

## *Chapter 2*

# *Developments in Israel's Foreign Currency Market in 2002*

During the year 2002, the NIS (New Israeli Sheqel) depreciated against the currency basket by 13.0 percent and against the US dollar by 7.3 percent. The difference reflects the weakening of the dollar against the other currencies in the basket—euro, sterling and yen. Between December 19, 2001 and December 31, 2002, the NIS depreciated by 16.6 percent against the currency basket and by 11.2 percent against the dollar—this period includes the weakening of the NIS which occurred in late December 2001 as a result of the exceptional two-percentage-point reduction of the interest rate. On December 31, 2002 the representative rate of the NIS was set at 4.737 against the dollar and 5.0467 against the currency basket.

During the first half of the year, the NIS weakened almost continuously, reaching its weakest levels of the year in mid-June at 4.994 against the dollar and 5.1674 against the currency basket, a depreciation of 13.1 percent and 15.5 percent, respectively, from its levels at the beginning of the year. During the second half of 2002 the NIS strengthened somewhat. The exchange-rate trend was more varied and the trading range was more moderate than they had been in the first half of the year.

The primary factors affecting the NIS exchange rate during 2002 include the change in the mix of macroeconomic policy—to monetary expansion, marked by the exceptional two-percentage-point reduction in the interest rate, and fiscal contraction, which was not upheld—announced in late December 2001, slack fiscal discipline and a growing budget deficit, the interest-rate differential between the NIS and the US dollar which widened sharply, especially in the first half of the year, an erosion of confidence in economic policy which contributed to concerns of a financial crisis, net capital outflow from Israel and other geopolitical risks including an exacerbation of the security situation and the threat of war against Iraq.

The volatility of the NIS/dollar exchange rate was 8.3 percent in 2002, more than double the rate of 4.0 percent in 2001. In spite of this rise, the volatility of the NIS is still lower than that of other currencies, both of emerging and advanced economies. Probable reasons for this include

minimal offshore trading, a low level of speculative activity, and the exchange-rate band, which can impose a limit on volatility.

The average daily turnover of foreign exchange in Israel's foreign currency market reached \$ 5.2 billion in 2002, representing a 20 percent increase over 2001 and an 89 percent increase from the 2000 level. The growth of the market in recent years may be attributed in large measure, although not exclusively, to the increased participation of foreign financial institutions, acting on their own behalf and on behalf of their clients. Foreign exchange turnover includes activity in the NIS/FX market as well the non-NIS sector (i.e. FX/FX) and the foreign-exchange-indexed sector of the market. The growth rate of the NIS/FX sector of the market—12 percent in 2002—was slower than in previous years, perhaps due to the market's maturity and its approaching equilibrium.

## 1. NIS EXCHANGE RATES<sup>1</sup>

From December 31, 2001 until December 31, 2002, the NIS (New Israeli Sheqel) depreciated against the currency basket by 13.0 percent and against the US dollar by 7.3 percent. The difference reflects the weakening of the dollar against the other currencies in the basket—euro, sterling and yen. Between December 19, 2001 and December 31, 2002 the NIS depreciated by 16.6 percent against the currency basket and by 11.2 percent against the dollar—this period includes the weakening of the NIS which occurred in late December 2001 as a result of the exceptional two-percentage-point reduction in the interest rate (see below). The exchange-rate band widened from 43.9 percent at the beginning of the year to 49.4 percent at the end.<sup>2</sup> On December 24, 2001, the lower limit of the band was reduced by one percent and its slope reduced from two percent to zero at a constant rate of NIS 4.1021 to the currency basket. The slope of the upper limit remained unchanged at 6 percent, as in 2001. The distance of the NIS from the lower limit of the band increased from 6.9 percent at the beginning of the period to 17.3 percent at the end (Figures 2.1 and 2.2).

During the year, NIS trading was characterized by an increase in volatility, both intraday and interday, a widening of the bid-offer spread, and a rise in trade turnover, especially in the first half of the period. The following were among the primary factors affecting the NIS exchange rate in 2002:

1. A change in the mix of macroeconomic policy to monetary expansion combined with fiscal contraction, which was formulated jointly by the Bank of Israel and the Ministry of Finance, in conjunction with the Prime Minister, and presented to the public on December 23, 2001. Among the measures announced was the Bank of Israel's

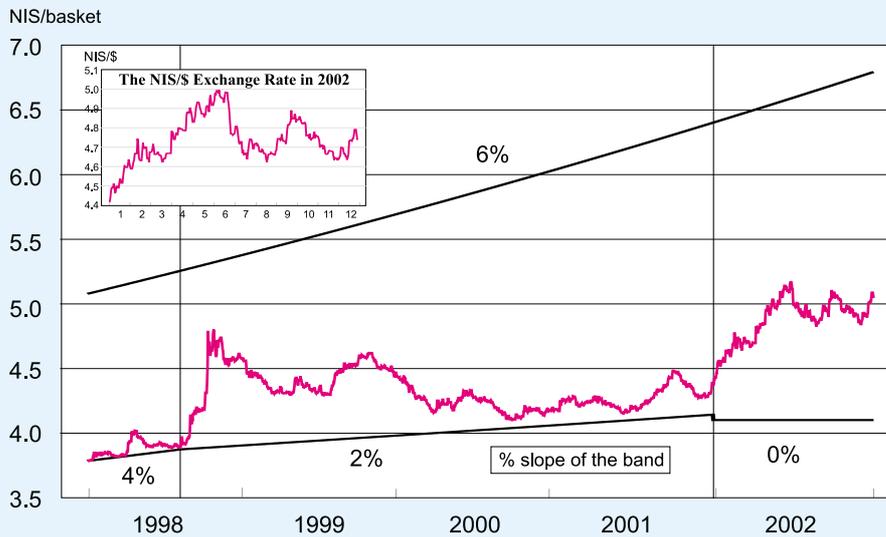
<sup>1</sup> Exchange rates quoted in this chapter are representative rates (see Appendix 2.1).

<sup>2</sup> The width of the exchange-rate band and the distance of the exchange rate from the upper and lower limits are calculated in terms of the average of the upper and lower limits of the band.

The NIS depreciated against the currency basket by 13 percent and against the US dollar by 7.3 percent in 2002.

The announcement of a change in the mix of macroeconomic policy to fiscal contraction, which was not fulfilled, coupled with monetary expansion, as expressed by the Bank of Israel's exceptional 2-percentage-point reduction in the interest rate, in addition to net capital outflow from Israel, a deterioration in the security situation and the threat of war with Iraq—all served to weaken the NIS during the year.

**Figure 2.1**  
**The NIS Exchange Rate against the**  
**Currency Basket and the Exchange-Rate Band, 1998-2002**



SOURCE: Bank of Israel.

**Figure 2.2**  
**Distance of the NIS/Basket Exchange Rate from**  
**the Lower Limit of the Band, 2001-2002**



SOURCE: Bank of Israel.

exceptional reduction of the interest rate by 2 percentage points to a historic low of 3.8 percent, the government's decision to reinforce fiscal discipline by cutting budgetary expenses, setting a deficit target for 2002 of 3 percent of GDP and returning to a declining deficit path from 2002 onwards (these measures were not fulfilled), and various structural changes aimed at liberalizing and increasing the efficiency of the financial

markets. These decisions were formulated with the intention of helping the economy emerge from the economic slowdown and boosting employment, while maintaining price stability.

Slack fiscal discipline, as expressed by the failure to restore the deficit to the agreed path, as well as a number of hikes in the deficit target weakened the NIS.

2. Slack fiscal discipline, as expressed by the failure to restore the deficit to the agreed path, the prolonged period for the budget's approval and the inability to curb private members' bills (which increase expenditure) during negotiations, changes to the deficit target, uncertainty as to whether the deficit target for 2002 would be attained in the light of declining tax receipts, and uncertainty regarding both the approval and implementation of the 2003 budget.

The narrow interest-rate differential between the NIS and the dollar at the beginning of 2002 weakened the NIS, while the wide differential in the second half of 2002 supported the NIS.

3. The interest-rate differential between the NIS and the dollar, which varied widely in 2002. After declining to a historic low of 1.8 percentage points in December 2001, following the two-percentage-point reduction in the interest rate, the differential widened during the first half of 2002, reaching 7.35 percentage points at the end of June, as the Bank of Israel raised rates by a cumulative 5.3 percentage points. The differential widened further, to 7.85 percentage points, when the Federal Reserve Bank of the United States lowered the interest rate by 0.5 percentage points in November. At the end of December 2002, the Bank of Israel announced an interest-rate reduction of 0.20 percentage points, slightly reducing the differential to 7.65 percentage points, effective in January 2003.

