



# **Bank of Israel**

Foreign Currency Department

Investment of the

Foreign Exchange

Reserves

**Annual Report 2005**

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## Investment of the foreign exchange reserves in 2005—Main developments<sup>1</sup>

- ◆ The average level of the Bank of Israel's foreign exchange reserves in 2005 was about \$27 billion,<sup>2</sup> equal to some five months' worth of imports, and constituting about 82 percent of Israel's short-term foreign debt.
- ◆ There was no change to the framework of the management of the reserves in 2005, which was based on the possible uses of the reserves and their benefit to the economy. The management framework will be reviewed again in 2006.
- ◆ The holding period rate of return on the reserves in terms of the numeraire in 2005 was 2.6 percent, up from 1.7 percent in 2004.<sup>3</sup> The return reflected the rise in yields to maturity in the capital markets in which the reserves were invested during the year, which led to rising interest income accompanied by capital losses.
- ◆ In 2005 the holding period rate of return was 21 basis points higher than that of the neutral benchmark, a spread that reflects the contribution of active management of the portfolio. As in previous years, most of the incremental yield derived from asset selection.
- ◆ The information ratio in 2005, more than 1.0, indicates a desirable yield/risk ratio.
- ◆ The exposure of the reserves to the banking system was on average 31 percent of the reserves. This exposure is managed under a system of quotas and rules, which plays a central role in credit-risk management of the portfolio.
- ◆ The reserves have a very high liquidity: about 84 percent of the portfolio is invested in liquid assets and the rest in assets with lower liquidity.

### 1. THE LEVEL OF THE RESERVES AND THEIR MANAGEMENT FRAMEWORK

The management of Israel's foreign exchange reserves is subject to the **Bank of Israel Law, 5714–1954** and its accumulated legal interpretations. These define how the Bank may conduct its foreign-currency activities and set limitations on the types of

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<sup>1</sup> This report continues the series published as Chapter 1 in the Foreign Currency Department volume in the Bank of Israel's Annual Reports in 2000 – 2004. Appendix A of those reports, which are published on the Bank's website, [www.bankisrael.gov.il](http://www.bankisrael.gov.il), contains a glossary of terms used in the current report. The reports for the years 2000 to 2004 also include discussions of various aspects of management of the foreign exchange reserves that do not appear in the current report.

<sup>2</sup> The level of reserves is calculated on the basis of the daily balances of the reserves assessed at their full market value.

<sup>3</sup> All holding period rates of return in this report are in terms of the numeraire, unless stated otherwise.

assets in which it may invest. In areas in which the Bank is not restricted by the wording of the Law, it acts within a framework that reflects its special characteristics and limits the various risks to which the reserves portfolio is exposed. The main financial risks are credit risk, controlled by a system of rules and quotas; interest-rate risk, controlled mainly by setting a target average duration for each currency portfolio; and currency risk, controlled by defining a neutral currency composition for the portfolio—called the numeraire—that serves as a yardstick for measuring the performance of the actual portfolio. Other risks are also taken into account, such as operational and legal risks.

**a. The level of the reserves**

At the end of 2005 the reserves stood at \$27,858 million, a rise of \$1,227 million from their level at the end of 2004. The average level of the reserves during 2005 was about \$27 billion, some \$1 billion higher than in 2004, and \$3 billion higher than in the years 2001–03 (Figure 1) The rise was due mainly to the ending of the practice of rolling forward currency swap transactions between the Bank of Israel and the commercial banks, transactions that for several years, until the third quarter of 2005, were used to reduce the domestic monetary base. The income earned on the management of the reserves was more or less offset by the weakness of the non-dollar currencies in the numeraire, in which some of the reserves are invested, while the activities of the government (net borrowing and operational withdrawals) had only a minimal effect. Although the reserves increased, the rise was not significantly greater than the rise in other economic aggregates with which the level of the reserves is usually compared, such as imports, the external debt, unindexed local-currency assets held by the public (M2), and GDP (Table 1). In dollar terms, Israel's foreign exchange reserves rose by 4.6 percent in 2005, while the total reserves of the member countries of the IMF (not including gold) rose by 9.6 percent during the year.

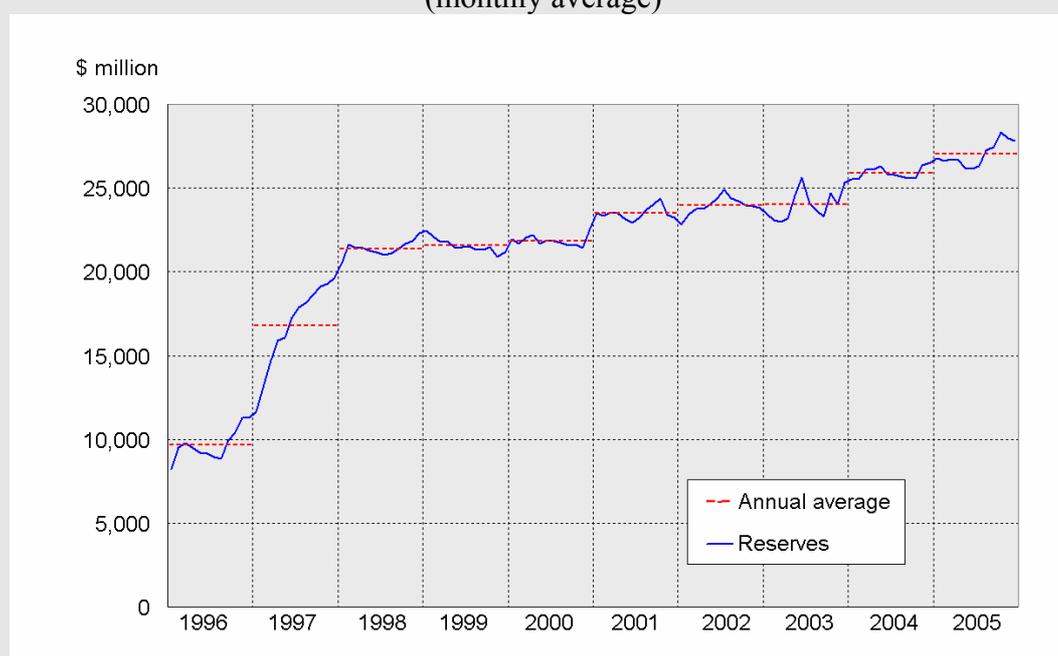
**Table 1**  
**The Level of the Reserves Relative to Other Aggregates, 1996-2005**

	Average level of reserves <sup>a</sup> (\$ million)	Imports (months)	Gross external debt	Short-term external debt	Unindexed local-currency assets (M2)	Gross domestic product
	<i>Reserves as percent of aggregate</i>					
1996	9,665	2.71	18	43	35	10
1997	16,797	4.66	29	73	52	16
1998	21,392	6.03	35	86	61	21
1999	21,718	5.42	33	82	55	21
2000	21,854	4.58	32	77	46	19
2001	23,523	5.53	34	78	43	21
2002	23,943	5.84	34	76	48	23
2003	24,002	5.64	32	78	46	22
2004	25,908	5.30	33	82	47	22
2005	27,020	5.02	35	82	46	22

<sup>a</sup> Based on daily valuation of the reserves.

SOURCE: Bank of Israel, The Central Bureau of Statistics, and returns from the banks.

**Figure 1-Gross Foreign Exchange Reserves, 1996–2005**  
(monthly average)



SOURCE: Bank of Israel

In the last eight years, in which the Bank of Israel did not intervene in the domestic foreign currency market, the level of the reserves rose by some \$7 billion. The main component of the increase was a cumulative profit of \$8 billion on investments, of which \$7.8 billion was interest and capital gains, and \$0.2 billion exchange-rate

differentials. This amount was partly offset by a net reduction of \$1 billion in the reserves due to the contraction during this period of the Bank of Israel's foreign currency activity vis-à-vis the banking system in Israel—banks' withdrawals of their deposits on the one hand, and the halt in rolling swaps forward on the other. The net balance of the government's foreign currency conversions in these years comes to a very small amount, so that this activity did not noticeably contribute to the change in the level of the reserves.

The reserves serve as a source of liquidity to be used as and when necessary, and their purpose is also to yield benefits that derive from the very fact that the country is holding a certain level of foreign exchange reserves. The desired level of the reserves to achieve these benefits is not added to the level derived from their uses, but overlaps with it. The current framework for estimating the desired level of the reserves is described below, according to the requirements of both uses and benefits. This framework is to be reviewed again in 2006, and changes may be introduced in the course of the year.

