D. Foreign Exchange Activity Of The Main Sectors

Unusual volatility characterized the year 2020, due to the COVID-19 crisis. At the beginning of the crisis, the shekel depreciated by about 11 percent against the US dollar, with a significant increase in volatility. Later in the year, the shekel again strengthened by an overall rate of about 7 percent. By the end of 2020, the shekel strengthened against the US dollar and in terms of the nominal effective exchange rate to a record level for the past two decades.

The shekel's marked appreciation came in view of the US dollar's weakness against the currencies of the advanced economies, the increase in the current account surplus, and direct investments in the Israeli economy and the increase in foreign investors' investments in Israel government bonds. It was also a result of Israel joining the global WGBI bond index.

There were net sales of foreign exchange by nonresidents, further to their activity in recent years. Institutional investors purchased large volumes of foreign exchange at the very beginning of the crisis, but then returned to net sales of foreign exchange of a similar volume later in the year.

In view of these developments, the Bank of Israel significantly increased its foreign exchange purchases. Buying a total of about $21 billion in 2020.

1. BACKGROUND: THE EXCHANGE RATES

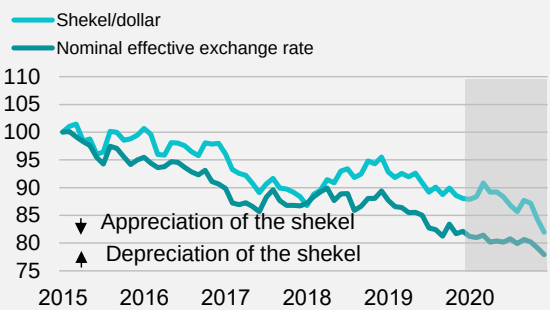
The shekel strengthened in 2020, further to the long-term trend of previous years, reaching a record high against the US dollar and in terms of the nominal effective exchange rate[1].

The shekel strengthened by about 7 percent against the dollar in 2020, reaching NIS 3.22 to the dollar, further to its appreciation of 7.8 percent in the previous year.

The strengthening trend of the shekel against the dollar was not uniform over the course of the year. At the beginning of the COVID-19 crisis in the first half of March, the shekel weakened sharply by about 11 percent against the dollar. The Bank of Israel's foreign currency injections through swap transactions succeeded in halting the sharp depreciation, and from April until the end of the year, the shekel strengthened by about 9.8 percent.

The shekel continued to strengthen by about 5.1 percent in terms of the nominal effective exchange rate, which represents the currencies of Israel's main trading partners.

Figure 4.1: The shekel/dollar and nominal effective exchange rate indices



SOURCE: Bank of

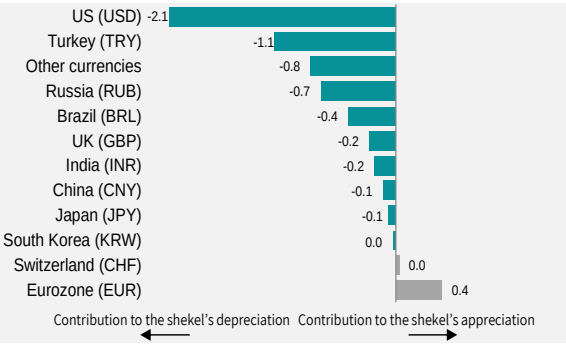
[1] For an explanation of the nominal effective exchange rate, see Data Sources and Main Terms at the end of this section.

The shekel strengthened against most currencies in the basket that comprises the nominal effective exchange rate.

The main contributing factors to the appreciation in terms of the nominal effective exchange rate were the strengthening of the shekel against the US dollar, which contributed 2.1 percentage points to the appreciation, against the Turkish lira, which contributed 1.1 percentage points, and against the Russian ruble, which contributed 0.7 percentage points.

In contrast, the shekel weakened against the euro, contributing about -0.4 percentage points to the appreciation in terms of the nominal effective exchange rate.