4. Net capital outflow from Israel. This occurred, on the one hand, in response to the significant reduction in interest rates and the liberalization of the domestic capital markets<sup>3</sup> in December 2001, which led to a change in the public's asset portfolio marked by the purchase of foreign currency and the transfer of funds abroad. This trend was strongest in the first half of the year. On the other hand, capital inflows declined against the backdrop of the global economic slowdown, the crisis in high-tech industries, concerns regarding domestic financial stability, and the rise in geopolitical risk, which discouraged foreign investment in Israel. The decline in capital inflows, in particular, meant that the primary factor which had exerted pressure for appreciation of the NIS in recent years, and which could have moderated the pressure for its depreciation in 2002, was missing. Deterioration of the current account also exerted pressure on the NIS: exports, especially of the high-tech industries, continued falling during the year and incoming tourism declined sharply as a result of the security situation.

The proposal by the Ministry of Finance to change the Bank of Israel Law so as to reduce the Bank's independence caused an erosion of confidence in economic policy and raised concerns of a domestic financial crisis.

5. Erosion of confidence in economic policy, which contributed to concerns regarding a domestic financial crisis. The first half of the year, in particular, was marked by tension between the Bank of Israel and the Ministry of Finance which included, among other things, a proposed amendment to the Bank of Israel Law aimed at reducing the Bank's independence and redefining its role so that the present policy of maintaining price stability would no longer be its primary objective.

<sup>3</sup>The share of investments which institutional investors were permitted to invest abroad was increased from 5 percent to 20 percent, to be followed by the complete removal of the limit by the end of 2002.

6. Other factors, including: an increase in geopolitical risk stemming from an exacerbation of the security situation and the threat of war against Iraq; the downgrading of Israel's domestic debt by two rating agencies as well as the downgrading of 3 Israeli banks; and the dissolution of the government in October 2002 and the move to early elections, scheduled for January 2003.

*During the first half of the year*, the NIS weakened almost continuously, reaching its weakest levels of the year at 4.994 against the dollar on June 11 and 5.1674 against the currency basket on June 21, a depreciation of 13.1 percent and 15.5 percent, respectively, from its levels at the beginning of the year. The main elements which affected the NIS during the first half of the year are discussed below.

Initially, and until about the second week of February, the NIS weakened in response to the steep two-percentage-point cut in the interest rate. The cut had a two-fold effect on the NIS: it reduced the relative attractiveness of NIS-based investments vis-à-vis foreign-currency-based investments and it raised the assessment of NIS exchange-rate risk by calling into question the Bank of Israel's commitment to maintaining price stability—in the light of the Bank's policy in recent years of gradual adjustments of the interest rate. Demand by individual Israeli investors for foreign currency increased sharply, primarily through the purchase of mutual funds specializing in investments in and indexed to foreign currency. Domestic institutional investors also transferred funds abroad in response to the liberalization of the capital markets. Two other factors which encouraged demand for foreign currency at this time were the deterioration in the security situation and the approval of the 2002 budget at the beginning of February, which was based on optimistic assumptions of tax revenues. This strengthened the suspicion that in 2002 the budget deficit would deviate significantly from the target, as it had in 2001.

From the middle of February until the end of March the NIS stabilized. On the demand side, this occurred after the Bank of Israel's press release of February 12 highlighting the considerations for investments abroad<sup>4</sup> and reiterating the Bank's commitment to maintaining price stability, and the subsequent interest-rate hike, two weeks later, of 0.6 percentage points. On the supply side, foreign financial institutions sold foreign currency and bought NIS, taking profits on open long-dollar positions and reducing overall exposures. Nevertheless, an atmosphere of uncertainty continued to prevail in the markets, as it became clear that the deficit was not returning to the path agreed upon, private members' bills were not revoked, and in addition, at the beginning of March an amendment to the Bank of Israel Law was proposed which would impair the Bank's independence and harm its ability to adhere to the objective of maintaining price stability.

The NIS weakened substantially during April, May and most of June as a result of the sharp deterioration in the security situation, an increase in economic uncertainty,

<sup>4</sup>The interest-rate differential which still favored the NIS, the risk of exchange-rate fluctuations, tax considerations, the potential for capital loss, and commissions expenses, among others. The market interpreted the press release as an expression of the Bank's intention to raise the interest rate at the end of the month.

The relative attractiveness of NIS-based investments declined following the surprising two-percentage-point interest-rate reduction in December 2001, causing an increase in local demand for foreign-currency-based investments and a weakening of the NIS.

Between April and June the NIS weakened against the backdrop of a decline in the security situation, an increase in economic uncertainty, and concerns that NIS-based investment alternatives would be taxed.

and concern that local-currency investments would be subject to taxation under the recommendations of the Rabinowitch Committee on Tax Reform. Regarding the security situation, following an intensification of terror incidents, Israel launched the *Defensive Shield* operation at the end of March. This, coupled with fiscal pressures, raised concerns of grave economic consequences—a fall in domestic demand, a decrease in investment and a further decline in tourism, which would lead to a decline in government revenues, an increase in expenditure, especially defense expenditure, and a significant deviation from the budget. Actual inflation rose rapidly during these months and inflation expectations for a year ahead rose to 5 percent, far above the 3 percent upper limit of the inflation target range. A sharp rise in government bond yields also reflected concerns of financial instability. At the end of April, the rating agency Standard & Poors lowered its outlook for Israel from “stable” to “negative.”

The government responded to these events at the end of April with an economic package aimed at limiting the deviation from the deficit target. The package was approved in June with some changes. The package included a reduction in expenditure, the imposition of new taxes, and a rise in the deficit target from 3 percent of GDP to 3.9 percent in 2002 and to 3.5 percent in 2003 as well as a deferral to 2007 of the target of 1 percent of GDP. At about the same time the government also published the recommendations of the Rabinowitch Committee on Tax Reform, among other things reducing the differential between tax on income from capital earned in Israel and that earned abroad, adversely affecting local-currency investments. This measure exerted additional pressure for a weakening of the NIS. (The recommendations passed, with some changes, in July.)

In response to sharp increases in both actual and expected inflation, the Bank of Israel raised the interest rate by a cumulative 4.7 percentage points between April and June.

Between the end of April and the end of June the Bank of Israel raised the interest rate four times, by a cumulative 4.7 percentage points, in response to the sharp increase in actual and expected inflation following the rapid weakening of the NIS. The first hike of 0.2 percentage points and the second hike of one percentage point were announced at the end of April and the end of May, respectively, as part of the regular monthly monetary programs. Surprisingly, the NIS weakened by about two percent immediately following the one-percentage-point hike. The market apparently assessed that a rise of this magnitude was insufficient to compensate for the risk of holding NIS assets. In an unusual move, the Bank of Israel raised the rate by a further 1.5 percentage points in mid-June, between the regular monthly monetary meetings. The extraordinary decision to raise the rate at this time was reached as a result of the rapid and ongoing depreciation of the NIS, the rise in actual inflation and in inflation expectations for the next few years, the increase in uncertainty as a result of the deterioration in the security situation, and the deteriorating fiscal position. For similar reasons, the interest rate was raised by a further two percentage points at the end of June at the regular monthly monetary meeting. The NIS appreciated quite quickly in response to this hike—by about 4.3 percent against the dollar and about 3.3 percent against the currency basket in the week following the rise. At the end of June, the representative rate of the NIS was set at 4.769 against the dollar and 4.9953 against the currency basket.

During the second half of 2002 the trend of the NIS was more varied and the trading range was more moderate than it had been in the first half of the year: the NIS strengthened until late August, weakened until late September and then strengthened again until mid-December. During the last two weeks of December, the NIS weakened again. Throughout the period from July to December the wide interest-rate differential with the dollar provided strong underlying support for the NIS. On December 31, the representative rate of the NIS was set at 4.737 against the dollar and 5.0467 against the currency basket.

From the beginning of July until the end of the third week in August the NIS strengthened markedly, primarily in response to the two-percentage-point interest rate hike of late June. This move widened the interest-rate differential between the NIS and the dollar to 7.35 percentage points and led to the purchase of NIS by foreign financial institutions. The market also attributed greater credibility to the Bank of Israel and its policy of maintaining price stability. The reduction in fiscal uncertainty due to the passage of the economic package in June and the relative quiet in the security situation at this time also supported the NIS. On August 20 the representative rate of the NIS was set at 4.6230 against the dollar, a level last seen near the end of March, on the eve of the *Defensive Shield* operation—an appreciation of 7.4 percent over the weakest level of the NIS, in June.

Although the NIS strengthened in July and August, several factors exerted pressure to weaken it during these months. These included the downgrade to 'C' of an Israeli bank by two rating agencies and warnings of a downgrade of the two largest Israeli banks, a general increase in financing costs faced by Israeli banks, a drop in foreign investment in Israel, and an overall decline in the outlook for global economic activity. Affected by the slowdown in global economic activity, exports of Israeli high-tech industries continued to fall steeply, sustaining the trend evident since the end of 2000.