The uses of the reserves, i.e., the possibility of selling them (for NIS) or lending them, can be divided between the needs of the government, which are met by the Bank of Israel's sale to it of foreign currency, and special uses by the Bank. The government's uses are mainly servicing its foreign currency debts and exceptional expenditure on imports of goods and services during an emergency. The level of reserves for this purpose is set at the total government foreign currency debt servicing requirement over the next five years, with an additional amount held as a reserve for exceptional situations—set at 5 percent of annual imports. At the end of 2005 these amounts were \$18.1 billion and \$3.1 billion respectively. The Bank of Israel's uses include: (1) activity during a serious financial crisis in Israel's foreign currency market, or when the stability of the banking system is threatened by temporary foreign exchange liquidity difficulties; (2) managing monetary policy by injecting or absorbing liquidity in the monetary system via non-sterilized intervention in foreign currency trade, without the intention of moving the exchange rate to any specific level. The level of the reserves to fund this activity is determined as a function of the volume of trade in the foreign currency market and the extent of the short-term foreign currency liabilities of Israel's banking system, and at end-2005 was estimated at about \$13.5

billion. Thus, the level required in order that reserves be available for use is some \$35 billion. However, the Bank of Israel will not approach that level by net purchases of foreign currency in the market, unless and until doing so would be consistent with the needs of a monetary policy committed to maintaining price stability.

The benefits to the economy gained from holding reserves are the reduction of the probability of a crisis in Israel's foreign currency market and the enhancement of Israel's standing in the international financial environment. There is no direct economic method of determining the amount required for this purpose, but indirect indications can be obtained in several ways. These show that the amount of the reserves calculated from the benefits is smaller than that calculated from the uses. Thus the level derived from the uses is likely to be appropriate also for achievement of the benefits.

#### **b. The management of the reserves**

In the areas where it is not limited by the Bank of Israel Law, the Bank acts within a framework of rules constructed over the years. The main directives governing the management of the exposure of the reserves portfolio to various risks and the degrees of freedom of the Foreign Exchange Department's day-to-day activities (henceforth, the investment policy) are set by the Foreign-Currency Committee headed by the Governor of the Bank. The Foreign Exchange Department suggests topics to be discussed by the committee, and reports to it on the performance of the portfolio and on investment decisions it has taken. The committee also reviews current developments in the international markets.

The investment policy guiding the management of the foreign exchange reserves is founded on three principles:

- *Maintaining the value of the reserves in terms of their uses*, in other words, the ability of the Bank to supply foreign currency for the intended uses of the reserves, described above. This is expressed in the determination of the currency composition of the reserves, the limitations on their exposure to credit risk and to some extent the management of their interest-rate risk.

- *Managing the reserves with a high degree of liquidity*, in other words, investing most of the reserves in assets which can be sold in large volume and at short notice without lowering the sale price. This is expressed mainly in the restrictions on the types of asset in which the reserves may be invested (some of these restrictions are specified in the Bank of Israel Law and the relevant legal interpretations of it, and some are determined by internal Bank of Israel decisions).
- *Achieving a reasonable yield on the reserves portfolio subject to the above two principles*. This is expressed in decisions on the duration of the portfolio, the permitted level of exposure to credit risk and the use of active portfolio management.

Control over most aspects of financial risk of the reserves portfolio is anchored in the management of the reserves portfolio against a benchmark. The benchmark is a hypothetical investment portfolio consisting of assets chosen according to predetermined rules which are part of the investment policy. These rules determine the currency composition of the benchmark, its duration in each currency, the types of assets included, and the dispersion of these assets along the yield curve. The management of the reserves portfolio relative to the benchmark fulfills three important functions: the benchmark serves as a risk-free portfolio for the Foreign Currency Department when holding positions does not appear worthwhile; the holding period rate of return of the benchmark provides the management of the Bank and the public with a basis of comparison for evaluating the yield achieved by the Department on the investment of the reserves; and the specification of quantitative restrictions on permissible deviations from the benchmark enables Bank management to control the financial risks involved in managing the reserves. These restrictions apply primarily to currency risk and that part of the interest-rate risk which is measured by duration. Comparison to the benchmark portfolio also makes it possible to monitor other financial risks which do not have quantitative restrictions applied to them, such as that part of interest-rate risk which results from dispersion along the yield curve.

The overall reserves portfolio benchmark is composed of several individual benchmarks, each denominated in a different currency, whose share in the overall benchmark equals the weight of its currency in the currency numeraire. The composition of the currency numeraire is determined according to the breakdown of the designated uses of the reserves. With regard to the reserves designated for the government's uses, the relevant factors are the currency breakdown of debt service during the next few years and the geographical distribution of imports. With regard to the reserves designated for the central bank's uses, the composition is determined according to various economic criteria. The question of the purposes of the reserves, including the definition of their intended uses, will be reviewed in 2006, and this may result in changes to the numeraire. The numeraire is defined in terms of fixed quantities of the various currencies, as opposed to fixed percentages, and is updated once a year.

In contrast to the currency numeraire, the structure of the benchmark's exposure to interest-rate risk in each currency, i.e., its duration and dispersion along the yield curve, is not derived from the structure of exposure of the reserve uses in that currency to interest-rate risk, but rather from the goal of achieving maximum yield, subject to a restriction on the probability of achieving a yield lower than a specified threshold. According to this concept, known as the shortfall approach, the target duration of the benchmark for each currency was determined at a fixed level of 16 months.<sup>4</sup> The decision not to base the interest-rate risk exposure of the reserves on the uses of the reserves but rather on the shortfall approach stems from the desire to avoid significantly lengthening the reserves' duration, which would be liable to increase the volatility of the level of reserves significantly—which in turn could hinder the achievement of benefits from holding reserves—and the volatility of their revenue stream.

Credit risk is managed primarily through a set of rules and quotas, which gives control over the degree of exposure to financial institutions and countries. This system determines a minimum threshold for the credit quality of the individual institution and ensures an appropriate distribution among institutions and countries, according to

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<sup>4</sup> From January 2003 to July 2005 the duration of the dollar portfolio shortened temporarily to 11 months. See the discussion in Section 2a below.

their size and credit quality. There are additional tools used in the management of credit risk such as quantitative restrictions on the general exposure of the reserves portfolio to the global banking system and on the investment of reserves in spread assets, which are not included in the benchmark and some of which may involve a small amount of credit risk.

The Bank of Israel manages the reserves using active management (position-taking) rather than passive management (exact imitation of the benchmark). Therefore, the reserves portfolio generally differs from the benchmark in the extent of exposure to the various risk factors, such as currency and interest-rate risk. The extent of deviation of the portfolio from the benchmark is constrained, as mentioned earlier, by the set of rules which is part of the reserves investment policy. The added value of active management is manifested in the difference in yields and risk between the reserves portfolio and its benchmark, which is analyzed by component in Section 2c below. The decision of the Bank to adopt an approach of controlled active management of the reserves is primarily justified by its contribution to the yield on the portfolio during the last decade which amounted to 7 basis points<sup>5</sup> annually (Table 2). Active management has additional advantages including the strengthening of the business relationships between the Bank and financial institutions abroad, which increases the its ability to obtain economic and business information, and enhancing the professional level of its staff.

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<sup>5</sup> A basis point is one-hundredth of a percent, or one in 10,000. At the current level of the reserves, one extra basis point is worth about \$2.7 million.

**Table 2**  
**The Performance of the Actual Portfolio vis-à-vis the Neutral Benchmark Portfolio, 1996-2005**

(percent, in annual terms)

	Portfolio performance		Incremental yield							Dispersion positions and other contributions
	Actual portfolio	Neutral benchmark	Total	Currency management	Intermarket positions	Decision to invest in GNMA <sup>b</sup>	Duration management	Asset selection		
								Spread effect <sup>c</sup>	Dispersion effect	
1996										
Yield	4.87	4.86	0.01	-0.01		0.03	-0.11	0.20		-0.09
Standard deviation	0.70	0.59	0.23	0.10		0.05	0.16	0.08		0.03
1997										
Yield	4.99	5.24	-0.24	-0.26		0.03	-0.17	0.18		-0.01
Standard deviation	0.44	0.49	0.16	0.08		0.02	0.09	0.07		0.02
1998										
Yield	6.00	5.99	0.01	0.00		-0.03	0.01	0.10		-0.07
Standard deviation	0.63	0.69	0.08	0.03		0.06	0.02	0.05		0.02
1999										
Yield	3.26	3.17	0.08	0.02		0.03	-0.06	0.05		0.05
Standard deviation	0.66	0.60	0.13	0.02		0.05	0.08			
2000										
Yield	6.79	6.78	0.01	-0.15		-0.04	0.00	0.19		0.01
Standard deviation	0.89	0.86	0.11	0.06		0.03	0.02			
2001										
Yield	6.35	6.13	0.22 <sup>a</sup>	0.00		-0.05	-0.01	0.23		-0.01
Standard deviation	1.44	1.36	0.20	0.03		0.04	0.04	0.09		0.00
2002										
Yield	5.18	4.98	0.20	0.03		0.00	-0.02	0.20		-0.01
Standard deviation	1.32	1.41	0.17	0.04			0.05			
2003										
Yield	2.15	1.94	0.21	0.04		-0.01	-0.02	0.19	0.02	0.00
Standard deviation	0.81	0.79	0.09							
2004										
Yield	1.70	1.67	0.03	0.02	-0.01	0.00	-0.05	0.11	-0.02	-0.02
Standard deviation	0.73	0.73	0.06							
2005										
Yield	2.64	2.44	0.21	0.00	0.02	0.00	-0.03	0.14	0.05	0.02
Standard deviation	0.67	0.71	0.09							
1996-2005										
Yield	4.38	4.30	0.07	-0.03		0.00	-0.05	0.16		-0.01

<sup>a</sup> 5.5 basis points of total incremental yield not attributed to any listed component in this year.

