDP growth rate of 2 percent), in 2000 some of the rise in the demand for credit can be explained by the acceleration of economic activity. GDP grew by an annual rate of 9.1 percent in the first three quarters, dipping by 9 percent in the last quarter of 1999 because of the security situation and the shocks to world capital markets (principally the Nasdaq), so that in 2000 as a whole GDP grew by 5.9 percent.

Figure 1.1
Measures of Banking Activity Relative to GDP,[a] 1993–2000



[a] Value added includes gross income, salaries, and related expenses.
[b] Including credit and credit guarantees at banks' responsibility.
SOURCE: Returns to Supervisor of Banks.

Additional factors, beyond the economic recovery, that served to increase the demand for credit beyond GDP growth, even during an economic slowdown, were:

1. The increased demand for credit in order to purchase corporations, a factor which is not expressed directly in GDP.

2. The accelerated growth of gross capital stock in Israel; this derived from the need to rehabilitate the capital stock/GDP ratio after it had declined in the first half of the 1990s because of the need to absorb the influx of immigrants.

3. Structural and technological changes in the economy, expressed in the rapid growth of such industries as the services and high-tech; these changes required extensive investment in order to increase physical capital stock.

4. The rise in firms' need to expand working capital in view of the economic slowdown, especially in commerce and the traditional industries.

Another possible reason is the greater flexibility of banks' credit policy, expressed in the rise in banks' finance of firms as a share of their equity.

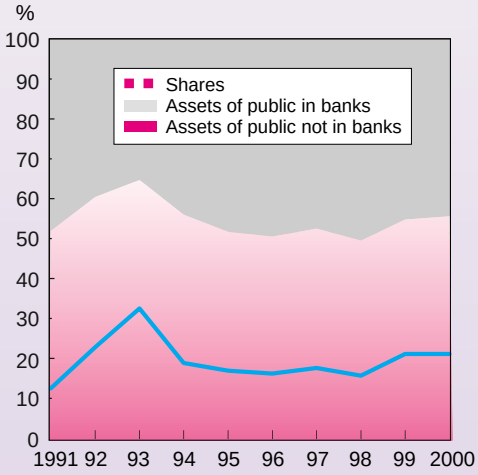
(i) The public's asset portfolio: deposits

Deposits of the public, which are the main component of bank's sources raised in order to finance activities, accounted for 82 percent of them in 2000. These deposits also constitute a large part of the public's asset portfolio (Table 2.2), and accounted for 44.2 percent of the public's total assets in 2000—similar to their share in 1999 and less than in 1995–98 (about 48.5 percent).

Deposits of the public were up by 7 percent in 2000 over 1999, compared with a rise of 11 percent in the two previous years. The increase was due primarily to the NIS 39 billion expansion of unindexed local-currency deposits, further to the 26 percent rise in 1999.

The growth in the public's unindexed deposits in 2000 continues the long-term trend, evident since the end of the 1980s, of preference for unindexed local-currency assets, which are of a short-term nature. This trend was influenced to a great extent by monetary policy, the exchange-rate regime and—primarily—by the reduction of both the inflation rate and uncertainty. The surge in the share of unindexed local-currency deposits in the public's asset portfolio occurred in 1994, against the backdrop of the crisis on the TASE. Since then these deposits have increased constantly, from about 9 percent of total assets of the public at the end of the 1980s and the beginning of the 1990s to an average of 20 percent in the last three years. The moderation of the growth in the deposits of the public in 1999 was expressed in the additional slight decline (0.8 percentage points) in the share of the public's assets held in banks, following their steep decline in 1999. In 1999 the stock market rallied, expressed in both high yields and larger turnover and, as in the past, activity in the stock market had a marked effect on the extent of financial intermediation: in 1999 the share of the public's assets in banks declined (i.e., disintermediation) from a peak of 50 percent in 1998 to 45 percent in 1999 (Figure 1.2).

Figure 1.2
Banking Intermediation vis-à-vis Nonbanking Intermediation, 1991–2000



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

(ii) Bank credit

Bank credit amounted to NIS 354 billion at the end of 2000, after rising by 12 percent during the year (Table 2.8), similar to its expansion in the two previous years (some 13 percent). Continuing the trend evident since 1992, the rate of expansion of bank credit in 2000 outstripped that of GDP, despite the accelerated GDP growth rate, which was 5.9 percent. The credit/GDP ratio was 75.5 percent at the end of 2000—compared with 72 percent at the end of 1999 and about 56 percent at the beginning of the decade.

The two main developments in the composition of the public's credit portfolio were the rise in the share of unindexed local-currency credit (Table 2.8). from 34 to 39 percent, and the drop in that of CPI-indexed credit, from 28 to 25 percent. The share of foreign-currency credit (whether indexed or denominated) dipped slightly, from 37 to 36 percent.

Outstanding unindexed credit rose rapidly in 2000, by 31 percent, compared with 17 percent in the two preceding years (Table 2.8). The rapid expansion of on-call credit, which swelled by 43 percent, was particularly noteworthy, continuing its 40 percent

Table 1.2
Bank Credit Extended,[a] and its Main Substitutes, 1994–2000

(NIS million, December 2000 prices)

	Bank credit extended[b] (net)	Main credit substitutes[c]	*of which* Capital raised by Israeli firms on foreign stock markets	Share of bank credit (net) in total credit
1994	36,791	3,582	293	0.911
1995	31,549	3,259	1,436	0.906
1996	34,276	7,848	6,011	0.814
1997	36,997	24,001	6,390	0.607
1998	47,612	25,212	4,605	0.654
1999	53,371	23,646	14,075	0.693
2000	51,489	26,799	17,219	0.658

[a] Credit from commercial banks and mortgage banks.

[b] Credit from provident funds to members, credit from insurance companies, direct credit from abroad, and capital raised in Israel and abroad by the private sector.

SOURCE: Monthly returns to the Supervisor of Banks and Monetary Department, Bank of Israel.

increase in 1999; the other components of credit also grew.

The rapid expansion of unindexed credit, especially short-term, is explained by the decline in its relative cost due *inter alia* to fierce competition for the business segment in the last few years, as well as from expectations of the continued decline in the inflation rate and in short-term interest.

Nevertheless, in the last two years Israeli firms have turned to a far greater extent to the capital markets—and especially those abroad—as a source of capital (Table 1.2), as a substitute for bank credit, so that the share of bank credit in total credit and its substitutes has declined.

CPI-indexed local-currency credit is generally extended for a long term for the purpose of financing investment in fixed assets and durable goods. This credit shrank by 3 percent in 2000, after a moderate 5 percent increase in 1999, in view of the decline in unanticipated inflation and financing taken abroad by Israeli firms.

Foreign-currency credit (indexed and denominated) rose by a moderate 5 percent in 2000, despite the marked expansion of Israel's foreign trade. This development is explained by the existence of credit substitutes—investment by nonresidents in Israel and capital raised abroad by Israeli firms. In addition, the nominal spread between the interest rates on foreign currency (which rose in 2000) and on local currency (which fell) contracted

The economic slowdown, which was clearly in evidence in 2000:IV, persisted in 2001:I, and annual GDP growth was only 1.8 percent vis-à-vis 1999:I. This is due to a large extent to the security incidents, the global crisis in the high-tech industry, and plummeting share prices all over the world, which had an adverse effect on the activity

of firms in various industries, especially those connected with tourism, construction and real estate, electronics, and the high-tech industry. These developments increase the risk level of bank credit, especially in those industries that were in difficulties.

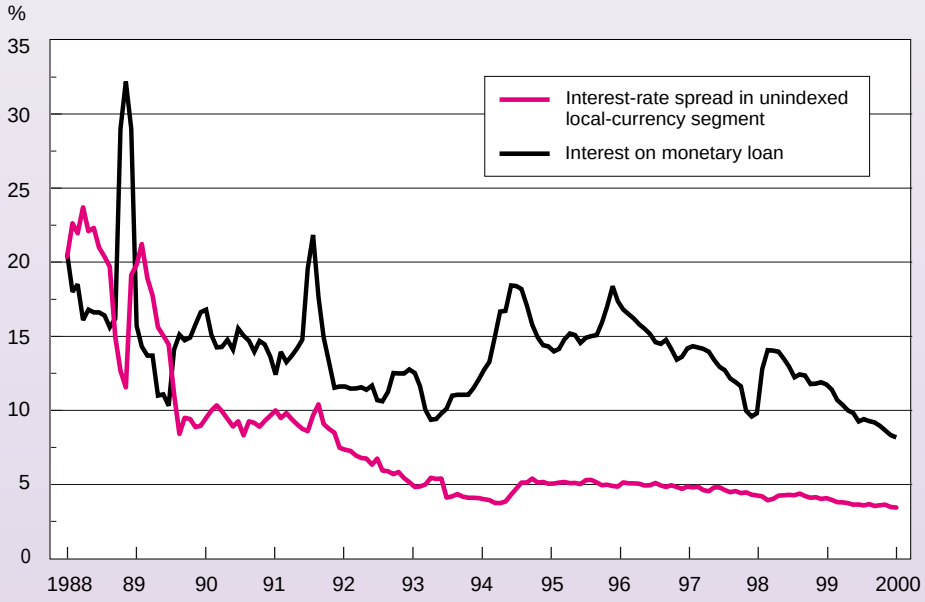
(iii) Interest rates and financial spreads

Changes in interest rates on unindexed deposits and credit, as well as in the interest-rate spread, are influenced by changes in the Bank of Israel's key interest rate, by shifts in the demand for credit and the supply of deposits, and to a great extent also by changes in their elasticities.

Research on interest-rate margins and spreads in Israel has shown that in the long run there is a positive relation between the Bank of Israel's key interest rate and the interest-rate spread in the unindexed local-currency segment (see Chapter 2).

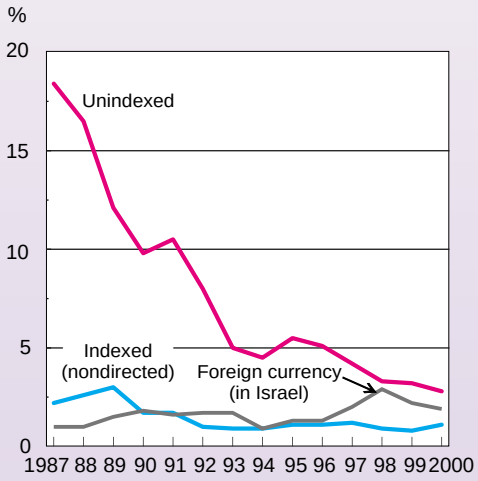
Nonetheless, from 1987 to 1995, when the Bank of Israel's key interest rate was reduced substantially and consistently, there were short-term fluctuations around the declining trend of the interest-rate spread (between the interest on term loans and SRO deposits). When the Bank of Israel's key interest rate rose, the interest-rate spread contracted, and vice versa. The main reason for these short-term fluctuations was the

Figure 1.3
Rate of Interest on Monetary Loan and Interest-Rate Spread, the Unindexed Local-Currency Segment,[a] 1988–2000



[a] Nominal data.
SOURCE: Based on Monetary Department data and returns to the Supervisor of Banks.