From the end of August to the end of September, the NIS weakened by about 5.8 percent against the dollar, reaching NIS 4.89 on September 25. Events exerting pressure for a depreciation of the NIS during this period included poor domestic economic fundamentals, difficulties in passing the 2003 budget and concerns over a collapse of the government coalition as a result of budget negotiations, the reduction in the credit rating of the three largest Israeli banks, the impending confrontation with Iraq, and large sales of NIS in exchange for dollars by foreign financial institutions.

From the end of September until mid-December, the NIS strengthened. However, during the last two weeks of December, the NIS weakened somewhat due to fears of the impending confrontation with Iraq. The primary factor supporting the NIS during these three months was the interest-rate differential between the NIS and the dollar: it widened to 7.85 percentage points in November when the US Federal Reserve Bank lowered interest rates by 0.5 percentage points and then narrowed slightly to 7.65 percentage points (effective in January 2003) when the Bank of Israel announced an interest-rate reduction of 0.20 percentage points at the end of December. Additional factors supporting the NIS included large purchases of NIS in exchange for dollars by

The wide interest-rate differential between the NIS and the US dollar strongly supported the NIS in the second half of the year.

Until mid-August the NIS appreciated markedly.

A decline in foreign investment, a reduction in the credit rating of Israel's three largest banks, a continuation of the economic slowdown, especially in the high-tech industries, the collapse of the government coalition, the downgrading of Israel's domestic debt, and the approaching confrontation with Iraq all exerted pressure for a weakening of the NIS during the second half of the year.

foreign financial institutions, statements by President Bush supporting both the Israeli economy and loan guarantees to Israel, the short period between the dissolution of the Knesset and new elections (on January 28, 2003) which would reduce the period of market uncertainty, and the passage of the 2003 budget. Factors which had exerted pressure for a weakening of the NIS during the year, such as the security situation and the potential conflict with Iraq, continued during these three months. The downgrading of Israel's domestic debt by two rating agencies added further pressure to the NIS. In the last two weeks of December, weeks marked by thin trading due to the end-of-the-year holiday season in world markets, the NIS weakened from about NIS 4.64 to NIS 4.79 against the dollar primarily against the backdrop of the potential conflict with Iraq. On December 31, the representative rate of the NIS was set at 4.737 against the dollar and 5.0467 against the currency basket, a depreciation of 7.3 percent and 13.0 percent respectively from its levels at the beginning of the year.

## 2. NIS EXCHANGE-RATE INDICATORS

The average volatility of the NIS/currency basket exchange rate was 9 percent in 2002, and of the NIS/US dollar, 8.3 percent, both significantly higher than their levels in 2001.

The average volatility<sup>5</sup> of the exchange rate of the NIS against the currency basket in 2002 was 9.0 percent, 3.9 percentage points higher than in 2001. The volatility of the NIS against the US dollar was 8.3 percent, more than double the average of 4.0 percent in 2001 (see Figure 2.3 and Table 2.1). The higher volatility of the NIS in 2002 than in 2001 and previous years reflects the market's response to the rise in uncertainty, especially with regard to macroeconomic policy.

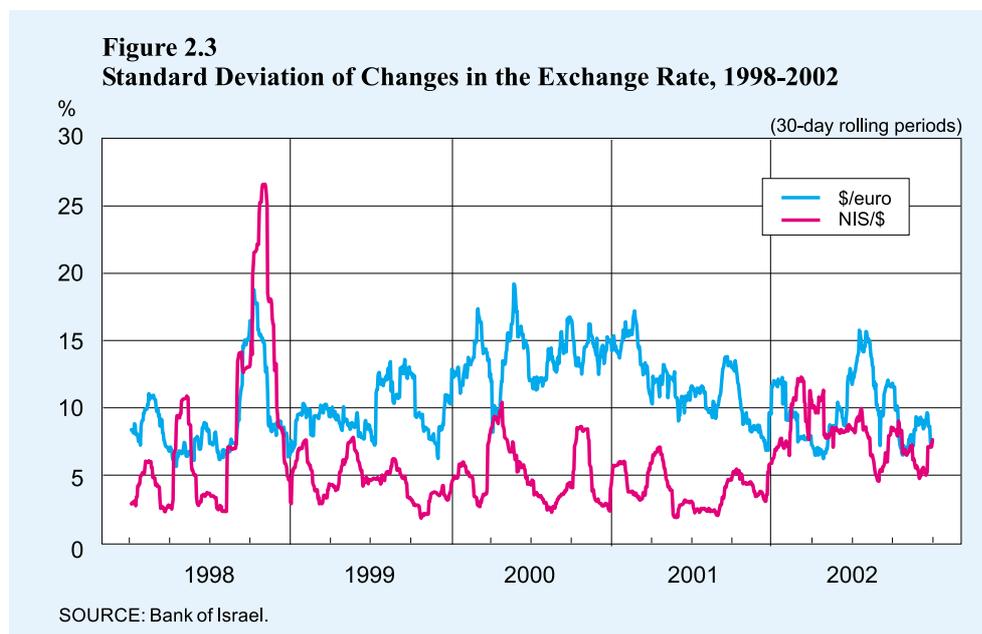
**Table 2.1**  
**Volatility of the NIS against the Dollar, 1993-2002**

	(daily average)	
	Volatility of NIS/\$ (%)	Intraday volatility of the NIS/\$ in agorot
1993	5.0	—
1994	4.2	1.2 <sup>a</sup>
1995	4.9	1.4
1996	5.2	1.3
1997	4.0	0.8
1998	8.4	1.4
1999	4.7	1.0
2000	5.1	1.0
2001	4.0	0.9
2002	8.3	2.1

<sup>a</sup> July-December 1994.

SOURCE: Bank of Israel.

<sup>5</sup> The volatility of the exchange rate is defined as the standard deviation of exchange-rate changes during the previous twenty-two business days (approximately thirty calendar days, or one month). The standard deviation is a statistical measure of the distribution of data around its mean, which is often used to measure the risk of financial assets.

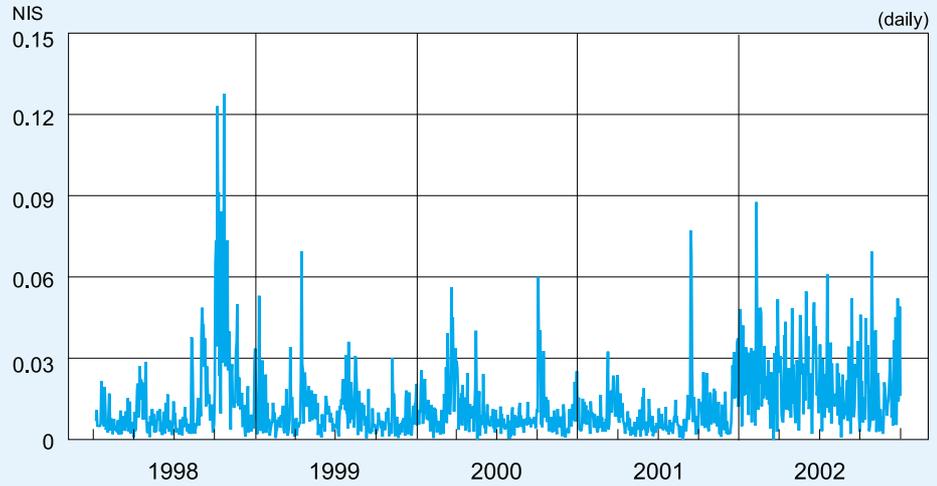


As can be seen from Figure 2.3, NIS/dollar volatility started rising at the end of December 2001 as the NIS weakened following the two-percentage-point reduction in the interest rate. The volatility continued rising, reaching its highest levels of the year during March, when it was around 12 percent for the first two weeks of the month. NIS/dollar volatility remained high during April—between 9.5 and 11.5 percent. Following the interest-rate hikes in May and June, NIS/dollar volatility declined rapidly, to around 5.0 and 6.0 percent, as confidence returned to the market and the NIS strengthened. In the last few months of the year the NIS/dollar volatility rose again, to the 7.0 percent to 9.0 percent range. This was due to an increase in uncertainty against the background of the budget negotiations, the dissolution of the Knesset, the downgrading of Israel's domestic debt and concern about war with Iraq.

Two additional measures of exchange-rate volatility, the *intraday volatility of the exchange rate* and the *bid-offer spread of the exchange rate*, showed sharp rises during the year 2002. The intraday volatility of the exchange rate, defined as the difference between the lowest and the highest exchange rates recorded in interbank trading on each day, averaged 2.1 agorot in 2002, much higher than the averages of around 1.0 agorot recorded in each of the previous eight years (Table 2.1 and Figure 2.4). The bid-offer spread of the NIS/dollar exchange rate as quoted by the interbank brokers was around 0.5 agorot during most of 2002, higher than the average of 0.3 agorot in 2001 (Figure 2.5). Following the Bank of Israel's press release and subsequent 0.6-percentage-point interest-rate hike in mid-February, the bid-offer spread was quoted at 1.0 agorot for about ten days. The general level of uncertainty which prevailed in 2002 caused volatility to remain high throughout the year, unlike in previous years when exceptional events caused instability in the market for a few days and only a temporary widening of spreads.