<sup>b</sup> During 1996-2003, certain funds were managed (externally and internally) against a GNMA market index benchmark. Therefore, this benchmark was substituted for part of the long-maturity portion of the US dollar benchmark. The incremental yield from this substitution is given here.

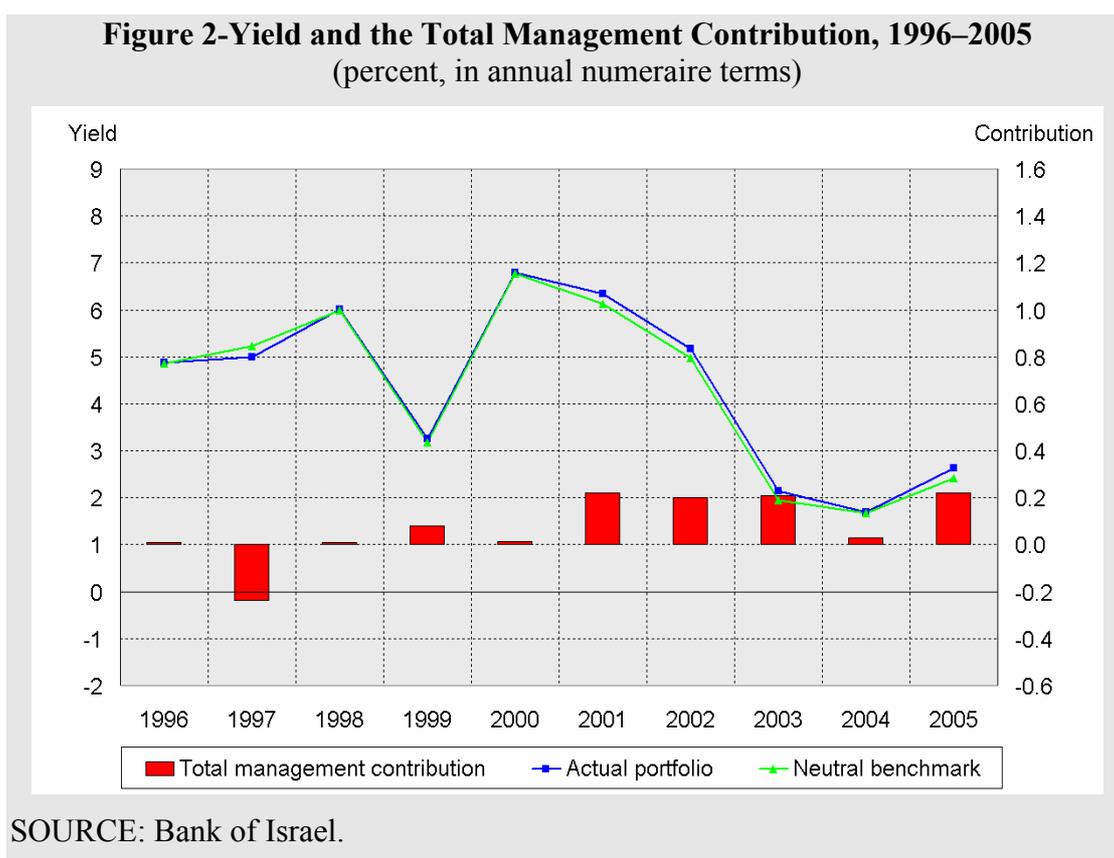
<sup>c</sup> For 1996-2002, the incremental yield from spread includes also the effect of dispersion.

SOURCE: Bank of Israel.

## 2. THE HOLDING PERIOD RATE OF RETURN AND THE RISK OF THE RESERVES PORTFOLIO, RELATIVE TO ITS BENCHMARK

### a. The holding period rate of return on the reserves portfolio

The total holding period rate of return on the reserves portfolio in numeraire terms was 2.6 percent in 2005, compared to 1.7 percent in 2004 and an average of 4.4 percent in the years from 1996 to 2005 (Table 2 and Figure 2). The volatility (standard deviation) of the portfolio return was 0.67 percent, compared to 0.73 percent in 2004. Three main factors affect the holding period rate of return on the foreign exchange reserves: (i) developments in the financial markets; (ii) long-term investment decisions, expressed in the composition of the portfolio's neutral benchmark; and (iii) day-to-day portfolio management, including active management (decisions on deviations from the neutral benchmark).



The Bank of Israel normally evaluates the holding period rate of return on the reserves portfolio in terms of the neutral currency composition, the numeraire, calculated according to intended uses of the reserves, as described above. The return on the

portfolio can also be calculated in NIS terms, and in 2005 this came to 6.5 percent, compared to 1.8 percent in 2004. The return in NIS terms in 2005 reflects the weakening of the NIS against the US dollar, which was partly offset by the strengthening of the NIS against the other currencies in which the reserves were invested. In the last ten years the holding period rate of return in NIS terms was 8.1 percent a year, or when deflated by domestic price increases in that period, 4.3 percent a year.

In dollar terms, the reserves made a loss of \$0.1 billion. Income from interest, capital gains and active management of \$0.7 billion were offset by losses of \$0.8 billion from exchange-rate differentials.<sup>6</sup> It should be noted that measuring the return on a multi-currency portfolio in terms of one currency is arbitrary from an economic standpoint. Thus for example, the return in 2005 in dollar terms was –0.3 percent, compared to a return of 14.9 percent in euro terms. Thus, the return on the reserves is generally measured in terms of the numeraire. The dollar portfolio of the reserves yielded a return of 2.51 percent, and the euro portfolio, 2.21 percent. These returns are the main components of the total return on the portfolio in terms of the numeraire, which is also affected by the returns on other portfolios and by elements of the active management contribution which are not attributable to any specific currency portfolio.

The return on the reserves in 2005 was affected to a great extent by the rising trends in short- and medium-term yields to maturity in the US and eurozone markets. These trends may be attributed to several causes, including the tightening of monetary policy in the US, via a rise of 2 percentage points in the interest rate of the US Federal Reserve during the year (in eight increases of 25 basis points each), and concern over the possibility of renewed global inflation. The rise in short- and medium-term bond yields increased the element of current interest income included in the total holding period rate of return on the reserves, but concurrently it was expressed in lower prices for those bonds, which were recorded as capital losses and thus reduced the holding period rate of return.

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<sup>6</sup> These amounts are calculated according to the average level of the reserves, and they include unrealized profits/losses, so that differences may appear between them and the amounts quoted in the Bank of Israel's financial statements.

The target duration of the benchmark in each currency was determined in 1999 at a fixed level of 16 months for all currencies, based on the shortfall approach, according to which it is highly probable that the benchmarks with this duration will yield holding period annual rates of return higher than the desired minimum threshold. Towards the end of 2002 it was decided to shorten the duration of the dollar portfolio only, from 16 months to 11 months. This was a temporary provision in a period of exceptionally low yields to maturity, and was intended to reduce the exposure to the possibility of capital losses in excess of interest income, a situation in which the total holding period rate of return on the reserves could be negative. With the rise in yields on the short term end of the yield curve in the US which started in 2004, the need for this temporary provision gradually disappeared, and it was cancelled in the middle of 2005. The cost of the temporary provision shortening the duration (which entailed also changing the dispersion of the benchmark along the yield curve) for the two-and-a-half years when it was in effect totaled 18 basis points<sup>7</sup>—13 basis points in 2003, 20 in 2004, and a negative cost of 15 basis points in 2005.