Figure 4.2: Contributions of the Change in the Various Currencies to the Change in the Nominal Effective Exchange Rate (5.1 percent)
percentage points

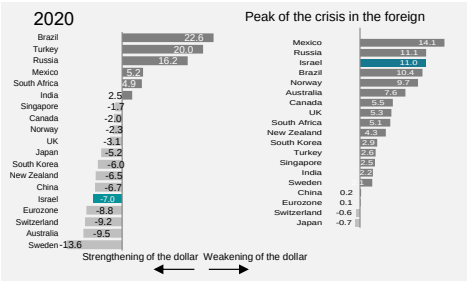


SOURCE: Bank of Israel

In view of the global COVID-19 crisis, the US dollar strengthened against most currencies in March, but weakened later in the year, mainly against the currencies of the advanced economies.

Most currencies of advanced economies appreciated against the dollar in 2020: the euro by 8.8 percent, the Swiss franc by about 9.2 percent, and the Japanese yen by 5.2 percent. The shekel was in the middle of the strengthening trend of advanced economy currencies against the dollarIn contrast, currencies of the emerging markets weakened significantly against the dollar: the Brazilian rial by 22.6 percent, the Turkish lira by about 20 percent, and the Russian ruble by 16.2 percent.

Figure 4.3: Rate of Change of the Dollar Against the Major Currencies*, 2020
Precent



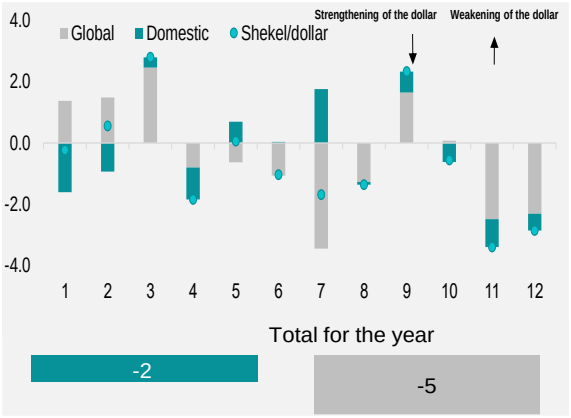
* The data are calculated based on end-of-day figures. The change in the shekel/dollar rate is calculated according to the representative rate.

SOURCE Based on Bloomberg

The weakening of the US dollar globally contributed to the shekel's appreciation against the dollar.

In view of the COVID-19 crisis, the global effect contributed about 5.3 percentage points to the shekel's depreciation against the US dollar in the first quarter of 2020 From the second quarter until the end of the year, the global effect contributed about 10 percentage points to the shekel's appreciation against the dollar. Over the year as a whole, the dollar's global weakness contributed about 5 percentage points to the shekel's appreciation of the dollar. In parallel, the domestic effect contributed about 2 percentage points to the shekel's appreciation.

Figure 4.4: Change in the shekel/dollar exchange rate by domestic and global effects[2], 2020
Percent

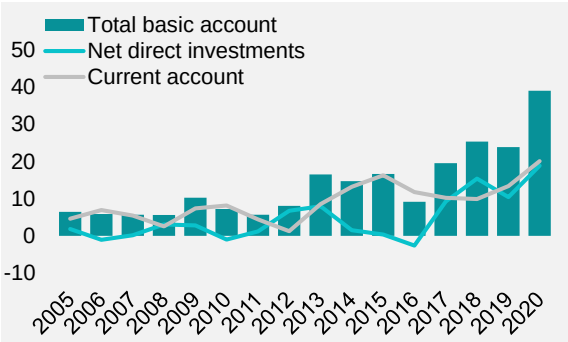


SOURCE Based on Bloomberg

In view of the appreciatory pressures on the shekel, there was a significant increase in the basic account surplus.

Transactions in the basic account totaled about $39 billion in 2020, an increase of about $15 billion from 2019.
This is due to a combination of a continued increase in the current account surplus, which increased by about $6.7 billion to about $20 billion, and an increase in direct investments[3] by nonresidents, which totaled about $19 billion.

Figure 4.5 Transactions in the Basic Account
$ billion



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

[2] The global effect reflects the relative change of the US dollar against 19 currencies that constitute about 90 percent of the total trading volume against the dollar, with the weight of each currency determined in accordance with its relative trading volume against the dollar. The difference between the global effect and the change in the shekel/dollar rate constitutes the domestic effect.