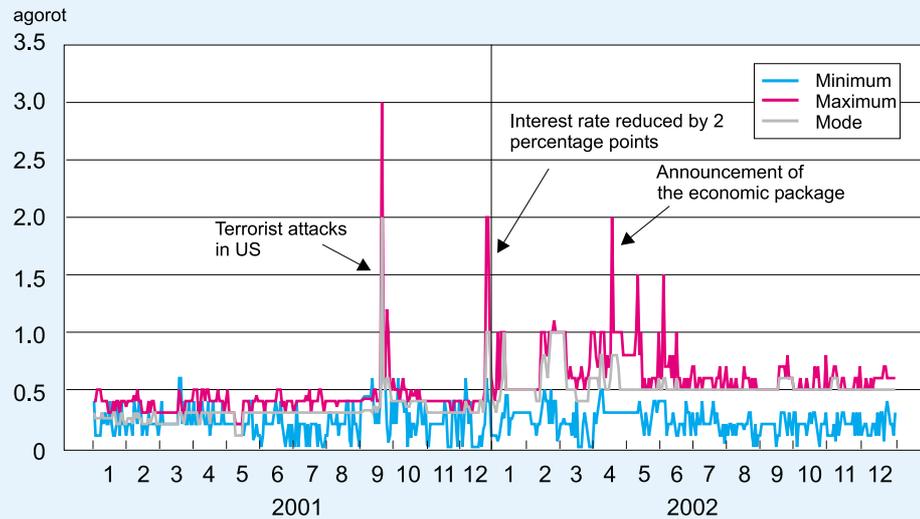
Market uncertainty, especially regarding macroeconomic policy, caused a substantial increase in volatility in 2002.

**Figure 2.4**  
**Difference between the Highest and the Lowest**  
**Dollar Exchange Rates, 1998-2002**



SOURCE: Bank of Israel.

**Figure 2.5**  
**Daily Bid-Offer Spreads in NIS/\$ Market,**  
**as Quoted by Brokers, 2001-2002**



SOURCE: Bank of Israel and the Broker.

An international comparison shows that over time, the volatility of the NIS has been consistently lower than that of currencies of advanced and emerging economies (see Table 2.2). The sharp increase in NIS/dollar volatility during 2002 brought it close to that of the other currencies in our comparison, though it remained slightly lower. (The Canadian dollar is an exception—its volatility is consistently low due to its high correlation with the US dollar.) Three factors may help explain this phenomenon. Firstly,

**Table 2.2**  
**Volatility of the Exchange Rate and Interbank Bid-Offer Spread of Various Currencies against the Dollar, 1998–2002**

	Volatility, per period						Interbank bid-offer spread (estimated)	
	1998		1999	2000	2001	2002	Dec 2001	Dec 2002
	Jan-July	Aug-Dec						
<b>NIS</b>	<b>4.8</b>	<b>13.4</b>	<b>4.7</b>	<b>5.1</b>	<b>4.0</b>	<b>8.3</b>	<b>0.07</b>	<b>0.11</b>
Euro (German mark)	7.9	11.0	9.7	13.8	11.7	9.1	0.03	0.03
Japanese yen	14.6	20.1	13.7	10.2	10.3	9.9	0.02	0.04
Canadian dollar	4.5	8.0	6.0	5.4	5.4	6.2	0.03	0.04
Swedish krona	9.6	13.5	9.4	12.3	12.1	9.7	0.05	0.08
Norwegian krona	9.3	13.7	9.4	11.0	10.7	9.6	0.06	0.10
New Zealand dollar	13.5	13.2	10.6	13.3	13.0	10.0	0.10	0.12
Czech koruna	12.8	14.5	10.0	11.9	11.3	11.3	0.08	0.13
Hungarian florin	6.8	8.3	8.0	12.8	12.6	10.1	0.11	0.13
Polish zloty	10.9	11.8	9.9	11.7	10.6	9.6	0.07	0.10
S. African rand	10.5	21.7	9.3	9.8	13.2	19.1	0.10	0.32

SOURCE: Based on Bloomberg.

the NIS is traded mainly on the domestic market, while the other currencies, including those of other emerging markets are traded internationally to a greater extent. Secondly, speculative trading, which is estimated by international market makers to comprise more than 50 percent of all foreign exchange trade, is very limited in the NIS market. Foreign financial institutions, some of which routinely engage in speculative trading, either on their own behalf or on behalf of their clients, account for only 16 percent of spot NIS/foreign exchange trades (see Table 2.5 below). Finally, the NIS/basket exchange-rate band (see Appendix 2.3) can impose a limit on volatility. Between 1995 and 2001, the NIS traded, on average, within 4 percent of the lower limit of the band, causing an asymmetric distribution of expected future exchange rates. During 2002, the NIS traded at a distance of 14 percent, on average, from the lower limit of the band. This, among other factors, may explain the increase in NIS volatility in 2002.

Comparing the bid-offer spreads of various currencies against the dollar (expressed as a percent of the underlying exchange rate), note that the currencies which are traded most actively on worldwide foreign exchange markets (e.g. euro and yen) trade at the narrowest spreads, while those currencies with lower worldwide turnover trade at wider spreads. During 2002, the bid-offer spread of the South African rand was particularly wide (0.3 percent), approximately three times wider than that of the NIS, due to a financial crisis in South Africa, which caused, among other things, an increase in inflation, a depreciation of the currency, and a four-percentage-point increase in the interest rate set by the central bank.

At the time of this writing, a new index is being developed in the Foreign Exchange Department which expresses, in a single number, how smoothly the NIS foreign exchange market is functioning on a given day. By comparing the value of the current day with the results of the previous days, policymakers can identify the existence and

The volatility of the NIS during 2002 approached that of other currencies.

the extent of market disturbances which may require further action. The index is described in Box 2.1 below.

### **Box 2.1: A Market-Integrity Index for the Foreign Currency Market**

Ensuring that the domestic foreign-currency market is functioning properly is one of the main responsibilities of every central bank. To help decision makers to identify, as early as possible, developments that may indicate that the domestic foreign-currency market is not functioning properly, the Foreign Currency Department of the Bank of Israel has developed an index of the degree of market integrity. The index expresses in one number the measure of proper functioning of the market on a given day relative to all the days for which the index has been calculated. It also enables the identification of days on which the orderly functioning of the market was disturbed, and indicates the seriousness of the disturbance.

The index, which is still in its trial stage, assigns weights to the following four data series. Each of the series is adjusted by deducting its average and dividing by its standard deviation. The weights of the series are determined according to the Principal Component Analysis method, which ensures that the index reflects the trends common to its component series.

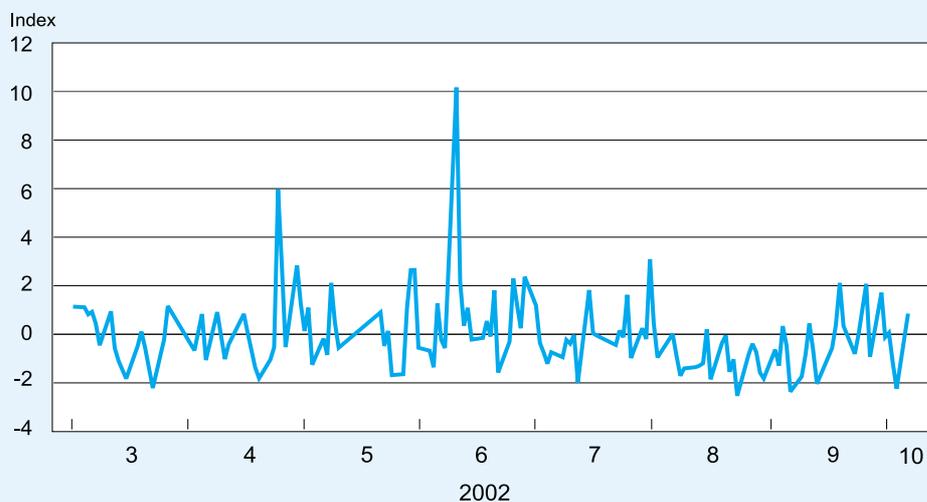
The following table shows the data series that make up the index, and alongside each series the correlation between it and the index.

<u>Component</u>	<u>Correlation</u>
Sum of the absolute changes in the exchange rate during the day	90%
Intraday volatility of the exchange rate	83%
Daily volume of foreign-currency transactions	80%
Highest daily offer-bid spread	59%

Volatility is the standard deviation of the percentage changes (in log terms) in the exchange rate from observation to observation. Unlike the first component—the sum of absolute changes—that expresses the ‘distance traveled’ by the exchange rate during the day, the volatility reflects the uniformity of the trend, i.e., the degree of similarity between the changes from one observation to the next in terms of size and direction. The first two components are calculated using observations made at five-minute intervals.