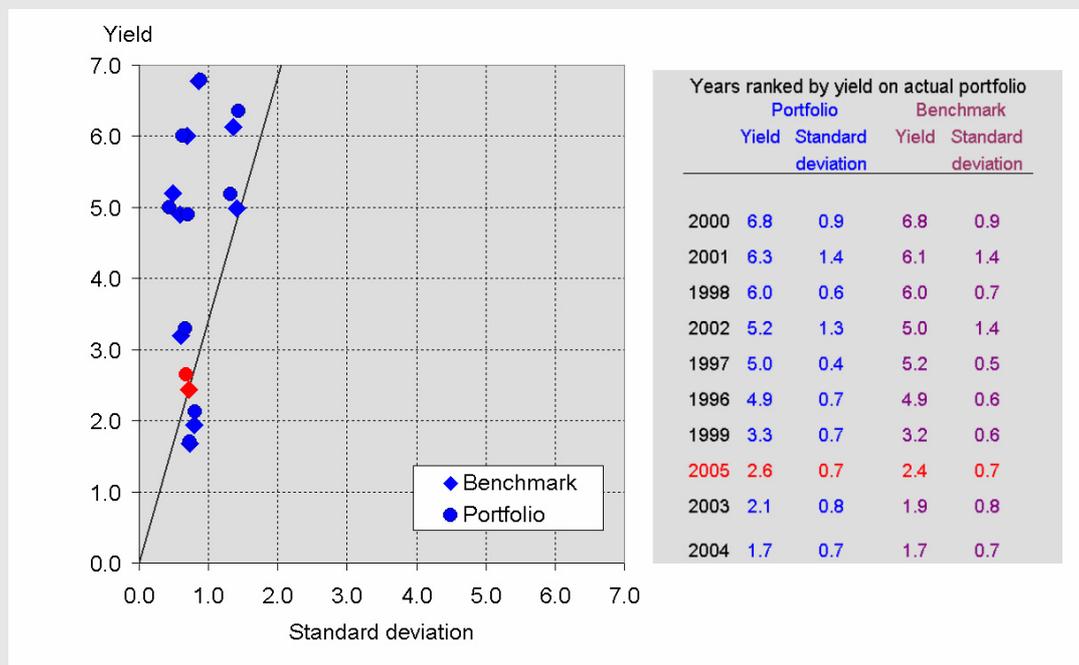
#### **b. Rate of return and risk in terms of the benchmark**

The holding period rate of return of the benchmark was 2.44 percent this year while its volatility was 0.71 percent. Given the developments in the markets, the benchmark was the dominant factor in determining the holding period rate of return on the portfolio in view of the relatively small magnitude of differences between the composition of the portfolio and that of the benchmark.

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<sup>7</sup> Most of this cost (26 basis points) derived from the change in dispersion of the benchmark along the yield curve.

**Figure 3-Distribution of Yields of the Portfolio and the Benchmark 1996–2005**  
(percent, in annual numeraire terms)

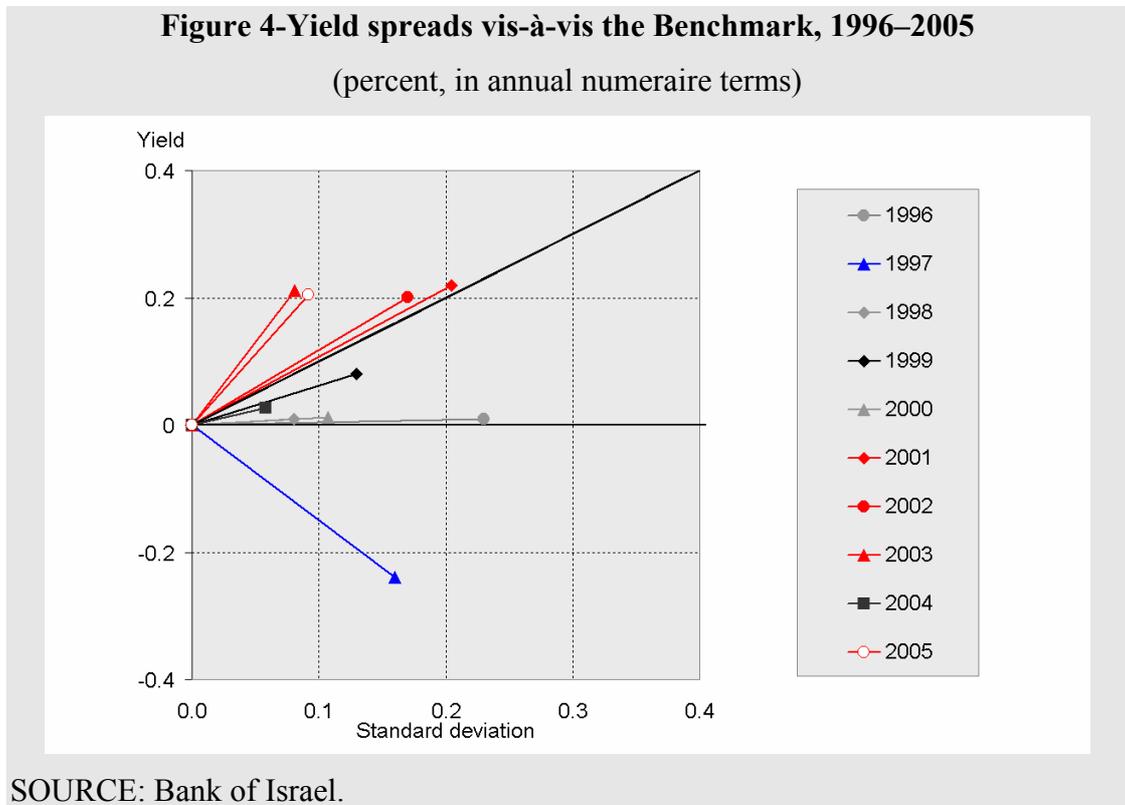


SOURCE: Bank of Israel.

Figure 3 presents holding period rates of return and volatilities for the benchmark and the reserves portfolio since 1996 which show that in each year the yield and volatility of the portfolio are very similar to those of the benchmark. The figure also clearly shows the fluctuations in the annual holding period rates of return on the benchmark and the reserves portfolio, which were largely determined by developments in the markets in each year. In contrast the fluctuations in the volatility of holding period return from year to year were relatively small. Therefore when the holding period rate of return of the benchmark is lower than its multiyear average—as happened in 2005—then the ratio of the yield on the benchmark to its risk is also lower than in most of the years in the previous decade. This feature—which reflects somewhat of a deterioration in the trade-off between yield and risk implied in the markets—can be seen in the past three years, as opposed to the preceding years. This may be seen in Figure 3, in which the observations for all previous years, except for 2003 and 2004, are above a line drawn from the observation for 2005 to the origin.

The spread between the yield on the benchmark and the yield on the actual reserves portfolio is the contribution of ongoing management of the reserves. Ongoing management this year contributed 21 basis points, with a volatility of 9 basis points (see Table 2 and Figure 2). This came mainly from decisions taken, within the degrees of freedom allowed by the investment policy, concerning portfolio attributes which can match those of the benchmark or deviate from it—in its currency composition, its duration, the assets included in it and their dispersion along the yield curve. The contribution of ongoing management could also be influenced by operational factors, which can affect the ability to reach and carry out decisions on which ongoing management is dependent.

**Figure 4-Yield spreads vis-à-vis the Benchmark, 1996–2005**  
(percent, in annual numeraire terms)



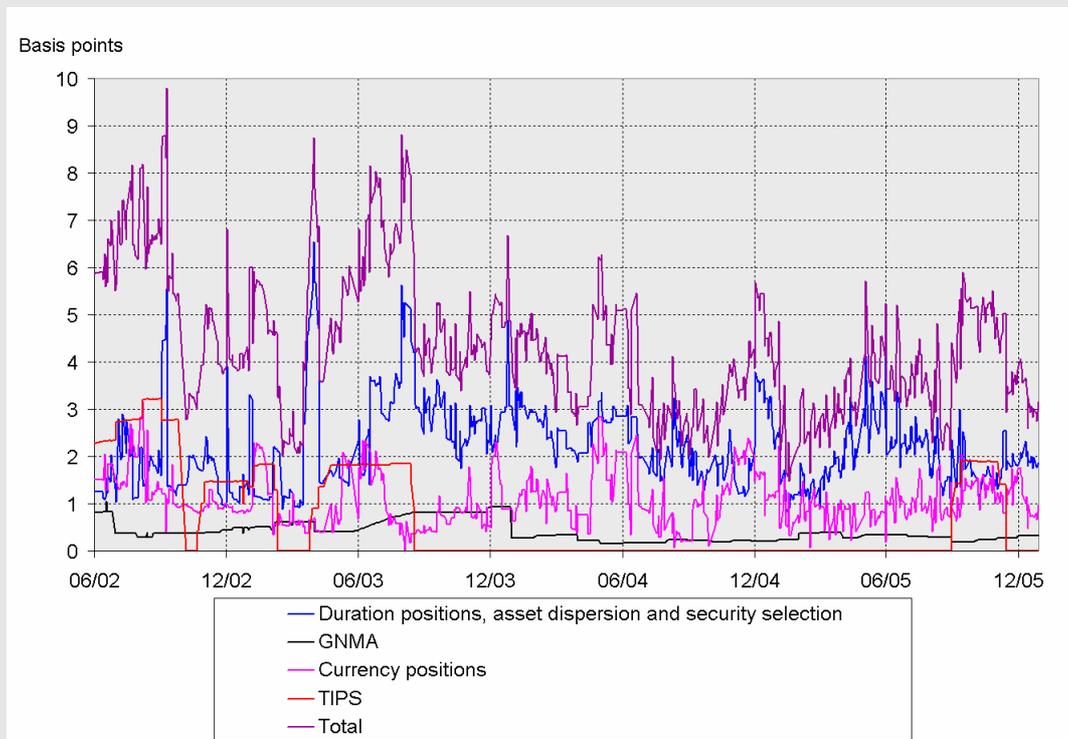
SOURCE: Bank of Israel.