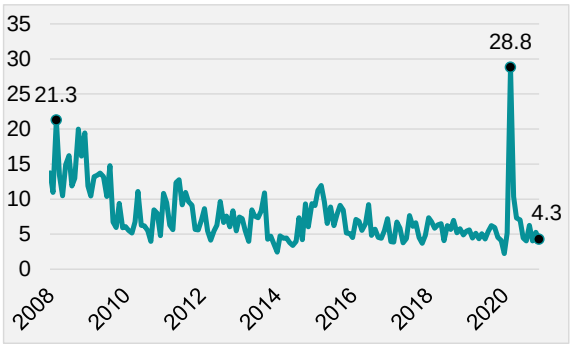
[3] For more information on direct investments, see the section on "Activity vis-à-vis Abroad" in this report.

The standard deviation of the change in the shekel/dollar exchange rate increased sharply in March.

The standard deviation of the change in the shekel/dollar exchange rate, which represents the actual volatility of the exchange rate, increased sharply in view of the uncertainty in the markets, to a record high of 28.8 percent at the end of March—a rate that was even higher than the rate during the Global Financial Crisis of 2008.

Other than the sharp increase during the crisis, the actual standard deviation remained low, at 4.3 percent—an increase of 0.2 percentage points from the end of 2019.

Figure 4.6 Standard Deviation[4] of the Change in the Exchange Rate
Percent



SOURCE: Bank of Israel

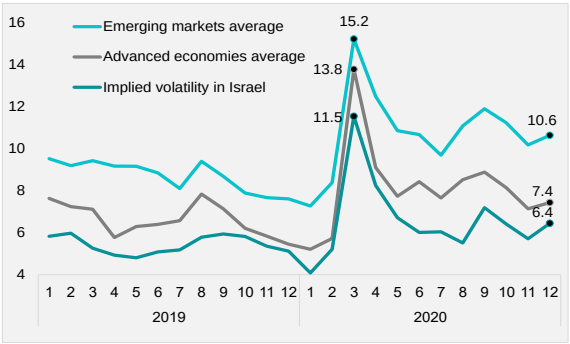
The implied volatility[5] of options on the shekel/dollar exchange rate increased in 2020, reflecting expectations of high volatility.

At the beginning of the global COVID-19 crisis, the implied volatility in the exchange rates of the emerging markets[6], the advanced economies[7], and Israel increased sharply, reaching record highs of 15.2 percent, 13.8 percent, and 11.5 percent, respectively, at the end of March.

The standard deviation of the shekel against the dollar fell back gradually later in the year, to 6.4 percent at the end of the year—an increase of about 1.3 percentage points from the end of 2019

The standard deviation of the advanced economies increased by 3 percentage points in 2020, to 10.6 percent, while the standard deviation of the emerging markets increased by 2 percentage points to 7.4 percent at the end of the year.

Figure 4.7: The Implied Volatility of Shekel/Dollar Exchange Rate Options, International Comparison
Percent



SOURCE: Based on Bloomberg

[4] Standard deviation in annual terms for the last 20 trading days.
[5] For an explanation of implied volatility in options, see Data Sources and Main Terms at the end of this section.
[6] The emerging markets included here are: Mexico, South Korea, Philippines, Poland, Chile, South Africa, Thailand, Hungary, Turkey, and Singapore.
[7] The advanced economies included here are: Australia, Canada, Japan, UK, Switzerland, and the Eurozone countries.

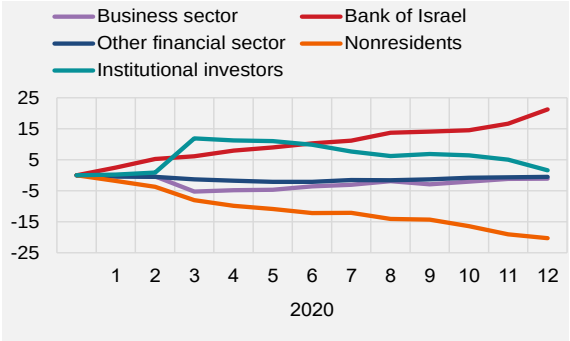
2. Foreign exchange activity of the main sectors[8]

Nonresidents increased their net foreign exchange sales, and the Bank of Israel increased its intervention in the foreign exchange market.