Note that the index as defined is a means of measuring the *ongoing integrity* of the market (i.e., whether the market is functioning today as it has done until now), as opposed to its *inherent integrity* (i.e., how it compares with other financial markets), a characteristic that changes only slowly over time. This distinction throws light on the role of the daily value of transactions as a component of the index: whereas in assessing the functioning of a

### The Market-Integrity Index of the Foreign-Currency Market, 1 March to 7 October 2002



SOURCE: Based on Reuters.

particular market a higher average volume of transactions will be interpreted as indicating a higher level of development, in measuring the current status of the market a daily volume higher than the historical average will suggest financial pressure.

Figure 1 shows the values of the index from March to October 2002. For most of that period the index fluctuated between  $-2$  and  $+2$ , a range indicating functioning of the market. On two days in the period the index gave exceptionally large readings: on 24 April, following the Finance Minister's announcement regarding taxation of the capital market, the index reached 5.96, and on 10 June, following the 1.5-percentage-point hike in the interest rate by the Bank of Israel, it climbed to 10.17. On five other days in the period the index was relatively high, above 2.5, indicating atypical conditions affecting the base series; four of these five days were in April or May.

### 3. TURNOVER IN THE FOREIGN-CURRENCY MARKET

The analysis in this section includes only data available directly to the Foreign Currency Department. Therefore, it includes data on spot<sup>6</sup> and swap<sup>7</sup> transactions, but does not

<sup>6</sup>Spot transactions include outright forward foreign exchange trades, which are spot transactions that settle more than two business days, and even up to a year or more, in the future.

<sup>7</sup>A foreign exchange swap is a combination of two transactions—a foreign exchange trade at the beginning of the swap, i.e., spot, and an outright forward foreign exchange trade in the opposite direction at the end of the swap. For example, one party sells NIS to a second party today in exchange for dollars. Simultaneously, the first party enters an obligation today to buy back the NIS from his counterparty, in exchange for dollars, at an exchange rate agreed upon at the outset (outright forward). The forward foreign exchange rate (i.e. the swap rate) is calculated solely on the basis of the interest differential between the two currencies involved in the transaction. One side of the swap transaction is usually a commercial bank, a market maker. The other side can be a corporation or other financial concern that wants to hedge against the exchange-rate risk to which it would be exposed if it executed only one side of the swap. Swap transactions affect trade volume, but not the level of exchange rates.

The average daily turnover of foreign exchange activity reached \$ 5.2 billion in 2002, a 20 percent increase over the level in 2001. Turnover is composed of three distinct segments: NIS/FX, FX/FX and foreign-currency-indexed transactions.

include data on foreign-currency options, even though it is known that an active NIS/dollar options market exists and that options positions may be hedged in the spot market. Available data are of market flows, i.e., purchases and sales of foreign currency. No data are available regarding the stock of exposures to foreign exchange rates.

Trade in Israel's foreign-currency market comprises three distinct segments: the NIS/FX segment which includes NIS trades against foreign currency, the FX/FX segment which includes trade in all non-NIS currencies, such as dollar against yen and euro against sterling, and lastly, the market for foreign-exchange-indexed transactions,<sup>8</sup> which is very small and is used almost exclusively by Israeli customers as a proxy for forward NIS/FX transactions (Table 2.3). Combining the trade turnover in all segments of the market, the average daily turnover of foreign exchange activity reached \$ 5.2 billion in 2002, representing a 20 percent increase over 2001 and an 89 percent increase in activity since 2000. FX/FX transactions accounted for the largest share of the market in 2002—fifty-three percent—with average daily turnover of \$ 2.8 billion. Turnover in the NIS/FX segment of the market averaged \$ 2.2 billion per day (Figure 2.6). The growth of the market in recent years may be attributed in a large measure, although not exclusively, to the increased participation of foreign financial institutions acting on their own behalf and on behalf of their clients. Foreign financial institutions have been particularly active in foreign exchange swap transactions, where they account for approximately 68 percent of NIS/FX swaps and 94 percent of FX/FX swaps. The growing participation of foreign financial institutions in Israel's foreign-currency market has occurred alongside the integration of Israel's economy into the global economy. Benefits of their participation include an increase in the depth, liquidity, and level of competition in the market, through the reinforcement of universally accepted norms of trade and through the subjection of the domestic market to the judgement and decision-making criteria of foreign entities.

While trade in Israel's foreign currency market has grown markedly in recent years, international foreign exchange activity has contracted—by 19 percent between 1998 and 2001, according to the Bank for International Settlements (BIS). The introduction of the euro, the growing share of electronic broking in the spot interbank market, and consolidation in the banking industry appear to have been the main causes of this decline in foreign exchange turnover.

Comparing Israel's foreign exchange activity with global turnover (Table 2.4), we find that although it is relatively small, it is comparable to that of other countries which are similar to Israel in terms of their levels of economic development, openness and international trade, such as the Czech Republic, Greece and New Zealand. (It should be noted that Israel's average daily turnover in this comparison includes only one leg of the foreign exchange swap transactions, in keeping with the calculation method of the BIS.)

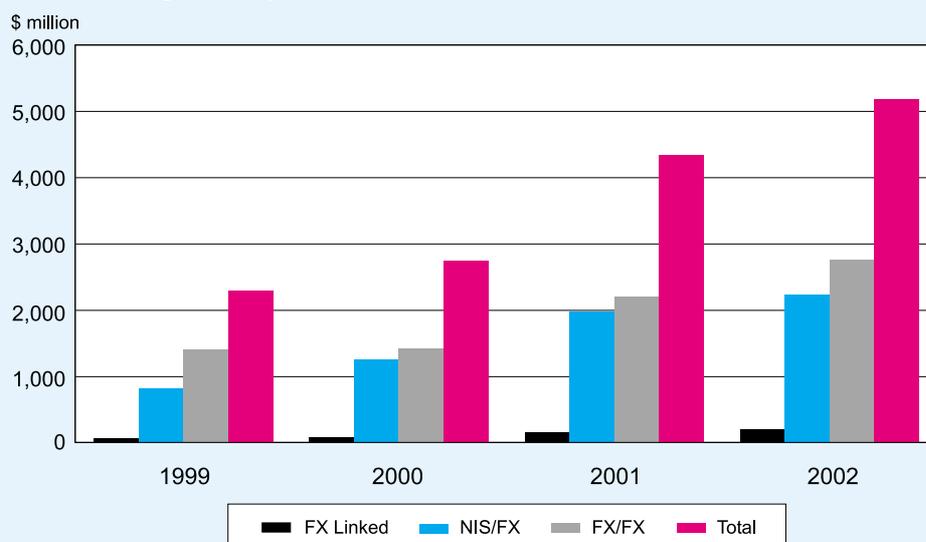
<sup>8</sup> Foreign-exchange-indexed transactions here include only forward foreign exchange trades. Other types of indexed transactions such as deposits and loans are not included in this survey.

**Table 2.3**  
**Average Daily Turnover in Israel's Foreign Currency Market,**  
**by Sector and Counterparty, 2001-2002<sup>a</sup>**

	2001				2002			
	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	Total	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	Total
NIS/FX	270	806	905	<b>1,981</b>	326	814	1,085	<b>2,225</b>
FX/FX	38	638	1,522	<b>2,197</b>	42	643	2,069	<b>2,754</b>
FX Indexed	1	156	–	<b>157</b>	0	206	–	<b>206</b>
<b>Total</b>	<b>309</b>	<b>1,600</b>	<b>2,427</b>	<b>4,335</b>	<b>368</b>	<b>1,663</b>	<b>3,154</b>	<b>5,185</b>

<sup>a</sup>Includes both legs of the swap transactions; does not include options.  
 SOURCE: Bank of Israel.

**Figure 2.6**  
**Average Daily Turnover in Foreign**  
**Exchange Activity, 1999-2002**



SOURCE: Based on daily reports from the domestic banks.

### Turnover in the NIS/Foreign-Currency Market

The average daily turnover in the NIS/FX market reached \$ 2.2 billion in 2002, a 12 percent rise over the level in the previous year. This activity represents an increase of about 12 percent in both spot transactions and in foreign exchange swap transactions.

**Table 2.4**  
**Reported Foreign Exchange Market Turnover in Various Countries,<sup>a</sup> April 2001**

(daily average, US\$ billion)

	In all currencies	vs. local currency
<b>Total turnover worldwide</b>	<b>1,618</b>	<b>836</b>
United Kingdom	504	123
United States	254	236
Japan	147	110
Germany	88	56
Canada	42	26
Sweden	24	14
Norway	13	8
South Africa	10	8
Poland	8	6
Greece	5	4
New Zealand	4	3
<b>Israel</b>	<b>3</b>	<b>1</b>
Czech Republic	2	2
Hungary	1	— <sup>b</sup>
Turkey	1	— <sup>b</sup>

<sup>a</sup> Includes only one leg of the swap transactions.