Figure 1.4
Net Interest Margins in the Various Segments, 1987–2000



SOURCE: Returns to Supervisor of Banks.

marked difference in the average duration of deposits and credit in that segment: the interest rate on deposits was adjusted immediately, because their duration is relatively short, while that on credit, which has a longer duration, was adjusted with a lag (sometimes of as much as two months).

Since 1995 the duration of credit has been shortened (principally because the banks introduced a policy of variable interest on the different kinds of credit and increased on-call credit), while the demand function for credit has become more elastic, largely because the liberalization measures increased the various substitutes available to firms. This led to immediate adjustments in interest rates and to greater similarity between changes in interest rates on deposits and credit in response to changes in the Bank of Israel's key interest rate. The positive long-term relation between the interest-rate spread and the Bank of Israel's key rate was maintained, but it became much weaker (Figure 1.3). As part of its monetary policy, the Bank of Israel gradually reduced its key interest rate, from 11.2 to 8.2 percent during 2000. In accordance with the long-term trend, the interest-rate spread in the unindexed local-currency segment (on term credit vis-à-vis SRO deposits) also contracted, from 4.2 to 3.6 percent, and the net interest margin in this segment reached 2.8 percent.

In the CPI-indexed segment, the banks' real marginal interest rates rose during 2000 (Table 2.5), in the wake of the fall in demand for indexed bonds and the negative accrual in savings schemes as indexed assets became less attractive. The net interest margin in the indexed segment was 1.1 percent at the end of 2000, so that it maintained its stability of the last few years (Figure 1.4).

Interest rates in the foreign-currency segment are affected mainly by the development of dollar Libor rates. The dollar interest-rate spread remained stable because the increase in the Libor rate, from 5.3 to 6.4 percent in 2000, was accompanied by a similar increase in the marginal interest on sources and uses. However, since the net interest margin in the segment is measured in real local-currency terms, it is influenced to a great extent by the changes that occur during the year in the exchange and inflation rates; in 2000 the margin was 1.9 percent.

In 2000, for the first time, the commercial banks' derivatives transactions are incorporated in the calculation of net interest margins. The purpose of these transactions

is to immunize the banks against market risks (interest-rate, exchange-rate, and inflation-rate). Hence we are unable to compare the margins by indexation segments with those of previous years, and can compare only the total margin.

If derivatives transactions are taken into account, whether intended to hedge balance-sheet activity or not, and to them are added fees from other financial transactions, there was a moderate decline in 2001 in the total net interest margin, from 2.1 to 2.0 percent. This margin is slightly higher than that in the western banking systems that are in Israel's peer group (see Chapter 3).

In the last thirteen years the net interest margin in the unindexed local-currency segment has declined consistently (Figure 1.4). Interbank competition has grown in this segment, in the context of the liberalization of the money and capital markets and the reduction of the reserve requirement. In both the other segments the net interest margins have remained stable.

In addition to the classification by indexation segment, since 1998 it has been possible to divide banking activity in the unindexed local-currency segment by type of customer—households vis-à-vis firms. As an indicator of the development of competition in banking activities with regard to these two sectors, we calculated the 'market power' index alongside the simple interest-rate spread (the difference between the interest on term credit and that on SRO deposits); the 'market power' index is defined as the relative deviation of the price of credit from its marginal cost, the latter being represented by the interest rate on SRO deposits.[1]

In intermediation vis-à-vis households the simple interest-rate spread is wider than it is in intermediation vis-à-vis firms, and the difference between them grew continually from August 1998 to December 2000 (Figure 1.5a). The banks' 'market power' in activities vis-à-vis households is greater than it is vis-à-vis firms, and both of them rose in the period reviewed (Figure 1.5b). Hence, it may be concluded (at least on the basis of these two indices) that interbank competition for large customers is fiercer than it is for households. It also transpires that competition in the unindexed local-currency segment has narrowed, as is indicated by the continuous rise in the market power of the banks in the two activity segments.

[1] The formula for the 'market power' of banking firm *j*, derived from maximizing the bank's income relative to the decision variables is: $\mathrm{M}_j = \frac{p - c'}{p} = \frac{1}{\eta} \cdot \theta_j^{\wedge}$

where

p = the price of the bank product (credit to the public);

c' = the marginal cost (financial and operating);

η = elasticity of the demand curve for credit;

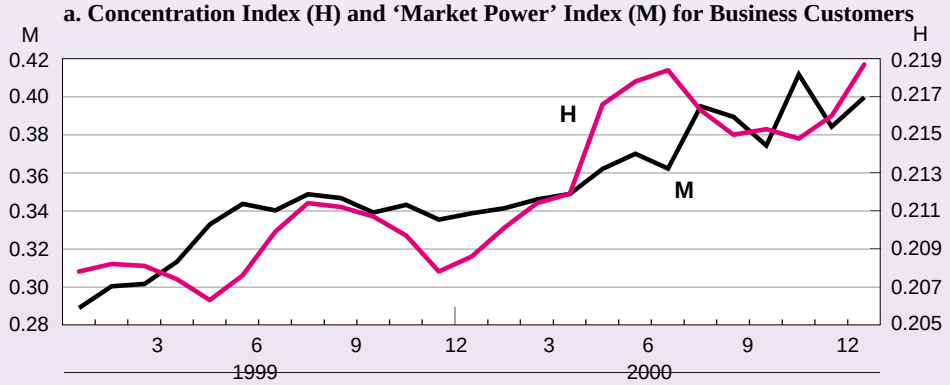
$\theta_j^{\wedge}$ = an index expressing the sensitivity of all the banking firms in the industry to changes in the output of banking firm *j*. In the literature this parameter is known as 'conjectured variation.'

The equation shows that 'market power' is affected negatively by the elasticity of the demand curve for credit (the more perfect is competition, the less is the banks' market power), and positively by the extent of the expected response of all firms to changes in the output of the single firm. In a competitive industry $\theta_j = 0$, and hence P = C; in a monopolistic industry $\theta_j = 1$, and hence

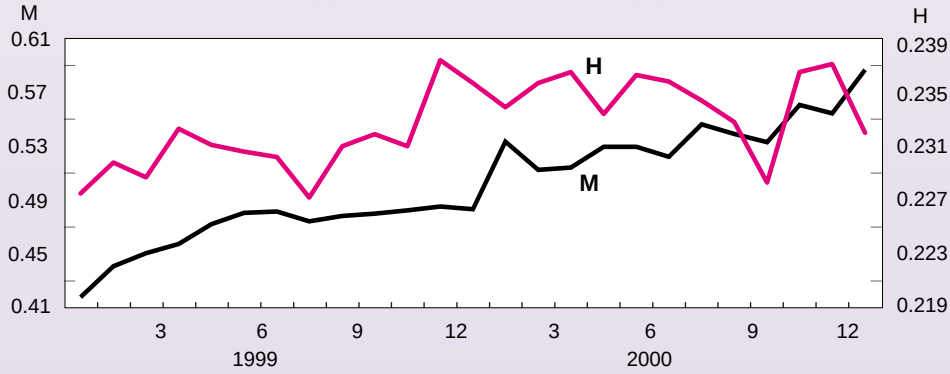
i.e., marginal revenue equals marginal cost. $P\left[1 - \frac{1}{\eta}\right] = C'$

Figure 1.5
Indices of Concentration and 'Market Power,' and the Interest-Rate Spread in the Unindexed Local-Currency Segment, 1999–2000

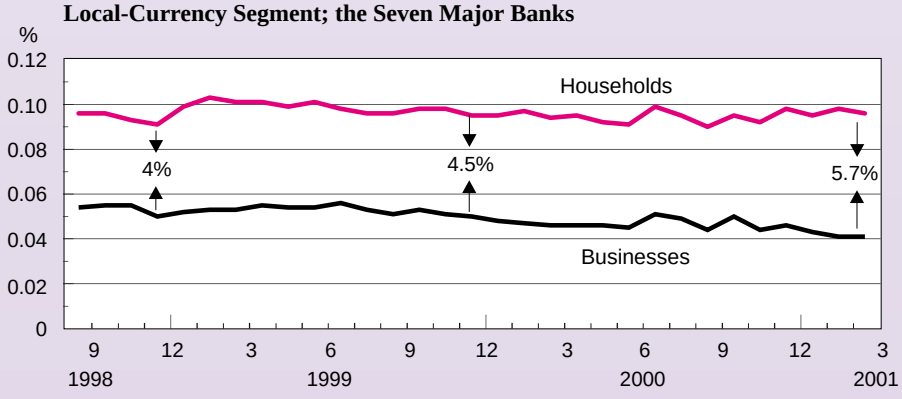
a. Concentration Index (H) and 'Market Power' Index (M) for Business Customers



b. Concentration Index (H) and 'Market Power' Index (M) for Households



c. Interest-Rate Spread[a] for Business Customers and Households; the Unindexed Local-Currency Segment; the Seven Major Banks



[a] Lending rate *less* on-call deposit interest..
SOURCE: Returns to Supervisor of Banks.