Nonresidents significantly increased their foreign exchange sales, which totaled about $20 billion in 2020. Half of those sales were by nonresidents from the financial sector, and half were by nonresidents from the business sector. Most of the nonresidents' sales ($8.5 billion) was concentrated in the first quarter of the year.

In contrast, the Bank of Israel increased its purchases in accordance with its policy, and purchased about $21 billion in 2020.

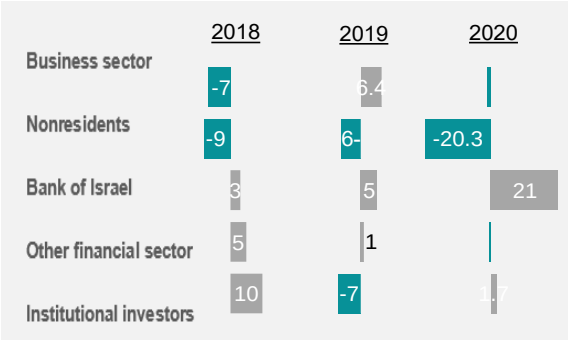
Figure 4.8a: Estimated Net Cumulative Foreign Exchange Purchases (+) of the Main Sectors
$ billions



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

Most investors changed their behavior at the beginning of the crisis. During March, institutional investors made significant net foreign exchange purchases totaling $11 billion. Beginning in April, they moved to foreign exchange sales totaling about $10 billion spread out over the rest of the year. For the year as a whole, the institutional investors made net purchases of foreign exchange totaling about $2 billion, compared with net sales in the previous year.

Figure 4.8b:



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

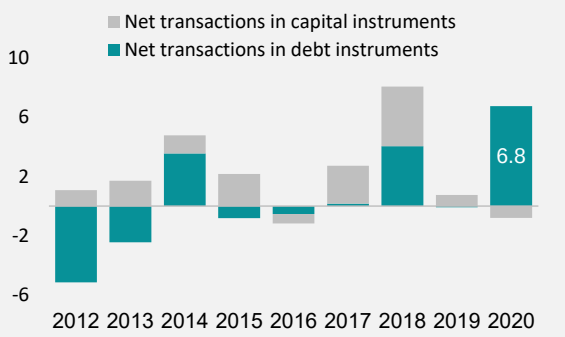
[8] For further details regarding definitions, terms, and explanations, see "Database on Shekel/Forex Market Activity" in Chapter 2 of the Statistical Bulletin for 2018.

2.1 NONRESIDENTS

As a result of these developments, the exposure to appreciation of the shekel in debt instruments[9] and in derivative instruments declined.

Nonresidents made a large volume of investments in debt instruments in 2020, totaling $6.8 billion, of which $5.9 billion was invested in government bonds and makam on the Tel Aviv Stock Exchange[10].
These developments came in view of the Bank of Israel's government bond purchasing program, Israel's accession to the FTSE World Government Bond Index (WGBI), and the widening of the shekel/dollar interest rate gap in swap transactions.
Despite the crisis and the uncertainty in the markets, nonresidents realized a relatively low volume of about $0.8 billion in capital instruments[11] on the Tel Aviv Stock Exchange.

Figure 4.9: Estimated Net Transactions in Shekel Assets by Nonresidents
$ billions



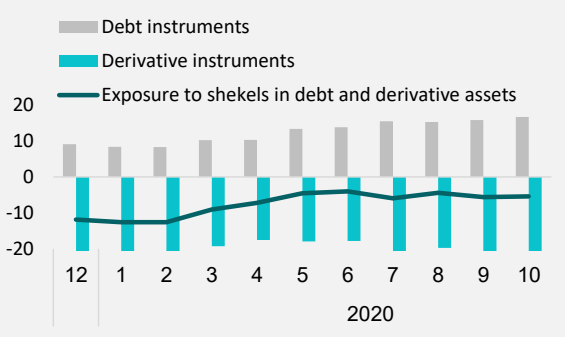
SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

As a result of these developments, the exposure to appreciation of the shekel in[12] debt instruments and in derivative instruments declined.