Analysis of the yield spread relative to the benchmark and its volatility can provide an indication of the level of skill of the portfolio management. Ideally, management of the portfolio should achieve a positive yield spread with relatively low volatility. Figure 4 (and Table 2) show average yield spreads in terms of the benchmark and their volatility in each of the years 1996-2005. The ratio of incremental yield and its volatility (the 'information ratio') is reflected in the figure by the slope of the line for each year. The slope of the line will ideally be greater than one, in which case the incremental yield more than compensates for the incremental risk. It can be seen that

the information ratio was in fact greater than one in the years 2001, 2002, 2003 and 2005 (since the slope of the lines for those years is steeper than the dotted line which has a slope of one), between zero and one in 1999 and 2004, close to zero in 1996, 1998 and 2000 and negative only in 1997.

The increase in the information ratio from 2001 onward was apparently the result of a change in policy regarding management of the reserves. In 2000, it was decided to increase the resources devoted to asset selection. At the same time, the extent of exposure resulting from duration management (from 2000 onward) and currency management (from 2001 onward) was reduced. These two areas of activity contributed significantly to the yield on the portfolio during the early 1990s but were less profitable subsequently. The results of this change in approach were an increase in the yield spread between the reserves portfolio and the benchmark accompanied by a reduction in the volatility of the spread.

**Figure 5-VaR of the Positions, June 2002–December 2005**  
(one-week horizon, parametric method, 95% confidence level)



SOURCE: Bank of Israel.

The incremental risk involved in the management of positions in a particular period can be measured after the fact by the volatility of the incremental yield, the same approach which served as the basis of the discussion of the information ratio. Another measure used in evaluating the risk of holding positions relative to the benchmark, which can be measured ex ante, is the VaR (Value-at-Risk) of the positions or in other words the VaR of the spread between the actual portfolio and the benchmark. VaR is an estimate of the maximum capital loss which can occur during a certain period of time and with a certain probability. The VaRs of all the positions, defined as the largest loss expected in a week at 95 percent confidence level, plays a role in the investment policy of the reserves and is restricted to a fifth of a percent (20 basis points) of the value of the reserves. Figure 5 presents the breakdown of VaR due to the various types of positions that were held in the portfolio from June 2002 to the end of 2005, from which one can see that this degree of freedom was only partially utilized.

### **c. Contributing components of ongoing management of the reserves portfolio**

As part of the ongoing management of the portfolio, decisions are made to deviate from the composition of the benchmark (positions). The additional yield from management of the various types of positions is presented in Tables 3 and 4. A position constitutes an addition of risk relative to the benchmark which may be rewarded by incremental yield. As part of the management of a position, a ceiling is generally put on the potential loss; the position is closed if the cumulative loss reaches the ceiling. The scope of actual positions is much smaller than the maximum permitted.

**Table 3**  
**Contribution of Management Decisions to the Yield Spread, vis-à-vis the Neutral Benchmark, 2005**

(basis points, in annual terms)

	Total contribution	Duration	Asset selection		Dispersion positions	Intermarket positions	Currency management	Other contributions
			Spread effect	Dispersion effect				
Total	20.7	-2.9	13.6	5.6	0.9	1.6	0.3	1.5
Currency portfolios								
Total	17.2	-2.9	13.6	5.6	0.9			
Dollar portfolio	15.8	-2.4	12.2	5.5	0.6			
Euro portfolio	-0.1	-0.5	-0.1	0.1	0.4			
Other portfolios	1.5	0.0	1.6	0.0	-0.1			
Intermarket positions	1.6					1.6		
Currency positions	0.3						0.3	
Other contributions	1.5							1.5

SOURCE: Bank of Israel.

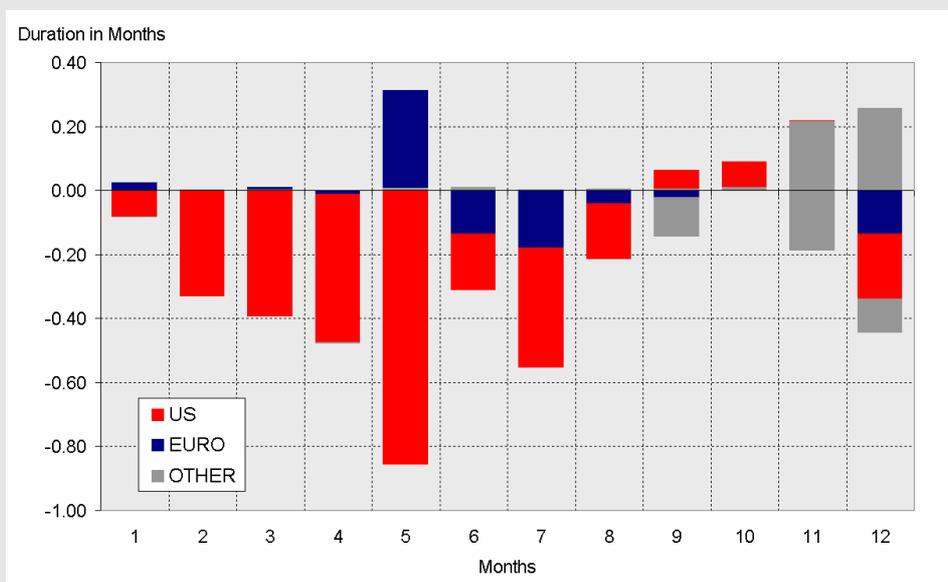
### 1) *Contribution of currency management*

The decisions relating to currency management determine the difference of the currency composition of the portfolio from the neutral currency composition, i.e. the numeraire. This difference is defined as a currency position. Currency positions may be managed on the basis of tactical considerations and the analysis of economic variables. Additional currency positions were managed with the aid of models, a tool for the management of short term currency positions. The amount invested according to the recommendation of each model is fixed and relatively small. The contribution of currency management, including exchange rate and interest rate differences on the currency positions, totaled 0.3 basis points in 2005 (Tables 2 and 3).

### 2) *Contribution of management of duration and dispersion along the yield curve*

During 2005, duration positions managed in the various currency portfolios made a negative contribution of 2.9 basis points to the yield spread relative to the benchmark (Tables 2 and 3 and Figure 6). The duration positions are manifested in the difference between the duration of the currency portfolio and the neutral duration determined for it (which was 16 months for all currency portfolios, except for the dollar portfolio in the first half of the year, which was 11 months).

**Figure 6-Duration Positions in the Reserves Portfolio, 2005**



SOURCE: Bank of Israel.

The total contribution of dispersion relative to the benchmark was 6.5 basis points, of which 0.9 was due to dispersion positions and 5.6 was due to the influence of dispersion that resulted from asset selection positions (Tables 2 and 3). Positions involving the dispersion of assets are created by purchasing assets in one area of the yield curve and selling assets in another while minimizing the impact of an upward or downward shift (without a change in slope) on the profitability of the position. Frequently these positions are managed through futures contracts.

### 3) *Intermarket positions*

These positions are created in such a way that their profitability depends on the development of the yield spread between two debt instruments. The instruments are denominated in different currencies and the resulting currency exposure is neutralized using a currency swap. In 2005, the management of this type of position led to an additional yield amounting to 1.6 basis points (Tables 2 and 3).