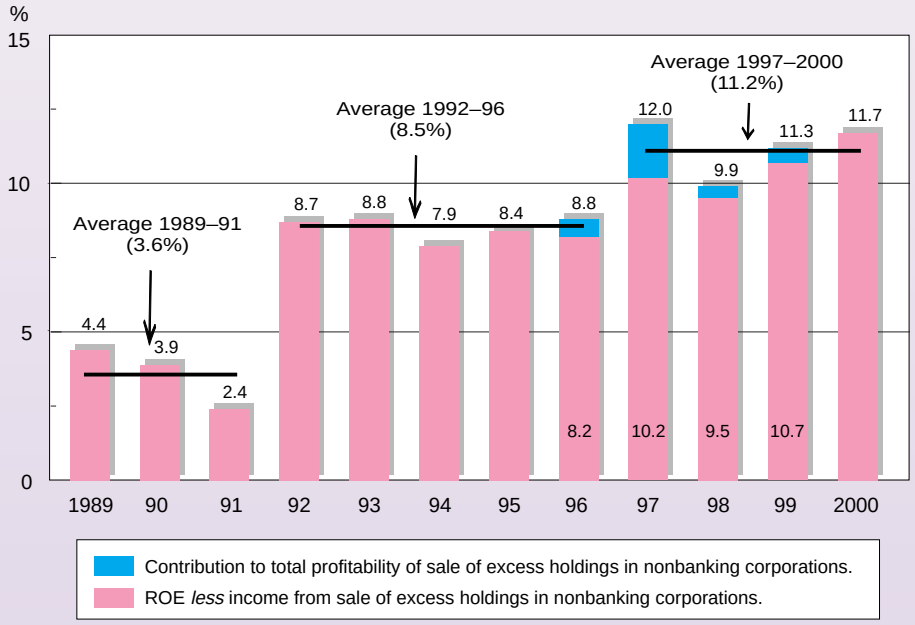
We also calculated the Herfindahl concentration index (H index) alongside the market power index (M Index) for the activity of the seven major banks vis-à-vis households and firms (Figure 1.5). Although the positive correlation between the two indices is not perfect (there are periods in the short run in which it is even negative), they both indicate a decline in the level of competition in the unindexed local-currency segment in the last two years. The findings show that alongside the fall in interest margins and spreads in the last fourteen years (Figure 1.3), which could indicate increased competition in the segment, other indicators show that while competition has increased in the last fourteen years, this trend was checked in the last three years. The entry into Israel's economy of foreign banks may have an effect on competition in the industry in the future (see Chapter 6).

b. Financial results and risks in the five banking groups

(i) Financial results

The total profit of the five banking groups (including minority interests) rose from NIS 3,580 million in 1999 to NIS 3,833 million in 2000. The increase reflects a rise in average return on equity (ROE) in the five banking groups, from 11.3 percent in 1999 to 11.7 percent in 2000 (Table 1.3, Figure 1.6)—above the long-term average for 1997–2000

Figure 1.6
After-Tax Return on Equity, the Five Major Banking Groups, 1989–2000



SOURCE: Published financial statements.

Table 1.3
Financial Results,[a] the Five Major Banking Groups, 1994–2000

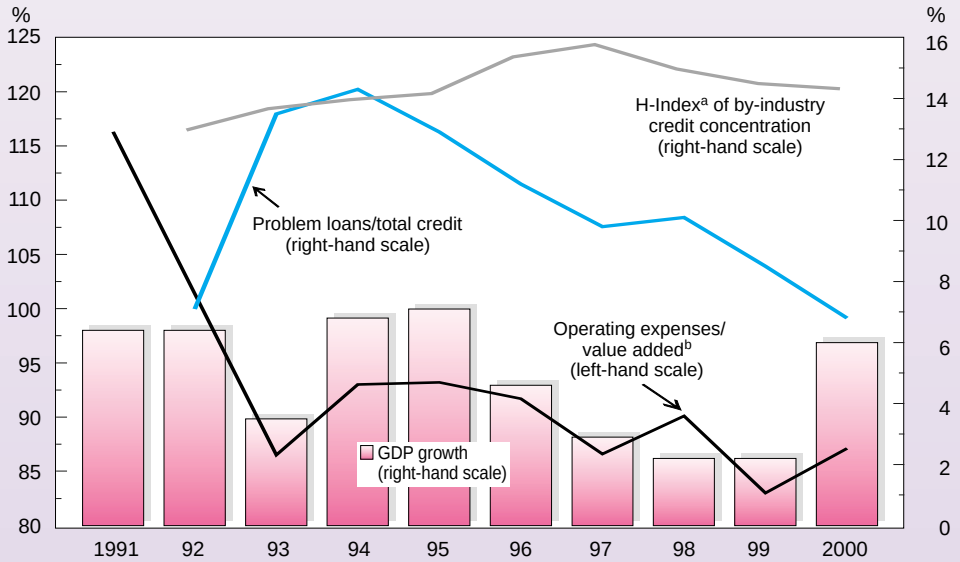
(percent)

	1994	1995	1996	1997	1998	1999	2000
Total after-tax profit (NIS million, Dec. 1999 prices)	1,933	2,162	2,393	3,428	3,062	3,580	3,833
Total after-tax profitability (ROE)	7.9	8.4	8.8	12.0	9.9	11.3	11.7
Financial margin on total assets	2.2	2.6	2.5	2.5	2.2	2.2	2.2
Operating costs/total assets	2.8	2.8	2.7	2.6	2.5	2.3	2.4
Non-interest income/ total operating expenses	63.7	58.0	56.2	58.0	57.2	58.9	58.3

[a] See notes to Table 3.3.
SOURCE: Published financial statements and returns to Supervisor of Banks.

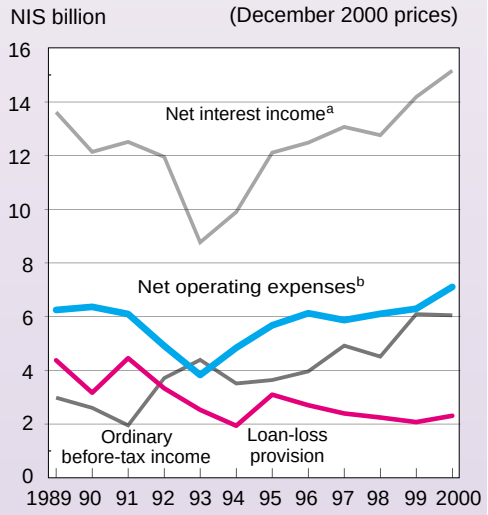
(11.3 percent). The return on equity (profitability) is not uniform among the five banking groups, with particularly marked differences in 2000. ROE in the First International group soared from 5.9 to 10.5 percent this year, while in the Discount group it plummeted from 6.5 percent in 1999 to a negative –0.6 percent in 2000; in the other banks it rose moderatedly (Table 3.2). ROE has risen to a new plateau in the last four years, after the

Figure 1.7
Risk and Efficiency Indices, the Five Major Banking Groups, and GDP Growth, 1991–2000



[a] H-Index x 100.
[b] Value added calculated as sum of ordinary before-tax income, salaries and related expenses, depreciation, and amortization.
SOURCE: Published financial statements and *Bank of Israel Annual Report.*

Figure 1.8
Effect of Income Components on Before-Tax Income, the Five Major Banking Groups, 1989–2000



[a] Before loan-loss provision.
[b] Operating expenses *less* non-interest income.
SOURCE: Returns to Supervisor of Banks.

new plateau attained in 1992, even adjusting for one-off income in 1996–99 due to sales of excess nonfinancial holdings. The average for 1997–2000 was 11.3 percent, compared with 8.5 percent in 1992–96, and 3.6 percent in 1989–91.

The relatively high ROE achieved by most of the banking groups in 2000 compared with the long-term average is due to several main developments: the continued expansion of their balance sheets, by 11 percent (because of the marked growth in credit), as described above (although it had little effect on profitability this year as there was a slight decline in the total net interest margin—from 2.1 to 2.0 percent); the increase in non-interest income, especially from fees, alongside a moderate rise in operating expenses.

An examination of the long-term trends in the main components of ordinary activity in banks' profit and loss statements (Figure 1.8) clearly shows a rising trend in ordinary before-tax income until 2000, even though it dipped slightly in 1989–91. Net interest income before loan-loss provision also displays a rising trend, though only since 1993. The upward trend in net interest income derives from the expansion of banking activity throughout the 1990s, but especially since 1993, despite the ongoing decline in the total net interest margin. This leads to the conclusion that before 1995 the fall in operating expenses (in the framework of the streamlining of the system) and the decline in loan-loss provision led to the rise in income. Since 1992 the banks have managed to attain continuous growth in ordinary before-tax income, in spite of fluctuations in its components, some of which displayed conflicting trends.

In 2000, for the first time since 1995, expenditure on loan-loss provision rose—by 12 percent. This may express the economic slowdown of 1996–99, but may also have been influenced by the security incidents, political uncertainty, and slump in the capital market evident since 2000:IV (Figures 1.7 and 1.8).

If these macroeconomic developments persist in 2001 it is reasonable to assume that the realization of banks' credit risks will increase—and will be expressed in a rise in current expenditure on loan-loss provision (see Chapter 3). The first signs of this can already be seen in the continued growth of current expenditure on loan-loss provision in 2001:I (by 17.2 percent) from 2000:I.

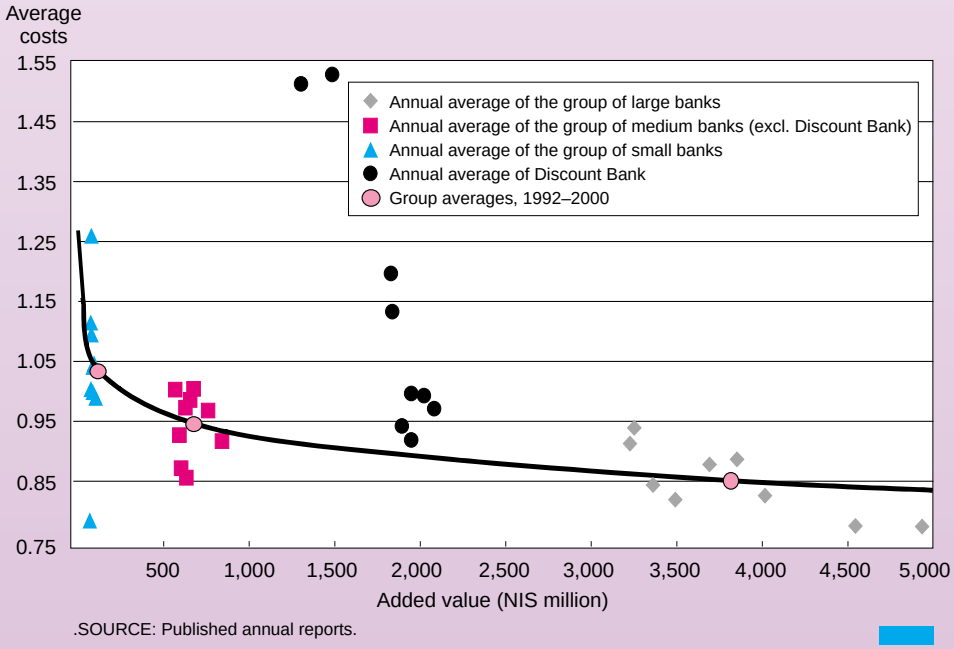
Since 1988, when the loan-loss provision on credit to the public was 3.3 percent, this ratio has been declining constantly, although there were fluctuations around the declining trend in the short run. In 1999 and 2000 the rate stabilized at 0.5 percent, and is still lower than it is in many western banking systems (Figure 1.13); it may not yet express the negative general economic developments evident since 2000:IV.