As a result of the purchase of government bonds and makam in 2010, nonresidents' exposure to appreciation of the shekel in debt instruments and in derivative instruments (short-term exposure), which is more influenced by changes in the interest rate and in the exchange rate, declined by $10 billion, to just $2.2 billion at the end of the year.

In parallel with the increase in the balance of shekel assets, nonresidents' future shekel liabilities in derivatives declined by about $2 billion to about $19 billion.

Figure 4.10: Nonresidents' exposure to shekels in debt instruments and in derivative instruments
$ billions



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

[9] Debt instruments: bonds, makam, deposits, and financial loans.

[10] See the section of the press release on nonresidents' investments on the Tel Aviv Stock Exchange during the COVID-19 crisis: https://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/14-12-20.aspx

[11] Capital instruments: direct investments and financial investments in equities.

[12] See explanation in Data Sources and Main Terms at the end of this section.

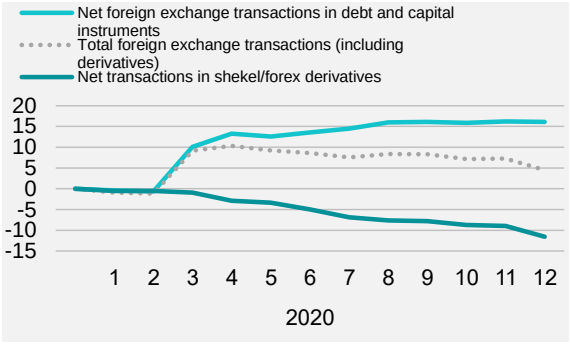
2.2 Institutional investors

The institutional investors purchased financial assets abroad in 2020, which were partly offset by the sale of foreign exchange through derivative instruments.

At the beginning of the COVID-19 crisis in March, the institutional investors significantly increased their exposure to foreign exchange by about $11 billion. In view of the high demand for US dollars, the Bank of Israel in March activated a liquidity tool in the markets and made swap transactions with the domestic banking system[13].

Over the course of the year, the institutional investors made net purchases of capital and debt assets in foreign exchange totaling about $16.1 billion (mainly through investments in equity abroad). In contrast, the institutional investors hedged about $11.6 billion through derivative instruments.

Figure 4.11: Net Cumulative Foreign Exchange Transactions by Institutional Investors
$ billions

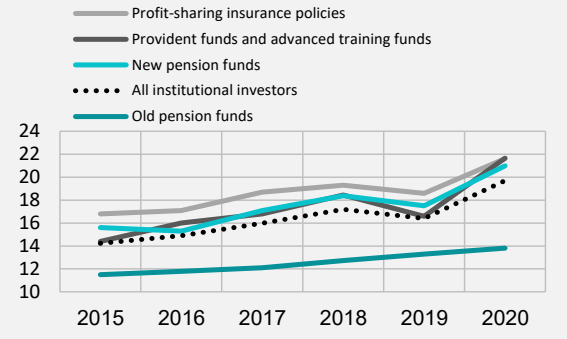


SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

The institutional investors' foreign exchange purchases increased their rate of exposure to foreign exchange (to appreciation of the shekel) by about 3 percentage points, to 19.7 percent. The provident funds and advanced training funds were particularly prominent in this regard.

The provident funds and advanced training funds significantly increased their rate of exposure to foreign exchange, by 5.1 percentage points, to 21.7 percent. The insurance companies and new pension funds increased their rate of exposure to foreign exchange by about 3 percentage points each, to 21.6 percent and 21 percent respectively. The old pension funds increased their rate of exposure to foreign exchange, further to previous years, but continued to maintain a low exposure level of about 14 percent.