**Table 4**  
**The Contribution of Asset Selection, 2005**

	(basis points, in annual terms)	
		Total reserve portfolio
Dollar deposits, repo, and reverse repo		3.6
<i>of which</i> : Securities lending	1.9	
Eurobonds		0.4
Synthetic investment in Japanese bonds		0.3
CD + CP		2.9
TIPS		2.2
GNMA (external management)		0.8
Other assets		3.4
Total contribution of asset selection		13.6
Dispersion deriving from asset selection		5.6
<b>Total</b>		<b>19.2</b>

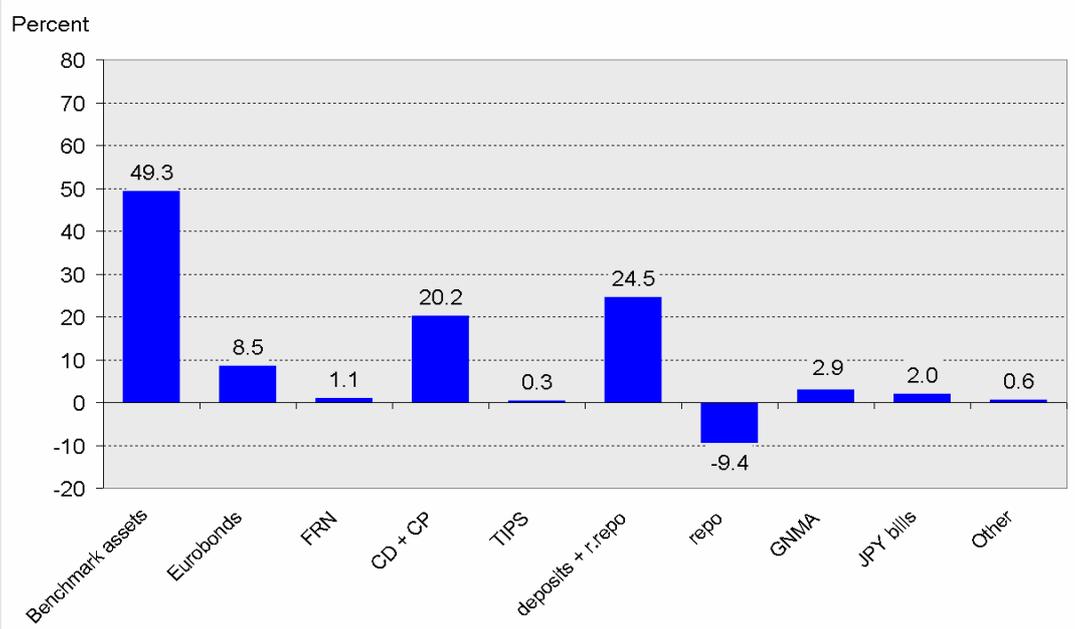
SOURCE: Bank of Israel.

#### 4) *Contribution of asset selection*

Decisions regarding asset selection contributed 13.6 basis points to the yield on the reserves portfolio (Table 4 and Figure 7). This increment was due to the investment in spread assets, assets which are not included in the benchmark. The yield to maturity of such an asset can be split into two components: i) the expected yield to maturity of a government bond in the same currency with the same maturity and ii) the yield spread, which reflects the characteristics of the issuer of the asset, and which usually changes continuously and moderately. The contribution of the selection of spread assets is measured by the spread between their holding period rate of return and that of assets with identical duration of the type included in the benchmark, while taking into account their weight in the portfolio. In calculating the overall contribution of ongoing management, the impact of the differences in dispersion of the assets along the yield curve—arising from the decisions on the selection of spread assets—is also taken into account, a factor which is included in the calculation of the contribution of dispersion as described in paragraph 2) above.

**Figure 7-Asset Distribution of the Reserves Portfolio, 2005**

(percent, annual average)



SOURCE: Bank of Israel.

The main contribution of asset selection to the incremental yield relative to the benchmark came from investments in assets that mature in under a year (categorized as money market assets). Investments in **bank deposits** which are not tradable and activities in **repo and reverse repo** transactions in dollars contributed incremental yield of 3.6 basis points relative to the benchmark. This includes the contribution from the activities of **securities lending**, which amounted this year to 1.9 basis points<sup>8</sup>. Investment in banks' **certificates of deposit** (CDs) and in **commercial paper** (CPs) issued or guaranteed by foreign governments contributed an incremental yield of 2.9 basis points. In addition, there was a contribution from investment in government bonds through **synthetic transactions**,<sup>9</sup> which amounted to 0.3 basis points. These

<sup>8</sup> Securities lending involves two transactions—a repo transaction and a reverse repo transaction or a bank deposit. In the repo transaction a security is lent in exchange for cash, which is “deposited” in a reverse repo transaction against another security or invested in a bank deposit. The two transactions are for the same time period and have no effect on the duration of the portfolio. The profit from such a pair of transactions results from the fact that the lent securities in the repo transaction are in demand in the market by parties who are prepared to borrow them and to lend the equivalent value in money to the securities lender at a lower rate of interest than what the lender receives by depositing it elsewhere.

<sup>9</sup> A synthetic transaction is comprised of three transactions that take place simultaneously: In the first, a security denominated in a particular currency is bought. In the second, the currency of investment is exchanged for the currency of the security, and the third is a currency forward transaction, that is the currency will be exchanged at a future date—the date of maturity of the security—from the currency of the security back into the currency of the

results were achieved in the context of an increase in the yield spread between short-term treasury bonds and bank deposits or similar debt instruments (the TED spread). For three-month maturity, this spread was around 15 basis points in the first two months of 2005 and around 42 basis points by the end of the year. This rise both increased the profitability of spread assets in the money market and also spurred the Department to expand activity in this area. An additional factor that boosted the total contribution of activity in the money market was the raising of the ceiling of the portfolio's maximum exposure to bank risk in February 2005 (see Chapter 2d below).

The contribution of the investment in **Eurobonds** totaled only 0.4 basis points this year compared to an average contribution of 4.7 basis points in the years 2001-04. The usual superior performance of this type of security relative to the assets within the benchmark is the result of their positive spreads relative to Treasuries. When these spreads change during the year, the contribution—whether positive or negative—is compounded by capital gains or losses. In 2005, spreads widened in the part of the Eurobond market that the Bank of Israel invests in (those issued or guaranteed by sovereigns or supranationals) by 10 basis points, from around 30 basis points to 40 basis points. Taking into account the average duration of the bonds held in the reserves portfolio, it appears that the capital losses caused by the widening yield spreads reached sums similar to the additional income from the yield spread.

The investment in **Treasury Inflation-Protected Securities (TIPS)** gave an incremental yield of 2.2 basis points. In the past two years, the TIPS market has become efficient and liquid, in contrast to its character in prior years, and therefore the Department's decision to invest in this market is made from time to time on an opportunistic basis. For several months, a position was held in TIPS, which were matched against sales of treasury bonds with similar maturities. This position was taken on the view that the level of expected inflation implied in the prices of TIPS was lower than that actually expected or derived from data on inflation already published.

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investment. The sums exchanged are equal to the cost of buying the security and the sum received at time of maturity, respectively.

The investment in **GNMA mortgage-backed securities**, externally managed, resulted in an incremental yield of 0.8 basis points relative to the benchmark. This portfolio is managed relative to the same benchmark as the long-term portion of the dollar portfolio managed in-house, but in practice is mostly invested in mortgage-backed securities. The Department also follows the GNMA market independently, and in past years a GNMA position was managed, initiated by the Department and taken generally through buying and selling for future delivery (TBA). In 2005, such a position was not managed.

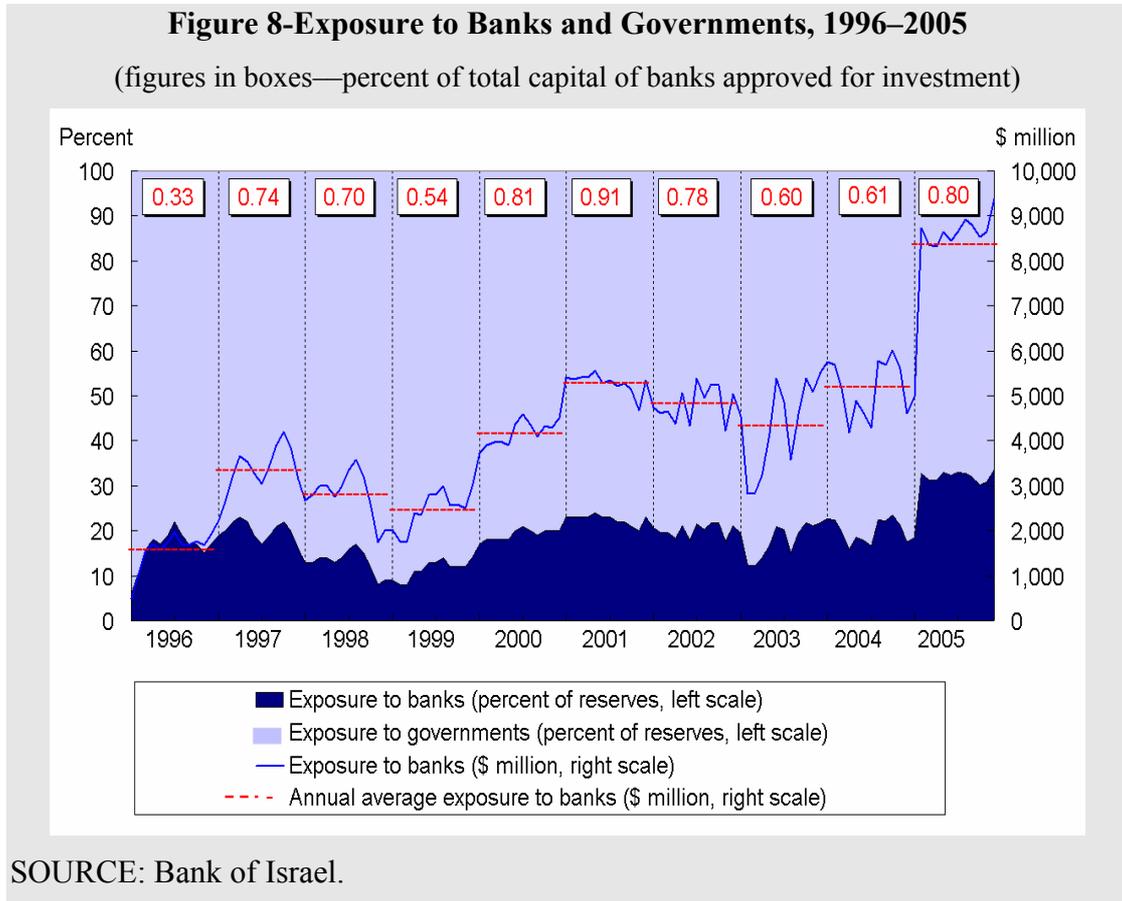
It is worth mentioning that up until December 2003, the portfolio of the external manager was managed relative to an index of the GNMA market, and in certain years part of the internally managed dollar portfolio was also managed against this benchmark. The spread between the yield on this benchmark and the yield on the benchmark for the long term portion of the dollar portfolio during the period 1996-2003 is attributed in Table 2 to the strategic decision to invest a certain part of the reserves portfolio in this asset class, a decision which was made by the Department several years ago and reversed in 2003.