<sup>b</sup> Less than \$ 0.5 billion.

SOURCE: BIS, October 2001, and Bank of Israel.

The average daily turnover in the NIS/FX market reached \$ 2.2 billion in 2002, a 12 percent increase over the previous year.

Spot transactions reached \$ 827 million and swap transactions reached \$ 1,398 million in 2002, compared with \$ 734 million and \$ 1,247 million respectively in 2001 (Figure 2.7). About 90 percent of NIS trade is transacted against the dollar, which is similar to the figure for worldwide foreign exchange turnover, according to figures released by the BIS in October 2001.

The slowdown in the growth rate of the NIS/FX market vis-à-vis previous years reflects the market's maturity and its approach to a state of equilibrium.

The 12 percent rate at which the market grew in 2002 represents a slowdown in the growth rate over recent years—58 percent in 2001 and 54 percent in 2000. Most of the slowdown was due to a decline in the growth rate of swap activity, which grew by only 12 percent in 2002 after 99 percent and 104 percent in 2001 and 2000 respectively. Israeli customers of the domestic banks reduced their average daily swap activity in 2002 to \$ 319 million from \$ 337 million in 2001, while the domestic interbank sector and foreign financial institutions increased activity at a slower pace than in previous years. It is likely that the slowdown in the market's growth rate stems from the market's maturity: since rapid expansion is not sustainable indefinitely, it may be that after several years of expansion in response to liberalization, the market is getting closer to its equilibrium. Nevertheless, the 12 percent growth rate of the market should be viewed against the 19 percent contraction in worldwide activity between 1998 and 2001, as reported by the BIS and discussed above.

Figure 2.7 and Table 2.5 show average daily turnover in the NIS/FX market during 2002 and over time. Transactions between domestic banks and their customers accounted for 37 percent of the market in 2002, down from 41 percent in 2001. This reflects a small 5 percent increase in spot transactions and a decline of 5 percent in swap

**Table 2.5**  
**Average Daily Turnover in the NIS/Foreign-Currency Market,**  
**by Transaction Type and Counterparty, 2001-2002**

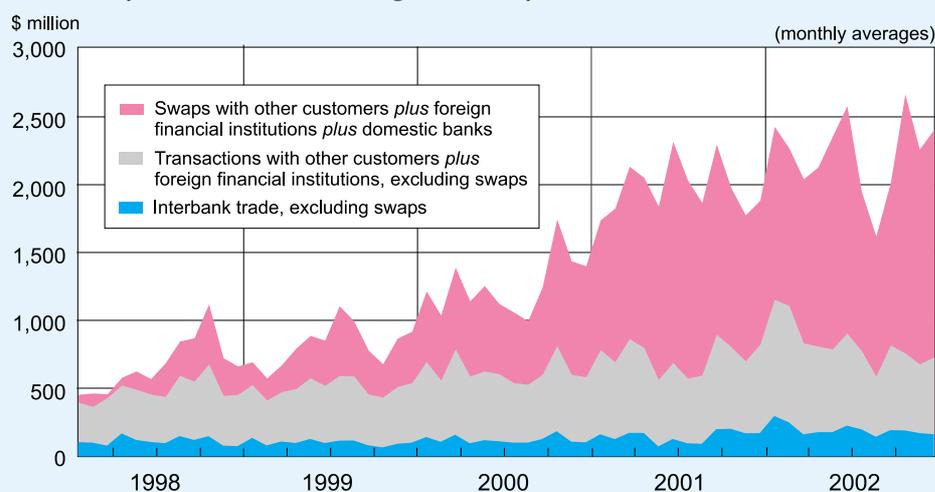
	Spot Transactions				Swap Transactions <sup>a</sup>			
	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	Total	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	Total
2001	150	468	116	734	121	337	789	1,247
2002	198	495	133	827	128	339	951	1,399
Change <sup>b</sup> (%)	32.2	5.8	15.0	12.6	6.3	-5.4	20.6	12.1
Market share (%) (2002 average)	24.0	59.9	16.1	100.0	9.2	22.8	68.0	100.0

<sup>a</sup>Includes both legs of the transactions.

<sup>b</sup>Calculated from unrounded figures.

SOURCE: Bank of Israel.

**Figure 2.7**  
**Daily Turnover in the Foreign-Currency Market, 1998-2002**



SOURCE: Based on daily reports from the domestic banks.

transactions. Transactions between domestic banks and foreign financial institutions accounted for 49 percent of the market in 2002, up from 46 percent in 2001. Their market share of swap transactions increased to 68 percent from 63 percent, while spot market participation remained stable at 16 percent. Foreign financial institutions sold dollars and bought NIS during most of the year (Figure 2.8).

An analysis of activity in spot transactions in 2002 shows a direct connection between the level of turnover in the market and the rate of absolute change of the NIS/dollar exchange rate. On the days on which daily turnover was greatest, at more than \$ 1,500 million, the representative rate marked the largest average daily change, 0.8%. On the

**Figure 2.8**  
**Cumulative Net Purchases of Dollars**  
**by Foreign Financial Institutions, 2002**



SOURCE: Based on daily reports from the domestic banks.

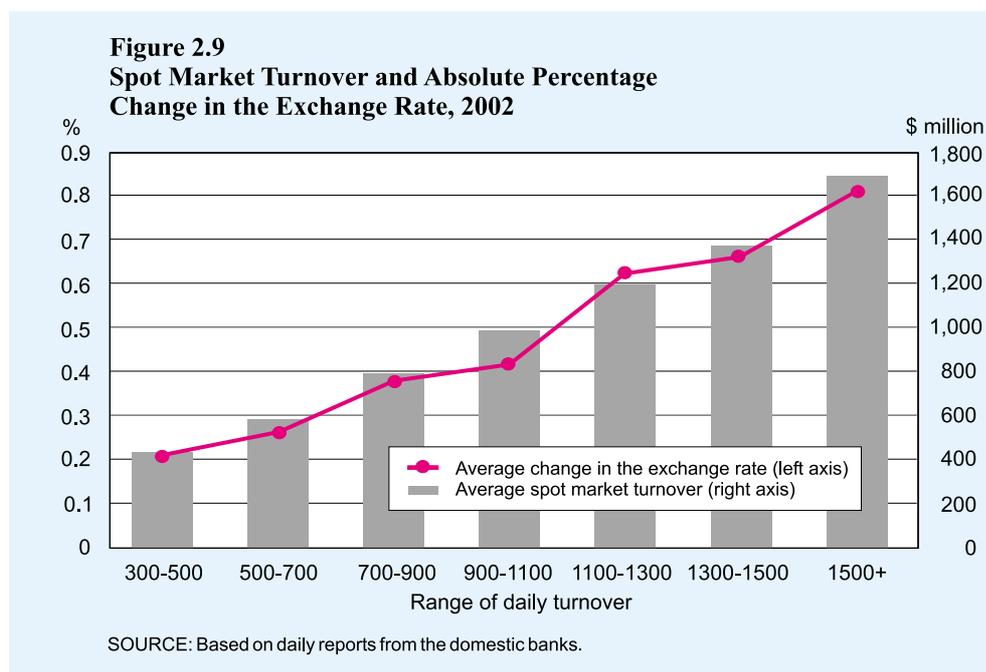
There is a direct connection between the level of turnover in the market and the rate of absolute change in the NIS/\$ exchange rate: on days with the greatest daily turnover, the representative rate marked the largest average daily change.

days on which daily turnover was lowest, between \$ 300 million and \$ 500 million, the exchange rate marked the lowest average daily change, 0.2%. The analysis is also consistent for levels of turnover between these two points (Figure 2.9). The connection between the level of trade turnover and the degree of absolute change in the exchange rate is found among all the market participants: interbank, domestic bank customers and foreign financial institutions. Nevertheless, on the days on which trade turnover exceeded \$ 1,500 million, foreign financial institutions accounted for about 20 percent of activity in the market, four percentage points more than their average market share for the year. One possible explanation for this is an increase in speculative activity by foreign financial institutions in times of exceptional events.

According to one measure of spot NIS/FX activity, foreign financial institutions consistently hold larger open foreign exchange positions (both long-NIS and short-NIS) than the Israeli customers of the domestic banks. Calculated by dividing absolute net foreign exchange positions by total trade turnover, on a daily basis, the positions of the foreign financial institutions accounted for an average of 28 percent of total turnover during 2002, vis-à-vis 9 percent for the Israeli customers. While this measure makes sense intuitively, since domestic customers are a heterogeneous group who trade foreign exchange for a variety of reasons (e.g. foreign trade, i.e., imports and exports; tourism, i.e., Israeli tourists going abroad and foreign tourists coming to Israel; investors, speculators and others), it also seems to support the view that foreign financial institutions engage in more speculative activity than do domestic customers.