There was a significant rise in banks' total non-interest income in 2000, alongside a smaller increase in operating expenses, so that the 'operating coverage ratio' was up by one percentage point over 1999, and amounted to 52.7 percent.

The main source of the 11 percent rise in non-interest income in 2000 was income from customers' securities transactions (purchase and sale commissions, custody fees, and currency conversions). Capital market transactions accelerated significantly in 2000, as expressed in turnover and capital raised (see Chapter 3).

The index of fees and commissions, representing the average cost of thirteen main fees in the five largest banks, rose by 4.1 percent in 2000, (continuing the trend evident since 1997), contributing to the rise in non-interest income. Operating expenses grew by 8 percent in 2000, the main component of this being the increase in labor costs. The expansion of expenditure on employees derives mainly from the rise in early retirement costs, which were up by 68 percent in 2000. This was the result of the implementation of early retirement schemes, particularly in the three largest banks, in order to make the

Figure 1.9
Ratio of Operating Expenses to Value Added: Group Averages for Three Groups by Size, 1992–2000



.SOURCE: Published annual reports.

system more efficient. This involves replacing veteran employees, whose wages are relatively high, with new ones, whose wages are lower but whose academic and professional qualifications are better suited to the more sophisticated and increasingly complex nature of the financial services.

The operating efficiency of the banks in the various intermediation segments also affects the profitability of the system. Developments in the area of operating efficiency can be divided into three components:

1. Efficiency deriving from changes in the size of banks, and expressed in economies of scale;

2. Efficiency due to the reduction of a bank's operating expenses without a change in its size—X-efficiency. This is expressed in the ability of a bank's management to reduce expenditure on the various production inputs (physical capital, labor, and financial sources) in order to generate a given output. The test of this efficiency relates to different size-groups (peer groups), and is generally related to the management's managerial abilities.

3. Efficiency that results from economies of scope, and reflects the bank's ability to use given production inputs to generate a wider range of banking products, and at a lower cost than when the outputs are produced separately.

In order to examine the development of expenditure per unit of output in the last decade, we mapped the average costs of eighteen commercial banks in 1992–2000 (Figure 1.9).

We first divided the banks into three size-groups—large, medium, and small. Israel Discount Bank was placed in a category of its own because its size prevents it from

Table 1.4
Statistics on Ratio of Operating Expenses to Value Added, for Groups by Size, 1992–2000

	2 largest banks[a]	Discount Bank	4 medium banks[b]	11 smallest banks[c]
Average, 1992–2000	0.85	1.13	0.95	1.04
Average, 1992–1996	0.88	0.96	0.93	1.05
Average, 1997–2000	0.82	1.34	0.97	1.02
2000	0.77	1.53	0.92	0.99
Maximum-minimum difference				
Average, 1992–1996	0.08		0.26	2.24
Average, 1997–2000	0.03		0.32	0.98
2000	0.03		0.32	0.98

[a] Bank Leumi and Bank Hapoalim.

[b] Mizrahi Bank, First International Bank, Union Bank, and Mercantile Discount Bank.

[c] Bank Yahav, Maritime Bank, Otsar Hahayal Bank, Arab Israel Bank, Investec Clali Bank, Continental Bank, Bank Massad, Euro-Trade Bank, Industrial Development Bank, Trade Bank, and Poalei Agudat Yisrael Bank.

SOURCE: Returns to Supervisor of Banks.

being classified as either large or medium; in addition, its average expenditure is exceptionally high, so that it would have biased the results of the analysis.

A bank's output is defined here as value added, calculated as the sum of pre-tax profit, wages and associated expenses, amortization and deductions, and expenditure on maintenance of buildings and equipment. This definition reflects the return on factors of production (labor and capital) as well as the yield to shareholders from the process of financial intermediation, as reflected by activities both on and off the balance sheet. The development of average costs for the entire period (1992–2000), as well as for sub-periods (1992–96 and 1997–2000) are summarized in Table 1.4.

The results of the analysis are as follows:

1. In the last decade Israel's banking system has displayed economies of scale. These are expressed in a continuous decline in average expenses, falling most steeply in the small banks. On average, throughout the entire period (1992–2000) average expenditure was NIS 1.04 per NIS 100 of value added in the small banks, NIS 0.95 in the medium banks (excluding Discount), and NIS 0.85 in the two largest banks. A similar picture of the relative economies of scale emerges when output is divided into the two periods, 1992–96 and 1997–2000, indicating that the average production costs function in the system is relatively stable. The result would be different if Israel Discount Bank was included in the group of large or medium banks. In 2000, continuing the trend of 1999, average expenditure was down from the average of the four previous years, and the utilization of economies of scale by the two largest banks was particularly notable.

2. There are greater differences in average expenditure between the smaller banks than between the medium ones, those between the two largest banks being negligible. The differences between the banks with the highest and lowest average expenditure in each group indicate that the potential exists for improving X-efficiency, especially in the small banks. It is possible to increase efficiency for a given level of output by cutting the number of employees, reducing wages, closing branches, changing the mix of factors of production, etc.

Differences in average expenditure between the large and small banks have narrowed significantly in the last decade (even though they are still very high in the small banks) and rose slightly in the medium ones (Table 1.4). The relatively large differences between the small banks are due *inter alia* to the heterogeneous nature of this group, which comprises independent banks, banks that are part of a group, and banks defined as specialist, whether as regards population (Massad, Yahav, Otsar Hahayal, etc.) or as regards activity (Industrial Development Bank, Trade Bank, Maritime Bank, etc.). The heterogeneous activity of the small banks also gives rise to high variance in the ratio of expenses to value added in this group. Since the two largest banks resemble one another to a great extent as regards their activities, and they are better able to diversify their sources of income, their expenses/value added ratio is more uniform and lower than in the other banks. Thus, this finding could indicate the existence of more economies of scope in the large and medium banks than in the small, specialized ones.

Table 1.5
Financial Activity and Results, Mortgage Banks and Overseas Offices,[a] 1994–2000

(end-year balances, NIS million, December 2000 prices)

	1994	1995	1996	1997	1998	1999	2000
Mortgage banks[a]							
Total assets	45,311	56,854	67,215	77,816	84,896	93,003	100,723
Total credit[b]	41,707	53,697	64,773	75,898	83,099	91,357	99,159
of which: Nondirected mortgages	34,148	43,026	52,512	61,203	67,273	74,761	82,461
Total deposits[c]	36,515	47,720	57,754	67,927	74,711	82,590	89,263
of which: Deposits of the public	24,008	30,857	35,461	40,438	43,005	44,956	45,787
Net income	331	370	457	523	414	517	575
Return on equity (ROE) (*percent*)	13.9	12.6	13.5	13.4	9.4	11.2	11.6
Risk-based capital ratio (*percent*)	12.0	11.9	12.0	12.0	10.6	10.6	10.2
Overseas offices							
Total assets[d] (in NIS)	46,227	50,881	52,770	58,659	76,881	88,907	99,988
Net income[e] (in NIS)	–61	183	–252	295	878	204	264
Return on equity (ROE)[g] (*percent*)	6.5	8.8	8.8	11.2	15.6	8.9	7.3

[a] Excluding directed credit.
[b] Including (nondirected) mortgages, and loans to building contractors and other construction and real-estate companies.
[c] Including deposits of the public and from banks.
[d] Translation of net income into NIS according to exchange rate on balance-sheet date.
[e] Return on equity in dollar terms refers to subsidiaries only.
SOURCE: Published financial statements and returns to Supervisor of Banks.

The economic and financial environment, and the banks' policies, have enabled the banks to attain a far higher return on equity since 1992 than previously (Figure 1.6). Below, we review the stability of the banks' performance over time, and examine the interaction between the components of the banking groups—the commercial bank and its subsidiaries, including the other commercial banks in the group, nonfinancial companies, insurance companies, mortgage banks, subsidiaries abroad, and capital-market institutions. These enabled the groups to compensate themselves for the loss of income from one component by an increase in income from another, i.e., to disperse risks efficiently.

(ii) The components of the banking groups

The five major banking groups invest about 55 percent of their capital in their main subsidiaries (consolidated and unconsolidated, Table 4.1), among them subsidiaries abroad, mortgage banks, capital-market companies, nonfinancial companies. (including insurance), and commercial banks. Investment in the main subsidiaries yielded income of NIS 1.57 billion in 2000, constituting an average yield of 8.4 percent (compared with 7.5 percent in 1999).

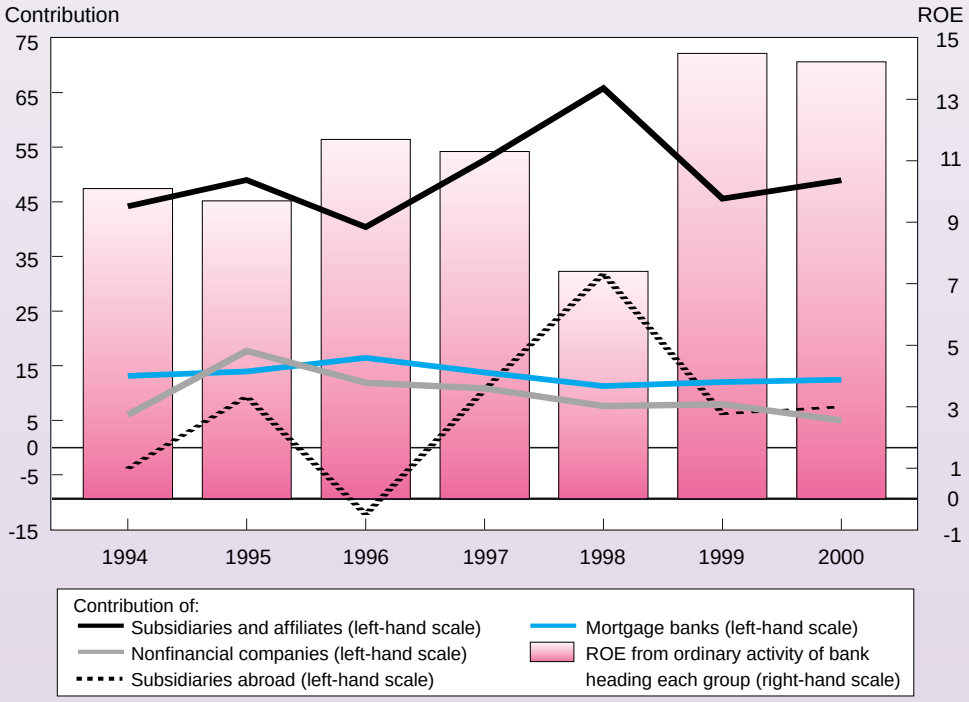
The book value of the investment of the five major banking groups in all subsidiaries was NIS 23.4 billion at the end of 2000, compared with NIS 21.6 billion in 1999 (Table 4.1). The distribution of the investment portfolio of the five groups has altered in the last few years. The most marked changes have been the greater investment in mortgage banks, from 15 percent in 1995 to 17 percent in 2000, the fall in the share of investment in overseas subsidiaries, which dipped from 29 percent in 1995 to 23 percent in 2000, and the drop in the share of investment in nonfinancial and insurance companies, which fell from 18 to 7 percent, *inter alia* because of the restrictions imposed through banking legislation.