Figure 4.12: Institutional Investors' Rate of Exposure to Foreign Exchange
Percent



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

[13] https://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/18-3-2020.aspx

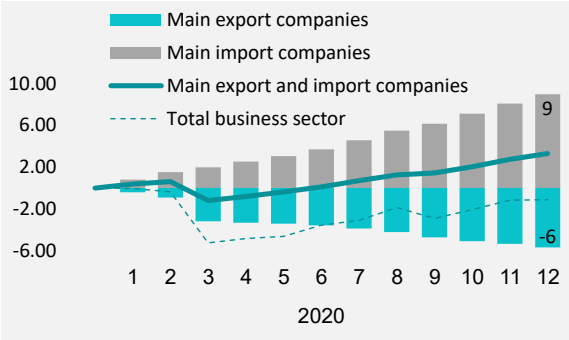
2.3 The business sector

The main import and export companies made net purchases of foreign exchange, as foreign exchange sales by exporters partly offset an increase in foreign exchange purchases by importers.

Net foreign exchange purchases by the main importers totaled about $9 billion in 2020, compared with $15 billion in the previous year. The main exporters significantly increased their foreign exchange sales in March in view of the weakening of the shekel in that month. Net foreign exchange sales by exporters totaled about $6 billion in 2020, compared with $7.5 billion in the previous year.

The business sector as a whole, including both importers and exporters, made net sales of foreign exchange totaling about $1 billion in 2020.

Figure 4.13 :Net Cumulative Foreign Exchange Purchases by the Main Import and Export Companies mport and Export Companies[14]
$ billion



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

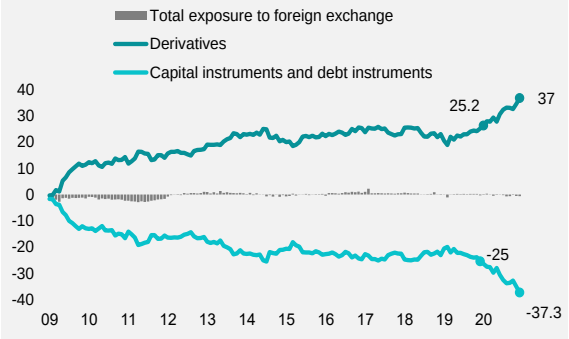
2.4 The banking system[15]

The balance of the banking system's liabilities in capital and debt instruments increased sharply, while in contrast, the balance of assets in derivative instruments also increased. Exposure to foreign exchange remained near-zero.

The banks' surplus of liabilities in capital instruments and debt instruments in foreign exchange increased by about $12 billion to a record high of $37.3 billion, mainly due to the increase in the public's foreign exchange deposits since the beginning of the year.

In parallel, the banking system's balance of assets in foreign exchange derivatives increased by about $12 billion, to a record high of $37 billion at the end of 2020.

Figure 4.14 : Net Balance of the Banking System's Foreign Exchange Assets and Total Exposure to Foreign Exchange
$ billion



SOURCE: Based on reports to the Bank of Israel from financial institutions and corporate firms

[14] Including the largest roughly 200 import and export companies in the economy.

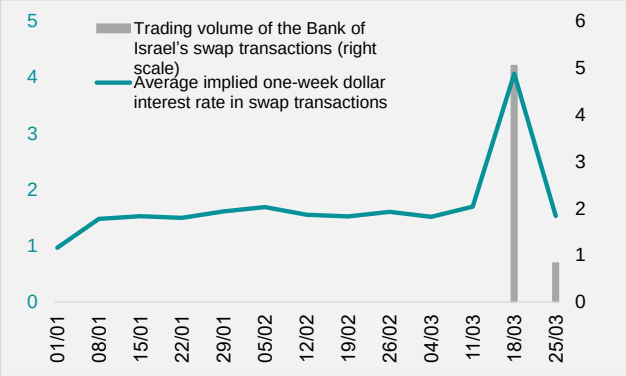
[15] The domestic banking corporations.

ZOOM-IN

THE COVID-19 CRISIS

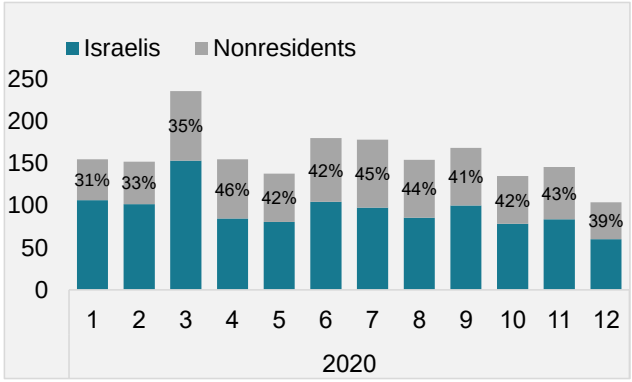
The Bank of Israel made swap transactions for the first time in March, in view of the dollar liquidity difficulties in the domestic market.