Data regarding the activity of foreign financial institutions shows a high degree of market concentration. While about 100 foreign financial institutions traded in the NIS/FX market during 2002, only 70 to 75 institutions, on average, were active in spot transactions in any single month and only 40 to 50 institutions, on average, were active

The activity of foreign financial institutions in the NIS/FX market is highly concentrated.



in swap transactions. Of these, the market is dominated by a handful of foreign banks. Among spot transactions, one institution holds about 25 percent of the market share, three institutions account for 50 percent of market share, and eight institutions account for 76 percent of market share. The situation is similar among swap transactions: two institutions account for 30 percent of market share, four institutions account for 50 percent, and nine institutions account for 77 percent. Only the two most active institutions in each sector (spot and swap transactions) trade consistently, almost every day, and there is only one institution which is consistently active in both spot and swap transactions.

### Turnover in the non-NIS Foreign-Currency Market

As can be seen from Table 2.6, trade in the FX/FX market differs from that in the NIS/FX market. Firstly, in the spot market, foreign financial institutions account for more than half the activity, 54.2 percent, while resident activity combined accounts for 42.8 percent of the market and interbank activity accounts for only 3.0 percent of the market. This suggests that the domestic Israeli banks offset most of their own and their customers' FX/FX trades against foreign banks, the natural FX/FX market makers. Secondly, swap market activity is dominated by trade between domestic banks and foreign financial institutions (94.2 percent), while customer activity is particularly low (5.6 percent). It appears that when Israeli customers take foreign exchange positions, they do so primarily via spot and outright forward foreign exchange transactions. In order to finance these positions, they are able to take foreign-currency loans directly from the domestic banks, eliminating the need for a swap. The domestic banks then cover their open forward positions through swaps against foreign financial institutions.

Foreign financial institutions accounted for more than 50 percent of FX/FX turnover in 2002.

**Table 2.6**  
**Average Daily Turnover in the FX/FX Market,**  
**by Transaction Type and Counterparty, 2001-2002**

(\$ million)

	Spot Transactions				Swap Transactions <sup>a</sup>			
	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	<b>Total</b>	Domestic interbank	Domestic banks and their customers	Domestic banks and foreign financial institutions	<b>Total</b>
2001	33	587	655	1,275	5	51	867	922
2002	39	562	712	1,313	3	81	1,357	1,441
Change <sup>b</sup> (%)	16.7	-4.3	8.7	3.0	-30.8	59.8	56.6	56.3
Market share (%) (2002 average)	3.0	42.8	54.2	100.0	0.2	5.6	94.2	100.0

<sup>a</sup> Includes both legs of the transactions.

<sup>b</sup> Calculated from unrounded figures.

SOURCE: Bank of Israel.

APPENDIX 2.1: REPRESENTATIVE RATES<sup>1</sup>

Representative rates give the exchange rates of foreign currencies and the currency basket in terms of NIS. The representative rate of any currency is an indicator of the exchange rate prevailing in the market;<sup>2</sup> it is based on an average of buying and selling prices published by banks, and does not necessarily reflect rates at which transactions were carried out. The rates have no official validity, are not legally binding, and are not published in the Official Gazette. They are used mainly for valuations and in contracts. Parties to a foreign-currency-indexed business transaction may carry out the transaction at any exchange rate agreed between them. The representative rate is binding for such a transaction only if explicitly stipulated in advance by the parties.

Several other Western countries which have bilateral foreign-currency trading systems also publish representative exchange rates. The United States Federal Reserve Bank publishes the mid-rate of interbank trade in New York twice a day. The rate appears on Reuters screen 1FED. The Bank of England publishes a mid-rate, based on its own calculations, daily, at 11:00 a.m., on Reuters screen BOE/SAF.

The Bank of Israel calculates representative exchange rates once a day on foreign-currency business days only, and makes them available to the general public as a purely informational service. There are no representative rates on Saturdays, Sundays, Israeli holidays, Christmas Day, New Year's Day and Easter, when foreign exchange markets are closed in most countries.<sup>3</sup> There may, of course, be other occasions when representative rates cannot be published due to lack of data or because there has been no trade in foreign currency, or for other reasons.

Information on the new rates of exchange is normally available in the afternoon (see below). The time is not fixed, however, and the rates may be calculated and made available to the public at other times. It is therefore advisable for the parties to a transaction linked to the representative rate to stipulate in advance what the relevant rate is to be: for example, the one published on the date of the transaction, the latest published rate before the date on which the transaction is carried out, or the rate published on a certain date before or after the date of the transaction.

Until May 23, 1990 the representative rate of the US dollar on a certain date was calculated as the average of the commercial banks' quoted buying and selling rates (transfers and checks) as reported by the banks to the Bank of Israel. As of May 24, 1990, when multilateral trading in US dollars against NIS between the Bank of Israel

<sup>1</sup> This information is current at the time of publication. It does not replace any law, regulation, or directive. Additional details and explanations may be obtained from the General Information Center, Foreign Currency Department, Bank of Israel, Tel. 972-2-655-2321.

<sup>2</sup> The representative rate of a foreign currency is not necessarily identical with any of its commercial exchange rates, e.g., rates quoted by commercial banks to their customers, buying and selling rates of banknotes, checks and transfers, and interbank rates.

<sup>3</sup> Until July 31, 1986 no representative rate was published for the currency of a country on its national holidays.

and the authorized dealer banks was introduced, and until multilateral trading was canceled, the representative rate for a given day was the rate at which the daily trading session closed. Multilateral trading between the banks and the Bank of Israel came to an end on April 3, 1995, and all trading has henceforth been on a continuous bilateral basis.<sup>4</sup> The system of determining the representative rate was adjusted at the same time, and the representative rate of the NIS against the US dollar for a specific day is the average rate in NIS of bilateral interbank trading close to the end of trading hours, which are set by the Supervisor of Banks. The average rate is calculated on the basis of a sampling of exchange rates published by the banks on the Reuters screens, taken at a random moment between 14.15 and 15.15 (or between 11.15 and 12.15 on Fridays and holiday eves). The representative exchange rate is published soon after 15.15 (or soon after 12.15 on Fridays and holiday eves). The representative rate is calculated from the average of the banks sampled, and excludes values which deviate from the sample average by more than two standard deviations. In exceptional cases, when the calculated exchange rate does not reflect actual rates prevailing in the market, discretion may be exercised in determining the representative rate.

The representative rates of the NIS against other currencies are based on the representative rate of the US dollar and the exchange rates of the relevant currencies against the US dollar on the international money markets at the moment the representative rate is determined. Consequently, the relationship between the various representative rates reflects the relationship between spot exchange rates abroad at the time they are determined.

On January 4, 1999, with the introduction of the euro in the European Monetary Union (EMU), the Bank of Israel began publishing a representative exchange rate against the euro instead of against the ECU (European Currency Unit). The Bank continued publishing exchange rates against the currencies of the EMU member countries up to and including January 25, 2002.<sup>5</sup> On January 1, 2002 euro-denominated notes and coins were introduced into circulation for use as the single currency of the EMU member countries. The national currencies of these countries were withdrawn from circulation during the first two months of 2002, with the effective dates differing from country to country. Against this background, the Bank has not published representative rates for the currencies of the EMU member countries since January 25, 2002.

<sup>4</sup> For the transition to the continuous bilateral trading system, see the 1994 publication of "Foreign Currency Exchange Rates in Israel," pp. xv-xviii.

<sup>5</sup> Note that there may have been differences between exchange rates calculated (in NIS) for the currencies of the EMU member countries via the euro representative rate, and their representative rates as published by the Bank of Israel. For a detailed explanation of this difference, see the Press Release dated September 15, 1998.

## APPENDIX 2.2: THE CURRENCY BASKET

The currency basket was introduced on July 19, 1976. The composition of the basket was based on the shares of five currencies—US dollar, German mark, Pound sterling, French franc, and Dutch guilder—in Israel's goods exports. At that time creeping devaluations of the Israeli pound against the currency basket were carried out. This regime continued until the end of October 1977, when it was changed to a managed float of the exchange rate.

In July 1985, with the start of the economic stabilization program, a regime of a fixed exchange rate against the US dollar was introduced.

A new currency basket was introduced on August 1, 1986. The currencies comprising it and their weights (see Table A.2.2.1) reflect their share in Israel's foreign trade of goods and services (imports and exports, excluding diamonds). Since the inception of the basket, the parameters of the exchange-rate regime (today, the exchange-rate band) have been set in terms of the basket rather than in terms of a specific currency.

The number of units of each currency in the basket is determined according to its share in trade during the previous calendar year and to international cross rates at the time the basket's composition is fixed. The number of units of each currency in the basket is constant, but the weight of each currency can change daily according to changes in cross rates. For example, when the US dollar gains strength, its share in the basket rises, and vice versa.