The contribution of all main subsidiaries as well as that of some of them—nonfinancial companies, mortgage banks, and overseas subsidiaries—to the income of the five major banks is presented in Figure 1.10, alongside the ordinary return on equity of the banks at the head of each group in the last seven years (1994–2000). It transpires that in the years when the ROE of the banks heading a group rose, the contribution of subsidiaries to the groups' income declined, and vice versa.

The ROE (profitability) of the commercial banks at the head of the banking groups (solo) dipped from 14.6 percent in 1999 to 14.2 percent in 2000. In the last six years the banking groups have managed to stabilize their income by diversifying their sources, due to the varied contribution of the subsidiaries (consolidated and unconsolidated). A long-term view shows a clear upward trend in the contribution of these subsidiaries to total income (Figure 1.10). The main contribution of the subsidiaries in the last few years has come from the capital-market companies and the mortgage banks; subsidiaries abroad, nonfinancial companies, and small commercial banks contributed to a lesser extent (Tables 4.1 and 4.2).

The contribution to net income of the *mortgage banks*, whose rate of return has been the highest and most stable of all the sectors held by the five major banks in recent years,

Figure 1.10
Contribution of Subsidiaries and Affiliates, Mortgage Banks, Subsidiaries Abroad, and Nonfinancial Companies to Net Income, the Five Major Banking Groups, 1994–2000
(percent)



SOURCE: Published financial statements and *Bank of Israel Annual Report.*

rose by 11.2 percent in 2000. The increase in income and profitability is noteworthy in view of the persistent economic slowdown, and especially in construction; it derives from the growth in outstanding credit (directed and nondirected) to home-buyers and all other borrowers. The mortgage banks have done well in the last few years, but it is doubtful whether this trend will continue. Competition in the industry, the decline in indexed sources, the expected drop in income from insurance transactions and from commissions on directed credit, as well as the rise in the credit risks facing banks, will serve to reduce the high level of profitability attained to date.

The contribution (local-currency adjusted) to net income of *overseas offices*, which operate via the banking groups' subsidiaries, branches, agencies, and representatives, rose by about 29.4 percent in 2000—*inter alia* because of positive differentials deriving from accounting adjustments (timing, translation, and accounting differentials). On the other hand, in dollar terms (excluding translation differentials) the net income of all the overseas offices declined, primarily due to the loss of Bank Leumi's Swiss office, which was partly offset by the increased

profitability of the other subsidiaries. Despite the decline in income, the activities of the overseas offices increased in 2000, mainly as a result of economic expansion in the US and Europe, as well as of the process of globalization in Israel.

Because of the risks endemic in the activities of the overseas offices and the increased competition and efficiency of the global banking system, and in view of the slowing of the growth rates of the industrialized economies, especially the US, these positive developments must be viewed with caution. In order to attain positive financial results in the long run the overseas offices must combine strategic preparedness with prudent risk management.

Nonfinancial and insurance companies (which come under the rubric of main unconsolidated subsidiaries and affiliates) contributed NIS 176 million to income (Table 4.1), and their yield in 2000 was 10 percent, compared with 17 percent in 1999. The average annual yield on investment in these main subsidiaries in 1994–2000 (11.2 percent) is the second highest after the mortgage sector (Figure 4.1). In the last decade holdings in nonfinancial companies have made a considerable contribution to income, largely due to these companies' growth rates and the sale of excess holdings at high prices. As a result, these companies still constitute a target for investment by banks which have not yet exhausted the potential for investing in them, and it is also expected that in the next few years the banks will continue to expand this holdings category, in order to diversify their income sources.

(iii) Risks

The long-term return on equity of the banking system should be analyzed alongside a review of the changes in the banks' exposure to the various risks—credit, market, liquidity, operating, etc. Below, we examine the banks' exposure to various risks in recent years, in view of the instability of their return on equity in the last decade. In order to examine the possible connection between ROE and risk, we analyze the development of several components of risk and return.

(a) Credit risk

Credit risk is generally divided into three components—the quantity, quality, and concentration of credit. In order to review the overall effect of these components on a bank's risk it is necessary to examine its credit risk vis-à-vis its equity, thereby taking into account the way the bank treats all the risks. Since the risks are expressed not only in terms of capital adequacy but also through the risk premium, the extent of collateral, and ongoing monitoring of the development of risk and its resulting classification, the extent of loan-loss provision, etc., it is also necessary to examine the bank's attitude to its risk exposure via these parameters. The *extent of credit* rose in 2000, continuing the long-term trend. This increase, and especially the credit/GDP ratio, intensify credit risk, as output/GDP expresses customers' repayment ability.

The *quality of credit* is measured by five indices: the credit/GDP ratio, the share of the banks' risk-weighted assets in their total transactions, the ratio of problem debts to total

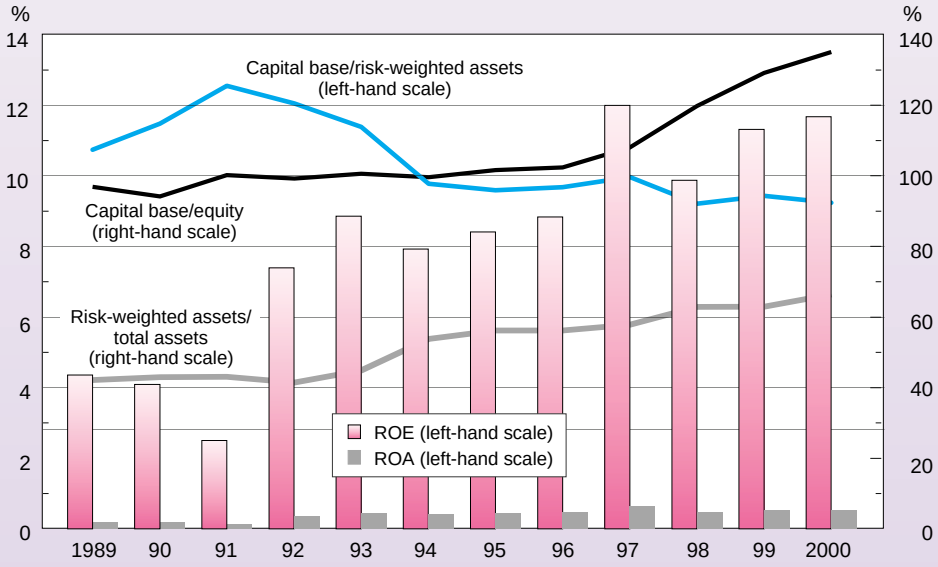
Table 1.6
Quality of Credit and Capital Adequacy, the Five Major Banking Groups, 1993–2000[a]

	1993	1994	1995	1996	1997	1998	1999	2000
Concentration of credit								
H-Index of concentration	0.136	0.139	0.141	0.153	0.157	0.149	0.144	0.143
Concentration by borrower						44.7	46.4	47.2
Quality of credit								
(*Percent*)								
Loan-loss provision/credit to the public	1.20	0.80	1.15	0.92	0.75	0.61	0.50	0.50
Risk-weighted assets/total assets	49.1	53.3	56.3	56.3	57.8	62.9	63.0	66.4
Problem loans[d]/capital	30.2	34.1	29.1	25.2	22.7	33.3	34.9	35.9
Credit/GDP ratio	66.2	68.5	71.9	74.3	79.4	89.0	97.6	103.6[a]
Ratio of balance of loan-loss provision to problem credit not under special mention	68.1	70.4	84.4	95.8	107.3	88.9	88.5	94.4
Ratio of problem credit (excl. agriculture) to total credit	3.4	3.7	2.9	2.5	2.2	2.9	2.9	2.8
Capital adequacy[a]								
Capital assets (end-year)	5.3	5.4	5.5	5.5	6.0	5.6	5.3	5.2
Capital/risk-weighted assets (end-year)	10.5	9.8	9.6	9.7	10.0	9.2	9.4	9.2
Tier 2 capital/risk-weighted assets				0.9	1.1	1.8	2.4	2.6

[a] See notes to Tables 5.4 and 5.12.

SOURCE: Published financial statements and returns to Supervisor of Banks.

Figure 1.11
Components of Return on Equity, the Five Major Banking Groups,[a] 1989–2000



SOURCE: Returns to Supervisor of Banks.

credit, the ratio of their annual expenditure on loan-loss provision to outstanding credit, and the ratio of the balance of loan-loss provision to problem credit not under special supervision.

The risk-weighted assets/total assets ratio rose from 63 percent in 1999 to 66.4 percent in 2000, continuing the long-term trend evident since 1992 (Figure 1.11 and Table 1.6). This upward trend is the direct result of the long-standing process of liberalization, which included *inter alia* the gradual reduction of reserve ratios in the commercial banks until the mid-1990s; subsequently the rise in risk-weighted assets derived primarily from the increase in the public's demand for credit (both local- and foreign-currency). The development of this ratio in the last decade signals a deterioration in the quality of bank credit; it is an important indicator, especially in view of the economic slowdown of the last few years.