Figure 4.15: The Average Implied One-Week Dollar Interest Rate in Swap Transactions, and the Volume of the Bank of Israel's Swlap Transactions
Percent, $ billion



Nonresidents' share of trading volume increased during 2020, to 39 percent at the end of the year.

Figure 4.16: Foreign Exchange Trading Volume Vis-à-vis the Domestic Banking System, billion $



The increase in nonresidents' share of trading volume was reflected in an increase in swap and conversion transactions by nonresidents vis-à-vis the main sectors

Figure 4.17: Trading Volume in Conversions by the Main Sectors Vis-à-vis the Domestic Banking System
$ billion

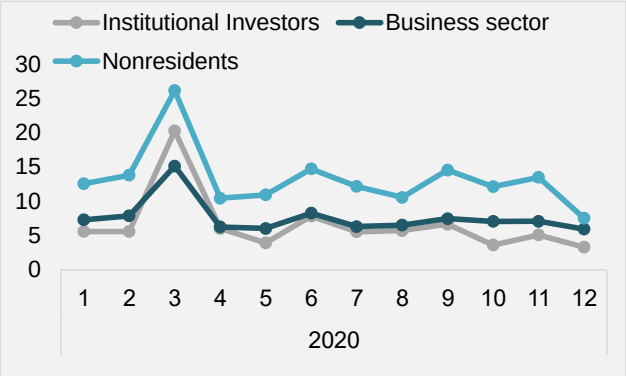
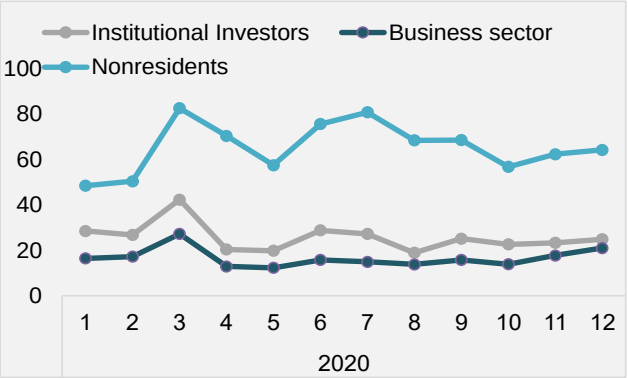


Figure 4.18: Trading Volume in Swaps by the Main Sectors Vis-à-vis the Domestic Banking System
$ billion



SOURCE: Based on Central Bureau of Statistics and BIS.

Main indicators in the foreign exchange market

	Level				Change			
	2017	2018	2019	2020	2017	2018	2019	2020
Actual volatility of the shekel/dollar exchange rate (moving 20-day average)	4.8%	4.9%	4.1%	4.3%	-2.4	0.1	-0.8	0.2
Implied volatility of shekel/forex OTC options	5.7%	5.5%	5.4%	6.4%	-0.4	-0.3	-0.1	1.0
Shekel/dollar representative exchange rate	3.47	3.75	3.46	3.22	-9.8%	8.1%	-7.8%	-6.9%
Shekel/euro exchange rate	4.15	4.29	3.88	3.94	2.7%	3.3%	-9.6%	1.5%
Dollar/euro exchange rate	1.20	1.15	1.12	1.22	14.0%	-4.7%	-1.9%	-8.8%
Yen/dollar exchange rate	112.55	109.87	108.52	103.08	-3.8%	-2.4%	-1.2%	-5.01%
Nominal effective exchange rate (January 1, 2010 = 100)	85.16	87.77	80.63	76.50	-4.3%	3.1%	-8.1%	-5.1%
Average daily trading volume - conversions, swaps and OTC options ($ million)	6,202	6,997	6,695	7,846	3.53%	12.81%	-4.31%	17.19%
Nonresidents' share of trading volume	31.2%	32.8%	34.4%	39.0%	3.5	1.6	1.6	4.6
Nonresidents' exposure to the exchange rate ($ billion)	29.0	18.0	26.0	35.0				
Institutional investors' exposure to the exchange rate ($ billion)	69.4	71.0	86.0	120.0				
The banking system's exposure to the exchange rate ($ billion)	0.4	-0.2	-0.3	-0.7				
Net foreign exchange purchases by institutional investors ($ billion)					-2.3	10.2	-7.0	-2.0
Net foreign exchange purchases by main exporters ($ billion)					-9.2	-11.6	-4.6	-6.0
Net foreign exchange purchases by main importers ($ billion)					13.1	13.8	10.6	9.0