#### **d. Control of credit risk in ongoing management**

As with many other central banks, the Bank of Israel's sensitivity to credit risk is higher than its sensitivity to other risks, such as interest-rate risk. The credit risk which is necessary to the ongoing management of the reserves portfolio is managed by the Bank's internal restrictions—quantitative ceilings on various exposures and a system of investment regulations, as described above in the discussion on management of the reserves—and the pricing of risk of tradable spread assets by their revaluation.

Exposure of the reserves to the banking system, which includes exposure to the banks through deposits with them (including tradable certificates of deposit—CDs) and other transactions connected to them, is an important part of the reserves portfolio's exposure to credit risk. This exposure is restricted by a ceiling, set as a percentage of the portfolio. This ceiling stood at 25 percent until February 2005, and was then raised to 35 percent of the portfolio. The decision to raise the ceiling was taken in light of

the improved financial stability of the banking system in countries where the reserves are invested. As a result of the change in the ceiling, the actual annual average exposure of the reserves to the banks increased, and stood at 31 percent of the reserves in 2005, compared to 19 percent in 2004 (Figure 8).



### 3. YIELD ON THE RESERVES PORTFOLIO RELATIVE TO OTHER MANAGED PORTFOLIOS

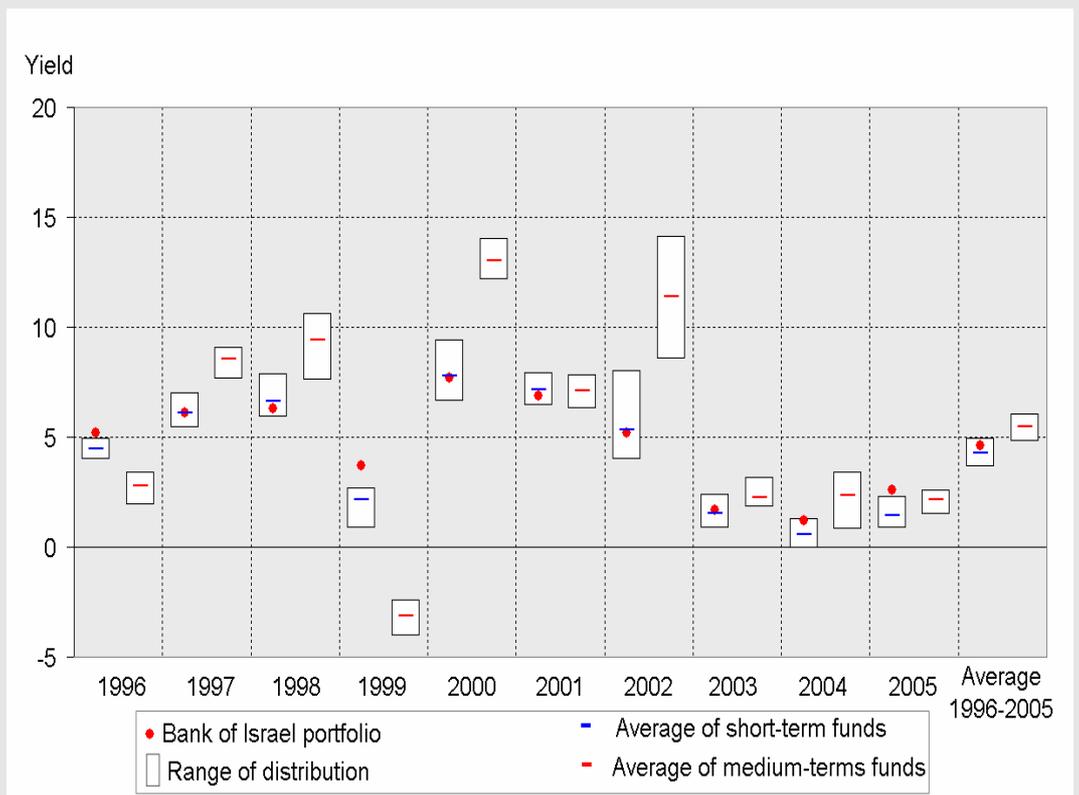
The comparison of performance between portfolios is problematic both because they are generally managed relative to different benchmarks and because of the differences in the rules applying to them. Nonetheless, something can be learned from a comparison of portfolios with similar characteristics.

The performance of 11 mutual funds which operated in the American market during the period 1996 to 2005 will be used for the comparison. These funds were primarily invested in US government bonds. Some of the funds are classified as “investors in short-term Treasuries” while the rest are “general investors in Treasuries,” which, in

practice, invest in the medium term. The funds invested no more than a small proportion of their portfolios in indexed US government bonds (TIPS—Treasury Inflation-Protected Securities) or in assets with a low rating (less than AA).<sup>10</sup> These traits make it possible to make a rough comparison between the performance of the Bank of Israel’s dollar-denominated portfolio and the performance of these funds in spite of the differences between them. However, it should be remembered that the performance of the funds is net of commissions which reflect the cost of ongoing operations while the performance of the dollar-denominated reserves portfolio is reported without subtracting this cost.

**Figure 9-Performance Distribution of Managers of Short- and Medium-Term Funds in the US Market, 1996–2005**

(percent, in annual terms)



SOURCE: Lipper Inc. via the Wall Street Journal internet site, and Bloomberg.

Figure 9 presents the range of annual holding period rates of return on the funds since 1996 for each type of fund—the "short terms" and the "medium terms". For each

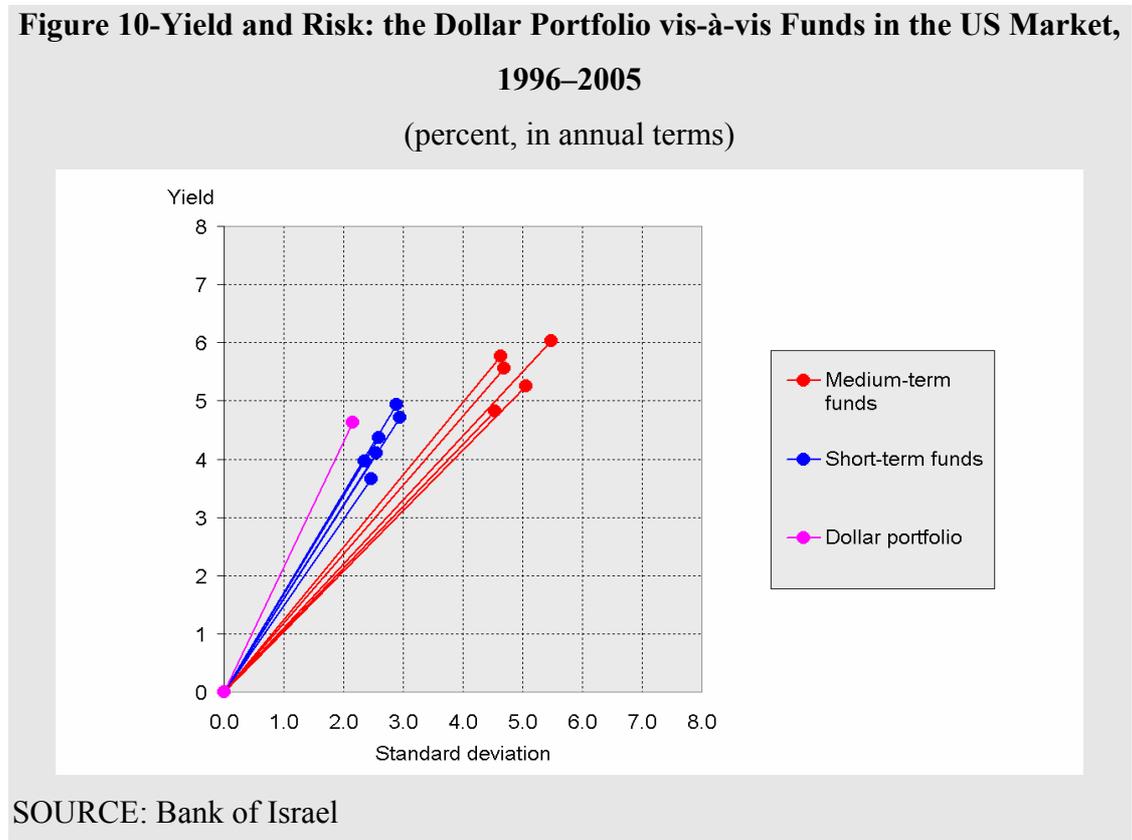
<sup>10</sup> It is possible that there was a component of corporate bonds among these assets which the Bank of Israel is not permitted to hold.