In contrast to this, the problem credit/total credit ratio has been declining in recent years in the five banking groups, after reaching a new plateau in 1993 (Figure 1.7). The fall in this ratio expresses the process of 'cleaning' the banks' credit portfolios of credit to problem borrowers, primarily credit extended in the framework of the arrangements in the farming industry. The problem loans/capital ratio has also improved in the last few years (Table 1.6), but if credit to agriculture, regarding which special arrangements were made in the last few years, is deducted from total credit, the ratio deteriorated in most of the banking groups. An index of the improved quality of credit in recent years is the ratio of loan-loss provision to the balance of credit to the public at the groups' responsibility. After declining persistently for five years—from 1.2 percent in 1995 to 0.5 percent in

Table 1.7
Return on Equity and its Components, the Five Major Banking Groups, 1993–2000

(percent)

	1993	1994	1995	1996	1997	1998	1999	2000	Average 1993–96	Average 1997–2000	Change (%)
Return on equity (ROE)	8.86	7.93	8.41	8.84	12.00	9.88	11.32	11.68	8.51	11.22	31.86
Return on assets (ROA)[a]	0.45	0.42	0.45	0.47	0.64	0.48	0.52	0.53	0.45	0.54	21.61
Assets to risk-weighted assets ratio, $\frac{A}{A^*}$	2.23	1.86	1.78	1.78	1.73	1.59	1.59	1.51	1.91	1.60	–16.15
Inverse of capital adequacy, $\frac{A^*}{\tilde{E}}$	8.79	10.23	10.43	10.33	10.03	10.86	10.61	10.82	9.95	10.58	6.38
Capital base/equity, $\frac{\tilde{E}}{E}$	1.01	1.00	1.02	1.02	1.08	1.20	1.29	1.35	1.01	1.23	21.75

[a] Total assets in the denominator include off-balance-sheet credit equivalents, and differ from the data in Chapter 3.
SOURCE: Returns to Supervisor of Banks.

1999, continuing the long-term downward trend evident since the late 1980s—this ratio stabilized in 2000 (Table 1.6), even though it rose in most banking groups. Note that in the last two years the rate of loan-loss provision has been below than the accepted level in western banking systems (Figure 1.13d).

Developments with respect to the three measures of credit quality raise questions about the link between economic activity in general and the extent and quality of credit. The economic slowdown may well affect the quality of the credit portfolio only with a lag, so that in view of the slackening of economic activity in the last few years (with the exception of the acceleration in the first three quarters of 2000) loan-loss provision may have to be raised due to the more frequent realization of credit risks. This assumption is reinforced by the continued economic slowdown and ongoing rise in demand for bank credit in the first half of 2000.

The by-industry concentration of credit to the public, measured by the H-index (Table 1.6) has declined in the last four years, after rising since 1992. This fall derives from both the drop in credit to agriculture (the new credit arrangements in the industry) and the slower growth of credit to construction in the last few years (Table 2.10). Another index of concentration, attesting to increased concentration by individual borrowers in the credit portfolio in the last year, is the share in total credit of credit extended to borrowers whose indebtedness exceeds NIS 33 million; in the five banking groups this index rose moderately—from 44.7 percent in 1998 to 47.2 in 2000 (Table 5.4).

In our view, the composite analysis of all the indices of credit described above (quantity, quality, and concentration) shows that credit risk exposure has risen. This assessment is based mainly on the persistent increase in both the credit/GDP ratio and the risk-weighted assets/total assets ratio, as well as on the deterioration of the ratio of problem credit (excluding agriculture) to the banks' total capital. All this comes against the backdrop of the continued economic slowdown (with the exception of the first nine months of the year) and the slump in the capital markets in Israel and elsewhere. Since at the same time the banks' capital adequacy also declined, their ability to cope with risks in the future has been impaired.

(b) Market risks: interest, exchange, and inflation rates

Exposure to interest-rate risk is examined by means of the Value at Risk index (VaR). The total amount subject to interest-rate risk (in the three indexation segments) rose during the period reviewed in all the major banks, with the exception of Hapoalim. VaR varied from 4.5 percent of net worth (about 0.97 percent of equity) in Hapoalim Bank, amounting to NIS 116 million, to 78.8 percent of net worth (about 3.91 percent of equity) at Discount Bank, i.e., some NIS 205 million (Table 5.9). Total VaR is calculated as the sum of the VaRs in each segment, on the conservative assumption of the worst case scenario in all segments simultaneously, ignoring the correlations between the changes in the various interest rates. A calculation of the total value subject to interest-rate risk,

taking these correlations into account, and using the covariance matrix, is given in the appendix to Chapter 5.

With regard to *indexation-base risks (inflation and exchange rates)*, total VaR rose in 2000 in the Leumi and First International groups, remained unchanged in the Mizrahi group, and plummeted in the other banking groups. VaR ranged from 0.22 percent of net worth, which was NIS 4.6 million in the Mizrahi group, to 1.06 percent of net worth, which was NIS 23.1 million in the First International group (Table 5.11).

In the Discount group, total value at market risk during the year was much higher than at the end of it, and in the Leumi groups the exposure to market risks in the first half of 2000 was far higher than in the second half. Total VaR is calculated as the sum of the amounts subject to inflation risk and to real exchange-rate risk—again under the conservative assumption of the worst-case scenario with regard to each risk factor, while ignoring the correlations between the changes in inflation and the real exchange rate.

Total market risks of the banking groups have risen in the last few years, though they are still relatively low, and their share of total risks is small. Although the long-term decline in inflation serves to reduce inflation risk, the widening of the exchange-rate band and the Bank of Israel's policy of non-intervention in the foreign-currency market serves to increase real exchange-rate risk.

2. THE INTERACTION BETWEEN RETURN ON EQUITY AND RISKS

In the last decade there has been a steady rise in the banking groups' return on equity (ROE), from 4.4 percent in 1989 to 11.7 percent in 2000. During this period two new ROE plateaux were reached, the first in 1992, when it rose from an average of 3.6 percent in 1989–91 to 8.5 percent in 1992–96, and the second in 1997, when it went up to 11.2 percent.

In view of these changes in the banking system, it is appropriate to examine the relation between ROE and the various risks which the commercial banks face. Thus, for example, it is important to assess whether the sharp increase in profitability since 1992, as well as the additional rise since 1997, derives from increased exposure to risk or whether the banks enlarged their incomes from risk-free activities, possibly also exploiting their 'market power' to augment their incomes. The relation between ROE and risk is examined below by decomposing ROE and by analyzing indices of risk-adjusted return on capital (RAROC).

a. Decomposition of ROE

In decomposing ROE we take into account the development of return on assets (ROA), the risk-weighted assets/total assets ratio, capital adequacy (the risk-weighted assets/capital ratio), and the composition of the capital base of each banking group. The share

of risk-weighted assets expresses the development of credit risk, whereas capital adequacy and the composition of capital express the banks' hedging against this risk, i.e., their management's attitude to risk exposure. Since 1999 capital adequacy also expresses the allocation of capital to cushion against market risks.

ROE is decomposed as follows:

$$\frac{\Pi}{E} = \frac{\Pi}{A} \cdot \frac{A}{A^*} \cdot \frac{A^*}{\tilde{E}} \cdot \frac{\tilde{E}}{E}$$

Where

$\frac{\Pi}{E}$ = return on equity (ROE);

$\frac{\Pi}{A}$ = return on assets (ROA), on and off the balance sheet;

A^* = risk-weighted assets, hence $\frac{A}{A^*}$ = risk-weighted assets ratio;

$\tilde{E}$ = the bank's capital base, i.e. (Tier 1 *plus* Tier 2 capital);

E = the bank's equity (Tier 1 capital);

$\frac{A^*}{\tilde{E}}$ = the increase of the risk-weighted capital ratio (i.e., of capital adequacy).

This decomposition makes it possible to identify and analyze the various factors affecting the components of ROE, as well as to distinguish between the long-term factors, which act on capital adequacy and are affected by the regulatory requirements, and short-term factors, which influence risk.

The development of ROE and its components in 1993–2000 is presented in Table 1.7. In the transition from 1996 to 1997 ROE shifted to a higher plateau, so that in the last four years (1997–2000) it was higher than in the four previous ones (an average of 11.2 percent compared with one of 8.5 percent). the data show that the new plateau was reached as a result of the combination of the following factors:

1. An increase in the return on total assets, from an average of 0.45 percent in 1993–96 to 0.54 percent in 1997–2000.

2. A rise in the $\frac{\tilde{E}}{E}$ ratio, from 1.01 to 1.23, indicating a change in the composition of the capital base, due to the fact that Tier 2 capital (debentures, etc.) was increased. Note that Tier 2 capital is considered to be less stable than Tier 1 capital because it is issued for shorter terms and hence can serve to a lesser extent to absorb future losses. Thus, an increase in $\frac{\tilde{E}}{E}$ expresses increased risk.

3. A rise in $\frac{A^*}{\tilde{E}}$ in the last four years from 9.95 to 10.58 percent, i.e., a decline in capital adequacy from 9.7 percent to 9.2 percent. Lower capital adequacy means a smaller cushion against future losses, and hence it reflects a rise in risk.

4. A fall in $\frac{A}{A^*}$ from an average of 1.91 percent in 1993–96 to one of 1.60 percent in 1997–2000, i.e., an increase in the risk-weighted assets ratio from 52.3 percent in the first period to 62.5 percent in the second. This rise also expresses an increase in credit risks.

Box 1.1:
Calculating the Risk Premium in Israeli Banks in the Last Decade

In the framework of a one-period model, we assume that P is the probability that credit extended to a firm will be repaid in full (principal and interest) at the end of the period. Consequently, (1–P) is the probability that the firm will go bankrupt and be unable to repay the debt. Another assumption is that at the time of the bankruptcy the commercial bank does not receive any extra compensation from the firm, i.e., there is no collateral or no part of the collateral can be salvaged.

R_L denotes the guaranteed return on government bonds (e.g., Treasury bills), a risk-free return, and R_L is the interest on term credit—the return on a risky investment, that embodies the premium (O) above the risk-free interest. If the bank has complete information about its customers, the credit market, and the state of the economy, it can be indifferent between the two possibilities: extending one shekel of term credit at interest R_L, which takes into account the probability of full repayment at n, or purchasing risk-free government bonds, the yield on which is R_f. Assuming a perfectly competitive banking system and that the risk premium is loaded on the risk-free interest by a prime plus method (additively), we can express the bank's indifference as follows:

(1) $P(1+R_L) = P(1+R_f+\theta) = (1+R_f)$

We solve for the probability for repayment: $P = \frac{1+R_f}{1+R_L}$, hence the probability of no repayment: $(1-P) = 1-\frac{1+R_f}{1+R_L}$

From equation (1), after adding and subtracting R_L and reorganization, we solve for the risk premium:

(2) $\theta = R_L - R_f = (1-P)(1+R_L)$.