SOURCE : Bank of Israel

DATA SOURCES AND MAIN TERMS

Exposure to the exchange rate and derivatives

The Bank of Israel Information and Statistics Department manages a database of activity in the foreign exchange market. The Department gathers data and information on a daily basis from financial intermediaries in Israel and abroad regarding shekel-forex transactions, and processes them into a detailed a high-quality dataset that provides a broad picture of the foreign exchange market. The data are received from domestic banking corporations, domestic financial institutions, and foreign banks. In addition, this section makes use of reports by the institutional investors to the Ministry of Finance and the Bank of Israel, reports from the banking system to the Banking Supervision Department, and reports from banks and other financial intermediaries to the Bank of Israel regarding nonresidents' holdings of Israeli financial assets.

Exposure to the exchange rate (or exposure to foreign exchange)

Exposure to the exchange rate is the monetary amount at risk in a case of changes in the shekel exchange rate vis-à-vis foreign currencies. In terms of Israelis and the various sectors in the Israeli economy, this amount is estimated in this chapter by the surplus of their foreign exchange assets over foreign exchange liabilities (denominated in and indexed to foreign exchange). In terms of nonresidents, this amount is estimated by calculating the surplus of their shekel assets over shekel liabilities. An Israeli is exposed to appreciation of the shekel when he holds a surplus of foreign exchange assets (positive), and is exposed to a depreciation of the shekel when he holds surplus foreign exchange liabilities (negative asset surplus). Nonresidents' exposure works in the opposite direction.

- Foreign exchange assets include: **balance-sheet assets** such as cash and deposits in foreign currency and foreign currency government and corporate bonds (generally foreign), and **off-balance-sheet assets**, meaning the open balance in transactions in derivative financial instruments (hereinafter: DFIs) for the purchase of foreign exchange against shekels, such as forward transactions and options (tradable and nontradable). Similarly, foreign exchange liabilities include: **balance-sheet liabilities** such as foreign exchange loans, and **off-balance-sheet liabilities**, meaning the open balance in DFI transactions for the sale of foreign exchange against shekels. Nonresidents' assets and liabilities in shekels are defined similarly.

- Many Israelis, led by institutional investors, hold foreign assets as part of an investment policy of diversification of their asset portfolio and its risks. Such holdings, of foreign assets only, expose them to appreciation of the shekel. In order to minimize this exposure, they sell foreign exchange in DFI transactions (referred to as **"hedging"**). Exporters and importers are exposed to changes in the exchange rate due to their commercial activity—in opposite directions—and protect themselves through DFI transactions. Other Israelis, such as financial companies, may manage exposure to the shekel exchange rate with the intention of profiting from changes in the rate, by purchasing and selling foreign exchange against shekels in the present (spot) and in the future through DFI transactions. The nonresidents sector is comprised of various companies and individuals with activity in shekels and a similar variety of motives.

- **Implied volatility in foreign exchange options** represents the expected volatility in the exchange rate. Assuming that the options market is efficient and that actors in the market price the options based on the Black-Scholes model, the implied volatility should include all the relevant information regarding future volatility of the exchange rate. It therefore serves as a market estimate of exchange rate volatility during the period remaining until the options expire.

The nominal effective exchange rate

An index that reflects the relative price of the shekel vis-à-vis a basket of currencies. The weight of each currency in the index reflects its importance in Israel's foreign trade. The index is calculated as the geometric average of the shekel's exchange rate against 26 currencies representing the 33 countries that are Israel's major trading partners.