Since the original composition of the basket was determined, the Bank of Israel has periodically checked the composition of trade in the previous calendar year, and compared it to the average composition of the basket in the same period. Until the beginning of 1995 only slight differences between the two were found, so that the composition of the basket was not changed till then, other than the continuous daily changes in weights arising from changes in cross rates. The review carried out in 1995, based on trade figures for 1994, revealed that the weight of the US dollar in the basket was 3.2 percentage points lower than its share in foreign trade. It was therefore decided on June 5, 1995 to increase the US dollar's weight in the basket by a similar amount, with corresponding reductions in the weights of the other currencies in the basket. In discussions between the Ministry of Finance and the Bank of Israel it was decided that each year the final trade figures for the previous year would be reviewed, and if these showed a difference of two percentage points or more between a currency's weight in the basket and its share of trade, the composition of the basket would be amended accordingly.

Following the above decision, on April 30, 1996 the weight of the dollar was increased by 3.3 percentage points, and those of the other currencies reduced accordingly. The review of the trade figures carried out in April 1997, April 1998 and April 1999 (i.e., of trade in 1996, 1997, and 1998) showed no significant differences between the

compositions of the basket and of the trade, so that no changes were made to the number of currency units in the basket for these years. In a similar review undertaken in April 2000, the share of the pound sterling in the currency basket was reduced by 2.1 percentage points. The weights of the other currencies were adjusted accordingly. The reviews carried out in April 2001 and April 2002 of the 2000 and 2001 trade figures, respectively, did not result in a change in the composition of the basket.

On January 4, 1999, due to the introduction of the euro in the European Monetary Union, a change was made to the composition of the currency basket. The euro replaced the German mark and the French franc. This change was purely technical and had no effect on the value of the currency basket.

As pointed out earlier, the relative shares of currencies in the basket change on every trading day in accordance with changes in their exchange rates, but the number of units of the currencies composing the basket remain as shown in Table A.2.2.2.

**Table A.2.2.1**  
**Weight of Currencies in the Basket, 1986–2002**

		(percent)					
Currency basket	Date	US\$	DM	£	FFr	¥	€
<b>When determining composition</b>							
1986	01.08.86	60.0	20.0	10.0	5.0	5.0	
1995	05.06.95	54.8	24.2	8.3	5.6	7.1	
1996	30.04.96	60.3	21.0	8.0	5.1	5.6	
2000	02.05.00	64.8		6.8		6.4	22.0
<b>At year end</b>							
	31.12.96	60.3	20.7	9.0	5.0	5.0	
	31.12.97	63.0	18.7	9.1	4.6	4.7	
	31.12.98	62.0	19.7	8.2	4.8	5.3	
	31.12.99	63.4	–	9.0	–	6.0	21.6
	31.12.00	64.9	–	6.5	–	6.1	22.5
	31.12.01	66.2	–	6.5	–	5.5	21.8
	31.12.02	62.9	–	6.9	–	5.7	24.5

SOURCE: Bank of Israel.

**Table A.2.2.2**  
**Units of Each Currency in Basket**

Currency basket	US\$	DM	£	FFr	¥	€
1986	0.6000	0.4177	0.0670	0.3394	7.7000	
1995	0.6732	0.3964	0.0604	0.3222	7.0106	
1996	0.6741	0.3588	0.0589	0.2933	6.5437	
1996 (euro)	0.6741	–	0.0589	–	6.5437	0.2282
2000	0.6698	–	0.0453	–	7.2411	0.2493

## APPENDIX 2.3 THE EXCHANGE-RATE BAND

On January 3, 1989 the Bank of Israel, in consultation with the Treasury, changed the policy regarding the determination of the exchange rate against the currency basket.<sup>1</sup> Instead of an exchange rate held constant over a period of time and adjusted from time to time, the rate was allowed to fluctuate within a band with limits 3 percent above and below the midpoint rate. The fluctuation span around the midpoint allowed expression to supply and demand for foreign exchange. Every few months the midpoint was adjusted (i.e. the NIS was devalued). On March 1, 1990 the limits were extended to  $\pm 5$  percent.

On December 17, 1991 another change was introduced to the regime. Under the new system, there was a gradual, constant, and predetermined adjustment to both the midpoint rate and the band. The midpoint rate rose daily at a fixed pace, so that its cumulative annual rise was constant and known in advance (as were those of the upper and lower limits of the band). The band sloped upwards—hence it was known as the crawling band. With the move to a crawling band, the band's width remained at  $\pm 5$  percent until May 31, 1995, when it was widened to  $\pm 7$  percent. On June 18, 1997 the band was widened further, to  $\pm 15$  percent.

The purpose of the crawling band was to indicate a predetermined path for the development of the exchange rate, and thereby to reduce economic uncertainty. The system was also intended to lower the probability of speculative capital flows, which had occurred in the past whenever there were expectations of a relatively large one-time realignment of the horizontal band. Such adjustments were made from time to time on account of the difference between the rate of inflation in Israel and those of Israel's trading partners. These adjustments were accompanied by severe fluctuations in interest rates.

The slope of the band was originally derived from the difference between Israel's expected inflation for the following year as set by the government, and predicted inflation abroad. When it was first established, the slope was 9 percent. The slope was reduced to 8 percent and then to 6 percent on November 9, 1992 and on July 26, 1993 respectively. In the last few years, the practice has changed such that only the slope of the lower limit of the band has been reduced, whenever possible, according to this principle, while the upper limit has remained unchanged, at a steeper slope than the lower limit. As a result, the band is gradually becoming wider. On June 18, 1997 the slope of the lower limit of the band was reduced to 4 percent, while the slope of the upper limit remained unchanged at 6 percent. On August 7, 1998 the slope of the lower limit was reduced further to 2 percent.

On December 24, 2001 the lower limit of the band was reduced by 1 percent and its slope was reduced to zero at a constant rate of NIS 4.1021 to the currency basket—hence the exchange-rate band can no longer be considered a crawling band. Its width was 49.4 percent at the end of 2002 (based on the average of the two limits).

<sup>1</sup> For a discussion of Israel's exchange-rate policy between 1948 and 1988, see the Bank of Israel Foreign Currency Department, Annual Report 2001.

**Table A.2.3.1**  
**Changes in the Exchange-Rate Band of the Currency Basket**

Date of change	Change	Currency basket			US\$	
		Mid-point	Repre- sentative rate	Change from previous day	Repre- sentative rate	Change from previous day
		(NIS)	(NIS)	(percent)	(NIS)	(percent)
<b>03.01.89</b>	<b>Band introduced</b>					
03.01.89	Midpoint raised by 13%; <sup>a</sup> limits $\pm 3\%$	1.9480	1.9479			
23.06.89	Midpoint raised by 6%	2.0649	2.0639	4.3	2.0175	4.4
01.03.90	Midpoint raised by 6% Band widened to $\pm 5\%$	2.1888	2.0941	-0.1	1.9626	0.2
10.09.90	Midpoint raised by 10%	2.4077	2.3086	2.4	2.0800	2.8
11.03.91	Midpoint raised by 6%	2.5522	2.4252	5.8	2.1920	6.7
<b>17.12.91</b>	<b>Introduction of crawling band</b>					
17.12.91	Midpoint raised by 3% Slope of band 9%	2.6288	2.5647	0.1	2.3100	0.1
09.11.92	Midpoint raised by 3% Slope reduced to 8%	2.9251	2.8707	0.3	2.6350	0.6
26.07.93	Midpoint raised by 2% Slope reduced to 6%	3.1511	3.0709	1.9	2.8650	2.1
31.05.95	Midpoint raised by 0.8% Band widened to $\pm 7\%$ No change to slope	3.5372	3.5200	0.4	3.0050	0.3
18.06.97	Gradual widening of the band to reach $\pm 15\%$ by year end Slope of lower limit 4% <sup>b</sup> Slope of upper limit 6% <sup>b</sup>	3.7072 <sup>c</sup> 4.9213 <sup>c</sup>	3.7155	0.2	3.4200	0.1
07.08.98	Slope of lower limit 2% Slope of upper limit 6%	3.8760 <sup>c</sup> 5.2583 <sup>c</sup>	3.9661	1.7	3.7160	1.8
24.12.01	Lower limit reduced by 1% Slope of lower limit 0% at constant rate of NIS 4.1021/basket Slope of upper limit 6%	4.1021 <sup>c</sup> 6.4033 <sup>c</sup>	4.3786	0.2	4.3350	0.3

<sup>a</sup> Including a rise of 5% on 27.12.88.

<sup>b</sup> Without any time limit.

<sup>c</sup> Upper and lower rates of the band. Since 18.06.97, exchange-rate policy relates to the limits of the exchange-rate band, and not to the midpoint rate. The midpoint rate is now used by the Foreign Currency Department for statistical purposes only and does not have any implication for the exchange-rate regime.