If the risk premium is loaded onto risk-free interest by a prime times method, we can reformulate the credit manager's indifference as follows:

(3) $P(1+R_L) = P(1+R_f(1+\phi)) = (1+R_f)$,

where (ϕ) is the multiplier, and in effect it is the weight of the risk premium (θ) in the risk-free interest:

(4) $\phi = \frac{R_L - R_f}{R_f}$.

A numerical example: assume that

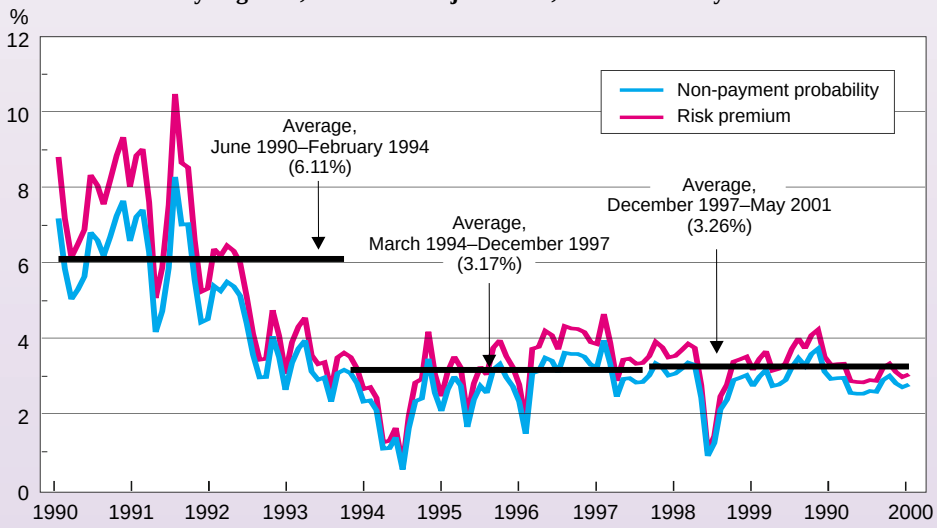
R_L = 15% and R_f =10%, P=95.65% and (1-*P*) = 4.35%.

The risk premium (θ): $\theta = R_L - R_f = (1-0.9565)(1.15) = 0.05 = 5\%$.

The relative risk premium (ϕ):

$\phi = \frac{R_L - R_f}{R_f} = \frac{0.15-0.1}{0.1} = 0.5 = 50\% : (\phi)$.

Figure 1.12a
Risk Premium[a] (θ) and Probability of Non-Payment[b] (1–P) in the Unindexed Local-Currency Segment, the Seven Major Banks, June 1990–May 2001



[a] Risk premium $\theta = R_L - R_f = (1-P)(1+R_L)$

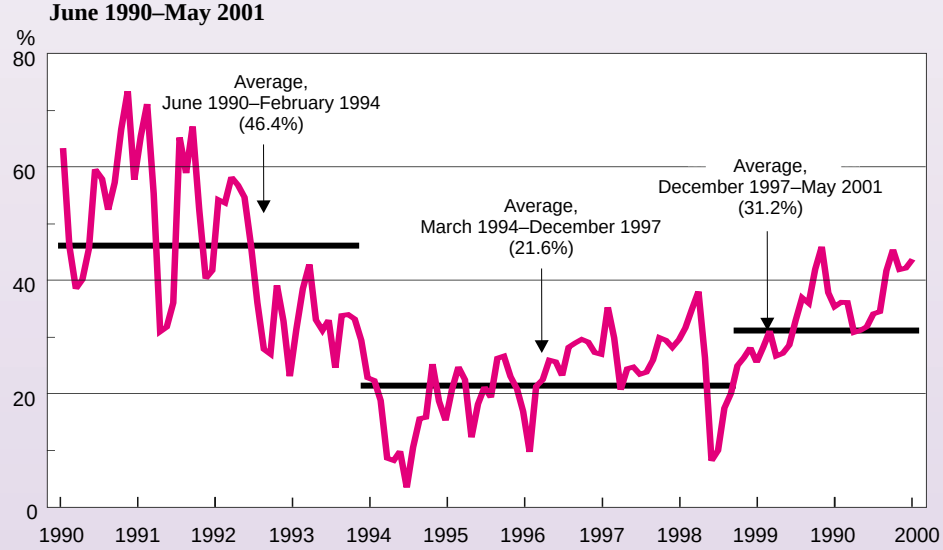
[b] Non-payment probability $(1-P) = 1 - \left(\frac{1+R_f}{1+R_L}\right)$

SOURCE: Returns to Supervisor of Banks.

Thus, it can be said in conclusion that the shift to a higher plateau in ROE in 1997, and its high level in the last four years, are the result of the banks' greater exposure to risks (a rise in the share of risk-weighted assets and in the share of Tier 2 capital, alongside a drop in capital adequacy), and a resulting increase in ROA—which to a great extent expresses the compensation through pricing for the rise in banks' total risks.

The positive relation between credit risk and ROA (i.e., compensation for risk) can be illustrated by calculating the risk premium implicit in the interest on bank credit. Figures 1.12a and 1.12b describe developments in the risk premium and the relative risk premium, and the probability of default (bankruptcy) embodied in the pricing of term credit (excluding on-call credit) in the unindexed local-currency segment between June 1990 and May 2001. In these calculations the yield to maturity on 30-day Treasury bills served as risk-free return. From Figure 1.12a it can be seen that the probability of default and the risk premium rose gradually and moderately in the second half of the 1990s, as an expression of the rise in the risks to which the commercial banks were exposed at that

Figure 1.12b
Relative Risk Premium[a] in the Unindexed Local-Currency Segment, June 1990–May 2001



[a] Relative risk premium $\phi = \frac{R_L - R_f}{R_f}$. See note on p. 15.

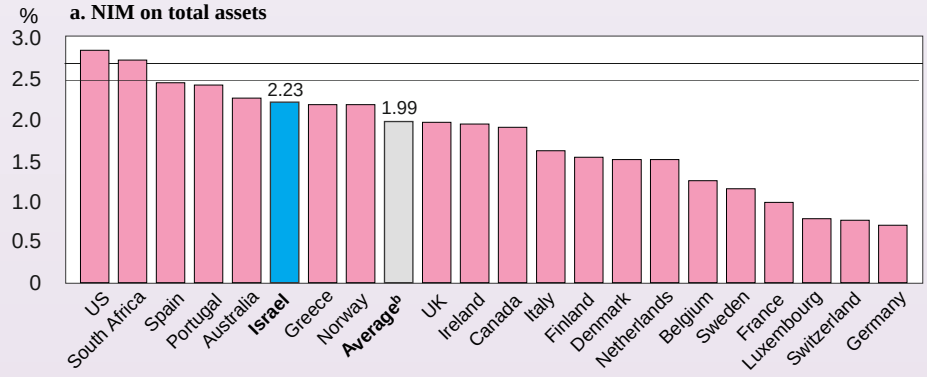
SOURCE: Returns to Supervisor of Banks.

time, and which are discussed extensively above. The rise appears to have begun in mid-1994, when the stock market started to fall after several years of prosperity. A stock-market slump means that firms' possibilities of going public as a substitute for taking bank credit are restricted, and this increases the risk of default on credit taken in the past or on new loans. In the second half of the 1990s the rise in the premium, in the wake of the foreign-currency crisis that hit the financial markets in October 1998, is particularly marked. Note, however, that the level of the premium in the second half of the 1990s was lower than in the first half.

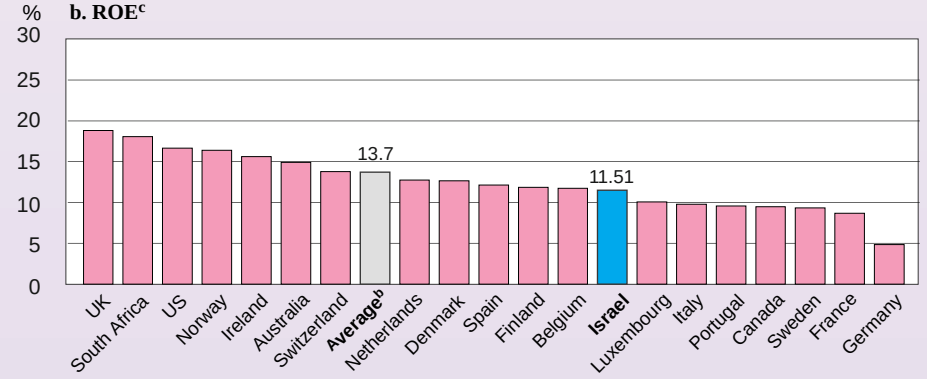
The increase in the risk premium in the second half of the 1990s came in the wake of a prolonged fall in the premium and the probability of default in the first half of the decade. In that period the economy was characterized by relatively high growth rates, a boom on the Tel Aviv Stock Exchange (TASE) until February 1994, and the fact that the banks 'cleansed' their credit portfolios to a great extent once the problems encountered in extending credit to certain sectors—primarily agriculture—had been resolved at the

Figure 1.13
Performance Indicators, Banking Systems Abroad,[a] 1999

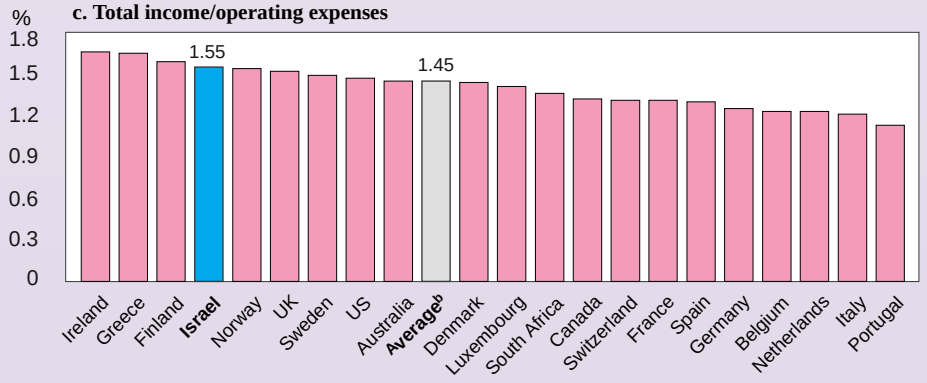
a. NIM on total assets



b. ROE[c]