period, the figure shows the lowest and highest yields from among the group of portfolios, the average yield for the group and the performance of the dollar-denominated portfolio. An examination of the range of the yields indicates that the performance of the dollar-denominated portfolio during the period was within, or above, the range of fund yields. The years during which the dollar-denominated portfolio outperformed the funds, i.e. 1996, 1999 and 2005, were years in which the yield-to-maturity of Treasury securities increased. The superior performance of the dollar-denominated portfolio during these periods implies that its duration was shorter than that of the other funds which also explains its lower ranking during the years 2000 to 2002 when yields-to-maturity declined. In 2005, the holding period rate of return of the dollar-denominated portfolio was at the upper limit of the yield range of all the funds and above the highest yield among the "short terms". This result apparently reflects the combination of the relatively short duration of the dollar-denominated portfolio relative to the short run funds and the differences in asset management policy between the managers of the funds and the managers of the dollar-denominated reserves portfolio.

The data also demonstrate the wide variation of yields among the funds which implies differing investment allocations and the large magnitude of volatility of the yields on the medium term funds relative to the short term funds. The latter apparently reflects the longer duration of the medium term funds. Nonetheless, the range of the cumulative yields of each of the two groups of funds is very limited and is also similar between the two groups. The return for additional risk associated with the higher duration of the medium term funds, is expressed in the range of cumulative yields of the medium term funds, which is higher by some 1.1 percent than the short term funds.

This finding is even more apparent when the average yield of each fund is compared to its volatility during the period 1996 to 2005. These are presented in Figure 10. Also presented is the average yield for the dollar-denominated portfolio and its volatility during that period. The ratio of yield to risk for the dollar-denominated portfolio is significantly higher than those of the other funds as can be seen in the diagram from the slope of the line joining the observations to the origin. Also evident is the higher yield-to-risk ratio for the short term funds relative to the medium term funds. The

differences in the yield-to-risk ratios between the dollar-denominated portfolio and the various funds is the result of the narrow range of variation among the yields relative to the wide range of variation in volatility.



#### 4. THE LIQUIDITY OF THE RESERVES<sup>11</sup>

The level of liquidity of the reserves portfolio is an estimate of that portion of the portfolio which can be realized quickly and without a loss in value. In order to monitor the general level of liquidity of the reserves portfolio on an ongoing basis, the various assets in the portfolio were divided into four groups according to their level of liquidity i.e., according to the possibility of selling them without the sale itself causing a loss. The criteria employed in classifying securities into different levels of liquidity are the bid-offer spread for tradable assets, and for nontradable assets, their time to maturity. The groups are:

1. Very liquid securities—with a spread of 0-2 basis points or 0-2 cents.
2. Less liquid securities—with a spread of 2-5 basis points or 2-6 cents.

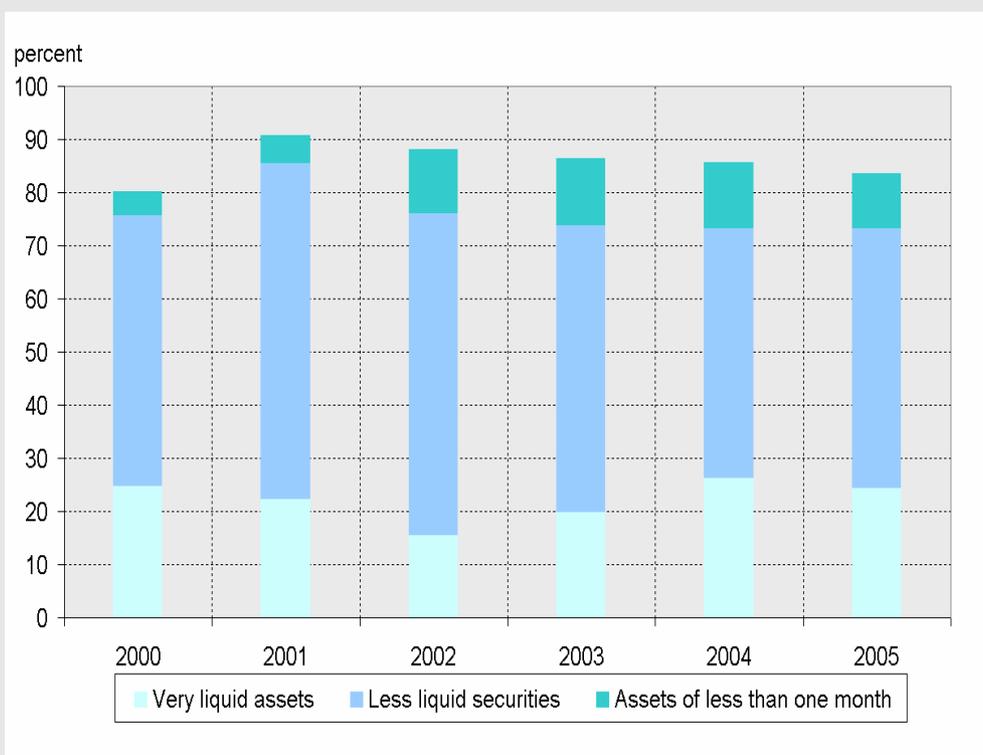
<sup>11</sup> A detailed discussion of the level of liquidity of the reserves and the management of that liquidity can be found in Box 1.2 in the 2002 Annual Report of the Foreign Currency Department.

3. Securities maturing within a month's time; deposits and repo and reverse repo transactions which are shorter than one month.
4. All remaining assets.

The liquid component of the reserves consists of the first three groups. The differentiation between the levels of liquidity of these three groups is not clear-cut: as liquidity is measured using two different criteria—period to maturity and the bid-offer spread—ranking the liquidity of the third group vis-à-vis that of the first two is a matter of judgment. It is clear, however, that the second group is less liquid than the first.

The liquid component of the reserves in 2005 accounted on average for approximately 84 percent of the total reserves as compared to 86 percent in 2004 (Figure 11). Of this amount, some 25 percent was invested in assets with the highest level of liquidity, 49 percent in assets with high liquidity, though less than that of the first group, and 10 percent in assets whose time to maturity was shorter than one month. In terms of the split between classifications of liquidity, there was no significant change on 2004.

**Figure 11-Liquidity of the Reserves Portfolio, 2000–2005**  
(annual average)



SOURCE: Bank of Israel.

On average, approximately 16 percent of the reserves portfolio in 2005 was invested in assets which were not classified as being part of the liquid component of the reserves portfolio since they are characterized by a lower level of liquidity. There has been a moderate upward trend in the share of this group since 2001, the year in which its share reached a low of 9 percent of the reserves. This group is composed of Eurobonds, funds under external management (which are invested primarily in GNMA securities), bank deposits with a term of more than one month and Treasury Inflation-Protected Securities (TIPS). In previous years, it also included internally managed GNMA securities.

In the light of the objectives of holding foreign exchange reserves and the ability to sell a large part of them in a short time without thereby depressing their value, it appears that their liquidity level is high enough, despite the gap between their actual level and the desired level. This is because, as far as it seems, the liquidity component of the reserves is enough to cover those uses that are liable to occur at short notice.

The high liquidity of the reserves derives from two main factors: one is the investment policy based on the Bank of Israel Law, that prescribes a conservative approach to the management of financial risks, and sets liquidity as one of the main objectives in managing the reserves. The second factor consists of economic considerations based mainly on the level of financial spreads of the various spread assets and the paths they are expected to follow relative to their inherent risk. In light of these considerations, the Bank has made only partial use of the degrees of freedom to invest in spread assets with low liquidity during the last few years.