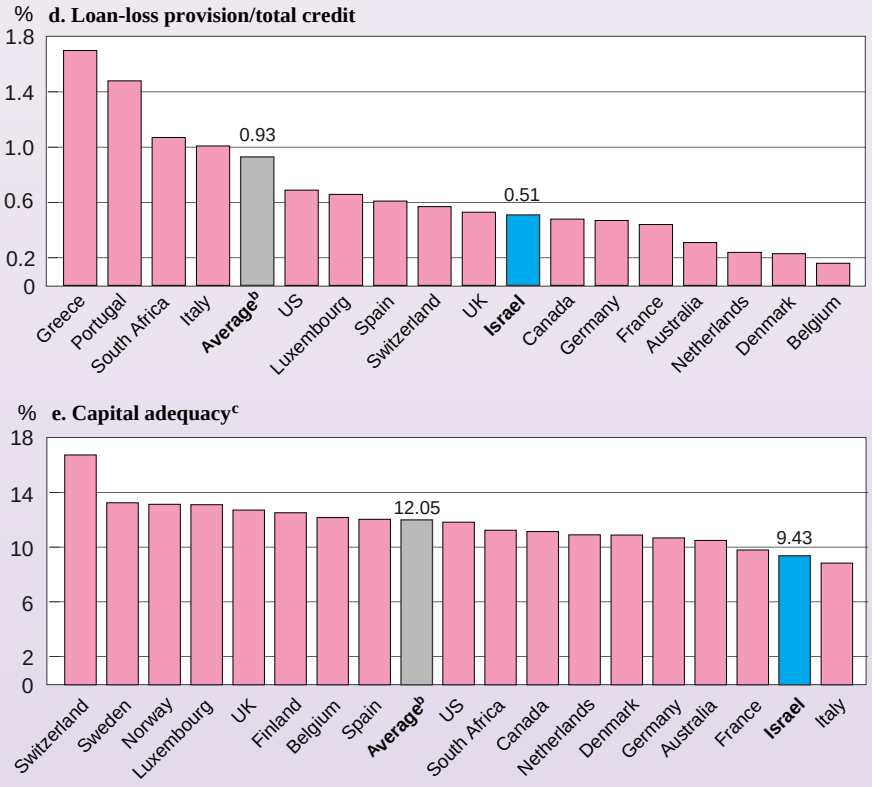


c. Total income/operating expenses



[a] The data refer to the ten major banking groups in each country; in Israel, the five major groups.
[b] Average of reference group including Belgium, Denmark, Finland, Greece, Ireland, Norway, Portugal, and South Africa.
[c] See note 3 toTable 3.3.
SOURCE: Data supplied by Bankstat.

Figure 1.13 (continued)
Performance Indicators, Banking Systems Abroad,[a] 1999



[a] The data refer to the ten major banking groups in each country; in Israel, the five major groups.
[b] Average of reference group including Belgium, Denmark, Finland, Greece, Ireland, Norway, Portugal, and South Africa.
[c] The number of countries in this category is smaller due to lack of data.
SOURCE: Data supplied by Bankstat.

A sharper image of the development of risks in the 1990s is provided by the development of the relative risk premium, which expresses the share of the risk premium in the risk-free interest rate. The rise in the relative risk premium in the second half of the 1990s is notable; during that period interest rates in Israel fell relatively sharply and the risk premium rose only moderately.[2]

[2]Note that throughout the period reviewed the risk premium was higher than the probability of default implicit in the pricing of term credit. If the model is expanded to the situation in which the bank demands collateral of its customers and there is a probability of recovering a certain proportion of it if bankruptcy occurs (recovery rate), the interest on credit should be lower, and the difference between the premium and the probability of default should narrow. The existence of a large premium in the framework of a more realistic model (the existence of collateral as a substitute for the risk premium) presents the hypothesis that the actual difference between the risk premium and the probability of default derives from the utilization of 'market power' by the banks and/or the operation of a pricing mechanism of cross-subsidization between the bank's operating and financial activities (net interest margins that should reflect credit risk, etc.).

Table 1.8
Risk-Adjusted Return on Capital (*RAROC*), by Banks and Activity Segment, 1992–2000

a. *RAROC* According to Variance-Covariance Method ($RAROC_S$)

(percent)

	1992–2000	1992–96	1997–2000
Leumi	0.75	2.37	1.76
Discount	0.25	1.08	–0.16
Hapoalim	1.35	1.74	3.23
Mizrahi	1.48	1.33	1.53
First International	1.38	2.57	0.77

Definition of $RAROC_S$: . $RAROC_S = \frac{ROE - R_f}{2.33 * \sigma_{ROE}}$

b. *RAROC* According to Variance-Covariance Method,[a] by Banks and Activity Segment, 1994–2000

	Leumi	Discount	Hapoalim	Mizrahi	First International
Commercial banking	0.84	-0.13	0.79	0.37	2.15
	(51.2%)	(59.1%)	(47.3%)	(33.3%)	(73.5%)
Financial companies	0.24	-0.07	0.34	0.07	-0.25
	(15.1%)	(3.4%)	(20.8%)	(11.8%)	(1.6%)
Nonfinancial and insurance companies	0.44	-	1.06	-	-
	(6.6%)	(0%)	(18%)	(0%)	(0%)
Mortgage banks	1.00	1.21	3.02	1.61	1.51
	(6.9%)	(6.6%)	(5.9%)	(48.4%)	(13.5%)
Overseas offices	0.01	0.17	-0.15	-0.21	0.08
	(20.1%)	(30.9%)	(7.9%)	(6.5%)	(11.4%)
Total banking activity	**0.72**	**0.08**	**2.15**	**1.33**	**1.21**

[a] Variance-covariance method: $RAROC_S = \frac{ROE - R_f}{2.33 * \sigma_{ROE}}$

[b] Risk-free interest (R_f) for the period (1994–2000): 4.57 percent.

[c] Figures in parentheses beneath RAROC indices are the share of investment in the activity as percentage of equity.

SOURCE: Published financial reports.

A similar picture is obtained for the relation between return and risk in the long run, too. This can be seen in Figure 1.11, which describes the development of ROE in 1989–2000: ROE rose more steeply in the period following 1992 than previously; in 1997 there was a shift to a new plateau relative to 1992–96; throughout the period reviewed

there was a moderate increase in ROA; the risk-weighted assets/total assets ratio rose continuously; the capital adequacy of the banking groups fell consistently (especially in 1991–94, but also in 1998 and 2000); in the last four years the Tier 2 component of the banking groups' capital has increased. The significance of these long-term developments is that the ROE obtained by the banking groups in the period reviewed is positively correlated with their risk exposure, and especially their credit risk exposure.

The decline in capital adequacy at the time when the risk-weighted assets/total assets ratio was rising is not consistent with a conservative risk-management policy, especially since this ratio is lower in Israeli banks than it is in western countries. Apart from this, the share of Tier 2 capital in the capital base is below the accepted level, although, as stated, it is rising (Figure 1.13). In this context the question arises whether the increase in profitability compensated for the greater risk in this period, and it is this that we endeavor to address below.

b. Risk adjusted return on capital (RAROC) in the last decade

Risk-adjusted return on capital (RAROC), in its wider definition, ascribes expected surplus income (above risk-free return), i.e., the risk premium, to a unit of risk. Risk is measured via the capital the bank must hold to cover maximum losses from its transactions in a given period (e.g., one month) and with a given probability (confidence interval, e.g., 99 percent). The definition of risk is derived from the bank's value at risk (VaR). There are several ways of calculating RAROC (variance-covariance, historical approach, Monte Carlo, etc.) (see Chapter 5).

Here we use the variance-covariance method. This is based on the assumption that the distribution of the causes/prices of risk is normal, and hence VaR is calculated on the basis of the standard deviation of these distributions, assuming that the mean change in the prices of risk is zero. In this approach the RAROC index is similar to the Sharpe index of performance.

We calculated RAROC for 1992–2000 for each of the five banking groups. In the analysis we divided the period into two: 1992–96 and 1997–2000, because of the two new plateaux reached in 1992 and 1997. The RAROC of the five banking groups in these periods, shown in Table 1.8, was calculated as follows (similar to the Sharpe index):

$$RAROC_S = \frac{ROE - R_f}{Z \cdot \sigma_{ROE}}$$

Where

ROE = the banking group's mean return on capital;

R_f = the risk-free interest (yield to maturity on 10-year government bonds);

σ_{ROE} = the standard deviation of the return on capital;

Z = the value of the confidence interval with 99 percent probability derived from the normal distribution: 2.33.

The excess return on equity is divided by the standard deviation, of ROE, on the basis of the assumption that in the reduced form the changes in risks over time are reflected in the distribution of the bank's income and ROE.

When the development of RAROC over time is compared across banking groups we find that in some banks performance improved between 1992–96 and 1997–2000, while in others it deteriorated; it declined in Leumi, Discount, and First International banks, but improved in Hapoalim and Mizrahi banks.

The differences in performance between the banking groups, and the changes within them over time, derive from the way the bank's management functions, as expressed in the choice of capital investment in various areas of activity (commercial banking, mortgage banks, nonfinancial companies, subsidiaries abroad, and capital-market activities), as well as in how they are managed. There are also differences between the groups as regards kinds of activity, and hence they are not perceived as uniform. Thus, in commercial banking the differences could be created by the management focusing on retail rather than wholesale banking, specializing in specific indexation segments (indexed, unindexed, foreign currency), etc. Hence, comparing banks' performance in each area of activity presents more problems than comparing the performance of different portfolios comprising homogeneous securities (shares, bonds, etc.) held by regular investors.

Table 1.8b shows the RAROC indices for the various kinds of activity as well as the distribution of the capital investments of each banking group between five channels of activity: commercial banking—whether in the bank itself (solo) or in subsidiaries; financial companies; nonfinancial companies; mortgage banks; and subsidiaries abroad.

In order to illustrate the effect of the heterogeneity of activity between the banking groups, and the effect of the quality of management, note, for example, that Discount Bank invested a similar proportion of its equity in commercial banking to Leumi and Hapoalim banks, but its performance was weaker than theirs; in First International Bank. which invested most of its equity in commercial banking, this activity performed the best, while in Mizrahi Bank mortgage banking predominated as regards investment and performance. In Bank Hapoalim the performance of mortgage banking and nonfinancial companies overshadowed that of commercial banking.

Finally, an analysis of the performance of the banking groups over time indicates the existence of—sometimes marked—differences in their performance. These may be due to the choice of investments (rate of investment in a given activity) and/or to the quality of management.